

Munters Mass Transfer equipment for biogas

Munters has the answers



An experienced European manufacturer of biogas to biomethane upgrade units asked Munters to support them again, this time on their internals in a new green project in Italy.

Key components in the process needed to be selected. And Munters had the equipment, experience and industry understanding to get the job done. "Our 3rd generation random packing and column internals were successfully designed by our team and their performance was confirmed on the field" said Pablo Ruiz, Munters Field Sales & Key Account Manger EMEA Process Industry.

Background

The European client has a proven, proprietary technology for biogas to biomethane conversion. Originally produced from OFMSW (Organic Fraction of Municipal Solid Waste), the biogas is then upgraded to renewable and CO₂-neutral biomethane, an energy source that helps reduce reliance on fossil fuels.

Biomethane has many sustainable uses, from vehicle fuel and cogeneration to usage in the natural gas grid after final conditioning. Carbon balance is negative since recovered CO₂ can be reused as raw material in many areas, and even has food grade quality.

Case study

- Mass transfer equipment for biogas upgrading

Benefits

- Munters application expertise helped define optimal solution
- Premium Munters equipment helped client to achieve the expected performance

- Carbon footprint further reduced thanks to Munters solutions

Products featured

- Munters Medal-Pak™ #25
- Munters Riser Deck Distributors, DRD503
- Munters Support Plates, SPM522
- Munters Bed Limiter BLR531



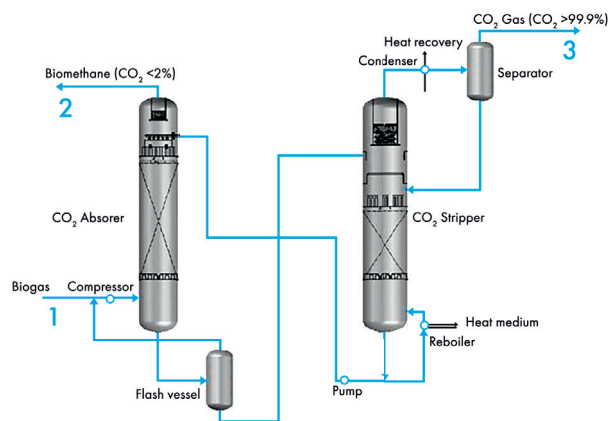
Process overview

Biogas is usually compressed for the selective removal of CO₂ and then recovered from the top of the absorption column as biomethane.

A CO₂-enriched solution then leaves the bottom of the absorption tower and is fed to a regeneration column where the absorbed CO₂ is released and recovered from the top of the regeneration column at high purity.

The biogas to biomethane manufacturer approached Munters for a second time and requested help with key components for their process.

Their aim was to achieve maximum capacity levels using as little space as possible. This project goes in line with the European climate targets and renewable energy utilization.



1. Biogas

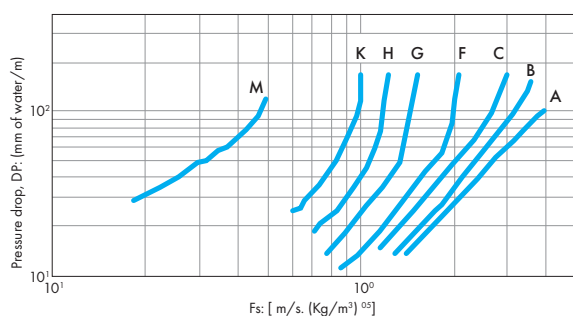
- Pressure: any
- CO₂: 20-60%
- CH₄: 80-40%
- Other gases: as per grid injection regulation/fuel standard

2. Dried biomethane

- Pressure: 4-15 bar (g)
- CO₂: 0.5-1%
- CH₄: balance
- Other gases: as per grid injection regulation/fuel standard
- Dew point: -5°C@70 bar (g)

3. Off-gas

Air Water Pressure Drop Data, Medal-Pak™ # 25, Random Packing



- A: 0m³/m² hr
- B: 10m³/m² hr
- C: 25m³/m² hr
- F: 49m³/m² hr
- G: 74m³/m² hr
- H: 98m³/m² hr
- K: 122m³/m² hr
- M: 147m³/m² hr



The Munters solution

Thanks to deep application knowledge and proven track record as international mass transfer equipment suppliers, Munters was able to help our European client enhance their biogas to biomethane process, while also reducing their carbon footprint. Some of the initiatives included:

Internals for the absorber and stripper were selected after comprehensive discussions with Munters' engineers.

3rd generation tower packing with Munters Medal-Pak was selected, offering high mechanical strength and a large effective interfacial area.

Other internals selected included Munters Riser Deck Distributors, which propagate liquid crossflow and enhance distribution quality. Support Plates, SPM522 for efficient gas injection were also provided. "Accurate hydraulic calculations and detailed technical support during the engineering phase of the projects lead to the appropriate selection of column internals" Pablo Ruiz, Munters Field Sales & Key Account Manger EMEA Process Industry.

Medal-Pak™

Medal-Pak (formerly sold as IMTP®) gives the best of both the worlds in terms of performance (i.e. low-pressure drop and high efficiency). It can be effectively used in both high pressure and vacuum towers. Other advantages include large effective interfacial area, high mechanical strength and low cost. Its monolithic construction overcomes the problem of “opening out” at the ends as can be experienced with ring shaped packings.



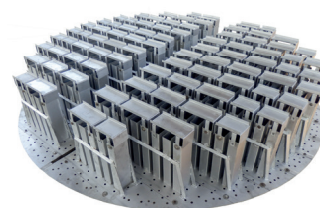
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Medal-Pak is available in an array of sizes to provide multiple combinations of efficiency and pressure drop. Medal-Pak can be fabricated from a variety of metals including, but not limited to, Carbon Steel, Stainless Steel, Copper, Aluminum, Titanium, Zirconium, etc.

Item/Size	Surface Area m ² /m ³ (ft ² /ft ³)	Voidage
Medal-Pak #15	291 (88.8)	95.6
Medal-Pak #25	225 (68.6)	96.6
Medal-Pak #40	150 (45.7)	97.7
Medal-Pak #50	100 (30.5)	98
Medal-Pak #60	74 (22.6)	98
Medal-Pak #70	60 (18.3)	98.5

Riser deck distributor/redistributor (model DRD503/RRD504)

The Riser Deck Distributor is a deck type distributor where orifices are located on the base/deck of the distributor. Gas risers located between the orifices propagate liquid cross-flow, thereby enhancing distribution quality.



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This style of distributor is generally supplied in multi-piece construction and all joints are sealed with gaskets. Attachment is by clamping to a ledge/support ring that is welded to column wall. This distributor can be provided with anti-migration bars in the risers to eliminate the requirement for a bed limiter. Redistribution risers are capped to prevent bypassing of liquid through risers from liquid raining down from the packed bed above.

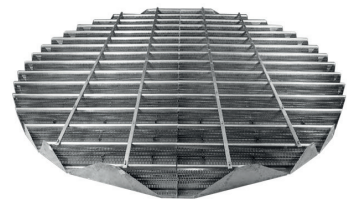
Selection criteria

- Column diameter > 600 mm (24 inches)
- Maximum Turndown ratio 2:1
- Liquid rates > 5 m³/m² hr /2.0 GPM/ft²
- Low fouling



Support plate (model SPM522)

Model SPM522 is a gas injection type support plate designed for towers generally smaller than 900mm (36 inches) diameter. This type of support plate is designed in multi-piece or single piece construction depending upon whether the support plate will be installed through a column manway or through a column body flange. The slot size is based on the size of packing to be supported. These support plates rest freely on a ledge/support ring or can be bolted/clamped directly to a tray support ring.

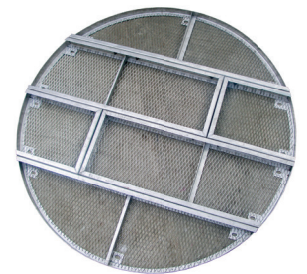


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Bed limiter for random packing (model BLR531)

This bed limiter is normally recommended for metal and plastic random packings. It is designed to withstand an upward thrust. The opening size can be varied to suit various packing sizes and the beams can be designed to support a prescribed man-load. The normal bed limiter is clamped on to a ledge/support ring.

In cases where the bed limiter may be located below a high performance distributor, the bed limiter construction can be made expandable, with jack screws provided to tighten on the column wall. This eliminates the need for a ledge/support ring and maintains good distribution near the column wall.



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If so, please visit our website, www.munters.com/en/solutions/mass-transfer/

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