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INSTRUCTION MANUAL IS3.003



INSTALLATION, USE and MAINTENANCE FOR FANS IN CONFORMITY WITH THE PROVISIONS OF DIRECTIVE 94/9/EEC (ATEX 95/100a)

CE  II 3G IIB T3 * / 3D T 195 °C *

CEN EN 1127-1: 1997,
EN 13463-1:2001, EN 13463-5:2003,
EN 14986: 2007

* Fans with higher or lower maximum surface temperatures with respect to those indicated can be constructed. The maximum surface temperature of the product will always be explicitly declared on the identification plate and on the relative declaration of 94/9/EC compliance. Any additional prohibited uses regarding correct use of the product will be supplied as a supplement to this document if necessary.

Documentation provided with the fan:

- Operator's instruction booklet edition MVC 08/07 or MVA 08/07, rev.00 or later;
- Operator's instruction manual for fans in conformity with Directive 94/9/EC called IS3.003;
- Instruction booklet for operating the motor connected to the fan;
- Declaration of conformity  of the fan according to the provisions of the Directive;
- Declaration of conformity  of the motor according to the provisions of the Directive;
- Typical section with the assembly distances between the fixed parts and the moving parts;
- Typical assembly section relating to the transmission protection guard (for fans type 9-12-8);
- Transmission card (for fans type 9-12-8);
- Operating data (diagram or table).

Make sure all the above documents are attached to the supply. If required, new copies are available from F.lli Ferrari.



Instruction manual for using fans made according to the provisions of Directive 94/9/EEC (Atex 95/100a).

Equipment belonging to categories 3G, 3D and 3GD

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1. Introduction

1.1 Foreword

This fan manual complies with Directive 94/9/EC (Atex 95/100a) and supplements the documentation normally provided with the fans supplied by F.lli Ferrari. On receiving the goods, the fitter and operator should check to make sure that the fan, besides this manual IS3.003, is also complete with the operator's instruction booklet edition MVC 08/07 or MVA 08/07, rev. 00 or later, with the declaration of conformity EC Ex relating to the fan, with the transmission card for fans type 9-12-8, with the typical fan section showing the assembly distances between the fixed and moving parts, with the typical assembly section for the transmission protection guard for fans type 9-12-8, with the operating data for the fan (diagram or table), with the instruction booklet for motor operation and the declaration of conformity EC Ex for the motor. Should any documents be missing, copies are available from F.lli Ferrari.

Before going on to read this manual for Atex fans called IS3.003, we should like to invite you to read and understand the information contained in the operator's instruction booklet edition MVC 08/07 or MVA 08/07, rev. 00 or later. All the instructions contained in this booklet, especially those concerning safety, must be followed, including for fans intended for use in potentially explosive environments.

1.2 Aim

The aim of this manual is to provide extra information on how to use the fans intended to be operated in potentially explosive environments and which are therefore subject to the provisions of Directive 94/9/EEC (Atex 95).

1.3 General information on Directive 94/9/EEC (Atex 95/100a)

Since 1 July 2003, the Directive 94/9/EEC (Atex 95/100a) has been in effect. This not only relates to explosion-proof electrical systems but also more in general to the machines and machine parts to be used in areas classified as explosion-risk areas. The Directive splits the products into two groups: group I for the mining industry (not considered in our analysis) and group II for surface equipment, which is split into three categories: category 1, category 2, category 3. A further distinction is made if the potentially explosive atmosphere is determined by the presence of inflammable gases, vapours or mists (by adding the letter G after the category) or by the presence of



combustion powders (by adding the letter D after the category). Linked to Directive Atex 95/100a is Directive 99/92/EEC (Atex 137) that establishes a classification of the explosion-hazard areas as indicated in table 1.

Presence of explosive atmosphere	Gases, vapours, mists	Powders
Permanent, or for long periods, or often	Area 0 (category 1G)	Area 20 (category 1D)
Probable during normal activities	Area 1 (category 2G)	Area 21 (category 2D)
Occasional and for short periods	Area 2 (category 3G)	Area 22 (category 3D)

Table 1 – Equipment belonging to group II, divided into areas/categories.

According to 99/92/EEC all workplace areas must be classified by means of a risk analysis that determines the critical areas and indicates the safety precautions to be adopted for the jobs to be done in such areas.

The person in charge of risk analysis must classify the areas and, in accordance with such classification, devices must be chosen that are in conformity with the areas where these are to operate. Industrial fans, like other equipment intended for use in potentially explosive environments, must comply with the requirements of the Directive. The ATEX 95/100a Directive is a total harmonisation law in the sense that it replaces all the laws, some of which contradictory, existing at national or European level in the various sectors of application.

It makes the person responsible for marketing and/or commissioning a product intended for use in an explosion-hazard area obliged to conform. The directive, being part of the “new approach”, defines the Essential Safety and Health Requirements, entrusting to the harmonised standards, or other documents of equivalent value, the task of giving technical expression to the pertinent requirements it contains.

The standards, the standard projects and the main reference documents for fans are:

EN 14986:2007 Design of fans working in potentially explosive atmospheres.

EN 13463-1 2001-11: Non-electrical equipment intended for use in potentially explosive atmospheres – Part 1 – Basic method and requirements.

The Directive and related standards also define the environmental characteristics and, more specifically, fans must not have operating temperatures below -20°C and above 60°C *; intake pressure must not be above 20 kPa and supply pressure not above 10 kPa. The temperature must be read at fan exit and so the fluid compression effects caused by the fan should be taken into consideration. * See note on front cover

1.4 Characteristics of F.lli Ferrari fans in relation to Directive 94/9/EEC (Atex 95/100a)

The electrical components and equipment of the fans made by F.lli Ferrari must be fitted in accordance with the provisions of the European Standards EN 60079-14 (applicable Edition), in area 2, and in accordance with the provisions of the European Standards EN 50281-1-2 (applicable Edition), in area 22; maintenance operations must be performed in accordance with the provisions of European Standards EN 60079-17 (applicable Edition), in area 2, and in accordance with the European Standards EN 50281-1-2 (applicable Edition), in area 22. The user must also be acquainted with the risks associated with electricity and with the chemical and physical characteristics of the inflammable/combustion gases, vapours and powders in the system.

The fans manufactured by F.lli Ferrari are in conformity with the Essential Safety and Health Requirements indicated in European Directive 94/9/EEC for equipment belonging to Group II, categories 3G and 3D and 3GD; such conformity is ensured by observance of the provisions of CEN EN 1127-1 and EN13463-1 standards, and of EN 14986:2007, as indicated in the EEC Declaration of Conformity for the fan, issued by F.lli Ferrari, and attached to this manual.

Nominal specifications are as follows::

- Gas group and temperature class: **IIB T3 ***
- max surface temp.: **T 195 °C ***
- ATEX code; **II 3G, 3D, 3GD**



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Always check application limits on the plate marked EEC Ex fitted on the fan.

In applications where the atmosphere around the ventilator is “not classified” as a potential explosion hazard, a motor without ATEX certification can be used, on condition that this is not directly exposed to a risk-classified atmosphere. This possibility is indicated on the ATEX information plate of the product with the letters “INT.” in the ATEX category definition, and the wording: “This product can be used only with a potentially explosive atmosphere *See note on front cover

inside the ventilator only” on the respective CE ATEX declaration of conformity. The ATEX product defined in this way can be used only in the classification conditions specified as follows: Zone 2 or Zone 22 inside the ventilator and non-classified area outside the ventilator, and the motor must be installed externally.

Example: **II 3GD IIB/T3 –T195 °C INT.**

It must be taken into consideration that Atex fans are not constructed to be perfectly airtight. The possibility therefore exists that a potentially explosive atmosphere can be formed inside or outside the fan by fluid leaks, for example from shaft apertures and from connection flanges for ducts. See Table 4 for loss characteristics according to fan series and size, and Fig. 3 for the determination of losses due to leakage.

Atex fans are normally intended for type D installation in compliance with the UNI ISO 13349 standard (intake and supply sides connected to ducts). To avoid the risk of the accidental entry of foreign bodies into the fan, the installer must fit the intake assembly with protection against the entry of foreign bodies, in such a way as to ensure protection with a rating of at least IP20, in compliance with the EN 60529 standard.

It is essential to take into consideration that both an increase in the density of the fluid being moved and operation peaks lower than -10% and higher than +20% of nominal fan capacity can cause temperature increases greater than those envisaged for the product. In general, conditions of operation at full speed with no fluid flow must be absolutely avoided. Consult the operating data given in the document accompanying the fan.

Frequent fan starting, and in particular on high-pressure centrifugal fans, may cause motor overheating. It is therefore necessary to respect the indications of the type of service (S1, ... S8) for which the product is designed, as shown on the motor information plate.

2. Fan identification.

The fans that comply with Directive Atex 95/100a are complete with an additional plate, as shown in Fig. 1. This additional plate (besides recalling the obligation to read this manual IS3.003) substantially describes the unit to which it belongs, the category, any gas type and the max surface temperature of the fan. Fig. 1 shows the additional plate located on the fan.



Fig. 1 – Identification plate for fans that comply with Directive 94/9/EEC, appliances belonging to category 3G, 3D, 3GD.

3. Transport, storage and installation.

3.1 Transport



The fan consists of rotating parts that can undergo damage following incorrect transport. We suggest protecting all the parts subject to corrosion (driving shafts, any rough parts, etc.) and protecting the fan against knocks as these could damage the bearings fitted to the motors and/or to the fan supports. For further details on handling procedures, refer to chapter 4 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later.

3.2 Storage

The fan must be stored in a place protected against the weather, damp, dust and the aggression of atmospheric and environmental agents. The condition of the fan will have to be checked every month to ensure that parts are not subject to corrosion (especially the rotating parts and fixed parts that could come into contact with the moving parts). It is also a good idea to check the condition of the bearings and lubrication grease to prevent condensation caused by any temperature fluctuations from damaging the surface of the bearings and provoking early damage and/or the deterioration of the lubricant. At each inspection, it is best to turn the impeller to prevent bearing deformation caused by radial loads applied by the impeller weight.

3.3 Installation

When a safety device is installed in a place where there is an explosion hazard, all the national laws and regulations applicable at the time of installation must be abided by.

In the absence of national Regulations and/or Laws, within the European Union, for electrical parts and appliances, the provisions will have to be complied with of CENELEC EN 60079-14 and EN 60079-17 standards in area 2, and the provisions of CENELEC EN 50281-1-2 standards in area 22.

F.lli Ferrari fans are normally supplied fully assembled. In the event, for transport reasons, of its being necessary to supply the fan dismantled, assembly and positioning should be made in accordance with the procedures indicated at chapter 4 of the operator's instruction booklet edition MVC 08/07 or MVA 08/07, rev. 00 or later and following the distances (between the fixed and moving parts) shown in the typical section attached to fan documentation. Fig. 2 shows an example of the representation of a typical fan section. For fans complete with belt drive or flexible coupling drive, together with the documentation, a typical section will also be sent for fitting the protection guard so as to prevent any accidental contact between fixed and moving parts. In the case of fans requiring special assembly operations, F.lli Ferrari will attach supplementary details to the transport documents. For any special products not included in this manual, F.lli Ferrari will provide additional information and instructions according to the specific type of product, covering correct installation, commissioning and the maintenance required to ensure correct fan operation.

F.lli Ferrari is in any case always at disposal for any further information concerning assembly and installation of its fans.

All the assembly and installation operations must only be performed by skilled personnel who are acquainted with the general hazards associated with such jobs. Furthermore, it is of crucial importance to remember that the correct performance of these operations helps to ensure correct fan operation and prevents hazardous situations during fan start-up.

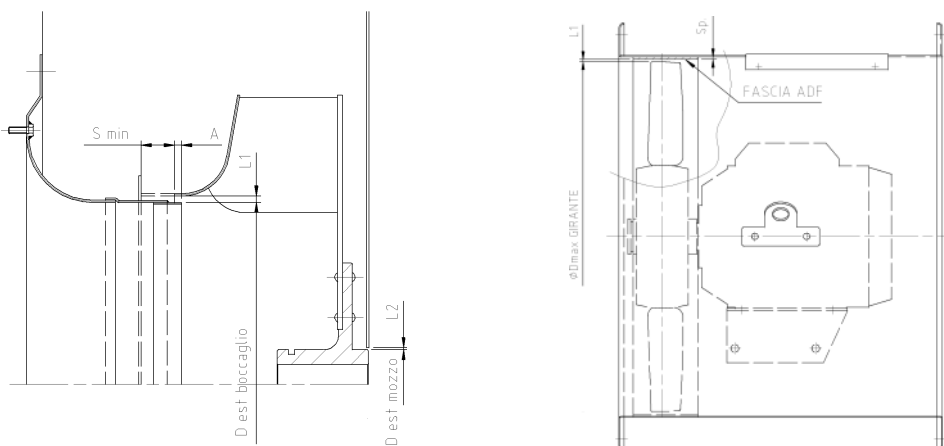


Fig. 2 Typical assembly section of a centrifugal fan and an axial fan.



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4. Commissioning the fan

4.1 Preliminary checks and inspections after commissioning

1. Before commissioning a safety device fitted in a system, the user should make sure this complies with the design data and correct installation.
2. Make sure the safety device is appropriate for classification of the hazardous place.
(IMPORTANT: The device is NOT suitable for AREAS 0 and 20, 1 and 21).
3. Make sure the safety device unit is suitable for the type of gases, vapours and/ powders in question. In particular, when selecting equipment, take into consideration the conductivity level of the powders and the risks of an electrostatic nature tied to the characteristics of the system on which the fan is to be installed.
4. Make sure the temperature class of the device is suitable for the inflammable gases and/or vapours in question and that the surface temperature is appropriate for the combustion powders in question.
5. Make sure the safety device is used for the purpose for which it was intended (voltage, frequency, mechanical and heat stress within project limits).
6. Make sure all the power and mechanical connections are perfectly tight (the tightness moments of nuts and bolts are indicated in chapter 11, page 40 of the operator's instruction booklet edition MVC 08/07 or MVA 08/07, rev. 00 or later).
7. Check the integrity and continuity of the earth leads, protection leads and equipotential leads.

NOTE: Carefully read the instructions in the motor instruction booklet and relating to all the other electrical and non-electrical appliances connected to the fan to ensure compliance with the provisions at para. 1, 2, 3, 4, 5, 6, 7 of this chapter.

Before commissioning, the installer and/or user must check that the distances between the fixed and moving parts of the fan correspond to the indications in the typical fan section (as shown in figura 2) and in the typical protection guard assembly section attached to fan documentation.

The installer and/or user must also check to ensure no changes have been made not expressly authorised by F.lli Ferrari or which in any case alter the structure and functional electrical and mechanical capacity of the safety device. With respect to the top speed of the fan, follow the instructions on the plate (fig. 1). In any case, before making any speed changes with respect to details provided during supply, always ask for the written approval of F.lli Ferrari.

It is also of crucial importance to correctly make the inspections listed in chapter 5 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later.

4.2 Operating faults

8. As regards this subject, follow the indications in chapter 6 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later.

5. Maintenance

5.1 General information on maintenance operations

1. Maintenance is a combination of operations performed in order to keep a machine in good and safe working order, able to comply with the provisions of the pertinent specifications and perform the job expected of it. These maintenance operations must be performed, on electrical parts and appliances, according to the provisions of European Standards EN 60079-17 (applicable edition), in area 2, and in accordance with European Standards EN 50281-1-2 (applicable edition), in area 22.



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2. For all maintenance operations, carefully follow the general and specific instruction given in chapter 7 (pages 27, 28, 30, 31, 32, 33) of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later.
3. The maintenance over time of the initial characteristics of electrical and NON-electrical safety parts must be ensured through a precise maintenance schedule, created by professional and skilled technicians, that takes into due account the type of electrical parts involved, the job they have to do and the environmental conditions in which they operate. (See chapter 5.2 of this manual)
4. Maintenance is called upon to ensure operation of the appliances in terms of safety and because safety is a legal obligation, so is the preservation of all the conditions on which this depends.
5. The safety appliances, in all their construction parts, must be installed and serviced so as to avoid hazards related to accidental contact with power parts or moving parts and fires and explosions caused by operating faults.
6. Maintenance operations must be entrusted to duly trained personnel, well-acquainted with the specific characteristics of the appliances.
7. In the event of the jobs required falling outside the sphere of routine maintenance (e.g. not restricted to changing parts with original spares supplied by F.lli Ferrari) and falling within the sphere of repairs concerning protection modes, suitable agreements must be reached with F.lli Ferrari as to the procedures to be followed, both for doing the jobs and for the subsequent single inspections and tests forming a mandatory requirement of Standards.
8. Before making any speed changes with respect to those provided during the supply stage, always ask for the written approval of F.lli Ferrari. Moreover, for some jobs, like changing the motor, a fan inspection and test may be necessary at the F.lli Ferrari facility. In this case, contact F.lli Ferrari to establish procedures.
9. **The use of a safety device on which jobs have been done not explicitly authorised by F.lli Ferrari S.p.A. shall naturally result in the latter disclaiming all liability and in the invalidation of the relevant EEC Declaration of Conformity with the Directive 94/9/EEC and of the contractual warranty.**
10. All maintenance operations must normally be done with power safety devices isolated from power sources, in compliance with the specific provisions of current standards (EN 60079-17 in area 2, and EN 50281-1-2 in area 22).
11. In the event of the power safety device being subject to vibrations, carefully check that the connections and cable entry points are properly tightened and that suitable anti-loosening devices have been fitted.
12. Make sure accessories have been correctly installed and secured. (The nut and bolt tightening moments are indicated in chapter 11, page 40 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later).
13. In the event of having to change the driving belts, always purchase antistatic belts complete with antistatic certificate and with dimensional and material characteristics identical to those supplied by F.lli Ferrari. Be careful when fitting the protection guard back on and make sure it is fitted as indicated in the typical section attached to fan documentation.
14. Only ever use Shell Albida RL2 lubricant to lubricate the support bearings or compatible greases as indicated on page 28 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later. In this latter case, the supports will have to be completely emptied and then filled with new grease.
15. For the maintenance operations to be performed on the motor and on other electrical and non-electrical parts connected to the fan, refer to the operator's instruction manuals of the single appliances (motor, any sensors, etc.). As regards dust, pay special attention to the instructions concerning appliance surface cleaning to prevent hazardous situations occurring.



5.2 Preventive maintenance

Preventive maintenance is a necessary and crucial way of making sure that the fan operates safely throughout its working life. Establish a sequence of inspections of fan operation at regular intervals. This will, in some cases, help prevent permanent damage caused for instance by a bearing seizing up. These inspections must be noted down in a special register. This way it will be possible to evaluate any changes in fan behaviour and implement measures for avoiding hazardous situations occurring in the future. These parameters should be pinpointed during fan commissioning. This way, an evaluation parameter can be established for changes that could occur over time with respect to the value pinpointed during commissioning. F.lli Ferrari nevertheless remains at disposal to provide any information in relation to the correct way of obtaining the above data and for any assessment of the pinpointed values.

The parameters to be pinpointed for fan monitoring are the following:

1. Bearing temperature: this check allows the operator to determine whether the bearings are working correctly (with stress levels within the norm and enough lubrication) and prevents the occurrence of hazardous situations. *(To be checked during commissioning and every 300 hours of operation. Permanent reading by means of a specific sensor is advisable)*
2. Bearing vibration level: this inspection allows the operator to ensure the bearings are working properly (with stress levels within the norm) and that there are therefore no dangerous unbalances of rotating parts that could even cause breakages of fan parts and thus produce hazardous situations. *(To be checked during commissioning and every 300 hours of operation. Permanent reading by means of a specific sensor is advisable)*
3. Fan speed . This is especially important for fans powered with a frequency variator. *(To be checked during commissioning and every 300 hours of operation. Permanent reading by means of a specific sensor is advisable)*
4. Fan sound pressure level: very often, noise increase coincides with gradually worsening situations as regards the unbalance of rotating parts, with bearing damage or changes in the distances between fixed and moving parts. Ongoing monitoring of this parameter permits preventing hazardous events. *(To be checked during commissioning and every 300 hours of operation)*
5. Checking the assembly clearances and the distances between fixed and moving parts of the fan and of the transmission protection guard: make sure these parameters remain within the limit values pinpointed during commissioning so as to prevent fixed and moving parts coming into accidental contact, thus avoiding hazardous situations. *(To be checked during commissioning and every 300 hours of operation)*.
6. Checking the state of cleanliness of the rotating parts: this inspection permits preventing material depositing on the fan that could cause unbalance and vibrations with consequences as at para. 2. *(To be checked every 300 hours of operation)*
7. Checking the state of cleanliness of the surfaces of the fan, motor and any other electrical and non-electrical equipment: this inspection permits preventing combustion powder from depositing on all the surfaces of the equipment. Such deposits could cause powder ignition and generate hazardous situations *(To be checked every 300 hours of operation)*
8. Checking the condition of the vibration dampers: this inspection permits avoiding any hazardous situations caused by the deterioration of the rubber used to make the vibration dampers located between the base of the fan and the floor. *(to be checked every 600 hours of operation)*
9. Checking the spare parts in stock: notwithstanding the fact that in most cases preventive maintenance avoids breakages of parts subject to wear, it is important to check the condition of the spare parts in stock in order to avoid long system stoppages which in some cases can produce hazardous situations. F.lli Ferrari is at your complete disposal to indicate the types of material to be kept in stock. *(To be checked during commissioning and at the end of every maintenance job on the fan and/or motor)*
10. Checking the environmental data, especially the temperature: in view of the application restrictions of Directive 94/9/EEC it is crucial that the environmental data fall within the limits set in order to prevent hazardous situations. The operating temperature must not be below -20°C and not be above $+60^{\circ}\text{C}$ *. *(To*



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*be checked during commissioning and every 300 hours of operation. Permanent reading by means of a specific sensor is advisable) *See note on front cover*

11. Checking total pressure before and after the fan: in view of the application restrictions of Directive 94/9/EEC it is important to make sure that pressures are within set limits in order to prevent hazardous situations. The intake pressure (upstream of the fan) must never be above 20 kPa and the supply pressure (downstream of the fan) must never be above 10 kPa. *(To be checked during commissioning and every 300 hours of operation)*
12. Checking motor power voltage and current values: this inspection permits preventing changes in system conditions producing power inputs over set limits with consequent motor damage. *(To be checked during commissioning and every 100 hours of operation. Permanent reading is advisable)*
13. Checking correct connection to earth points on the chair and casing of the fan: this inspection permits avoiding hazardous situations due to the fan not being earthed. *(To be checked during commissioning and at the end of maintenance jobs performed on the fan and/or motor)*
14. Checking the driving belt tension (if fitted): this inspection permits avoiding belt elongation causing a reduction in power transmission and loose belts becoming trapped on the pulleys or on the protection guards, producing hazardous situations for the fan. After checking belt tension, always fit the protection guard back on in accordance with the instructions in the typical section attached to fan documentation. For belt tensioning procedures, refer to chapter 7 page 31 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later. *(To be checked during commissioning, every 300 hours of operation and after every maintenance job done on the fan and/or motor)*
15. Checking the alignment of the fan shaft-motor flexible joint coupling (only for fans es. 8-17, ex 7D): this inspection permits avoiding misalignment between the shafts causing damage to the bearings of both the fan and the motor and creating hazardous situations. After alignment inspection, always remember to fit the protection guard back on in accordance with the provisions in the typical section attached to fan documentation. *(To be checked during commissioning, every 600 hours of operation and at the end of each maintenance job performed on the fan and/or motor)*
16. Checking the condition of the lubricant: this inspection permits ensuring correct lubrication of the bearings and prevents these being damaged, with risk of hazardous situations and damage to the fan. The transmission cards supplied with the documentation attached to the fan indicate lubrication schedules. These indications have priority over all general indications. Refer to chapter 7 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later, for lubrication schedule details. *(To be checked during commissioning and every 600 hours of operation unless otherwise indicated)*
17. Checking the condition of the bearings: this inspection permits protecting bearing life and prevents any early damage to the bearings. To make this inspection, totally eliminate the grease from the supports. For the types of bearings used, refer to chapter 7 pages 29, 30, 36 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later. *(To be checked every 2000 hours of operation)*.

In order to make some of these inspections easier, the best thing is to equip the fan with permanent measuring systems for vibrations, temperature of bearings or other parts subject to vibrations/overheating, as well as with speed sensors. F.lli Ferrari remains at disposal to evaluate the fitting of such accessory devices. Moreover, different inspections involving the same component (e.g., the bearings, para. 1 and 2) should be performed at set intervals but at different times. This way it will be possible to pinpoint any operating faults quicker. With the aim of making the inspections indicated from para. 1 to para. 17 easier, we attach a specimen page of how the data obtained from systematic parameter checks should be recorded. See table 2 on page 10 - Inspections during commissioning and at page 11 table 3 – Inspections to be made at regular intervals.

6. Dismantling

Follow the general instructions provided in chapter 9 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later.

7. Fan disposal

Follow the general instructions provided in chapter 10 of the operator's instruction booklet, edition MVC 08/07 or MVA 08/07, rev. 00 or later.



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Table 2. Inspections during commissioning

Inspection during commissioning				
type of inspection	date	value/result	person responsible for the inspection	notes
<i>Bearing temperature (°C)</i>				
Fan: impeller side (if fitted)				
Fan: side opposite impeller (if fitted)				
Motor: coupling side				
Motor: side opposite coupling				
<i>Bearing vibrations (mm/s – RMS)</i>				
Fan: impeller side (if fitted)				
Fan: side opposite impeller (if fitted)				
Motor: coupling side				
Motor: side opposite coupling				
<i>Operating speed (rpm)</i>				
Motor				
Fan (if different from motor speed)				
<i>Sound pressure level at 1.5 m from side opposite intake (db/A)</i>				
<i>Inspection of assembly clearances, checking of correspondence to data indicated in typical fan section and in typical assembly section for any transmission protection guard. See typical sections attached to fan documentation.</i>				
<i>Check spare parts stock according to F.lli Ferrari instructions (list on request)</i>				
<i>Check environmental data</i>				
Ambient temperature (°C)				
Temperature at fan entry (°C)				
Temperature at fan exit (°C)				
<i>Check total pressures (Pa)</i>				
Total pressure at intake				
Total pressure at supply				
<i>Motor voltage and current values</i>				
Voltage (V)				
Current (A)				
<i>Check correct connection of earth points</i>				
<i>Check condition of lubricant</i>				
<i>Check condition of bearings</i>				



Inspections to be made on a regular basis				
type of inspection	date	value/result	person responsible for the inspection	notes
<i>Bearing temperature (°C)</i>				
Fan: impeller side (if fitted)				
Fan: side opposite impeller (if fitted)				
Motor: shaft side				
Motor: side opposite shaft				
<i>Bearing vibrations (mm/s-RMS)</i>				
Fan: impeller side (if fitted)				
Fan: side opposite impeller (if fitted)				
Motor: shaft side				
Motor: side opposite shaft				
<i>Operation speed (rpm)</i>				
Motor				
Fan (if different from motor speed)				
<i>Sound pressure level at 1.5 metres from the side opposite that of the suction intake (db/A)</i>				
<i>Checking assembly clearance. Check correspondence with data provided in the typical fan section and in the typical assembly section of any transmission protection guard. See the two typical sections attached to fan documentation.</i>				
<i>Check the spare parts stocks according to F.lli Ferrari instructions (list on request)</i>				
<i>Check environmental data</i>				
Ambient temperature (°C)				
Temperature at fan entry (°C)				
Temperature at fan exit (°C)				
<i>Check total pressures (Pa)</i>				
Total pressure at intake				
Total pressure at supply				
<i>Motor voltage and current ratings</i>				
Voltage (V)				
Current (A)				
<i>Check correct connection of earth points</i>				
<i>Check state of cleanliness of rotating parts</i>				
<i>Check the state of cleanliness of fan surfaces, motor surfaces and of surfaces of all electrical and non-electrical equipment connected to the fan</i>				
<i>Check condition of vibration dampers (if fitted)</i>				
<i>Check belt tension</i>				
<i>Check alignment of flexible couplings</i>				
<i>Check condition of lubricant</i>				
<i>Check condition of bearings</i>				

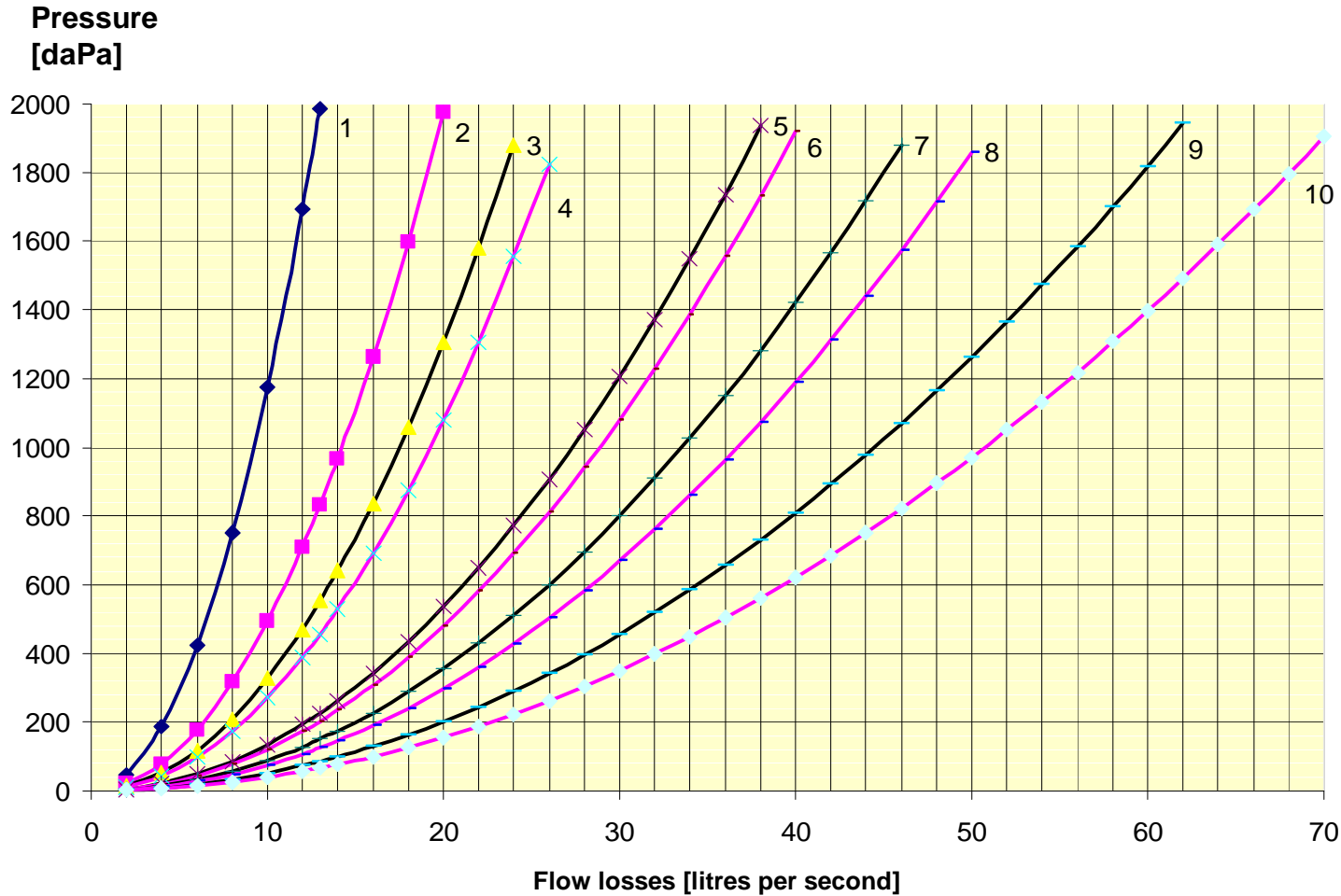
Table 3. Checks to be made at regular intervals.



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Size	FA R	K P	FC P FC N	KA P	FE P FE N	KB P	FG P FG N VCM N	FI N	ART N KC R	FP N FP P	MEC N	FQ N	KM R	FR N	FS P
180															1
200															1
220															2
250											1	1	1	1	2
280											1	1	1	2	2
310	1	1									2	2	2	2	2
350	1	1					2				2	2	2	2	2
400	1	2		2	2	2	2	3	2	2	2		2	4	4
450	2	2		2	2	2	3	3	3	2	4	3	3	4	4
500	2	2	2	2	2	4	3	3	4	3	4	4	4	4	4
560	2	2	2	2	3	4	4	4	4	4	4	4	4	4	5
630	2	2	3	4	4	5	4	4	5	4	4	5	4	4	5
710	2	4	4	4	4	5	5	5	6	5	5	6	5	5	5
800	3	4	4	4	5	6	6	6	6	6	5	6	5	5	5
900	4	5	5	5	6	6	6	6	7	7	6	7	6	6	5
1000			5	5	7	7	7	7	7	7	7	7	7	7	
1120			6		7	9	9	9	8	8	8	8		8	
1250					9		9	9	8	9	8	8		8	
1400							9	9	9	9	9	9		9	
1600							9	9	9	9	9	9		9	
1800							9	9	9	9	9	9		10	
2000							10	10	10	10	10	10		10	

Table 4 Reference curves for determination of losses due to leakages (see diagram in Fig. 3 on page 13).



Notes:

- approximate values valid for correct assembly;
- negligible losses through intake sealing gaskets;
- negligible losses through sealing gaskets on casings and/or supports;
- negligible losses through welds;
- without effect of any seals;
- without effect of any retro-welded blades;
- considering only the contribution of pressure produced by fan;
- data relative to fluid density of 1.226 kg/m³.

Example of use of diagram:

With a series ART fan size 801, working at a pressure of 500 daPa at 1226 kg/m³. Table 4, for series ART and size 800, gives the reference to curve 6. Entering the graph to the side with a pressure of 500 daPa and finding the intersection with curve 6, flow losses due to leakages are found to be 20.5 litres/second.

Fig. 3 Diagrams of losses due to leakages.