


SAFETY REGULATION VV 27 Exposure to sulphur dioxide (SO2)	 Balen/Pelt
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Nature of last modification: Adjustment of limit values Conform new legislation, see blue text & general update	

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Exposure to sulphur dioxide (SO₂)



Balen/Pelt

1 PURPOSE

At the Roasting department in Balen there is a risk of sulphur dioxide gas emissions:

1. due to diffuse leaks from the installation.
2. when performing tasks on the installation (e.g. boiler cleaning), or a planned stop.
3. in the event of an unplanned shutdown of the installation (emergency stop).

The sulphur dioxide spreads in the environment and can pose a risk to anyone working within the Roosterij as well as within the adjacent departments Logerij, Zinkhallen and Zn-dust/CGG.

This safety regulation aims to reduce the risks by providing information and taking measures.

2 SCOPE

This regulation applies, regardless of the tasks performed, to all those present at one of the following production departments of the Balen site:

- Roosterij and surroundings
- Logerij
- Zinc halls
- Zn-dust/CGG

3 IMPORTANT BACKGROUND INFORMATION

Sulfur dioxide (SO₂) properties

Sulfur dioxide is a pungent gas that is well soluble in water and heavier than air. The concentration is expressed either in ppm (ml/m³) or mg/m³. The conversion from ppm to mg/m³ is 1 ppm= 2.66 mg/m³.

The limit value in Belgium (2022) is **0.5 ppm** and the STEL value is **1 ppm**.


Lower concentrations (< 5 ppm) are experienced as a nuisance due to a deterioration of the airways and eyes and a specific taste sensation.

In high concentrations (> 20 ppm), damage to health can occur with longer exposures. It can then cause breathing problems and severe stimulation of mucous membranes and eyes.

At concentrations above 100 ppm and an exposure duration longer than 30 minutes, the gas becomes life-threatening (this is also called the IDHL value).

For people with asthmatic conditions, exposure to lower concentrations of SO₂ (some studies say as low as 0.1 ppm) is also a serious health risk, as the gas can trigger an asthmatic attack.

Exposure to low concentrations does not lead to chronic health effects (in non-asthmatics). The excitatory effects disappear shortly after exposure. The consequences of exposure to higher concentrations can manifest themselves for a longer period of time . Adequate treatment by a doctor is then necessary.

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Important limit values for sulphur dioxide gas

Name	Definition	value
Limit of smell	Concentration that can still be observed by most people	0.5-0.7 ppm
Legal limit value	Legal limit value. 8 hours weighted average exposure to which one may be exposed for a maximum of 8 hours per day	0.5 ppm
STEL value	Short term exposure limit, value to which one may be exposed max. 4 times a day for a maximum of 15 minutes with a minimum interval of 1 hour	1 ppm
IDLH value	Immediate dangerous to life or health, serious health damage after 30 minutes of exposure	100 ppm
NOAEL	Concentration below which no adverse effects are known	0.2 ppm

4 PRESCRIPTION

4.1 No access to asthmatics

People with asthmatic complaints or a history of asthma can get very serious complaints (acute shortness of breath) or even a static asthma (acute asthma attack) when exposed (already at very low concentrations). As exposure at the production sites cannot be ruled out, these persons are advised not to enter the relevant departments (see also 2.3.12 of AH01 Guidelines for contractors).

In the event that someone nevertheless develops an asthmatic attack, the internal emergency number 9300 should be called as soon as possible or other professional help in case of urgency (112) should be called in.

4.2 Action values

The danger of sulfur dioxide gas depends on its concentration. The effects on health are due to the irritating properties of this gas rather than its toxic properties. Therefore, the actions depend on the concentration. Concentrations will not always be known and when measured one will always see fluctuations. In case of measurement, short-term peaks may be ignored, it is intended that one acts on the average image of a few minutes. In the absence of measurement data, an expert estimate of the concentration level or measurements should be provided.

Scenario 1: sporadically > 0.5 ppm (olfactory limit/limit value)

When employees detect sulphur dioxide (odour limit roughly coincides with the limit value) or their gas measuring device indicates 0.5 ppm, they report this in the control room. This exposure can occur as a result of diffuse leakages from the installation: as a rule, these can last longer, the concentrations are limited (< 0.5 ppm) but can also occasionally be higher. Given a STEL value of 1 ppm, the operator has ample time (15

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minutes) to go to the control room. In this situation, operators in the respective environment are equipped with a portable gas measuring device and must wear a half-face mask with ABEK filter.

The same happens if it is known that there are leaks on the Roosterrij, there is a special operation with an increased risk of sulphur dioxide emissions or the fixed SO₂ monitoring network indicates that there is increased release of SO₂.

Scenario 2: > 0.5 ppm – 10 ppm

As soon as his measuring instrument shows a value **> 0.5 ppm**, the operator in question alerts the control room of his department. He can continue his work with suitable respiratory protection or he leaves the area (if he does not have suitable respiratory protection at hand). Since the protection factor (TPF : Assigned protection factor and not the NPF: nominal protection factor) of the ABEK gas filter for half-face masks is 20, it is possible to work at concentrations of maximum 10 ppm.

The following actions are taken from the roasting control room:

- Other employees (including contractors) are warned
- the control room of the Logerij, Electrolyse and Zn-dust/CGG is informed depending on the measurement results of the fixed monitoring network or the wind direction.

The Roosterrij control room also takes the following action:

- investigation into the cause of the emission in order to reverse it if possible

Preferably, the area is avoided.

Nyrstar is responsible for providing appropriate respiratory protection to third party employees (unless contractually agreed otherwise).

Note: In case of sensation of stimulation in the eyes, a full face mask is recommended.

Scenario 3: > 10 ppm, < 100 ppm:

The zone must be evacuated as a filter mask does not provide sufficient protection to stay in this zone for an extended period of time. In this environment, only very short-term (max 30 minutes) and urgent work may be carried out, using a full face mask with ABEK filter to prevent eye stimulation. When you get a sense of taste through the ABEK filter cartridge, you have to leave the place immediately. (one never knows in advance how saturated the gas filter was).

The following actions are taken from the control room:


- other employees (including contractors and) are warned
- the control room of the Logerij, Electrolyse and Zn-dust/CGG is informed depending on the measurement results of the fixed monitoring network or the wind direction.

Scenario 4: > 100 ppm:

In this environment, only urgent work may be carried out using independent respiratory protection. Arisk analysis should be carried out prior to the work, assessing, among other things, the risks of respiratory protection failure.

The following actions are taken from the control room:

- other employees (including contractors and) are warned

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- the control room of the Logerij, Electrolysis and Zn-dust/CGG is informed depending on the measurement results of the fixed monitoring network or the wind network.

Calamities

In the event of (possibly) short-term very high concentrations with a clearly visible release of SO₂ gas (for example as a result of the unplanned shutdown of the Roasting Plant under unfavourable weather conditions), the Porters are warned and the Emergency Plan is put into effect. Through the Emergency Plan, evacuation will be carried out that can be cross-service.

Summary action values

Concentration SO ₂	Protection
> 0.5 ppm to 10 ppm	Half face mask + ABEK filters mandatory.
> 10 ppm to 100 ppm	Only secure urgent works, e.g. Full face mask + ABEK filters (short-term use < 30 minutes, otherwise independent respiratory protection)
> 100	Only securing urgent works e.g. Performing risk analysis Independent respiratory protection

4.3 Availability of flight masks

At the Roosterij department it is mandatory to always bring an escape mask, unless respiratory protection with a higher degree of protection (ABEK half-face mask, full face mask) is already used. This guarantees that one can safely leave the zone with an occasionally high concentration of SO₂.

In the Logerij service, escape masks are available in the elevator of the main Logerij building that, if necessary, can be used to leave the elevator in a safe manner.

4.4 Protocol victims exposure sulfur dioxide

First aid

In case an employee shows symptoms that may be associated with exposure to sulfur dioxide (e.g. cough, shortness of breath, painful breathing, vomiting), take the following action:

- put the person in a fresh air environment in a half-sitting position
- do not let him smoke or exert himself
- alert the Medical Service or call 9300, in the meantime stay with the person.
- outside office hours, the industrial helpers are called upon, who may decide to contact the emergency number 112

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Treatment protocol

The Medical Service has an up-to-date protocol for the treatment of victims who have been exposed to sulfur dioxide (***XW-435-VI-0-00013***). The medication prescribed in the protocol is in stock on the BGD.

Note: Outside office hours, the 112 service is called upon

4.5 Nyrstar Medical Department contact details

For questions or concerns regarding the application of this prescription, please contact Nyrstar's Medical Service during office hours:

Occupational physician: Dr De Groof, ☎014 819475

Nurse: ☎ 014 819270

4.6 Information to third-party employees

The risks associated with the exposure of sulphur dioxide are mentioned in the Safety Film at the gate.

The Services Roosterij and Logerij point out the risks and course of action to employees when granting the work permit.

Third-party employees must be able to guarantee and demonstrate that they are not astute (see AH01 Guidelines for Contractors).

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5 RESPIRATORY PROTECTION SULPHUR DIOXIDE GAS

The following respiratory protection should be worn in case of sulphur dioxide gas.

Concentrations > 0.5 ppm but less than 10 ppm: **half-face mask** with filter canisters with a yellow ring and the code "E" or "ABEK". Na. **Full face mask** when eye stinging occurs

Concentrations > 10 ppm but less than 100 ppm: **full face mask** with filter canisters with a yellow ring and the code "E" or "ABEK".

NOTE!! This only applies to short-term use (maximum 30 minutes) e.g. safeguards. When the filter is saturated, the zone must be left immediately. For longer stays, autonomous respiratory protection must be worn.

Concentrations > 100 ppm: **autonomous breathing apparatus** (breathing air or fresh air cap). In the risk analysis, attention must be paid to the reliability of the air supply (sufficient stock in bottles, back-up, pinching of hoses, ...). **Wearers of autonomous breathing apparatus must be specifically trained and inspected for this purpose.**

Important notes:

- Due to the simultaneous presence or risk of metallic dust: use a filter canister that is also suitable against dust (P3).
- It should be tested in advance whether the breathing mask fits well to the face and that one has a correct and unsaturated filter. Check the proper functioning of the filter at the start by covering the filter canisters (inhalation) and sucking in air. If air does flow into the mask, do not go to work.
- As soon as the pungent smell of sulfur dioxide is detected in the mask, immediately cease work. The filter stations may be saturated and must then be replaced. With prolonged use in a high concentration, these filters must be replaced daily.
- **When work is carried out at the relevant site, the possible exposure to SO₂ gas should be included and discussed** in the Task Risk Analysis (TRA) for non-routine tasks.
- **One must always be careful whether process conditions can be optimized at the relevant work locations (example: controlling more negative pressure in the system, sealing diffuse leaks faster,...).**