Kanadevia INOVA

Datasheet Gas upgrading

Amine scrubbing

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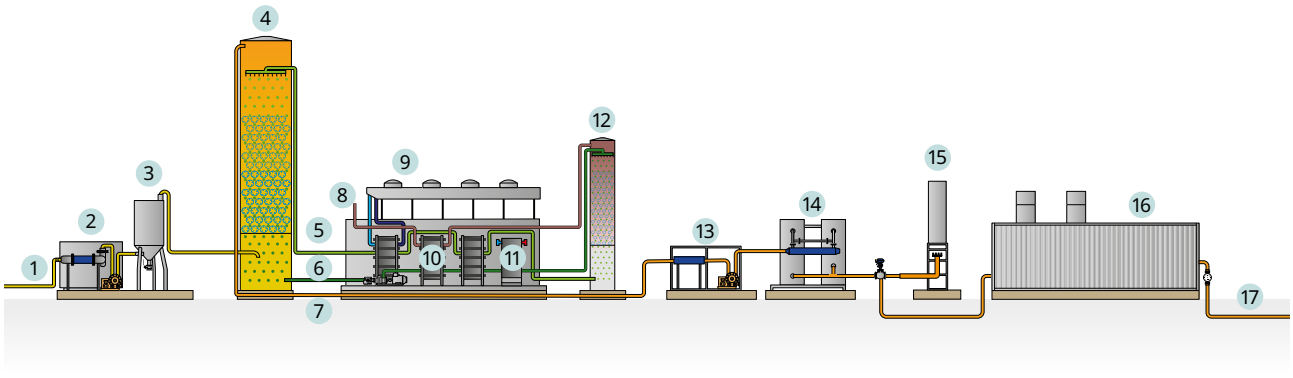
Future-proof resource economy
A comprehensive, reliable supply of renewable energy and the ability to produce regenerative fuels such as bio-LNG and bio-CNG are key to decarbonization and energy transition efforts. Whether it's combined with a Kompogas™ plant to create a complete solution or deployed on a standalone basis, biomethane gas upgrading technology completes the range of Kanadevia Inova products enabling energy to be produced from any sort of waste or biomass – in this case employing an upgrading process to convert raw biogases into high-purity biomethane that can be used as a versatile energy source.

Advantages of biomethane technology
Raw gases from a wide range of different sources are suitable for upgrading: the digestion of municipal green waste, organic household waste or agricultural biomass. Sewage and landfill gas can also be converted into energy. This extends a plant's value chain and promotes the circular economy. Depending on the composition, raw gas pretreatment may be required. Then comes the main process, where the carbon dioxide in the stream of gas is separated from the methane, with the resulting biomethane conditioned to the desired quality parameters.

Technical description
Amine scrubbing is a chemical process that is suitable for sites with a source of heat and high product gas requirements, and where the gas has to be delivered from the gas upgrading unit to the feed-in station at low pressure. It is also no problem to increase the pressure for sites outside Germany where higher pressure is required. After pretreatment, the raw gas flows through a packed column, where an amine solution that absorbs carbon dioxide trickles from top to bottom in the opposite direction to the gas. Then biomethane of up to 99.9% purity is removed at the top of the tower. The used amine scrubbing solution is regenerated for reuse in the process. This process is highly robust when it comes to dealing with impurities in the stream of biogas, and like membrane technology stands out in terms of high plant availability.

Scheme of principal setup



Vorbehandlung
1 Rohgasleitung
2 Trocknung und Vorverdichtung
3 Entschwefelung

Rohgasaufbereitung
4 Waschkolonne
5 Regenerierte Aminwaschlösung
6 Beladene Aminwaschlösung
7 Methanleitung
8 CO_2 zur weiteren Nutzung
9 Freikühler
10 Wärmetauscher
11 Zufuhr der Prozesswärme
12 CO_2-Abscheidung
13 Trocknung und Verdichtung
14 Feinsttrocknung

Energetische Nutzung
15 Sicherheitsfackel
16 Gaseinspeisung
17 Gasversorgungsnetz

Gas upgrading: A-Series

		Model S			Model M				Model L
Upgrading capacity									
lb CO_2/h		660	1,100	1,540	2,200	3,090	4,400	5,510	12,340
scfm RBG@47% CO_2		200	340	470	675	950	1,350	1,680	3,770
Nm^3/hr RBG@47% CO_2		325	540	760	1,080	1,520	2,160	2,700	6,050

Technical data									
Container		1 x 45’			2 x 40’				Skids
Length of container		44 ft – 11 ½ in			39 ft – 4 ½ in				39 ft – 4 ½ in
Width of container		9 ft – 10 in			19 ft – 8 ¼ in				19 ft – 8 ¼ in
Height of container excl. superstructure		9 ft – 10 in							
Area of outdoor installation	ft^2	464	810		1,400		1,700		3,300
Height of scrubbing column	ft – in	39 ft – 4 ½ in							52 ft – 6 in
Weight of container 1	lb	44,100			68,400				88,200
Weight of container 2	lb	n/a			43,200				55,200
Connection RBG	NPS	4	6	8	10		16		
Connection BM	NPS	3	4		6				

Performance data									
Voltage	V	480							
Frequency	Hz	60							
Scrubbing liquid		MDEA/water							
Content scrubbing liquid	Gal	530	1,060	1,330	1,590	2,120	2,650	2,650	7,400
Processable RBG		Biogas/waste gas/sewage gas							
BM quality	Vol.-% CH_4	≤ 99							
	Vol.-% CO_2	≥ 1.0							
Outlet pressure BM [1)]	in. w.c.	20–60							
Dew point BM [2)]	°F	≤ 40							
Power demand [3)]	kWh/scfm RBG	0.18							
Heat demand at 47 vol.-% CO_2 in RBG	(BTU/hr)/ scfm RBG	60							
Max. inlet temperature of cooling water	°F	85							
Max. outlet temperature of cooling water	°F	104							
Theoretically removable cooling water heat	MMBTU/hr	0.55	1.1	1.5	2.2	3.1	4.4	4.4	12.4
Heat extraction primary <194 °F	MMBTU/hr	0.12	0.2	0.28	0.4	0.57	0.81	1	2.28
Heat extraction secondary 113/130 °F	MMBTU/hr	0.32	0.54	0.76	1.09	1.52	2.18	2.72	6.1
Water demand	gal/hr	n/a							
Condensate [4)]	gal/hr	6.1	10.3	14.5	20.6	29	41.2	41.2	46
Resulting waste water	gal/hr	n/a							
Designed for temperatures	°F	−4 to +93							

Emissions		
Methane loss	%	≤ 0.1
Sound pressure level at 32 ft distance [5)]	dB(A)	75

[1)]optional increase possible, [2)]@norm conditions, [3)]tolerance of ± 10% according to DIN 1945/VDI 2045/ISO 5389. Electrical consumption depends on operating parameters and environmental conditions, [4)]resulting condensate in g/Nm^3 raw biogas per hour, [5)]optional reduction possible
Abbreviations: RBG = raw biogas, BG = biogas, BM = biomethane

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