

ATEX



TECHNICAL SPECIFICATION OF CENTRIFUGAL FANS DESIGN

FLÄKT SOLYVENT VENTEC

Following TC 305/WG 2/SG1 WI doc N86-2 : 2002 (E)

Fläkt Solyvent-Ventec

*Fläkt***Woods**

1- Centrifugal fans categories : Categories 2 and 3, gas and dust

Relation between categories and zones

FAN CATEGORY	DESIGNED FOR ZONE
1	0 and 20
2	1 and 21
3	2 and 22

The design chosen by Fläkt Solyvent-Ventec corresponds to the categories 2 and 3 of the ATEX normalisation, which covers 1, 21, 2 and 22 zones, in gas and dust

Category 1 is excluded of this scope.

For categories 2 and 3, the certificate is issued by the FAN MANUFACTURER itself, providing that the under listed rules are strictly followed.

A certificate for the Motor (tested by a recognized lab) will be also be delivered with the fan.

2- Pairings of material for the construction

There is a broad range of acceptable material pairings. We have selected the following pairing of material, which is suitable for category 1 and 2 (zones 1, 21, 2 and 22) for the rotating and stationary parts of fans :

For centrifugal fans :

- Naval Brass CuZn39Sn
 - o inlet cones
 - o shaft seals
 - o linings inside belt guards
 - o Coupling of an anti-spark design
- Carbon or stainless steel = impellers

3- Linings

If the inlet cone is not made 100% in Naval Brass :

- Linings have to be welded or riveted onto the main material
- Lining shall have a minimum thickness as given in table hereunder, in order to withstand impact or abrasion for an appreciable time.

Motor Power KW	Minimum of thickness In mm
≤ 11	2
$11 < x \leq 90$	3
$90 < x \leq 250$	4
> 250	5

4- Vibration levels and balancing

Balancing level : G 6.3

Vibration levels respect the ISO 14 694 , that means should not exceed 4.5 mm / s if motor power is ≤ 7.5 kW, and 7.1 mm /s motor power is > 7.5 kW.

If the fan is driven through V-belts, then the pulleys shall also be balanced.

Vibration monitoring is mandatory for category 2D (Zone 1 and 21). The alarm and shutdown levels shall meet the requirements mentioned here above.

5- Earthing conducting parts

It is normally sufficient to ground the static parts of the fan.

6- Motors , surface and fluid temperatures

a- Motors have to be ATEX certified

b- Overheat protection shall preferably be fitted. We will propose the option to the customers.

It is of the USER RESPONSIBILITY to determine , according to the nature of the gas, mist or dust in his system , the appropriate temperature class for the fan , so that the maximum surface temperature in the table hereunder is never exceeded.

Temperature Class	Maximum Surface Temperature
T1	450 °C
T2	300 °C
T3	200 °C
T4	135 °C
T5	100 °C
T6	85 °C

c- Temperature of the fluid itself should never exceed 60°C. In case of high pressure fans, heating of the gas inside the fan due to compression shall also be considered and verified by calculation.

7- Casings

For motor power exceeding 11 kW , casing has to be in a fully welded construction = it will be done for all Centrifugal ATEX fans. In case of split casing, or for the inlet, outlet and all other joints and gaps, the fan enclosure will be sealed with a suitable sealing material, or provided with gaskets.

To facilitate the fan maintenance, all fans dedicated to dust applications will be equipped with an inspection door. It will be bolted on the casing, with an appropriate sealing material.

8- Impellers

Impellers will be of a fully welded type. They will mechanically be able to withstand a 1.15 times the maximum operational rotating speed for at least 60 seconds, without causing an ignition risk, following the norm's request.

The fan blade shape shall also be appropriated to the air transported, to avoid any attachment of dust under normal conditions.

9- Clearance between rotating elements and the fan casing

The minimum clearance between rotating components such as the impeller and fixed components e.g. the fan casing shall be at least 1% of the inlet diameter, but shall not be less than 2 mm in the axial or radial directions, nor need be more than 20 mm.

Shaft seals are not subject to this provision.

10- Bearings for fan arrangements 1 or 8

Life of bearings should be at least 40 000 hours. They will be fixed by a reliable and positive locking method.

Where re-greasing is required, the interval and type of grease will be marked on the fan nameplate or on a separate late, riveted on the casing.

11- Impeller – shaft attachment

Only positive locking is accepted over 15 kW. The impeller will be fixed between a shoulder on the shaft and locking device, or a tapped shaft with locking screw and washer.

12- Arrangements

a- Direct drive :

Whatever the ZONE, direct drive arrangement should be preferred

b- Belt Drive Arrangement

Belt Drives :

The belts shall be manufactured from an antistatic material. The manufacturer shall recommend regular inspections and re-tensioning in the user instructions.

Belt Guards :

Brass linings protection will be fitted inside the guard to prevent from any spark with the pulleys.

MONITORING SYSTEMS:

FOR CATEGORY 2 FANS , the following devices are requested :

- Rotating detector
- Bearing Temperature PT100

c- Coupling Drive Arrangement

MONITORING SYSTEMS:

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- Rotating detector

Bearing Temperature PT100

13- Documentation

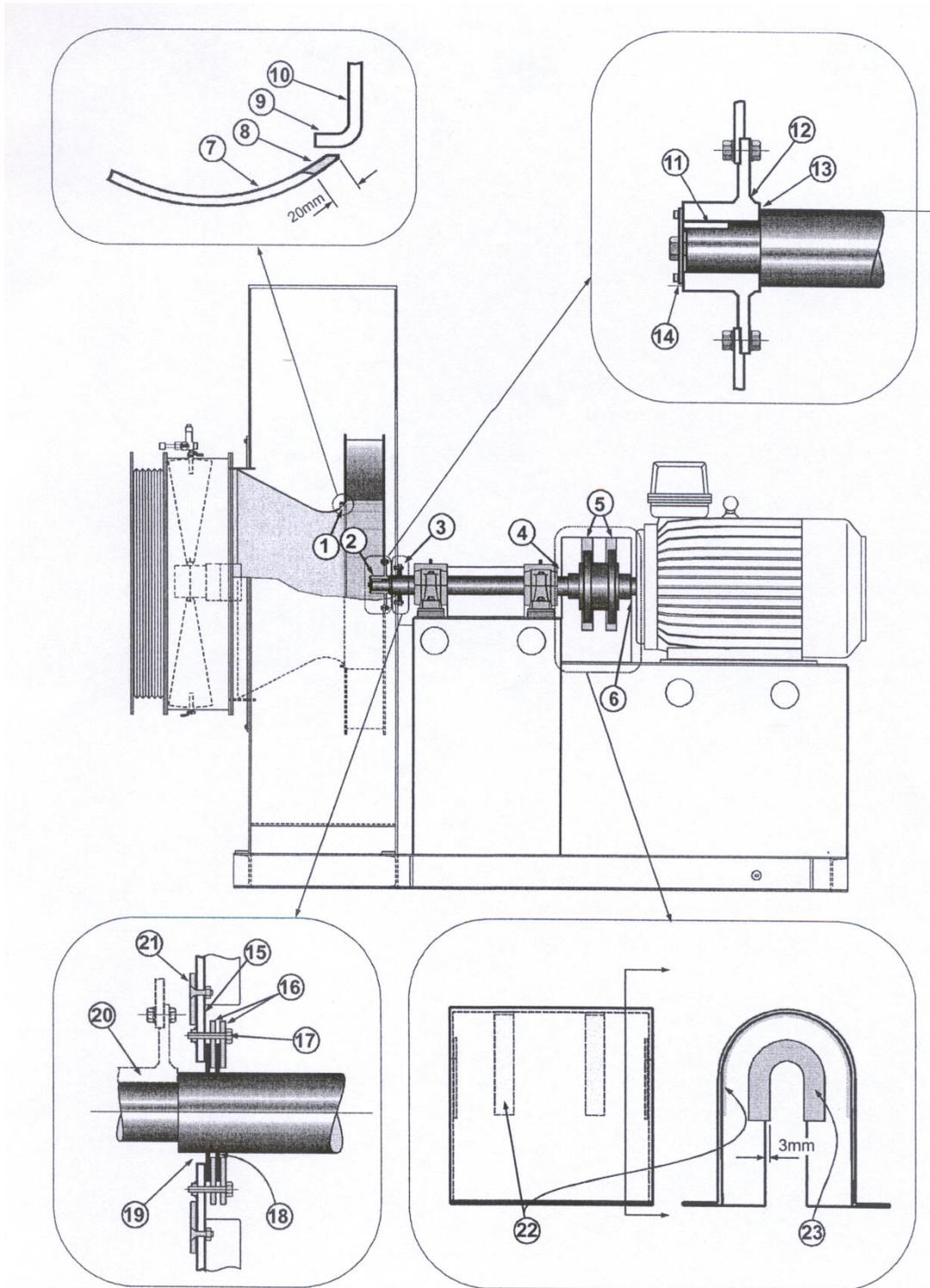
Contractual documentation shall include / indicate :

- Maintenance & operations manual
- Fan erection and commissioning manual
- Be in local language
- Have clear pictures
- Indicate lifting points
- Paper & electronic version available
- Long term storage instructions

14- Markings

Nameplate shall be fixed permanently and indicate :

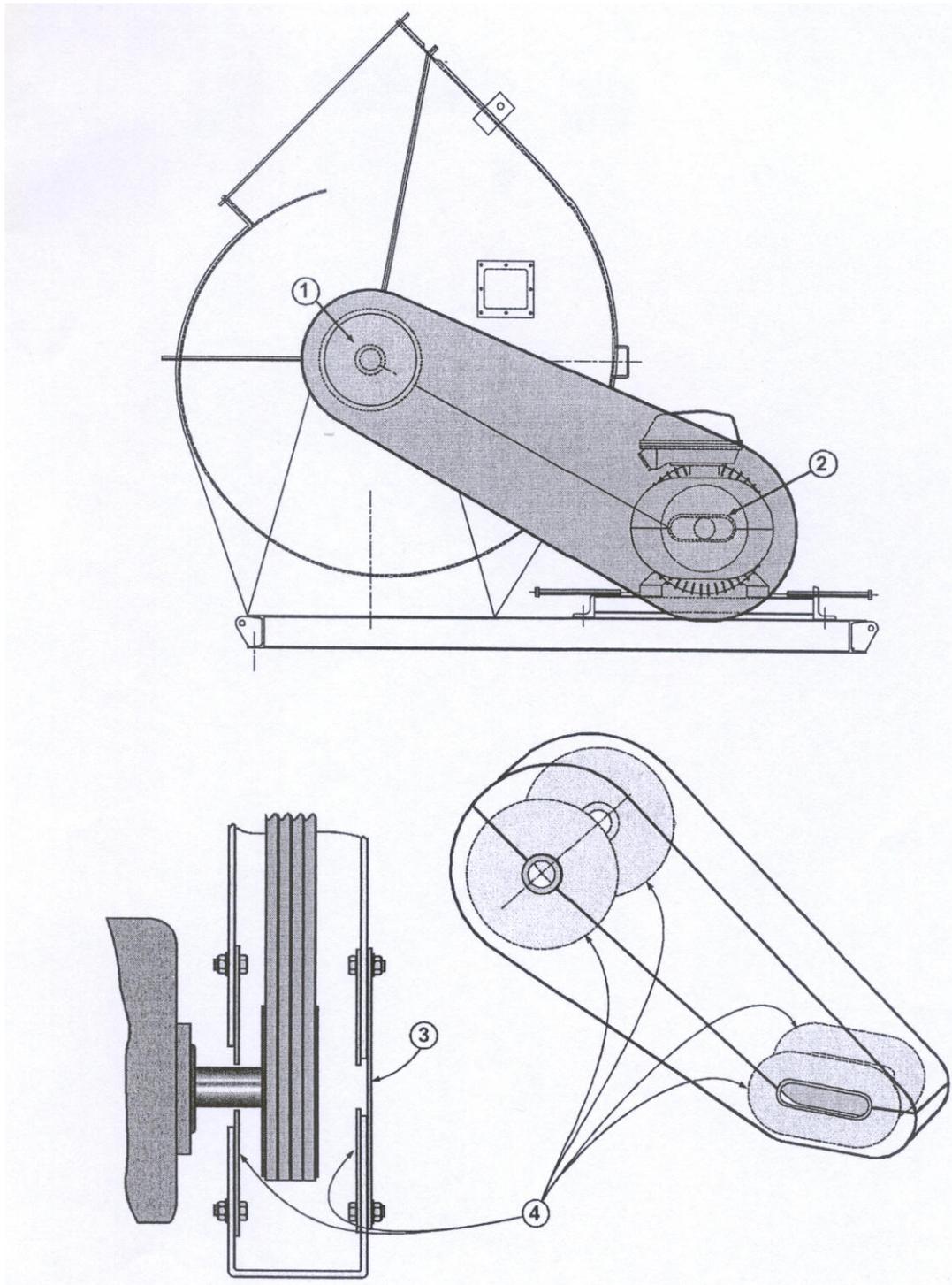
- Name and address of the manufacturer
- Year of construction
- Designation / Type of fan
- Serial or identification number
- Casing pressure , temperature, flow rate
- Greasing data



ARRANGEMENT 4 & 8 PRINCIPLE

- 1- Rubbing (spark generating) potential between the inlet-flow guide and the impeller
- 2- Impeller connection
- 3- Shaft to casing seal zone
- 4- Bearing shaft zone

- 5- Coupling guard anti-sparking feature**
- 6- Motor shaft zone**
- 7- Impeller upstream inlet flow guide**
- 8- Anti-sparking feature on the inlet flow guide (brass inserts)**
- 9- Impeller inlet ring**
- 10- Impeller side shroud**
- 11- Impeller hub keyed to the shaft**
- 12- Impeller shaft connection hub**
- 13- Shoulder on shaft to positively locate the impeller hub**
- 14- Impeller locking device**
- 15- Fan discharge casing**
- 16- Shaft seal plates manufactured from brass**
- 17- Seal retaining fasteners manufactured from anti-spark material**
- 18- Shaft to casing sealing elements manufactured from non-sparking material for example thin pressure vessel fibrous gasket material , carbon ...**
- 19- Ample running clearance provided between the casing sidewall and the shaft**
- 20- Impeller hub**
- 21- Anti-spark running strip attached to the inside of the casing I way of the impeller attachment bolts**
- 22- Internal anti-spark strip positioned to align with the outside diameter of the drive coupling flange (two required with spacer type coupling)**
- 23- Anti spark brass end plates to be fitted to provide a minimum of 3 mm extension from the carbon steel)**



ARRANGEMENT 1 ADDITIONAL PROTECTIONS

- 1- Shaft penetration at fan
- 2- Shaft penetration at motor
- 3- Cover plate fitted to outside of fan drive belt guard
- 4- Internal surfaces, in way of drive pulleys, fitted with an anti-sparking material such as brass