

# FOCUS ON THE SAFE PLANT

Biogas plants should be safe to operate. In Germany, the owner is responsible whenever statutory regulations are violated. During inspections, experts regularly find defects and other weak spots under Section 29a BImSchG which is Germany's Federal Pollution Control Act; Arrangement of safety tests for facilities. **By Thomas Gaul**

**T**he most frequent weak spots found on the list of defects are in the areas of gas explosion protection, as well as the design and state of major plant components. Usually, the design of escape and rescue routes also requires improvement. To improve plant safety, the German Biogas Association started a new training concept at the beginning of this year in order to enhance the quality of the further training of plant owners and speed up the implementation of higher safety standards in biogas plants (Biogas Journal 1\_2014). Together with Toni Baumann, an independent appraiser and biogas expert, we visited an (exemplary) plant in lower Saxony (Germany) to make plant owners aware of potential weak points. Our inspection comprised the items looked closely during a safety inspection according to Section 15 BetrSichV which is Germany's Ordinance on Industrial Safety and Health Act.



*Gas leaks are a major issue in biogas plants. Leaks are not only dangerous (explosion hazard!), they are also detrimental to the environment – and they cost the owners money. So they should absolutely be avoided. "Sources of loss" are, in particular, the foil roofs of digesters and postdigesters. They should regularly be inspected for leaks. This can be done by a gas cam or a handy measuring gauge.*



*The rope leadthroughs should be inspected. Are they moving easily, and is there a sufficient supply of lubricant? Gas leaks are also possible at rope leadthroughs.*



*The portholes should be checked during the daily inspection tour of the plant. The owner will have a look in the digester anyhow – then why not look at the porthole and the area around it as well?*



*Pipe leadthroughs and connections are potential sources of leaks. Gas losses due to leaks can add up to a total of 1,000.00 euro a year in a 500 kW plant. The investment in a gas meter will be recovered quickly.*



*If covers are installed on the digester roof, the seals need a close look. A gas leak tester will provide reassuring results.*



*The external parts of an agitator should be inspected closely for dirt build-up and possible corrosion.*



*Railings should be installed in the plant. This is an item of interest especially to the professional association.*



*The cords on the foil roof are exposed to particular wear and tear due to wind and weather, and should therefore be inspected regularly.*



*The owner should also check under the edge of the foil regularly. Mechanical wear can be the cause of leaks in the transition area from the digester.*



*Know from where the wind is blowing: Better than a flag, which will hang down limp at times of no wind, a windsock indicates the wind direction. This is important to know so that the fire brigade can barricade off and possibly evacuate the area in an emergency.*

*Quite a number of trucks move regularly on the site of a biogas plant. Therefore, sturdy buffers are prescribed so that crashes against plant components can be avoided.*



*The condensate pit is a place where your personal safety may be at stake. The explosion label is somewhat misleading because the danger comes from the concentration of carbon dioxide down in the pit. There is acute suffocation hazard! Enter the pit only well secured and with personal protection equipment by climbing down a ladder.*

*The point at which the agitator enters the digester should be inspected for leaks. The ventilation should also not be bypassed but checked.*



*In addition to the portholes as such, all bolted connections should also be inspected.*



*The air from the blower supports the foil roof. The blower will give good and lasting service provided it is inspected and cleaned regularly.*



*All connection sockets should be clean. Escaping or spilling substrate mars the general image of the plant.*



The approval authority will require the construction of a wall around the biogas plant. The purpose of the wall is to prevent contamination of the environment by harmful fluids from the digesters and store tanks.



Sufficient pressure in the pipeline from the blower to the roof is important because the roof can be stabilised additionally before a thunderstorm or an approaching storm.

A stable ladder is a precondition for carrying out work at a height. Some plant manufacturers offer a platform as a kind of gangway around the plant. A work platform at a telescopic loader is an alternative. This is good provided access to the vessel is possible from all sides.

In an emergency it must be possible to shut off the gas pipeline quickly. Therefore, access to the main valve should be free and marked clearly.





*The ventilation of the cogeneration container is very important to prevent overheating and fire.*



*The pipelines with gas in the cogeneration room must be inspected. A gas detector is obligatory here.*



*Proper bolting of pipe connections installed on the roof of the cogeneration container is important.*



*Fire extinguishers (also with CO<sup>2</sup>) in good working order should be available in every plant, also a lamp for use in potentially explosive atmosphere.*



*Visual and audible warnings are required to signal the state of the plant to rescue personnel on their arrival. Suitable rescue measures can be taken more quickly.*



*A warning device should also be available in the common room.*



*Signs warning of fire hazard should be put up generously throughout the plant premises.*



*Exemplary: Plant layout plans and an emergency folder make it easy for rescue personnel to find their way about. A list of emergency call numbers saves valuable time for rescue. External personnel must be familiarised with the behavioural constraints on the premises before they are allowed to start work.*



*The gas pipeline from the post-digester should also be inspected.*



*The biogas flare should be state of the art and always ready for operation.*



Appropriate warning devices should also be available at the satellite cogeneration unit.



Such a "go-devil" is a tool to clean the pipelines from time to time.



This also applies to shutoff devices without which a satellite cogeneration unit must never be operated.



Warnings instruct visitors to wear ear protectors. Especially during open-house days, visitors with a cardiac pacemaker should be told not to enter the cogeneration unit room.



The fire protection function must be restored where a hole is cut in a fire wall. A badge provides the required information. An electric check must be made every three years. This is a one-and-a-half day job for a trained electrician.





Self-luminous signs marking escape routes are prescribed by law.



At a place where personnel assemble in an emergency must be signposted and always read for operation.



First-aid kit and ear protectors should be available for your personal safety.  
Exemplary gas measuring device and equipment in the cogeneration unit room.



The storage of trace elements and their dosing are exemplary in this plant. Computer programmed dosing minimises the hazard for the operator.



A catch basin must be available where water-polluting fluids are handled.



*Good lighting of the cogeneration room improves safety and makes work easier*    *Personnel protection equipment should be handy and marked.*



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