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| **Procedure** | | Et bilde som inneholder tekst, utklipp  Automatisk generert beskrivelse | |
| Work in cisterns, sumps and confined spaces – Skagerak Kraft | | | |
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| Auditor | Erlend Kaarstad | Approval date | 30.10.2023 |

# Purpose

The purpose of this procedure is to prevent accidents while carrying out work in environments where there is a risk of noxious fumes or reduced oxygen levels.

# responsibility

The HSE Manager at Skagerak Kraft AS is responsible for ensuring that this procedure is approved and audited.

The line managers have a responsibility to ensure that this procedure is followed within their area of responsibility/unit and that the necessary personal protective equipment is made available to each employee, that training in its use is provided and that such equipment is worn/used.

Each employee has a responsibility to wear and use personal protective equipment in accordance with the present procedure.

# Description of work

## Planning

* A Job Safety Analysis (JSA) must always be carried out before work starts. Necessary rescue equipment and a rescue plan must be assessed and documented as part of the JSA.
* When working in cisterns, sumps, confined spaces or worksites at a lower level where there is a risk of noxious fumes or reduced oxygen levels, there must always be at least two people present.
* The standby person must not go down into the cistern, but remain above and supervise the work.
* The standby person must be able to communicate with colleagues in the cistern or sump.
* First aid equipment and eyewash bottles containing sterile water must be available.

## Gas measurement

* Anyone who is to use a multi-gas meter must have received the basic training in its use, understand what the results mean and have insight into relevant risk factors. The training must be documented.
* Before anyone enters cisterns/sumps or confined spaces at a lower level, a gas meter must be lowered that measures H2S, CO, O2 and LEL (EX zone: risk of explosive gases or dust). The meter must be suspended for at least one minute so as to provide a correct measurement.
* If the oxygen levels in the cistern/sump are too low (< 20 per cent), ventilation must be provided with fresh air using a mobile unit and/or fresh air equipment.
* Work in cisterns/sumps or confined spaces at a lower level must not be carried out until satisfactory exposure limit values have been reached. It is vital that the multi-gas meter is always used at the lowest level at which work is performed.
* If an alarm is triggered, leave the worksite immediately and return to the agreed meeting place.

## Personal protective equipment

Personnel who enter cisterns/sumps or confined spaces at a lower level must wear and use Skagerak’s personal protective equipment and basic clothing, and in addition carry a gas meter for H2S, CO, O2 and LEL.

The standby person must have received the necessary training in the use of this equipment and interpreting and understanding the measurement results.

## Particularly hazardous conditions

### Dry ice blasting

Dry ice blasting is a method that can be used to clean a stator. However, CO2 will sink and displace oxygen in the levels below. A gas meter must be used, and personnel at the worksite must communicate with each other and be prepared to leave the area if the oxygen level falls.

### Sewage sumps

H2S gas (hydrogen sulfide) can form in stagnant waste water and sludge. This gas is heavier than air, and is therefore a particular hazard in cisterns, sumps, pools, tanks and channels. At lower concentrations it smells strongly of rotten eggs, but at higher concentrations it deadens the sense of smell. Therefore, you cannot rely on your sense of smell to detect H2S, and you must use a suitable gas meter in any situation where H2S may form.

H2S gas is flammable, and when mixed with air there may be a risk of explosion at concentrations above 4 per cent.

If work is to be carried out in a cistern, pool etc., waste water and sludge must be removed from the worksite.

All personnel entering the cistern/sump must always wear a multi-gas meter that registers H2S, CO, O2 and LEL.

If there is gas in the cistern/sump, and it is still necessary to enter it to work, either ventilate with a fan (to supply air) or use fresh air equipment.

When working in cesspits, vaccination may be necessary.

Contact BHT to assess the correct need for vaccination.

### Using fans for ventilation

When using a fan for ventilation, the personnel working below must wear a safety harness connected to lifting equipment, and a standby person must be on duty above. Personnel working in the cistern must immediately exit if the gas concentrations approach the hazardous threshold or the oxygen level falls.

### Using a fresh air system

If fresh air equipment/oxygen tanks are used, the personnel working below must wear a safety harness connected to lifting equipment, and a standby person must be on duty above. Personnel working in the cistern must immediately exit if the concentrations of explosive gases approach the hazardous threshold.