



Double layer system in winter- Information and recommendations

Dear Sirs,

During the cold winter season, we would like to remind you to take special precautions for the operation of your double membrane gas storage tank in winter weather conditions. In order to ensure trouble-free operation, system components that are particularly sensitive to weather conditions should be checked and maintained on a regular basis.

To this end, we would like to provide you with the following information and recommendations:

Observe the WEATHER FORECAST

In order to prevent the negative effects of heavy snowfall and extreme frost, it is advisable to keep an eye on the current weather forecast, especially in winter. If heavy snowfall and/or frost is forecast, precautionary measures can be taken and particularly sensitive parts of the system can be checked as a precaution.

- >> Check the supporting air pressure. Is the supporting air blower working properly?
- >> Are all exhaust air flaps free to move?
- >> Are the intake openings of the blowers clear?
- >> Is there sufficient antifreeze liquid in the excess and low pressure safeguard?
- >> Is it possible to attach a snow clearing rope to the roof as a precaution?
- >> Is it possible to fill the gas storage tank in order to make use of the heat from the gas that is stored?

SUPPORTING AIR BLOWER SET

- >> Please check if the roof of the double membrane gas storage is covered by snow.
- >> In winter, all blower intake protective screens of the double membrane gas storage must be checked regularly with regard to frost formation and icing. In addition, exhaust air flaps must be checked with regard to free movement. Icing is very likely to restrict the functionality of the blowers, i.e. the recommended supporting air pressure might not be maintained.
- >> If heavy snowfall is forecast, the supporting air pressure of the double membrane gas storage should be checked as a precaution. One mbar of pressure supports 10 kg of snow load per m². However, if the weather protection membrane is at risk to being pushed in, countermeasures must be taken. On warm fermenters and digesters, the snow can be melted by filling the gas storage space. Depending on the moisture content of the snow and the outside temperature, the snow can melt or slide off. In addition, tapping on the outside of the weather protection membrane can help the snow to slide off. Suitable tools for tapping off the snow are, e.g. brooms with telescopic handles or a 50 mm HT pipe. **Attention:** Do not use any sharp-edged tools!

>> In case the centre of the weather protection membrane is dented by snow and/or water pockets, the gas storage membrane must be emptied during suitable weather conditions (no wind, no rain). Then, the supporting air blower is switched off. A rope or a tensioning strap is thrown across the weather protection membrane and, by its tightening, a flute is created through which the water can drain away. Accumulations of snow can also be removed via this flute. **Attention:** Do not use any sharp-edged tools!

EXCESS AND LOW PRESSURE SAFETY DEVICE

>> During winter temperatures, the excess and low pressure safety device should be checked for free movement at least daily - or even several times a day during extremely cold weather (for further information, please check our operating instructions, chapter inspection and maintenance plan).

>> Please avoid blowing off biogas for an extended period of time (also due to environmental reasons). Despite using very pure or highly concentrated antifreeze liquid inside the excess and low pressure safety device, (recommendation up to -30°C), it may be diluted by internal condensation (condensation of water vapor on the cold surfaces) to such a substantial extent that the safety device loses its frost protection. If a safety valve blows off for an extended period of time during frost, pipes and the technology are likely to freeze due to condensate freezing on.

>> Due to the lack of heat resources, unheated "cold" storage tanks, excess and low pressure safety devices are particularly susceptible to winter temperature conditions. So, before every frost period, they should be checked in profound manner.

The dilution effect caused by condensation is less pronounced in digesters than in relatively warm fermenters. When the excess and low pressure safety device is filled, please pay attention to the exact filling level (see scale). It will be apparent instantly if the level decreases due to evaporation or after blowing off. Likewise, it is apparent instantly if the level increases due to formation of condensate.

>> We highly recommend using a booster heater for safe operation, especially for tanks with increased formation of condensate and in areas with expected heavy and extensive frost. Our product range includes booster heaters for excess and low pressure safety devices. For further information, please contact us on +49 (0) 8334 99991-0 or at www.baur-folien.de.

CAUTION: Please do not attempt to defrost a frozen excess of low pressure safety device, e.g. with a hot air gun/gas burner due to the risk that the biogas/air mixture ignites. A hazardous explosive atmosphere may occur at the chimney opening of the excess and low pressure safety device in both normal operation and in the event of faults. Non-explosion-proof appliances must not be used there. It is safer to defrost with hot water.

LEVEL MEASUREMENT

The mechanical level measurement device (particularly rope length transmitters) may freeze, thus indicating unreliable data. Corresponding excess or low pressures may cause damage to the double membrane gas storage.

Depending on the weather, these system components must be checked with regard to icing on a regular basis. Spraying the cord with silicone spray in the area of the deflection pulleys also helps to prevent freezing.

FLAT PROFILE FASTENING

In case of membranes screwed on with flat profiles, slipping snow might accumulate on top of wall crown, causing the membrane to be pushed in sideways, contrary to clamp hose fastenings. For this reason, the top of the wall crown must be cleared in the event of large snow accumulations and any water pockets that may have formed must be skimmed off. **Caution:** Do not use any sharp-edged tools!

COMPRESSED AIR CONNECTION SET for the clamping hose

Glycol unit: As a preventive measure, approximately 0.6 litres of pure antifreeze liquid should be flushed into the system every year before the frost period (for the procedure, see glycol unit operating instructions, page 7). Please observe that only the antifreeze (ALGOREX radiator antifreeze 40°C) supplied with the glycol unit or agents with the same specifications may be used!

Screw and clamp connections should be checked regularly and tightened, if necessary.

HEAT PROTECTION FILM

By using a heat protection film, heat losses may be reduced by up to approximately 30 %, thus saving heating energy. Retrofitting is possible. For further information, please contact us via telephone +49 (0) 8334 99991-0 or www.baur-folien.de.

SNOW REMOVAL CONCEPT

Depending on the shape of the roof and the size of the tank, a rope can be thrown across the tank. For roofs with spherical shapes and central flanges, several ropes can be attached to the central flange at the highest point by using eyebolts. By pulling the rope sideways, snow can be prevented from sliding off. Attention: Caution is required if a filling level sensor is installed with the weather protection membrane at the highest point. After the snow has slid off, the supply air ducts and the exhaust air flaps must be checked with regard to their functionality.

For further information please contact us by telephone +49 (0) 8334 99991-0.

>> GENERAL SAFETY INFORMATION:

Please take care to protect yourself against accidents when working on and around the double membrane gas storages, particularly against slipping on frozen ground or slipping and falling on black ice. Make sure to wear gloves to protect yourself from frostbite when touching metal parts. At all times, watch out for icicles or avalanches falling down from roofs or tops of tanks.

If you have any further questions and/or need more information, please do not hesitate to contact us, we are please to assist!