

Safety Information for Bello Zon® Systems, type CDV (Diluted Chemicals)



Safety information on chemicals

- Chemical containers, safety trays and intake lances should be clearly marked (e.g. acid = red, chlorite = blue) and the possibility of confusion must be avoided.
- Hydrochloric acid is to be connected on the left-hand side (chemical formula HCl, concentration 9%).
- Sodium chlorite is to be connected on the right-hand side (chemical formula NaClO₂, max. concentration 7.5%).
- Risk of explosion if higher concentrations of sodium chlorite are connected!
- Accidental mixing of both chemicals must be avoided under all circumstances as, in this case, toxic chlorine dioxide gas may be released and may cause a risk of explosion.
- Residual chemicals remaining in the tank must not be refilled into another chemical container or tank as this may cause a risk of confusing the chemicals.

Safety information on operation of the system

- Only instructed personnel are permitted to operate the Bello Zon® system (this also includes changing the chemical containers). Applicable safety guidelines, must be observed; in Germany: Accident Prevention Regulations, § 10 Chlorination of Water.
- After changing the chemical container, the intake line of the corresponding chemical pump must be bled. After bleeding, make sure the bleeder cock valve is closed again.
- The stroke length of the pumps must not be adjusted during operation. If changes are necessary, the capacity of all pumps must be re-calibrated to ensure the ratio of chemicals of 1:1 (acid:chlorite) is maintained.
- The flow monitoring facilities in the bypass line and in the chemical lines must be active and set correctly.

Safety information on installation and start-up

- System start-up must only be carried out by a ProMinent service technician or personnel trained by ProMinent. Prior to start-up, the system must be examined by a specialist to ensure the installation is safe for operation.
- The flushing device included in the scope of delivery must be installed in the bypass line directly after the system. The flushing device must be open during the commissioning at the first filling of the reactor with water to prevent any impermissible excess pressure in the bypass line and reactor. Otherwise the reactor might burst!
- The installation of the system must be carried out such as to reliably ensure that under no circumstances (operation, standstill, fault) can a vacuum act on the bypass line. Otherwise there may be a risk that the chemicals are drawn through the reactor uncontrolled and explosive gas vapours can collect in parts of the system.
- The risk of a vacuum is especially high (particularly when the water is stationary):
 - when the main or bypass lines end in a reservoir below the water level.
 - if the direction of flow in the main water line (with large diameter) reverses (non-return jack valves are never 100% tight!).
 - the system is positioned above the level of the main line or of the reservoir.

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Installations with a longer bypass line are also dangerous, particularly when the bypass line is routed downward, i.e. the metering point is located below the level of the Bello Zon® system.

- **In the case of doubt, a back pressure valve (this valve should be backpressure safe, i.e. it should keep its function also at elevated pressures in the main water line) should be installed at the end of the bypass line. A vent valve should be installed at the highest point of the bypass line.**
- **Only PVC (PN 16) may be used as material for the bypass line. The use of steel or stainless steel is not permitted.**

Safety information on storage tank systems

- **The chemical tanks that are connected directly to the Bello Zon® system must never be located on a higher level than the Bello Zon® system.**
If the tanks cannot be installed below the Bello Zon® system or if large quantities of chemicals are to be connected, the supply lines must be hydraulically separated from the storage tanks by the use of intermediate tanks. Otherwise, due to the fluid level in the tank store, a positive pressure occurs in the intake line that can cause an uncontrolled flow through the generator or incorrect metered quantities can occur at different levels in the storage tanks.
- **Large quantities of chemicals will flow out if the chemical pump in the Bello Zon® system has a positive pressure (i.e. the level of a directly connected large container is above the intake connection of the metering pump) and the intake line breaks off or a leak occurs.**

General information on chlorine dioxide

Gaseous chlorine dioxide has an orange/yellow colour and a pungent odour. Chlorine dioxide is unstable and as from a concentration of 10 vol.% (= 300 g/m³) decomposes explosively into chlorine and oxygen. Dilution reduces the explosion tendency; there is no risk of at concentrations below 10 vol.%. Critical concentrations of chlorine dioxide can be expected, for example, in the gas space above an aqueous chlorine dioxide solution with a concentration of more than 8 g/l chlorine dioxide (at a temperature of 20 °C). Without a gas space above them, chlorine dioxide solutions are explosive as from a concentration of 30 g/l, i.e. they can self-decompose explosively without any external influence such as heat, sparking, dirt or rust.

Measures to be taken in the case of accidents

If the concentrated chemicals are mixed together uncontrolled, a violent chemical reaction immediately begins in which large quantities of chlorine dioxide gas are released together with the formation of heat. In this case, the accident location should be cleared immediately. Critical gas concentrations may also be reached after some time. Escaped gas can be washed down by spraying it with water. A sodium thiosulfate solution can be poured onto spilt chlorine dioxide solution. It should then be diluted with a lot of water and flushed into the drainage system.

Health protection

- Maximum workplace concentration = 0.3 mg/m³ = 0.1 ppm
- Odour threshold: From approx. 15 mg/m³
- Respiratory protection equipment: Gas mask filter B/grey
- Eye protection: Protective goggles, face visor
- Hand protection: Rubber gloves
- A chlorine dioxide gas concentration of above 45 mg/m³ can cause respiratory complaints as well as irritation of mucous membranes, taste irritation and headaches.