



## INDICATIONS FOR CHOICE OF ATEX FANS

### **CAUTION!**

ATEX marking is possible only if the fan is assembled by Ferrari or one of its qualified "OBT ATEX" dealers.

For the machine technical specifications, refer to the technical documentation of the ATEX fans.

### 1. ATEX SERIES FANS

Fan type	Category 2		Category 3		Not ATEX certifiable
	G - atmospheres with explosive gases	D - atmospheres with explosive dust	G - atmospheres with explosive gases	D - atmospheres with explosive dust	
Centrifugal fans	FA/R - FC - FE - FG - FI - FP/P, FC - FE - FG - FI - FP/N, VCM, ART, FQ, MEC, FR, FS, PFB, PFM	FA/R - FC - FE - FG - FI - FP/P, FC - FE - FG - FI - FP/N, VCM, ART, FQ, MEC, FR, FS, PFB, PFM	FA/R - FC - FE - FG - FI - FP/P, FC - FE - FG - FI - FP/N, VCM, ART, FQ, MEC, FR, FS, PFB, PFM, DFR/DFM (with intake temperature limited to 40°C, fluid not corrosive or toxic and without suspended particles), K, KA, KB, KC, KM	FA/R - FC - FE - FG - FI - FP/P, FC - FE - FG - FI - FP/N, VCM, ART, FQ, MEC, FR, FS, PFB, PFM, K, KA, KB, KC, KM	CFR
Axial fans	EF (excluding versions 9 and 12), EFR, ES, ESR, EB, ET	EF (excluding versions 9 and 12), EFR, ES, ESR, EB, ET	EF (excluding versions 9 and 12), EFR, ES, ESR, EB, ET	EF (excluding versions 9 and 12), EFR, ES, ESR, EB, ET	EK, EQ, EP
<b>Note: The plug fans series PFB and PFM are available as ATEX configuration only 4A with baseframe</b>					

Chart 1

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## 2. GROUPS, CATEGORIES, WORK ZONES, TEMPERATURE CLASSES

The specific standard for fans (UNI EN 14986) does not envisage type 1D machines and explosion group II C for gases, even though it covers use in atmospheres containing hydrogen. In addition, the Ferrari range does not envisage type 1G machines (see Chart 2).

ATEX GROUP	II														
WORK GROUP	II G - atmospheres with explosive gases									II D - atmospheres with explosive dust					
CATEGORY	1*			2			3			2			3		
WORK ZONE	0*			1			2			21			22		
EXPLOSION GROUP**	II A	II B	II C***	II A	II B	II C***	II A	II B	II C***	III A	III B	III C	III A	III B	III C

\* = Category/work zone not manufactured by Ferrari.

\*\* = For dust, the classification of explosion groups is envisaged only for electrical devices (marking on motor only).

\*\*\* = Explosion group envisaged by standard UNI EN 13463-1, but not by standard UNI EN 14986. Fans destined for operation in atmospheres containing hydrogen must be marked "II B + H<sub>2</sub>".

Chart 2

**Warning:** GD marking, which means that the product is suitable for use both in atmospheres with explosive gases and dusts (and it's not explicitly provided in the standards UNI EN 13463-1 and UNI EN 14986), is no longer available because of 2 main reasons:

- It can be easily misunderstood and interpreted as the fan is suitable for hybrid atmospheres, where explosive gases and dusts are simultaneously present.
- Electric motors with GD marking are no longer available, only G or D marking is available according the standard CE EN 60079-0. If the motors are suitable for both atmospheres, they shown the 2 separate markings with specific characteristics.

If the fan can be installed both in atmospheres with gases and dusts, it will be marked G and D with the specific characteristics of the 2 separate Atex zones.

Fans in categories 2D and 3D that operate in environments with conductive dust must have motors marked 2D – III C, with an IP 65 protection rating.

Fans can be supplied in the following temperature classes:

Gases: T2 (maximum surface temperature 300°C).

T3 (maximum surface temperature 200°C).

T4 (maximum surface temperature 135°C), only for direct fans with motor marked T4. All fans with drive-belt transmissions are excluded. For high-pressure fans (series FA/R - FC - FE - FG - FI - FP/P, FC - FE - FG - FI - FP/N) requested in this class, the technical office must make a feasibility check in the case of ambient temperatures over 40°C.

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Ferrari does not supply fans in classes T1 (maximum surface temperature 450°C), T5 (maximum surface temperature 100°C) or T6 (maximum surface temperature 85°C). NB: Each class always includes the preceding classes (e.g. class T4 also includes classes T1, T2 and T3, and class T6 includes all classes).

Dust: Surface temperatures 125 – 135 – 195 – 295°C. For temperatures lower than 195°C, only direct fans with a motor with a marking corresponding to the required temperature (125 or 135°C) can be supplied, and therefore all fans with a drive-belt transmission are excluded. For high-pressure fans at these temperatures (series FA/R - FC - FE - FG - FI - FP/P, FC - FE - FG - FI - FP/N) the technical office must make a feasibility check. As an approximate indication, for high-pressure fans with a diameter greater than 900 mm requested for temperatures of 125-135°C, the technical office must make a feasibility check in the case of ambient temperatures over 40°C.

### 3. WORKING CONDITIONS

The following precautions must be observed:

- Intake temperature must be between -20 and 60°C.
- Intake pressure must not be less than 80 kPa (0.8 bar) or greater than 110 kPa (1.1 bar).
- Flow must not be lower than the minimum flow indicated on the Operating diagram in the catalogue.
- On fans with transmission, the maximum power of the motor installed must not exceed 80% of the motor power indicated in the catalogue.
- The fan rotation speed must be less than 85% of the maximum speed envisaged by the diagrams in the catalogue, for both direct and transmission fans.

For series ART, FQ and FR with cooling fan in category 3G only, suspensions of the standard can be accepted, if the following conditions are respected:

1. intake temperature must not exceed 150°C;
2. ambient temperature must not exceed 30°C;
3. the maximum admissible surface temperature must be greater than the intake temperature plus 50°C;
4. the load on the motor bearings due to the overhanging impeller must be monitored;
5. the fan flow must always be between the minimum and maximum values indicated on the operating diagram;
6. the pressure difference between intake and supply must be lower than 3000 Pa along the entire operating curve;
7. no sliding seals must be present;
8. installation must be with a horizontal axis;
9. the motor must operate in S1;
10. the motor must not be powered by an inverter.

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#### 4. WORKING TEMPERATURES

Charts 3 and 4 summarize the ignition point temperature for gases (Chart 3) and for dust (Chart 4), according to the temperature class (gases) or the marked surface temperature (dust) for fans produced by Ferrari.

Temperature classes	Nominal surface temperature (as marked) (°C)	Maximum admissible surface temperature (°C)	Minimum gas ignition point temperature for category 2 (°C)	Minimum gas ignition point temperature for category 3 (°C)
T2	300	290	363	290
T3	200	195	244	195
T4	135	130	163	130

Chart 3 The ignition point temperature for gases in according to UNI EN 1127-1

Nominal surface temperature (as marked) (°C)	Minimum dust ignition point temperature with clean surfaces (°C)	Minimum dust ignition point temperature with deposits of thickness up to 5 mm (°C)	Minimum dust ignition point temperature with deposits of thickness over 5 mm (°C)
295	443	370	According to thickness and ambient temperature
195	293	270	
135	203	210	
125	188	200	

Chart 4 The ignition point temperature for dust in according to UNI EN 1127-1

When ordering, the customer/user must therefore choose the temperature class (for gases) or the surface temperature (for dust) according to the type of substance present in the fluid propelled by the fan, and according to the conditions of the work environment. In addition, the additional materials used for ATEX constructions are normally copper and aluminium alloys. The customer must explicitly inform Ferrari Ventilatori of any possible incompatibilities between these materials and the fluid propelled.

#### 5. CONSTRUCTION DETAILS

In addition to the indications given above, the following points must be taken into consideration.

Impellers cannot be equipped with retrofit blades.

##### a) Seals

Refer to Chart 5 below for the choice of seals.

Seal type	Admissible temperature classes
Plain ring in Teflon	T2, T3, T4
Labyrinth seal in Teflon with/without blowing rings	T2, T3, T4
Labyrinth seal in bronze with blowing rings*	T2, T3, T4
Sliding seal in Viton	T2
Seal with felt ring	NOT ADMISSIBLE
Stuffing box seal	NOT ADMISSIBLE

\*= Labyrinth in bronze to be used only if Teflon is not compatible with the system.

Chart 5

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When the most hazardous zone is internal, the motor can be lower by no more than one category (see also point b) below) if the Teflon sealing ring is used. It must however be taken into account that fans are not perfectly airtight, and the possibility of fluid leakages must also be considered, as specified in point 1.4 of the ATEX Instruction Manual. Depending on the environment in which the fan is installed, a more hazardous situation than that foreseen can therefore be created due to leakages of the working fluid, so that the exterior becomes the same category as the interior. The definition of the category to which the installation environment belongs must therefore be accurately assessed according to its characteristics (open or closed space, presence or absence of ventilation, etc.).

**b) Motors**

For all motors constructed by contract, customers are responsible for checks on bearings.

In the case of fans intended for use with explosive atmospheres only internally, the following criteria must be followed:

- If the hazard zone is type 1 or 21 (category 2G or 2D), the motor must be marked at least 3G or 3D respectively. In addition, a ring seal in Teflon must be fitted on the casing.
- If instead the hazard zone is type 2 or 22, a standard motor can be installed, as long as a ring seal in Teflon is fitted.
- There may never however be more than one category of difference between the interior and exterior (it is therefore prohibited to fit standard motors with categories 2G or 2D internally, even if there is no hazardous atmosphere externally). It may even be more appropriate to fit a motor corresponding to the same category as that of the interior, when there is no certainty on the precise category of the environment (see point a) above).
- For version 5 fans in categories 3G or 3D only internally, an ATEX 3G or 3D motor must always be fitted if the motor itself is in contact with the fluid. A standard motor may be fitted if the spacer columns are present.

If operation with an inverter is envisaged, the motor must always have a PTC switch or a similar device envisaged by the manufacturer. In addition, if it is an ATEX motor, it must be derated with 15% less power compared to the standard version. Similarly, power derating must also be applied if the ambient temperature is greater than 40°C.

The temperature class of the motor must be equal to or greater than that of the fan, even if the motor is of a lower category (e.g. if the fan is category 2G and class T4, the motor can be category 3G and must have a temperature class of T4 or T5).

On direct axial fans, it must be remembered that the motor is in direct contact with the fluid propelled by the fan. The temperature for the assessment of the suitability of the motor must therefore be the same as the fan operating temperature. For example, if it is 60°C, this will be the temperature of the motor, and in particular its bearings.

**c) Sensors and electrical connections**

For fans for zone 21 (category 2D) we recommend to install a sensor for the constant monitoring of vibrations. This sensor can be fitted by Ferrari, the installer or the end user. If the sensor is not installed, a periodical fan check must be executed and officially recorded by fan end-user every 200 hours of functioning. The absence of this check reports will invalidate the ATEX certification of the fan. With regard to the ATEX marking of the sensor, the indications given earlier for motors are applicable.

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#### d) Accessories

Accessories are not ATEX marked. Nevertheless, assessments can be made on the relative velocity between the fluid and the component, so as to determine the probability of triggering an explosion.

## 6. NATIONAL AND INTERNATIONAL STANDARDS ON ATEX CONSTRUCTIONS

The applicable reference standards are as follows (NON-EXHAUSTIVE LIST):

<a href="#">Directive 94/9/EC</a>	ATEX Directive
<a href="#">Directive 99/92/EC</a>	Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres
<a href="#">UNI EN 14986</a>	Design of fans working in potentially explosive atmospheres
<a href="#">UNI EN 1127-1</a>	Explosive atmospheres – Explosion prevention and protection – Basic concepts and methodology
<a href="#">UNI EN 13463-1</a>	Non-electrical equipment for use in potentially explosive atmospheres – Part 1: Basic method and requirements
<a href="#">UNI EN 13463-5</a>	Non-electrical equipment intended for use in potentially explosive atmospheres – Part 5: Protection by constructional safety "c"
<a href="#">VDMA 24167</a>	Ventilatoren: Sicherheitsanforderungen (Fans: Safety requirements)
<a href="#">EUROVENT 1/5-99</a>	Specification for fan construction and use to reduce the ignition risk in potentially explosive atmospheres
<b>IEC/CEI EN 60079</b>	Electrical apparatus for explosive gas atmospheres – <a href="#">Part 0: Equipment – General requirements</a> – <a href="#">Part 20-1: Material characteristics for gas and vapour classification - Test methods and data</a> – Part 10: Classification of areas – <a href="#">Part 14: Electrical installations in hazardous areas with explosive gases (other than mines)</a>
<b>CEI EN 61241</b>	Part 14: Electrical installations in hazardous areas with explosive dust (other than mines)

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