# USER AND MAINTENANCE MANUAL FOR ATEX CENTRIFUGAL AND AXIAL FANS

***Attention: Operators are required to read the manual and strictly follow the instructions provided. The Manufacturer is not liable for any damage to persons and/or property or to the product itself if the conditions described below are not met.***

***This document has been prepared in reference to the UNI EN 14986:2024 standard concerning equipment and protective systems intended for use in explosive atmospheres.***

*The C.G.N. fans subject to this document, which bear the marking* ***2G Ex h –IIB T1...T4 Gb****, are suitable for installation within* ***zones classified as 1 and 2 due to the presence of flammable gases (EN 60079-10-1: 2016)****. Those bearing the marking* ***2D Ex h – IIIB T450°C...T135°C Db*** *are suitable for installation within* ***zones classified as 21 and 22 due to the presence of combustible dusts (EN 60079-10-2: 2016).***

***The fans are not suitable for installation within zones classified as 0 and 20 according to the aforementioned standards.***

***The manual is an integral part of the product and must always be available to users.***
***The manual must always accompany the product, even in case of transfer to another user.***
***The user or their representative is responsible for assessing the type of zone under their own responsibility.***

# Table of Contents

# 1. INTRODUCTION

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***Fans compliant with the ATEX directive differ from standard fans as they are constructed with particular precautions to make them suitable for use in potentially explosive environments.*** *The Manufacturer disclaims all liability for any damages of any kind that may result from improper or careless operations****. It is strictly forbidden, as well as dangerous, to use the product for purposes other than those provided within the scope of its use.***

*In addition to the special construction features of the fan, special surveillance and maintenance activities are required, which are fundamental for maintaining the safety requirements of the fan over time and its suitability for use in the potentially explosive environment in which it is installed. This manual contains special prescriptions for this purpose. It is therefore necessary to strictly adhere to what is indicated in this manual, in addition to what is already required in the standard basic use and maintenance manual, relating to your model. In case of different instructions on the same activities covered in both manuals,* ***the instructions in this manual will take precedence.***

*The Manufacturer assumes no responsibility for damages and operational failures resulting from non-compliance with the prescriptions of this document and what is reported on the fan nameplates.*

*Personnel working in potentially explosive environments for installation, commissioning, maintenance, and decommissioning activities must operate according to current regulations related to potentially explosive atmospheres.*

# 2. GENERAL INFORMATION

## 2.1 ATEX Regulations

ATEX directives (ATmosphères EXplosibles) regulate equipment intended for use in explosive risk environments. ATEX centrifugal fans must meet the following standards: **ATEX Directive 2014/34/EU, EN 14986, EN 13463-1, EN 1127-1** and, when applicable, standards **EN 13463-5** and **EN 13463-6.**

## 2.2 Installation and Use Conditions

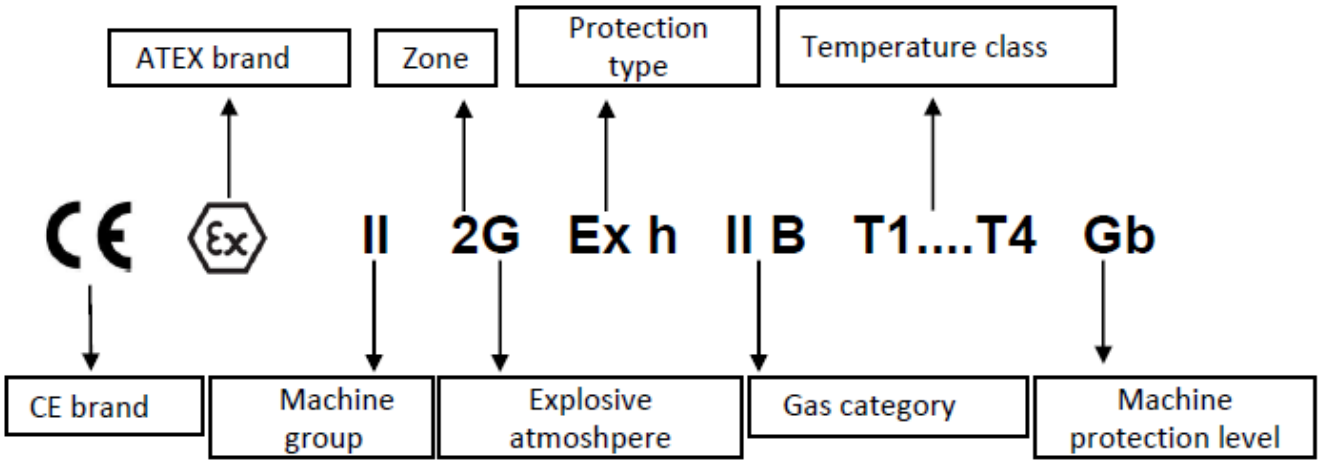
The operational conditions of the fan, unless otherwise indicated, are:

- Ambient temperature ranging from -20 °C to +40 °C
- Absolute pressure ranging from 0.8 bar to 1.1 bar
- Maximum volumetric fraction of 21% oxygen content
- Maximum thermodynamic energy increase of 25 kJ/kg (equivalent to 30 kPa at an inlet density of 1.2 kg/m³)

Unless otherwise indicated, it is not possible to transport fluids with the following characteristics inside the fan:

- For dust: abrasive fluids
- For gas: potentially explosive fluids other than categories IIA and IIB
- Fluids with suction temperature greater than 60 °C

## 2.3 Reading the ATEX String



## 2.4 Hazardous Zone Classification

Hazardous areas are places where explosive atmospheres can develop under certain conditions. Depending on the duration of the potential explosive atmosphere and the relative type of atmosphere, the risk zones are defined and shared with the Customer; they may differ between the inside and outside of the fan. ATEX fans can only be used in the risk zone defined between the Manufacturer and the Customer. Below is the classification of zones:

| HAZARDOUS ZONE | DESCRIPTION | FAN CATEGORY | FAN TYPE |
|---|---|---|---|
| **0** | Presence of potentially explosive gases/vapors/mists. Areas where an **explosive atmosphere is always present or present for long periods**. | **1G** | Fan that ensures explosion-proof safety even in the event of rare malfunctions. **NOT AVAILABLE.** |
| **20** | Presence of potentially explosive dust. Areas where an **explosive atmosphere is always present or present for long periods**. | **1D** | Fan that ensures explosion-proof safety even in the event of rare malfunctions. **NOT AVAILABLE.** |
| **1** | Presence of potentially explosive gases/vapors/mists. Areas where **an explosive atmosphere is likely to occur under normal conditions** | **2G** | Fan that ensures explosion-proof safety even in the event of foreseeable malfunctions. |
| **21** | Presence of potentially explosive dust. Areas where an **explosive atmosphere is likely to occur under normal conditions.** | **2D** | Fan that ensures explosion-proof safety even in the event of foreseeable malfunctions. |
| **2** | Presence of potentially explosive gases/vapors/mists. Areas where an **explosive atmosphere is possible only rarely and for a short period.** | **3G** | Fan to ensure anti-explosion safety under normal operating condition |
| **22** | Presence of potentially explosive dust. Areas where an **explosive atmosphere is possible only rarely and for a short period**. | **3D** | Fan to ensure anti-explosion safety under normal operating condition |

**ATTENTION: In case of any modifications to the fan, its accessories, or the installation location, the user is obliged to carry out a new risk assessment.**

## 2.5 Temperature Classes for Gas Atmospheres

Equipment is classified according to their maximum surface temperature in 6 temperature classes. The maximum surface temperature is the highest temperature reached during operation, under nominal conditions, at any point on the surface of the electrical equipment.

| TEMPERATURE CLASS | MAX SURFACE TEMPERATURE (°C) |
|---|---|
| T1 | 450 |
| T2 | 300 |
| T3 | 200 |
| T4 | 135 |
| T5 | 100 |
| T6 | 85 |

# 3. SAFETY WARNINGS

## 3.1 General

- Safety guards such as nets and barriers, together with anything that serves as protection of dangerous parts such as ducts, shelters, components and parts of machines or installations, must not be removed except for absolute necessity of ordinary or extraordinary maintenance work. If guards are removed, all appropriate safety measures must be taken to highlight any possible danger. The reinstatement of the removed guards must take place immediately as soon as the reasons for the temporary removal come to an end.
- All ordinary and extraordinary maintenance work must be carried out with the fan stopped and the power supply disconnected. Put appropriate precautions in place to avoid the danger of accidental insertion.
- It is not permitted to operate the fan at a temperature and speed higher than those defined and in any case for directly coupled at a maximum speed higher than the rated speed of the motor (unless otherwise specified).
- Before connecting the power supply cable to the motor terminal board, check that the line voltage and frequency conforms to that shown on the motor nameplate, or in its absence, on the product nameplate.
- Always be extremely careful and especially observe the indications placed on the signs and labels placed on the fan. If they become illegible over time or accidentally become detached, replace them immediately.

## 3.2 Residual risks

***Risks due to hot surfaces***

***Risks due to open flames or hot gases***

In some industrial processes, flames associated with combustion reactions may be present. The combustion process also produces hot gases as reaction substances which, when propagated, can induce high temperatures towards places where dangerous substances are present and trigger the explosive atmosphere present, if their temperature exceeds the typical ignition temperature of the substance.

***Risks due to mechanical friction***

During normal operation, due to a misalignment of the moving part caused by a fault or deterioration of the blade supports, it is possible that contact may occur between the fixed part and the moving part inside the equipment. If the two surfaces are made of oxidizable substances, such as iron and steel, during the rubbing, particles may separate which could heat up due to the energy used.
These particles (sparks) could ignite any explosive atmosphere present inside the equipment.

***Electrical risks***

Inside classified areas, all electrical equipment must be constructed so as not to trigger any explosive atmospheres present in the environment.
For this reason, traditional electrical equipment cannot be used in hazardous areas, but only equipment constructed so that during normal operation or during a fault it does not produce sparks, overheating or anything else that could ignite the surrounding mixture.

***Risks due to potential differences or stray currents***

All the parts making up the equipment, if they are not all at the same potential, can generate electrical currents within them.
In certain conditions, these currents can give rise to a corrosion process or generate sparks when different metal parts come into contact.

***Risks due to electrostatic charges***

There must be no surfaces capable of accumulating electrostatic charges inside classified areas. Particular attention must be paid to surfaces made of plastic material such as panels or plexiglass with a surface area greater than 0.5 m2. Any insulating surface greater than 0.5 m2 must be connected to earth by overlapping a metal mesh or copper strips. In place of insulating surfaces, it is possible in some cases to use antistatic materials, i.e. materials with a surface resistance between 106 and 108 Ω.

***Ignition Due to Lightning***

Discharges of significant intensity caused by atmospheric phenomena can generate considerable electric currents in structures near the point of impact.

***Ignition Due to Radio Frequency Electromagnetic Waves***

The emission of radio frequency electromagnetic waves from transmitters or radio frequency generators can induce electric currents in metal parts affected by the electromagnetic field. The generated currents could, in turn, cause the heating of surfaces or potential differences that may result in sparks.

***Ignition Due to Electromagnetic Waves from $3x10^{11}$ to $3x10^{15}$ Hz***

Radiation in this spectral range (sunlight, laser beams) can become an ignition source through the absorption of energy by explosive atmospheres or solid surfaces. Concentrated light beams (e.g., laser beams or sunlight deflected and focused by reflective surfaces) can cause high temperatures and, consequently, dangerous situations.

***Ignition Due to Ionizing Radiation***

Ionizing radiation, generated by X-ray tubes and radioactive substances, can ignite explosive atmospheres due to energy absorption, especially in explosive atmospheres generated by the presence of dust. The radiating surface may also heat up to the point of exceeding the minimum ignition temperature of the hazardous substance.

***Ignition Due to Ultrasound***

The use of ultrasonic waves can transmit a large amount of energy, which is absorbed by solid or liquid substances present. The substances subjected to ultrasound can heat up to the point of reaching the ignition temperature of any hazardous substances present.

***Ignition Due to Adiabatic Compression and Shock Waves***

During the compression phase of a gas at room temperature, a sudden pressure change can cause a significant temperature increase in the gas, sufficient to ignite a possible explosive mixture. Shock waves can be generated, for example, by the sudden release of high-pressure gas from ducts or other containment systems. In this case, the gas propagates into the surrounding environment at a speed greater than that of sound, and in areas where the shock waves are refracted, an increase in pressure and, consequently, in temperature occurs, which may reach values above the ignition temperature of the gas itself.

***Ignition Due to Exothermic Reactions, Including Dust Ignition***

Exothermic reactions are typical of substances being processed. When the heat generated by the reaction exceeds the rate of heat dissipation, the heat developed by the reaction can become an ignition source for the substance itself. The fact that the reaction can reach a high temperature may depend, among other parameters, on the ratio between volume and surface area of the reactive system, ambient temperature, and residence time. These temperatures can induce the ignition of explosive atmospheres present, as well as flame-free ignition or combustion.

***Ignition Due to Improper Operations***

In addition to equipment and its operation, an explosion can also be caused by improper behavior by the personnel involved or by those who happen to be near hazardous areas. To prevent possible ignitions due to improper operations, the following rules must be followed:

-Never place hands or other body parts near moving parts.
-Do not place hands or other body parts beyond the guards (protections).
-Do not remove, eliminate, or modify the guards (protections).
-Do not remove, eliminate, or modify any control devices.
-Do not use the fan in hazardous areas other than those specified.
-Unauthorized personnel are prohibited from performing any interventions on the fan.
-Restore protective systems before restarting the fan after interventions that required their removal.
-Keep all protective systems in perfect working order.
-Maintain all safety and indication plates on the fan in good condition.
-Personnel performing any kind of intervention on the fan must be equipped with the necessary personal protective equipment.
-Do not wear bulky clothing.

**It is strictly forbidden to:**

***-Operate on the fan under service conditions.***
***-Remove guards under service conditions.***
***-Operate on the fan without disconnecting the power.***

***Use of Frequency Converters (Inverters)***

When using frequency converters, it is necessary to follow the Manufacturer's recommendations to avoid electromagnetic interference, and where necessary, use appropriate devices to reduce disturbances.

***Gas Leaks from Ducting***

The ducting to which the fans are connected must ensure adequate sealing against possible gas leaks from the inside to the outside of the ducting and vice versa unless it has been previously specified and declared that the fan operates without ducting and with the same risk category between the internal and external zones of the fan.

***Ungrounded Parts of the Ducting or System***

In addition to verifying the grounding of the fan, it is advisable to ensure that the ducting to which the fan is connected, or other metal parts, are also appropriately grounded. Where necessary, consider using an additional grounding cable between the ducting and the fan.

***Fans with Open Intake***

For fans with open intake, despite the protective grille, due to the high strength of the incoming airflow, it is necessary to avoid the passage of people and objects near the intake opening. It is advisable to make the area in front of the fan inaccessible.

# 4. TRANSPORT AND INSTALLATION

## 4.1. Transport

The fan must not be lifted by the shaft, motor, or impeller.

The transport position of the device or individual components must be respected as defined by the manufacturer.

Stacking goods during transport or applying loads not specified by the Manufacturer is prohibited.

For lifting, only the designated attachment points must be used.

Use only lifting systems suitable for the weight and dimensions of the fan.

Use lifting straps of appropriate length and quantity and attach them to the proper slots on the fan structures. If necessary, use the motor's lifting eye bolts to balance the load due to the motor's considerable weight.

It is strictly forbidden to lift the entire fan using only the motor’s attachment points.

## 4.2. Storage

The fan must be stored in a cool, dry place. It is necessary to avoid leaving the impeller stationary for long periods, whether during warehouse storage or the time taken to complete the installation in which the fan will be integrated. During these periods, the fan should be periodically checked by manually rotating it to prevent damage to the bearings.

## 4.3. Installation

**IT IS STRICTLY FORBIDDEN TO START THE FAN WITHOUT FIRST EXAMINING THE MACHINE'S PROPER INTEGRITY.**

**Before starting any installation operation, ensure that the machine is secure.**

The fan must be installed with sufficient surrounding space to allow for normal assembly or disassembly, cleaning, and maintenance operations.

The product installation must be carried out with a clear understanding of the installation's purpose and the operational challenges related to the fans, auxiliary equipment, location, and ducting where it will be installed. In potentially explosive (ATEX) environments, it is essential to consider that installation, commissioning, maintenance, and decommissioning operations require special precautions to avoid the accidental production of sparks, flames, or hot surfaces.

Do not use tools that generate sparks, such as those caused by cutting, grinding, or welding operations. If the use of potentially explosive equipment is unavoidable, ensure in advance that the area is cleared of potentially flammable substances. Personnel involved in all stages of the fan's life cycle and/or equipment must be aware of the risks of operating in potentially explosive atmospheres. They must have read and understood the information in this manual beforehand and must operate according to the current regulations related to zones with potentially explosive atmospheres.

### 4.3.1 Preliminary Checks

-Ensure that the machine is disconnected from all electrical power sources.
-Verify that all moving parts are completely stationary.
-Wait until the internal and external temperature of the machine has reached a safe level to touch.
-Properly illuminate the area surrounding the machine (if necessary, provide operators with electric lamps).
-Wait until any flammable or combustible mixture inside the machine has fully settled.
-Mechanically lock all moving parts.
-Below are the main checks to be performed:

-Check the distance between the impeller and the nozzle.
-Check for vibrations.
-Check the temperature of the bearings.
-Measure the rotation speed.
-Measure the grounding resistance.

*Before commissioning, ensure that the fan's construction class is suitable for the environment in which it will be used (both internal and external classes).*

### 4.3.2 Checks with the Fan Stopped

-Verify the tightness of all bolts, with particular attention to the locking screws of the impeller on the shaft, the motor, and the supports.

-By manually rotating the impeller very slowly, check that there is no interference between the impeller and the nozzle.

-Inspect the fan both externally and internally to verify its integrity and ensure there are no foreign objects, dirt, anomalies, etc.

-Check the position of any dampers or flow regulators: open for axial fans, closed for centrifugal fans (during startup, this operation prevents dangerous overloads on the motor).

-Verify the integrity of the seals, both near the motor shaft passage and on the ducts adjacent to the fan.

-Ensure proper lubrication of the rotating parts.

-Where applicable, connect the temperature monitoring devices, vibration sensors, and rotation speed control devices according to the instructions in this manual and the relevant technical documentation, and correctly set the control thresholds.

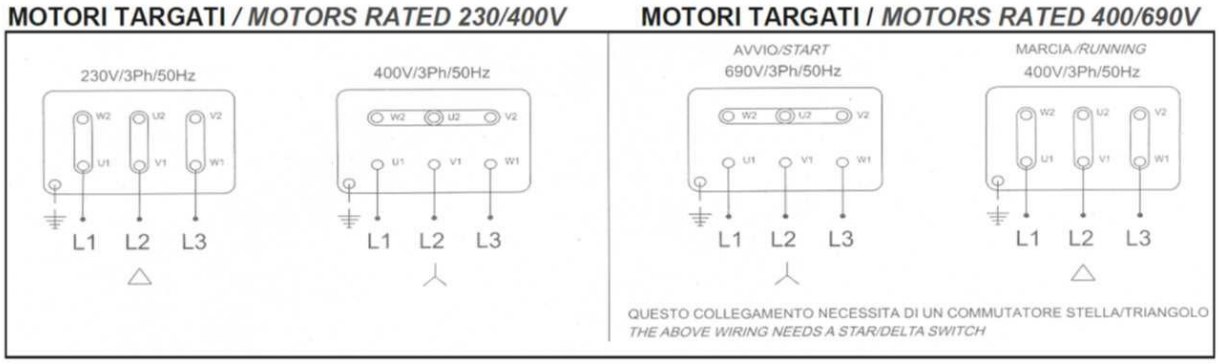
-Ensure that all grounding connections for the fan and its accessories are properly connected. Once this operation is completed, measure the grounding resistance.

## 4. Electrical Connection

**THE ELECTRICAL CONNECTION MUST BE CARRIED OUT BY QUALIFIED PERSONNEL.** ALWAYS CONSULT THE ELECTRIC MOTOR'S OPERATION AND MAINTENANCE MANUAL.

The control panel and the electrical system must comply with the regulations in force regarding the environment where the fan is to be installed. Both the control panel and the electrical system must be designed in accordance with the CEI EN 60204-1 standard. The fan casing and base must be electrically connected to the grounding system using a conductor of appropriate size. All equipotential connections and grounding conductors must be connected to the same grounding system. The motor should not be installed in an area with obstructed ventilation to prevent the temperature from exceeding the specified limits.

Below is a diagram showing the most common motor connections:




**IF IN DOUBT, DO NOT PROCEED AND CONTACT THE ELECTRIC MOTOR MANUFACTURER.**

# 5. FIRST STARTUP

## 5.1 Checks with the engine running

### 5.1.2 Checks to be made when starting the fan

During initial start-up, it is necessary to:

- Make a thorough visual inspection of the fan + motor system + any accessories.

- Check that the direction and speed of rotation of the impeller are as indicated (indications on the motor and/or product nameplate). In case the direction of rotation needs to be changed, after disconnecting the power supply and securing the fan, proceed in the following ways:
(a) in the case of three-phase motor, simply reverse two electrical phases between them.
(b) in the case of single-phase motor, follow the connection diagram shown.

- Check that the absorbed current does not exceed the current indicated on the motor nameplate. To get a reliable figure consider a reasonable stabilization time. In the star/delta connection the reading should be taken upstream of the commutator; if this is not possible, take the phase current on any of the six leads at the terminal block and multiply this value by 1.73. Avoid consecutive motor starts; this results in continuous overloads that overheat electrical parts. Allow sufficient cooling before restarting.

- Check, by thermometer, that the temperature of the bearings is regular; a momentary increase in temperature followed by subsequent decrease is considered normal. The temperature at steady state must not be higher than that of the motor class.

**IN CASE ABNORMAL VALUES ARE FOUND, STOP THE MACHINE AND CONTACT THE MANUFACTURER.**

### 5.1.3 Checks to be carried out a few hours after starting the fan

- Make a thorough visual inspection of the fan + motor system + any accessories

- Check that vibrations have not loosened the tightening of all hardware or changed the tension of the belts. Repeat tightening if necessary.

- Check that the distance between the impeller and the case is as indicated in chapter 6.3.4 “Checking minimum safety distances” avoiding any possible contact between the parts. If it is necessary to reset the clearance, contact the Manufacturer for instructions and/or assistance.

**IN CASE ABNORMAL VALUES ARE FOUND, STOP THE MACHINE AND CONTACT THE MANUFACTURER.**

# 6. MAINTENANCE

**Before starting maintenance operations, ensure that the fan is stopped and emptied and the machine is made safe.**

The fan needs cleaning and maintenance at regular intervals suitable to preserve its efficiency and prevent damage that would compromise its integrity and the safety of people.

## 6.1 Stopping and emptying

During downtime, it is possible that a zone classified higher than that for which the machine was designed may be generated inside the fan itself or in the connected systems.

In case of a planned shutdown, it is necessary to provide for the use of sectioning valves, so as to avoid a saturation inside the fan, and subsequently flush with a suitable amount of nonexplosive mixture before restarting. On the other hand, in case the fan shutdown is accidental and unplanned, appropriate external systems must be provided to empty the fan or to flush with nonexplosive mixture before restarting.

- In the event of saturation of the fan's indoor environment, do not open to disperse the potentially explosive atmosphere to the outdoors, there may be neighboring equipment or the fan itself if rated for a different zone in the outdoors, unsuitable for operation in such an environment.
- When transporting fluids at high temperatures, care must be taken to refrigerate the fan or mix its contents with cold air before performing any operation: the operator could burn himself by touching parts of the fan or coming into contact with the fluid left inside;
- In case of transporting chemical agents that may settle on the bottom, drain plugs should be provided under the fan and the fan should be emptied before opening it.

## 6.2 Cleaning

**Before starting cleaning operations, ensure that the fan is stopped and the machine is made safe**

In removing any dust that may be present in the machine, take care not to disperse it into the surrounding environment.

Use only cleaning products and machinery of a type suitable for the environment

Before starting up, make sure that no metal foreign bodies are left inside the fan housing.

After the cleaning operations have been completed, restart the fan by carrying out the same checks reported for the first start-up.

It is necessary to check with particular care that after restarting, the vibrations generated by the fan have not increased: if cleaning has not been thorough, it may have generated imbalances that affect the balance of the impeller. If this is the case, the cleaning operation should be repeated more rigorously.

## 6.3 Routine maintenance

In order to maintain proper operation of the fan in a potentially explosive atmosphere, the following activities must be carried out in addition to what is already indicated in the standard basic operation and maintenance manual.
The inspection frequencies may be intensified at the discretion of the user/customer in case of special requirements or suspected anomalies.
Below is a summary outline regarding the required maintenance activities.

| ATTIVITA' | CADENZA | NOTE |
|---|---|---|
| GENERAL CHECK OF THE FAN STATUS | DAILY | |
| CONTROL OF MINIMUM DISTANCES | 150 HOURS | Minimum distances between a fixed part and a moving part, both radially and axially, should always be greater than 1% of the impeller diameter and in any case never less than 2 mm and never more than 20 mm |
| CLEANING | TO BE DEFINED | Cleaning intervals are closely related to the type of fluid being transported and its concentration, so it is necessary for the end user to determine a cleaning cadence such that the impeller is always perfectly clean (accumulations of materials on the rotating parts cause imbalance) and that no accumulations of material layered more than 1 mm thick are created on the stationary parts. |
| CHECKING THE TIGHTENING OF THE HARDWARE | 150 HOURS | |
| CHECKING THE CONDITION OF SEALS AND GASKETS | 150 HOURS | |
| VIBROMETRIC CONTROL | MANUAL: 150 HOURS SENSORS: CONTINUOUS | For directly coupled fans, the vibrometric check must be carried out by instrumentation every 150 hours maximum; for deflection fans, it must be carried out by sensor or as an exception by instrumentation every 100 hours maximum and at every start-up.<br>In the case of stainless steel fans, a sensor connected to an electrical release device is required. |
| THERMAL CONTROL | MANUAL: 100 HOURS SENSORS: CONTINUOUS | It is necessary to monitor the temperatures developing inside and at the outlet of the fan, when these frequently reach 40°C it is necessary to provide a system of thermal probes connected to an electrical release device, otherwise periodic monitoring as per the table above is sufficient.<br>Please note that the temperature range provided by the standard is -20/+60°C with a maximum discretion of 10%.<br>In hot gas version fans, it is mandatory to provide for the presence of a sensor. |
| LUBRICATION | | |
| BEARING REPLACEMENT | 40000 HOURS | |
| BELT TENSIONING | 300 HOURS | The first belt tensioning should be done after 20 hours of operation. |

### 6.3.1 Lubrication

In all cases where lubrication is required, instructions including recommended lubricant and intervals for checking its condition will be delivered along with the final documentation.

### 6.3.2 Impeller cleaning

It is recommended to constantly check the state of cleanliness of the impeller. Possible layering of material on the impeller causes its unbalance with consequent damage to the transmission parts and/or the electric motor. During cleaning operations it is necessary to completely clean every part of the impeller, any residue in circumscribed spots can bring more unbalance than a uniform coating of dirt, so cleaning must be thorough.
In the specific case of impeller with curved blades, the transport of materials that become electrostatically charged or that contain glues or resins can cause a deposit in the back of the blades.
Deep cleaning is therefore recommended to make any residual dirt uniform and thus avoid the occurrence of imbalances. Should such cleaning become necessary too frequently, it is preferable to replace the impeller with one having an appropriate blade profile.

### 6.3.3 Transmission maintenance and belt tensioning

For all transmission fans, instructions on transmission maintenance and proper belt tensioning will be delivered along with the final documentation.

### 6.3.4 Control of minimum safety distances

At each maintenance operation, it is necessary to check that the minimum clearances between impeller and nozzle, back impeller and wall, seal and shaft have not changed.
To carry out the impeller/nozzle clearance check, proceed as below.

1) Stop the fan and disconnect it from any power source.
2) In case it is necessary, sanitize the surroundings of possible toxic substances.
3) Remove the guard on the fan inlet and/or any ductwork.
4) Check that the distance complies with the values below in "*Minimum safety distances between moving parts*"
5) Caution: if in doubt or if the distance does not comply, contact the Manufacturer
6) If the check is successful, reinstall the guard on the fan inlet and/or any ducting and restore proper operating conditions.

#### 6.3.4.1 Minimum safety distances between moving parts

The distance between rotating and stationary parts should be 1% of the value of the diameter of the possible contact and never less than 2 mm or not necessarily more than 20 mm. Seals are not subject to this rule.
Below is a summary mirror of the minimum distances.

| **DIAMETRO** | **DISTANZA MINIMA** |
|---|---|
| Inferiore a 200 mm | 2 mm |
| Tra 200 mm e 2000 mm | 1% del diametro di contatto |
| Superiore a 2000 mm | 20 mm |

### 6.3.5 Vibration control

If no sensors are provided for vibrometric readings, equip yourself with a vibrometer and check that the readings meet the maximum parameters identified in ISO 14694:2003 Cat.BV-3:

| **CONDIZIONE** | **VENTILATORE MONTATO IN MODO RIGIDO mm/s r.m.s.** | **VENTILATORE MONTATO IN MODO FLESSIBILE mm/s r.m.s.** |
|---|---|---|
| NORMALE FUNZIONAMENTO | 4.5 | 6.3 |
| ALLARME | 7.1 | 11.8 |
| SPEGNIMENTO IMMEDIATO | 9 | 12.5 |

If these parameters are not met, it is possible that the bearings are worn (maximum 40000 working hours) or the impeller is unbalanced. Stop the fan and contact the Manufacturer for assistance.

### 6.3.6 Checking the condition of the seal

It is necessary to check the condition of the seal at each scheduled maintenance and, if it is not in optimal condition, replace it.
If replacement is necessary, contact the Manufacturer for instructions.

## 6.4 Extraordinary maintenance

Depending on the various operating conditions of the fan, it is sometimes necessary to intervene with the following extraordinary maintenance activities.

### 6.4.1 Impeller maintenance

Necessary especially if the fan operates in the presence of dust or is used for pneumatic conveying. Check through the inspection door the condition of the impeller and, if removal is necessary, contact the Manufacturer for instructions.
**CAUTION: Any blows or falls, even if they do not cause cosmetic damage, may cause imbalance to the impeller. If this occurs, it will be necessary to rebalance the impeller by contacting the Manufacturer.**

### 6.4.2 Replacement of bearings or monoblock

Contact the manufacturer for assistance.

### 6.4.3 Electric motor replacement

In case it is necessary to replace the electric motor, do the following:

1.Secure the fan

2.Disconnect any electrical connections

3.Dismantle the fan parts necessary to pull the motor off the impeller

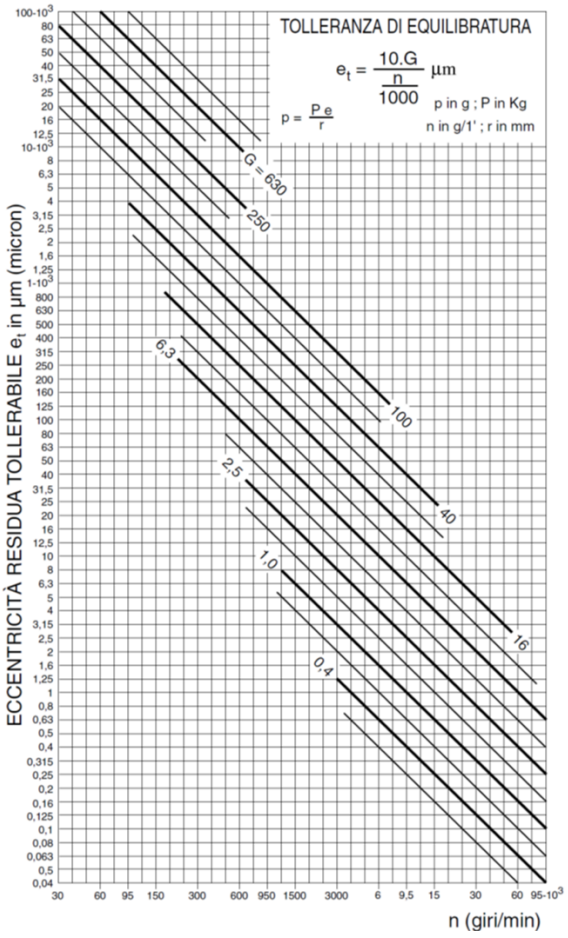
4.Install the new motor, making sure that the characteristics are the same as the one to be replaced

5.Center the impeller in case of direct executions or align transmissions and couplings for transmission or coupled executions

6.Proceed with the first start-up checks (Ch. 5).

## 7. IMPELLER BALANCING

All impellers manufactured by C.G.N undergo static and dynamic electronic balancing in accordance with ISO 21940-11, balancing grade 6.3.
The tolerable residual eccentricity values plotted below refer to the entire impeller and must be equally divided over both correction planes to have the correct dynamic tolerances.
From the residual eccentricity values, the value of the maximum allowable unbalance weight is easily traced with the formula given in the table below




## 8. VIBROMETRIC ANALYSIS

All fans manufactured by C.G.N. are subjected to a running test with vibration control in accordance with ISO 14694:2003.
This standard identifies the industrial fan as category BV-3 and requires that the fan not exceed 4.5 r.m.s. if rigidly mounted or 6.3 if flexibly mounted.
Measurements on the fan at the final installation site are not the responsibility of the manufacturer: the measured values are influenced by the flatness and strength of the bearing surface.

# 9. FAILURE ANALYSIS

**In case of malfunction and/or failure, always contact the Manufacturer.**

| PROBLEM ENCOUNTERED | POSSIBLE CAUSE | POSSIBLE REMEDY |
|---|---|---|
| **VIBRATIONS OUTSIDE THE PARAMETERS** | Imbalance of the impeller | Rebalance the impeller |
| | Bearing failure | Check the wear and lubrication condition of the bearings |
| | Unsuitable support structure | The frequency of the bearing is close to that corresponding to the fan's rotational speed. Alter the natural frequency of the bearing by adding weights |
| | Slack screw connections | Tighten the hardware |
| **EXCESSIVE NOISE** | High speed to achieve necessary performance | Use of soundproof boxes and/or silencers; choose a larger fan with the same performance or lower peripheral speed |
| | Vibration in the winding | Replace electric motor |
| | Eccentricity between rotor and stator | Check coaxiality |
| | Imbalance of the impeller | Rebalance the impeller |
| | Positioning in reverberant area | Move fan or use soundproof boxes |
| | Bearing failure | Check wear and lubrication condition of bearings |
| **STARTUP DIFFICULTY** | Excessive power consumption | Contact the manufacturer |
| | Reduced supply voltage | Check motor nameplate data |
| | Inadequate fuses to meet requirements | Replace fuses with suitable ones |
| | Insufficient starting torque in the motor | Provide replacement with a more powerful motor and/or contact the Manufacturer |
| | Inadequate evaluation of the moment of inertia | Recalculate the moment of inertia and, if necessary, replace the motor with a suitable one |
| **ABSORBED POWER HIGHER THAN INSTALLED POWER** | Rotational speed too high | Re-evaluate the plant design and/or contact the Manufacturer |
| | Air density different from fan design data | Re-evaluate the plant design and/or contact the Manufacturer |
| | Flow rate or pressure out of fan design range | Re-evaluate the plant design and/or contact the Manufacturer |
| **LACK OF FLOW RATE WITH POWER REDUCTION AT CONSONANT SPEED** | Clogged piping and/or clogged suction points | Clean piping and hoods, check position of dampers |
| | Insufficient rotation speed | Check supply voltage and check motor terminal connection. Check for correct gear ratio and verify that belts are not slipping |
| | Working pressure higher than the fan design pressure | Design error. Replace the motor and pulleys. Replace and/or adapt the circuit |
| | Clogged impeller | Clean the impeller from the inspection door when the fan is stopped |
| | Reversed direction of rotation | Check winding connection on electric motor terminal board |
| | Filter overload | Increase the frequency of intervention of the automatic cleaning device (where provided) or intervene manually |

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| **EXCESSIVE AIR FLOW RATE** | Incorrect rotational speed | Check the direction of rotation; check particular turbulent conditions at the intake; check the speed of rotation in the motor., of the supply voltage, or if there are defects in the winding |
| | Air leakage due to open access doors, poorly constructed or poorly installed piping or components, or improperly closed bypass dampers | Check the system and replace as necessary |
| | Excessive estimation of circuit pressure drops | Close the dampers, or slow down the speed until the required air flow rate is reached |
| **INSUFFICIENT PRESSURE** | Insufficient rotational speed | Check the supply voltage and check the connection of the motor terminals. Check if the gear ratio is correct and check that the belts are not slipping |
| | Flow rate higher than design values due to incorrect circuit sizing or due to air temperature significantly different from fan design value | After reevaluating the design, change the gear ratios and/or replace the fan with a suitable one |
| | Impeller in suboptimal condition or partially blocked | Check the condition of the impeller |
| | Reversed direction of rotation | Check the connection of the windings on the electric motor terminal board |
| **SUDDEN DROP IN PERFORMANCE** | Leakage in the fan volute gasket and/or leakage in the suction and pressure piping | Replace the seal and perform a ducting check |
| **AIR PULSATIONS** | Axial fan operating in the initial zone of the characteristic installed condition | Re-evaluate the system and/or replace the fan with a suitable one |
| | Centrifugal fan operating under zero flow conditions | Re-evaluate the system and/or replace the fan with a suitable one |
| | Instability of suction flow with presence of vortices | Redefine inlet with insertion of baffles |

# 11. MECHANICAL DANGERS

-Personnel in charge of fan maintenance are obliged to use personal protective equipment, as well as devices to protect the airway and face.

-It is forbidden to stop the fan if the fluid temperature is above 60°C. In case it is necessary to stop with higher temperature fluids, provide external cooling devices.

-The suction and pressure ports must always be protected so that it is impossible to reach moving parts.

**Consult the Law and Company safety regulations before handling the fan.**

## 10.1 Noise dangers

Please refer to the Law specifications on noise exposure in the workplace and the assessment on the need to provide sound pressure protection devices.

## 10.2 High temperature dangers

The fluid transported by the fan may be of a temperature higher than 60°C. It is mandatory to service the fan only when the fluid temperature is below 60°C. If it is impossible to decrease the fluid temperature, external cooling systems should be provided to be operated before maintenance.

**Consult the Law and Company safety regulations before handling the fan.**

The danger due to the presence of high-temperature surfaces is indicated by appropriate plaques placed in strategic locations, stating this risk and the operator's obligation to use the most appropriate personal protective equipment.
Below are some examples of plaques:

## 10.3 Inhalation hazards

The fan, if intact, does not allow gas/dust to escape, but in case of maintenance work, it is necessary for the operator to use airway and face protection devices such as masks. Please refer to legal regulations and Company guidelines on the type of mask to be used.

## 11. OBLIGATIOND AND RESPONSABILITY

**This documentation is intended for qualified personnel.**

Before activating and using the product, verify the presence of all attached documentation necessary for its installation, operation and maintenance.

If one or more operators do not wish to assume responsibility for the safe use of the product, they should refrain from using it and contact the Manufacturer for clarification and/or assistance.
The Manufacturer does not accept any indemnity or disclaimer from the Customer unless amply justified and reasoned.

This manual accompanies each fan built according to ATEX regulations and is general in nature.
For any specific information about the purchased fan, as well as for recommended spare parts refer to the additional documentation provided and/or contact the Manufacturer by providing the serial number.

If necessary, the Manufacturer C.G.N. is available for on-site interventions to assess the state of wear of the fan and its accessories. It is also possible to agree with C.G.N. on annual maintenance operations designed to keep the fan and its accessories in the best possible condition.

**CAUTION: In case spare parts are needed, supply only original C.G.N. parts.**
**In case non-original spare parts are installed on the fan, any possible warranty and liability will be considered void.**