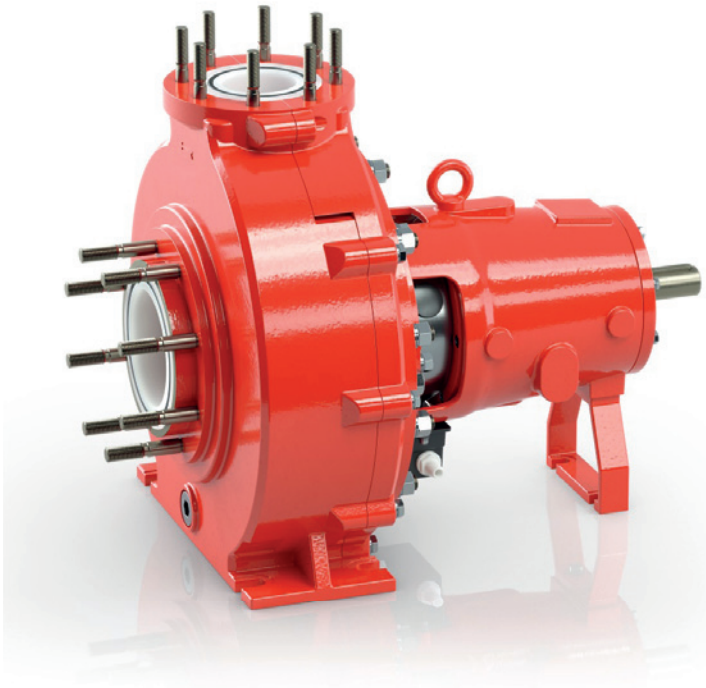
STÜBBE

Pumps

ATEX additional instructions



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Subject to technical modifications.

Read carefully before use.
Save for future use.

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1 About this document

These additional instructions on ATEX are only valid together with the operating manual for the pump and other related documents listed there.

This manual describes requirements for the operation of pumps in potentially explosive atmospheres.

1.1 Warnings and symbols

Symbol	Meaning
⚠ DANGER	• Immediate acute risk • Death, serious bodily harm
⚠ WARNING	• Potentially acute risk • Death, serious bodily harm
⚠ CAUTION	• Potentially hazardous situation • Minor injury
NOTE	• Potentially hazardous situation • Material damage
	Safety warning sign ▶ Take note of all information highlighted by the safety warning sign and follow the instructions to avoid injury or death.
▶	Instruction
1. , 2. , …	Multiple step instructions
✓	Precondition
→	Cross reference
	Information, notes

Tab. 1 Warnings and symbols

1.2 Scope

Pump type	Pump series
Centrifugal pumps	BE NX, BX SHB, up to sizes 50–180
Magnetically coupled centrifugal pumps	SHM

Tab. 2 Scope

2 General safety instructions

2.1 Intended use

- Transportation of permissible liquids (→ data sheet and compatibility list).
- Adhere to the operating limits (→ Data sheet).
- Do not use pump for liquids that can create an explosive atmosphere under normal atmospheric conditions or under process conditions.
- Use in accordance with ATEX Declaration of Conformity.

2.2 Obligations of the operating company

- Evaluate and document the operating areas of the system for danger of explosions in accordance with Directive 99/92/EC, appendix I.
- Ensure that directive 99/92/EC, to protect the health and safety of the employee in potentially explosive atmospheres, is maintained.
- Ensure that type plate information matches the system data.
- Only use the pump as required by the explosion protection label.
- Always ensure that the following is maintained:
  - the pump is earthed
  - there is no contact between the coupling and the coupling guard
  - pump interior, seal chamber, auxiliary systems and vacuum and pressure pipes are always completely filled with the liquid being transported
  - the maximum permissible surface temperature of the pump is not exceeded
  - armatures on the input and output of the pump are set correctly
  - the pump must be regularly maintained and monitored
  - it must be impossible for the pump to run dry e.g. by monitoring levels, flow measurements
  - Dry run monitoring for use in category 2, for example using level monitoring, flow measurement
- Ensure that the motors, couplings and monitoring units supplied on site actually correspond to the category and temperature class of the associated zone.
- Observe included data sheet.
- Observe included manuals for supplier components (explosion-protected motor, couplings).
- Inform personnel regarding special dangers:
  - Danger of explosions through removal of dust build-up
- Ensure that maintenance and repair work are only carried out by authorized personnel who:
  - know the standards and regulations for devices for use in potentially explosive atmospheres
  - possess the required knowledge and experience for handling devices when used in potentially explosive areas
- After maintenance and repair work, the pump unit may only be released for operation by authorized personnel, an officially appointed person or the pump manufacturer.
- Ensure that the following actions are carried out following significant modifications to the pump unit (e.g. seal materials, seal versions, auxiliary seals, hydraulics):
  - A new ignition hazard assessment is carried out.
  - The pump unit is inspected according to the state of the art and the requirements of Directive 2014/34/EU
  - The modifications are documented in the explosion protection document of the operator according to Directive 1999/92/EC, or in the conformity assessment procedures according to Directive 2014/34/EU with the issue of a declaration of conformity.

2.3 Materials and liquids

Ensure that

- all components are electrically conductive.
- the build up of static electricity is avoided: Only use pumped liquids with a conductivity > 10^{-9} S/m.
- Do not use pump for liquids that can create an explosive atmosphere under normal atmospheric conditions or under process conditions.
- in the IIC explosion group: paint is not applied with thicknesses of > 200 µm.
  - for several applications, the value refers to the total thickness

3 Explosion protection label

3.1 Marking

This section provides information applicable to all explosion protection labels.

The temperature class and type of explosion protection are documented on the explosion protection label.

The identification mark attached to the pump identifying it as non-electrical equipment in accordance with Directive 2014/34/EU applies to the specified pump/motor combination. The motors comply with the Directive and are tested and identified accordingly.

If the pump is delivered without a motor, this attached identification mark only applies to the pump. In this case, it is the responsibility of the owner/user of the pump to equip the pump with a motor that complies with Directive 2014/34/EU.

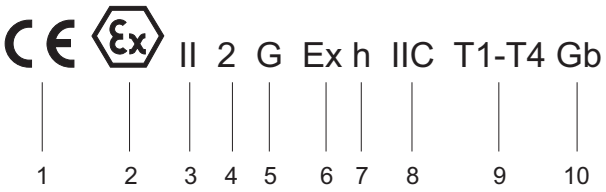

Fig. 1 Explosion protection labelling at the pump (example)

1 CE label
2 Symbol for explosion protected equipment
3 Equipment group according to Directive 2014/34/EU
4 Equipment categories according to Directive 2014/34/EU
5 Ex atmosphere
6 Symbol Ex
7 Type of protection against ignition (in this case h)
8 Equipment group with subgroup
9 Range of Temperature class
10 Equipment Protection Level (EPL)

3.2 Temperature class

Flammable gases and vapors are divided into temperature classes for their inflammability on hot surfaces.

The surface temperature of the pump must always be less than the lowest ignition temperature for the temperature class.

Temperature class	Lowest ignition temperature of the mixture [°C]	Maximum surface temperature [°C]
T1	450	< 450
T2	300	< 300
T3	200	< 200
T4	135	< 135
T5	100	< 100
T6	85	< 85

Tab. 3 Temperature class

The pump may only be operated up to the temperature class specified on the type plate.

3.3 Type of protection against ignition

The **type of protection against ignition** describes the type of measures used to prevent ignition in a potentially explosive atmosphere.

The marking consists of the symbol Ex (explosion protection against ignition), followed by letters which describe the type of type of protection against ignition.

Type of protection against ignition	Meaning	For an area	
		without electrical equipment	with electrical equipment
Ex h	Ignition source monitoring	X	–
	Design safety	X	–
	Liquid encapsulation	X	–
Ex d	Pressure tight encapsulation	X	X
Ex e	Enhanced safety	–	X
Ex nR	Vapour inhibiting safety	X	X
Ex o	Oil encapsulation	–	X
Ex p (xb, yb, zc)	Over pressure encapsulation	X	X
Ex q	Sand encapsulation	–	X
Ex m	Cast encapsulation	–	X
Ex i	Intrinsic safety	–	X
Ex t	Protection provided by the casing	–	X

Tab. 4 Type of protection against ignition

3.4 Ex atmosphere

The **Ex atmosphere** describes the type of potentially explosive atmosphere in a zone.

Ex atmosphere	Meaning
G	Flammable gases and vapours
D	Flammable dusts

Tab. 5 Ex atmosphere

3.5 Zone / Equipment group / Area of use / Category

The **zone** depends on the probability of the formation of an explosive atmosphere and differentiates between gases (G) and dusts (D).
Pumps are divided by area of use into **Groups** or **Equipment groups** and **Equipment Protection Levels (EPL)** or **Categories**.
The **Category** or the **Equipment Protection Level (EPL)** describes the design safety of the pump and is dependent on the Zone.

Zone	Frequency of formation of dangerous explosive atmospheres	Classification according to EN 80079-36		Classification according to Directive 2014/34/EU		Design safety
		Group	EPL	Equipment group / Area of use	Cate-gory	
–	–	I	Ma	I / underground	M1	very high
–	–	I	Mb	I / underground	M2	high
0	constantly or over long periods or frequently	II	Ga	II / other	1G	very high
1	occasionally (any faults occurring may not become source of ignition)	II	Gb	II / other	2G	high
2	unlikely; if they do, only infrequently and for a short period (surface temperature must not become a source of ignition in normal operation)	II	Gc	II / other	3G	normal
20	constantly or over long periods or frequently	III	Da	II / other	1D	very high
21	occasionally (any faults occurring may not become source of ignition)	III	Db	II / other	2D	high
22	unlikely; if they do, only infrequently and for a short period (surface temperature must not become a source of ignition in normal operation)	III	Dc	II / other	3D	normal

Tab. 6 Zone / Equipment group / Area of use / Category

4 ATEX measures

4.1 Installation and connection

The measures to install and connect depend upon the category

4.1.1 Check the explosion protection label

► Compare the explosion protection label on the pump with the information in the ATEX Declaration of Conformity and make sure that both sets of information match the explosion protection requirements at the installation site.

4.1.2 Check operating conditions

1. Check ambient conditions:
   – Ambient temperature -20 °C to +40 °C (depending on material)
   – Seals and lubricants are resistant to all vapors, gases and dusts present at the location of use
2. Check the temperature of the pumped medium:
   – 0 °C - 100 °C (depending on material → data sheet)
3. Check properties of the pumped medium:
   – Does not contain solids
   – Does not create an explosive atmosphere under normal atmospheric conditions or under process conditions
   – Chemically stable (does not tend break down exothermically under operating or ambient conditions or when subject to pressure)
   – Non-flammable when excluded from oxygen
4. Check installation site requirements:
   – Free air supply to pump and motor
   – Grounding connection present
5. Do not use pump under different operating conditions.

4.1.3 Performing basic measures

1. Check whether pump and motor are suitable for use in the selected area (→ 3.1 Marking, Page 5).
2. For inverter operation:
   – Only use motors that are approved for this type of operation
   – Ensure nominal speed of pump is maintained (→ Data sheet)
   – Motor must be approved for ATEX operation with inverter
   – Observe standards and regulations for installation and operation with an inverter
3. For pumps with motors supplied by the operator:
   – Motor must meet requirements (group, category) of the potentially explosive area
   – When using a frequency inverter, the motor must be suited for this application
4. Observe the operating manuals for the motor, coupling and monitoring devices.
5. For couplings with contact guard: Only use contact guards made from electrically conductive components.
6. Prevent uptake of foreign bodies (for example, by using a separator, starting strainer).
7. Install leakage monitoring that meets the requirements of Directive 2014/34/EU.
8. Protect the pump from knocks and from falling metal objects.

4.1.4 Performing measures for category 2

1. Ensure there is monitoring equipment to prevent overheating due to dry running.

Type and design of the shaft seal	Action
Single mechanical seal	► Ensure protection against dry running (→ Tab. 8 Monitoring equipment to avoid overheating, Page 9).
Double mechanical seal arranged back-to-back	► If necessary fit a pressure gage for the sealing medium.
Double mechanical seal in tandem arrangement	► If necessary, fit level measurement device for the supply container. ► If the temperature difference between sealing medium and temperature class < 15 Kelvin: Fit a temperature gauge for the sealing medium.
Single mechanical seal with quench and a secondary seal with lip seal	
Magnetic coupling	► Ensure protection against dry running (→ Tab. 8 Monitoring equipment to avoid overheating, Page 9).

Tab. 7 Possible control measures to avoid dry running and overheating

2. Ensure that there are monitoring systems to avoid overheating, using the following table.

Parameters[1)]	Action
Constant	► If system control is not suitable for monitoring: Install power monitoring. ► Set the monitoring according to – the pump parameters – the characteristic curve of the pump – the motor manufacturer's specifications
At least one is not constant	► If system control is not suitable for monitoring: Install measurement of flow and/or tank level ► Set flow measurement and/or tank level measurement device according to – the pump parameters – the characteristic curve of the pump – the necessary level in the tank

Tab. 8 Monitoring equipment to avoid overheating

1) Flow rate, head, density, viscosity, speed of rotation, flow quantity

4.2 Operation

⚠ WARNING

Risk of explosion due to vapors of the pumped medium!

► Collect leaking liquid safely and damage fitting in accordance with local regulations.

4.2.1 Performing basic measures

1. Make sure that pump is completely filled and bled.
2. Observe the operating manuals for the motor, coupling and monitoring devices.
3. Consult the manufacturer regarding each operation of the pump (including test runs).
4. Following an emergency stop, have recommissioning carried out by authorized personnel.

Conveyed fluid

► Comply with maximum permissible temperature of the pump medium (→ Data sheet).

4.2.2 Performing measures for category 2

Avoid overheating

► Monitor system according to the behaviour of the parameters:

Parameters[1)]	Action
Constant	► Monitor motor power
At least one is not constant	► Monitor flow and/or tank level

Tab. 9 Measures to prevent overheating

1) Flow rate, head, density, viscosity, speed of rotation, flow quantity

Avoid running dry

► Take measures according to the following table.

Type and design of the shaft seal	Action
Single mechanical seal	► Regularly vent mechanical seal cavity (if present). ► Ensure that the mechanical seal cavity (if present) is always filled.
Double mechanical seal arranged back-to-back	► Monitor the pressure of the sealing medium.
Double mechanical seal in tandem arrangement	► If the temperature difference between sealing medium and temperature class < 15 Kelvin: Monitor temperature of the sealing medium. ► Monitor the level in the supply container.
Magnetic coupling	► Monitor the pump for dry running.

Tab. 10 Measures to prevent running dry

4.3 Maintenance

⚠ WARNING

Risk of explosion due to vapors of the pumped medium!

- ▶ Allow the pump to cool completely before any maintenance and repair work.
- ▶ Empty the pump before maintenance and repair work and flush it, when necessary.
- ▶ Collect leaking liquid safely and damage fitting in accordance with local regulations.

⚠ WARNING

Explosion hazard due to unsuitable replacement parts!

- ▶ Only replace worn parts with genuine spare parts.

ⓘ Maintenance intervals are reduced under extreme operating conditions or for use in an aggressive environment.

Perform maintenance work according to the pump operating manual.

4.3.1 Performing basic measures

1. Remove dust build-up according to the operating specifications.
2. Remove swarf and dirt from on and below the coupling guards.
3. Observe the operating manuals for the motor, coupling and monitoring devices.
4. As a precautionary measure, replace pump antifriction bearings with lifetime lubrication every 2 years when used in category 2 applications.
5. Change the motor roller bearings as specified by the manufacturer.
6. Check at appropriate intervals:
   - Motor and coupling according to manufacturer manual
   - deformation of the guard around the coupling and spacing to the rotating parts
   - the functioning of the monitoring devices
   - If present: Suction line for leaks