



## Neighborhood information from Linde Gas AS about safety and notification



### **This information material contains important information for the general public in the event of a major accident occurring at Linde Gas Leirdal, Gamle Leirdalsvei 2.**

If the alarm goes off at Linde Gas AS, and there is a major accident situation, the nearest neighbors will be notified by telephone. Which neighbors are notified will depend on the situation. They may be asked to close ventilation/windows and stay indoors or move away from the area around Linde Gas. After the rescue service has arrived, they take over responsibility and the public must comply with their instructions and recommendations.

### **About Linde Gas AS at Leirdal**

Linde Gas AS's operations in Leirdal are covered by the Major Accident Regulations and are therefore obliged to inform neighbors about dangers that may arise and what is being done to prevent incidents that may affect third parties. A safety report has been submitted to the supervisory authorities in accordance with §9 of the Major Accident Regulations.

### **Factory Description**

The factory at Leirdal was commissioned in the mid-1980s. The first construction phase was the air gas factory, followed by a filling plant for gas cylinders. In the late 1990s, the factory was expanded with a filling plant for propane cylinders.

At the air gas factory, Oxygen, Nitrogen and Argon are produced. The gases are stored in storage tanks and distributed in liquid form by tanker trucks to customers. In the gas cylinder filling plant, gas cylinders are filled with both pure gases and mixtures. In addition to what is produced at Leirdal, Carbon dioxide and Propane are trucked in. Carbon dioxide is stored in a storage tank and filled into gas cylinders, either as pure gas or in the form of a mixture with other gases. Propane is stored in a storage tank and filled into gas cylinders. Other types of gases are imported from abroad.

The remaining area is used for storage and loading/unloading.

### **Description of the site and its surroundings**

Linde Gas AS's production facility is centrally located in Groruddalen in Oslo. The area borders Strømsveien to the south, a recreational area



to the north, and commercial activities to the west and east. The distance from the fence boundaries to the residences/workplaces of neighboring companies is sufficient so that these companies are unlikely to be affected by an accident at Linde Gas AS.

### Description of hazardous substances

Oxygen and Nitrogen are stored in large storage tanks that hold 1000 m<sup>3</sup> of condensed gas, while Propane is stored in a buried tank that holds 230 m<sup>3</sup> of condensed gas.

### Oxygen

Oxygen is not flammable, but supports combustion. This can cause non-flammable substances, such as metal, to burn. Oxygen together with fat/oil poses an explosion hazard. The boiling point of liquid oxygen at normal atmospheric pressure is -183 °C. The extremely low temperature of condensed gas can cause severe frostbite on exposed skin. The low temperature of the gas causes moisture in the air to condense and fog to form.

### Nitrogen

Nitrogen is not a flammable gas, but displaces air. The risk of suffocation is high at high concentrations and in confined spaces. The boiling point of liquid nitrogen at normal atmospheric pressure is -196 °C. The extremely low temperature of condensed gas can cause severe frostbite on exposed skin. The low temperature of the gas causes moisture in the air to condense and form fog.

### Propane

Propane is flammable in the range between approximately 2% and 10% in air. In this range, the gas can cause severe explosions. Propane is 1.6 times heavier than air will naturally accumulate in low-lying areas such as cavities, basements, trenches, and manholes. Propane is added with an odorant that makes it noticeable in the event of a leak. Inhaling propane gas does not cause direct poisoning, but it is slightly narcotic, will cause nausea and fatigue and headaches, and it is suffocating when the air is displaced. The boiling point of propane is -42 °C. Leaks of propane in liquid form cause frostbite on bare skin. The gas's low temperature causes moisture in the air to condense and form fog.



5 Kg and 10 Kg composite gas cylinder

### Description of activities that may pose a hazard

The following incidents have been identified through risk analyses and are considered to, in the worst-case scenario, contribute to incidents that may affect third parties:



### **LPG (propane) release**

This can happen through the safety valves of the storage tank, the storage tank bursting or when unloading Propane into the storage tank. In the first case, the propane is in the gas phase and will spread with the wind. If the release occurs during unloading or if the tank bursts, the propane gas is in both the liquid and gas phases, and will spread partly with the terrain and partly with the wind. Due to our safety routines, the probability of a release being ignited is very small. Should it nevertheless occur, it will normally only have consequences for equipment or people standing near the release site. The risk to neighbors is very small.

### **BLEVE tanker (propane)**

If a fire were to occur around a tanker, the ultimate consequence could be that the tank ruptures and a fireball is formed. Due to our safety procedures, the probability of a BLEVE occurring is very small. Should it nevertheless occur, it will normally only have consequences for equipment or people standing nearby. The risk to neighbors is very small.

### **Release of LOX (liquid Oxygen)**

This can happen when loading Oxygen from a storage tank to a tanker truck or if the storage tank ruptures. The liquid and gas phase will spread partly with the terrain and partly with the wind. We have strict safety procedures, so the likelihood of this contributing to an ignition is minimal. The risk of this affecting a third person is small.

### **Release of LIN (liquid nitrogen)**

This can happen when loading Nitrogen from a storage tank to a tanker truck or if the storage tank ruptures. The liquid and gas phase will spread partly with the terrain and partly with the wind. We have strict safety procedures, so the likelihood of this happening is minimal. The risk of this affecting a third person is small.

Linde Gas AS is obliged to take necessary measures to prevent major accidents and minimize the impact on people, the environment and material.

### **Measures to prevent unwanted incidents**

Linde Gas AS has a system for safety training for all employees and contracted workers. This ensures that everyone working at Leirdal has the necessary expertise to be able to work safely. Risk analyses are regularly carried out for all parts of the plant and measures are implemented where conditions that could lead to unwanted incidents are identified. We also have a system for handling accidents and near-accidents and internal deviations. This is to learn from any unwanted incidents that may occur and prevent them from happening again.

Risk analyses, recorded accidents and near misses are available to all countries within Linde Gas, so that we can learn from each other's experiences. Regular preventive maintenance is carried out and regular safety and fire safety rounds are held. Technical safety systems, alarms and detectors are incorporated to secure the facility.



### **Protective measures in the event of accidents**

The plant is equipped with fire alarms and gas detectors with direct notification to the fire department. Linde Gas AS has established an Emergency preparedness group with trained personnel. The Emergency preparedness group we have groups for firefighting, medical support and smoke divers, among other things. Training and exercises are carried out regularly every year. Some of the exercises are carried out together with the Oslo Fire and Rescue Service, with whom we have very good cooperation. To limit the consequences of an accident to the greatest possible extent, Linde Gas AS has prepared an Emergency plan that has been submitted to the municipality and the Oslo Fire and Rescue Service.



Production plant for air gases: Oxygen, Nitrogen and Argon.

The entire air gas plant is designed according to the "fail safe" principle. If operational disturbances occur, all or part of the process

stops automatically. Furthermore, a number of manual emergency stop functions and automatic alarms have been added that notify external emergency services at all departments to ensure rapid shutdown and notification.

### **Access to internal and external resources**

In the event of a major accident, the emergency services are notified. In addition, Linde's Emergency preparedness group is activated. If necessary, Linde's national and regional crisis teams are also activated. The activities at Linde Gas AS (Gamle Leirdalsvei 2) are included in external authorities' risk and vulnerability analysis.

### **Contact**

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If you would like further information, please contact:

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Information about supervision of activities under the Major Accidents Regulations can be obtained from the Directorate for Civil Protection and Emergency Preparedness (DSB).