

GAS STORAGE CONCRETE PROTECTION CONCRETE REFURBISHMENT EMISSION PROTECTION SUBSTRATE STORAGE

AGROTEL and CenoTec

a strong union

The acquisition of CenoTec strengthens AGROTEL's position as Europe's leading component manufacturer in the biogas sector and further expands its product portfolio. Customers continue to benefit from the proven "one-stop-shop concept" from development and production to service and maintenance, we are the point of contact for our customers and can respond to their individual requirements. The expertise of AGROTEL and CenoTec employees complement each other perfectly, creating plenty of room for innovation and a constant increase in product quality. By taking over the production site with state-of-the-art machinery in Greven, the products can be manufactured even faster and more individually according to customer requirements.

As an internationally active family business, we stand by the quality and durability of our products. AGROTEL CenoTec's quality management and environmental management are certified to ISO 9001 and ISO 14001.





What sets us apart

- » 30 000 $m^2\,production$ area in Neuhaus am Inn, Bavaria
- » 15 000 m² of manufacturing space in Greven, North Rhine-Westphalia
- » Performance capability
- » Delivery reliability
- » Owner-managed family business

, Bavaria Iorth Rhine-Westphalia

AGROTEL and CenoTec

what sets us apart

Consulting, planning and project management

Our qualified consultants will find the most suitable solution according to your wishes and requirements.



Technical construction

With our experienced staff in our inhouse construction and also statics department, we can react flexibly to your needs and also offer support with the official approval of your project.



Production Made in Germany

With our unique technical-textile confection with production machines that are state of the art, the company's own steel construction (EXC 3 gem. EN1090-2) and in-house locksmith, as well as a warehouse and logistics center at our location we can guarantee optimum quality and flexibility.



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Assembly & Service

Our own assembly teams take care of the professional installation of your project and with their know how ensure a professional result. Regular maintenance measures increase the durability of your biogas storage and reduce downtimes. With our service packages we ensure that your plant will work for you a long time.



Double Membrane

Gas Storage

Construction

- » Stainless steel (1.4571) support column
- » Textile belts in star shaped formation from the central column to the tank wall, fastened in intervals of 0,8 m at the lower clamping flat bar
- » Full-surface net: supporting function for the membrane to avoid contact with the substrate in case of low gas pressure also suited as colonization area for sulfur bacteria
- » Inner and outer membrane in polyester fabric with PVC coating

The robust design and proven interaction of the individual components ensure maximum efficiency and success for your system. High-quality materials ensure unique quality.

The AGROTEL Ceno Tec double diaphragm gas cylinder complies with the relevant national requirements.



Three DMGS with airflow system 550 m³, 1210 m³ and 2590 m³ storage



Construction

- ① Outer membrane
- Inner membrane
- ③ Airflow system supply air
- ④ Airflow system exhaust air
- ③ Belt system
- (i) Stainless steel anchoring ring
- Rain drain skirt
- Blower with non-return flap
- In Pressure control flap
- ③ Safety valve
- Inspection window
- 1 Fill level measurement

Features of the material

Technical textile

- » High tear resistance, very good welding seam adhesion, high frequency welded
- » Flame-retardant B1 accord. to DIN 41021 (B1,s2,dO) and EN 13501-1
- » UV-resistant, weatherproof, gas-resistant and anti-mildew treated
- » Use of different fabric types depending on static requirements and pressures

Metal components

 » All metal components (central support, screw connection, fastening technology) are made of stainless steel

The success

lies in the detail



V4A center support

V4A center support for anchoring the belt net substructure



Clamp

Force-locking double stainless steel clamp with integrated belt fastening



Concrete protection

WireTarp concrete protection for gas area and tank crown



Fabrication

Pressure or volume-related fabrication of the outer and inner membrane type II to IV or piping design



Airflow system

Variants for supply and exhaust air with patented airflow
system or air guide solution
① Outer membrane
② Airflow system supply air
③ Airflow system exhaust air
④ Inner membrane
⑤ Belt net substructure



Balconies Service shafts

Installation of balconies and service shafts



Storage volumes

Storage volumes from 29 %
to 50 % of a hemisphere
1 29 %
2 33 %
3 40 %
50%



Inner membrane solutions

Chemical requirements: grease-resistant inner membrane Thermal requirements: Special coating / insulated inner membranes and iso-sandwich overlay

Combi gas storage DMGS C

The AGROTEL CenoTec combi gas storage is a tank-mounted, air-supported gas holder with three diaphragms, which in principle functions like a double-diaphragm gas holder. However, the raw gas and clean gas compartments are sealed off from each other by a separating membrane. In the combi gas holder, the unpurified biogas (called raw gas), which is formed from the substrate stored underneath, is discharged into the existing standard biogas line.

After the raw gas has passed through the gas purification process, it is temporarily stored in the upper part of the combi gas holder (clean gas holder) before it is sent directly to the combined heat and power plant (CHP).

The clean gas storage tank is designed with such a large volume that sufficient purified biogas is available for multiple CHP outputs, thus enabling demand-oriented plant operation. The combined gas storage system is also of economic interest, as a complex and cost-intensive expansion of the raw gas purification line can usually be avoided and possible impairments to the effectiveness of gas purification in intermittent operation can also be avoided.



Combi gas storage 5600 m³



Construction

- ① Outer membrane
- Inner membrane
- ③ Raw gas separation membrane
- Belt net substructure with stainless steel center support

Features and benefits

Technical textiles

- » Air-supported gas storage tank with three membranes, mounted on a container
- » Functioning according to the principle of the double membrane gas holder
- » Unpurified biogas (raw gas) is separated from clean gas by raw gas membranes
- » Large-volume clean gas storage system
- » No complex and expensive expansion of the raw gas purification necessary
- Impairment of the effectiveness of the gas purification in the interval range can be avoided

Metal components

 » All metal components (center support, screw connection, fastening technology) made of stainless steel

Gas storage tank DMGS F

The free-standing double membrane gas cylinder consists of a shaping outer diaphragm, as well as an inner and a bottom diaphragm, which form the actual gas chamber. A permanently running supporting air blower conveys air into the intermediate space and keeps the pressure constant - independent of gas filling and removal. The pressure in the intermediate space keeps the outer membrane in shape. This allows the storage tank to absorb all external loads. At the same time, this pressure is applied to the inner diaphragm and gas is pumped into the pipeline network. A highly visible trademark of the AGROTEL CenoTec double diaphragm gas holder is the patented AIRFLOW SYSTEM. Laser measurement is the preferred method for level measurement. In order to increase the measuring accuracy, a special production of the inner membrane ensures a reproducible diaphragm position.



3/4 storage tank, 7 units 8500 m³



Construction

- ① Outer membrane
- Inner membrane
- ③ Airflow system supply air
- ④ Airflow system exhaust air
- ③ Air maintenance valve
- Support air blower
- Anchoring ring
- Safety valve
- Inspection window
- Laser level measurement
- Pressure control flap

Features and advantages

- » High operating pressures
- » Suitable for high snow and wind loads
- » Permanently biogas-resistant
- » Low investment and operating costs
- » Short construction time
- » High operational reliability
- » Precise level measurement
- » Low maintenance costs
- » Consistent air supply via AIRFLOW-SYSTEM

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Freestanding gas storage tank DMGS F **Details - Examples**





Rail system

Blower



Laser measurement

Overpressure protection





Pressure control valve



Special solutions for double membrane gas storage tanks

Thanks to our expertise, we develop and manufacture individual solutions for your requirements. Different geometric shapes, structural reinforcements or logos can be incorporated.

A selection of successfully implemented solutions to date: » Cable mesh for operating pressures >30 mbar, even with very large storage tanks

- » Container solutions
- » Truncated cone diaphragms
- » Cigar-shaped accumulators
- » Rectangular storage tanks as free-standing storage tanks or on rectangular tanks



50 % storage 2850 m³, 35 mb pressure



Rectangular storage 7000 m³



Can storage 570 m³



Horsehoe storage 275 m³

Mobile double membrane gas storage tank rental

The mobile rental gas storage tank from AGROTEL CenoTec is designed as a horizontal double membrane gas storage tank. It offers operational reliability for the system and enables combined heat and power plant operation even when gas storage systems are being overhauled or converted.

When converting or repairing existing systems with biogas storage tanks, it is often necessary to store biogas temporarily. Without temporary storage, restrictions in the flexibility of plant operation and sometimes considerable financial losses are unavoidable. Furthermore, the absence of a reliable, temporary storage system entails the risk of biogas or methane being released into the environment - an aspect that should be avoided not only for ecological reasons.





Rental gas storage 150 m³

Gas storage systems: Gas bags GS

AGROTEL Ceno Tec gas bags can be manufactured as cylinders or rectangular cushions. This unpressurized gas storage system is installed in buildings or in steel or concrete containers.

The unpressurized gas bags are usually extracted and filled via connections in the non-moving floor and ceiling surfaces. Rope length measuring systems are used to measure the filling level. Gas bags require an enclosure to absorb external loads and the membranes are made of polyester fabric coated on both sides with PVC. Different membrane types are used depending on structural requirements, legal specifications or customer requirements.



Rectangular storage 1500 m³



Gas bag in a container



Cylinder storage 5000 m³



Gas bag in a tunnel hall

The single-shell biogas roof mounted on a container consists of an outer membrane that is shaped by a central support. This enables the biogas roof to absorb all external loads such as wind, rain and snow. The biaxial curvature of the roof surface prevents the roof from flapping and pumping when exposed to wind. The membrane is attached to the outer wall of steel or concrete tanks so that it is gas-tight all the way around. Safety valves protect the cover against excess and negative pressure on the gas side.

The double-shell biogas roof is a mast-supported tank cover and has an inner membrane that performs the integrated storage function. Here too, the outer membrane is tensioned between the central mast and the edge of the tank. This uniform tensioning protects the membrane in the area of the tank edge.

Biogas roof single shell

Biogas roof double shell



Features and advantages

- » Pole supported system
- » Pressureless cover
- » Blow-off pressure up to 2 mbar
- » Combines storage function and cover
- » Stability due to the biaxial curvature
- » High operational safety
- » Suitable for high snow and wind loads wind loads
- » Permanently biogas-resistant



Biogas roof on stainless steel tank



Biogas roof on reinforced concrete tank



Biogas roof on prefabricated concrete container

WIRETARP

Concrete protection WireTarp W

For more than 20 years WireTarp has been reliably used as corrosion protection for reinforced concrete tanks. By applying WireTarp, future cost-intensive refurbishment measures can be avoided and the economic viability of the facility can be increased. AGROTEL concrete protection products are state of the art in the steel concrete container construction technology.



Construction

- ① WireTarp pre-confectioned wall covering
- ② Wall / ceiling welding seam
- ③ Ceiling covering
- ④ Concrete ceiling
- ③ Recess and service openings
- © Central column protection foil
- Central column with head
- ③ Concrete baseplate

Material

- » PP-loop fabric (on concrete side)
- » Full-surface PP-coating (shuttering side)
- » Impermeable to gas and liquids
- » Ensures permanent resistance to aggressive materials

Advantages

- » Proven protection of concrete surfaces
- » Increases the profitability of your plant
- » Avoiding of downtimes
- » Weather-independent installation
- » Optimum price performance ratio
- » Absolute adhesion and impermeability tested and confirmed by the Fraunhofer institute





Concrete refurbishment SaniTarp ST



SaniTarp was developed as a cost effective and efficient way to subsequently protect the concrete walls of biogas fermenters or secondary fermentation tanks requiring renovation.



Construction

- ① SaniTarp concrete repair foil
- Weld over mounting
- Crown protection
- ④ Stainless steel (1.4571) fixings

Material

- » PP-coating: gas-tight and media resistant
- » Fabric base made of PP: covers all mechanical requirements

Advantages

- » Reliable protection of the concrete surfaces against corrosion
- » Weather-independent refurbishment
- » Short refurbishment times
- » Easy and fast installation
- » Mechanical stainless steel fixing
- » Optimum price performance ratio



Wall renovation 1 m



Wall renovation 5 m

Ceiling and wall renovation



Emission protection free standing domed roof KD

AGROTEL's patent-protected, self-supporting domed roof is designed for existing and new tanks with a diameter up to 22 m and takes the requirements of immission control into account. The tank does not need to be emptied or cleaned, so the roof can be installed during operation. A reinforcement of the base plate or other construction measures are not necessary.



Construction

- ① Fabric reinforced plastic membrane (optional inner membrane for additional » High tear resistance, very good welding corrosion protection)
- Galvanized steel construction
- ③ Tensioning with galvanized steel tubes and block ratchets

Material

- » Fabric reinforced plastic membrane
- seam adhesion,
- » Flame retardant EN 13501-1 2009 B-s2,d0 / NF P 92-507 2004 M2
- » UV resistant, weatherproof, gas-resistant and anti-mildew treated
- » All metal components are made of galvanized steel

Advantages

- » Reliable emission protection
- » Free standing steel construction
- » Fast assembly during operation, no need to empty the container
- » Container diameter up to 22 m
- » Large service openings possible
- » Robust and proven fastening technique with block ratchets





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Central Support Membrane Roof MSD

The membrane roof with central support from AGROTEL CenoTec serves to reduce emissions and prevent rainwater from entering the slurry. The roof constructions are characterised by maximum resistance to snow and wind loads. The characteristic shape of the roof is the result of a particularly material-appropriate design. It prevents the roof from pumping or flapping and thus protects the material for a longer service life. At the same time, it also contributes to environmental protection, as practically no emissions are released.

Both in agriculture and in the sewage treatment plant and biogas sector, the centre support covers impress with their well-engineered design and versatile functionality.



Construction

- Corrosion resistant central column with head
- Upper belt suspension (crown)
- ③ Fabric reinforced plastic membrane
- Tensioning with galvanised tubes and stainless steel ratchets
- ④ Belt substructure

Material

- » Fabric reinforced plastic membrane
- » UV resistant, weatherproof, gas-resistant and anti-mildew treated
- » High tear resistance, very good welding seam adhesion

Advantages

- » Reliable emission protection
- » Durable construction due to high quality components
- » Standard container diameters up to 40 m
- » High structural stability
- » Approval under building regulations and safety approval of the cover
- » Service openings possible
- » Special fastenings for in-situ concrete, prefabricated tanks and steel tanks





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Earth basin lining Lagoons

Earth basin lagoons are the ideal solution for large-volume storage of liquid manure, slurry, silage leachate, waste water from animal husbandry and beet pulp silage. They can be ideally customised in size, shape and management to the respective requirements and site conditions. AGROTEL Ceno Tec specialises in the construction of lagoons and impresses with the highest material quality as well as modern production and welding techniques.



Digestate substrate storage 8400 m³



Floating cover 9300 m³

Features

- » High quality technical textiles
- » High storage capacity
- » Leak detection system
- » Lagoon cover solutions,
- floating or tensioned covers available with PV



Gas-tight floating textile cover 25000 m³



Roofing of an earth basin with lattice frame construction and PV system



Tensioned textile cover



Example: Earth basin width 30 m

Liquid tanks

AGROTEL CenoTec liquid tanks are used for the storage of agricultural waste water, extinguishing water or liquid fertiliser (AHL). They are self-supporting and can be put into operation immediately on a level surface. The tanks are filled from the side or from above. They can be removed either by a pump on the wide side of the container or by gravity at the bottom.

Available sizes: 10 bis 1000 m³.



Service water storage



Separated slurry or substrate

Applications

- » Liquid fertiliser
- » Extinguishing water
- » Process water
- » Separated substrate and slurry



Extinguishing water reservoir



Liquid fertiliser reservoir with drip tray

Material: special membrane with plastic coating on both sides, acrylic lacquered

- » High tear strength, very good weld seam adhesion
- » Flame retardant EN 13501-1 2009 B-s2,d0 / NF P 92-507 2004 M2
- » UV-resistant, weather-resistant, gas-resistant, anti-mould treated
- » Surface weight 900 g to 1500 g / m^2



Rainwater storage tank



Extinguishing water reservoir



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