Propane Reduction Solution

nZero Group's
TEEBLENDER
Reduces up to
100%
propane usage pa

INNOVATIVE BIOMETHANE BLENDING SOLUTION

nZero Group's Teeblender was developed for the gas utility industry to blend unconventional gases, injected into the gas grid, with the grid gas. As part of a blending loop system, the Teeblender optimises the propane enrichment requirement of biomethane. In other words, it can reduce use and spend on propane up to 100% over a year.

HELPING DECARBONISE YOUR BIOMETHANE: HOW IT WORKS

Teeblender consists of two intersecting cones, the silver inlet and the green outlet, as shown in the image above. The purple element is the pressure containment element, part of the customer's own pipework, not part of the supply.

This design provides customers with enough flexibility to position and size the gas-to-grid injection connection (side branch), which can be an equal or reducing forged Tee, or another welded connector to a short length of pipe between welded flanges. Both cones are fabricated from certified stainless steel (SS316) by qualified welders using industry-compliant procedures.

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PERFORMANCE STATEMENTS

1. The Teeblender is a unidirectional device.
2. The induced flow of pipeline gas for blending around the blending loop is proportional to the motive flow of the injected biomethane.
3. To remove the requirement for propane injection enrichment in a 1MJ/m^3 calorific value tolerance scenario (as in the UK) a blend of ~1 part biomethane to 4 parts pipeline gas (~1:4) needs to be achieved. The availability of the pipeline gas for blending is considered fortuitous and therefore the Teeblender is designed to achieve maximum performance in all operational scenarios.

   3.1 **Forward flowing pipeline gas**

   The Teeblender over performs when the pipeline flows in a forward direction, achieving ~1:7 blending ratio.

   3.2 **Reversed flowing pipeline gas**

   The Teeblender continues to induce the same proportional amount of pipeline gas for blending around the blending loop. As the pipeline flow is now reversed, some of the induced flow will be previously blended gas which reduces the actual blend ratio to ~1:3, sufficient to provide significant savings.

   3.3 **Reduced amount of pipeline gas availability**

   The Teeblender continues to induce the same proportional amount of pipeline gas for blending around the blending loop. As there is no longer sufficient pipeline gas to supply this requirement, the Teeblender will use all the available pipeline gas and supplement the quantity with re-injected blend gas.

   As the blended gas is analysed for calorific value before it is re injected, a proportional amount of propane can be added to the biomethane to make up for the unavailability of pipeline gas for blending. Alternatively, biomethane flow to grid can be reduced to balance the blend ratio to the available pipeline gas flow which also removes the need for propane enrichment for the period of unavailability of pipeline gas.

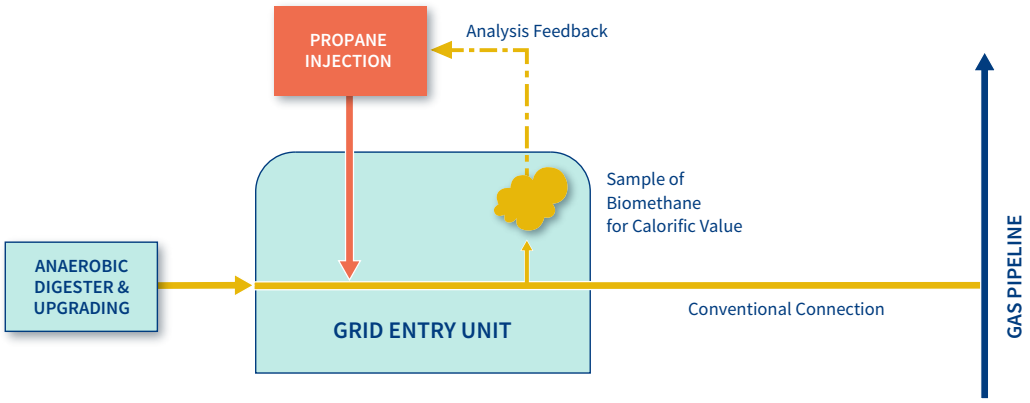
4. An homogenous blend of the two gases is achieved in 10 pipe diameters (10D) of the Teeblender which enables a compact, blending loop/sample for analysis, design.
5. An example of expected biomethane to grid pressure drop across the Teeblender jets: 7 barg pipeline, 600 sm^3/hr biomethane flow, 113mbar pressure drop.
6. Gas network pipeline flow is not affected by the introduction of a Teeblender blending loop.

EXPLAINING HOW TEEBLENDER WORKS

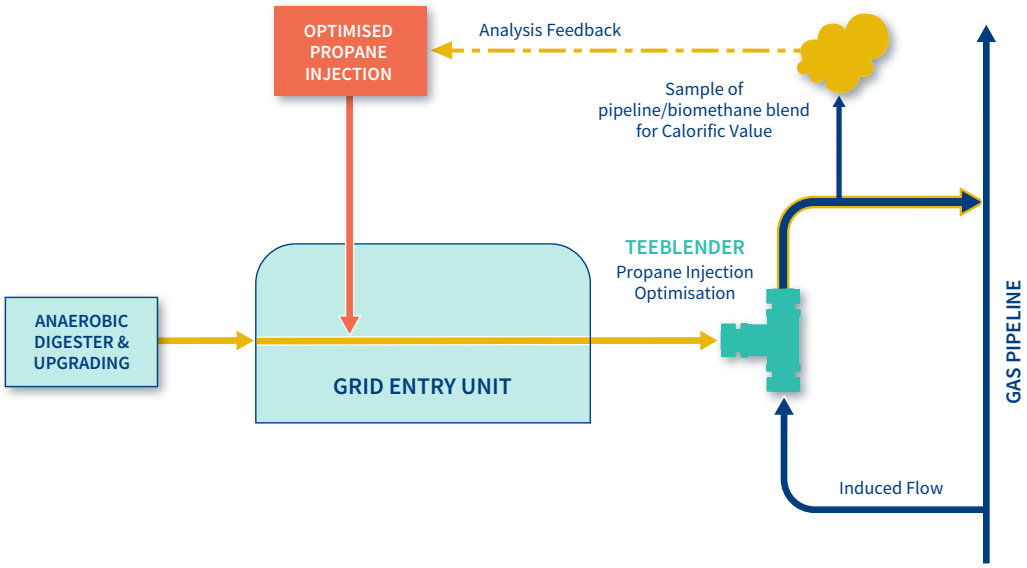
Our Teeblender's dual cones are inserted and overlap inside customers' pipework. Each cone is held in a gas-tight sandwich, between the pipework bolted 'raised face' flanges and suitable gaskets. The blender mounts in a parallel blending loop, with the grid pipeline and it's sized to accommodate the highest design flow.

The assembled blender creates a void on the outside of the cones for the biomethane gas, which feeds through injection jets into the blending loop. The accurate sizing and directing of these multiple gas jets creates an induced flow of gas, for blending, and a helical swirl, for efficient mixing. The venturi throat maximises the pipeline flow velocity, and minimises the pressure drop across the injection jets. The overlapping of the two cones provides a telescopic assembly that self-positions to accommodate any fabrication tolerances of customers' pipework and/or gasket thickness variations.

The inlet and outlet cone mounting flanges have a machined profile that centrally locates the flange relative to the flange bolts. Raised face flange fittings are required on the mating pipework, other flange types can be accommodated on request. To help further, each cone has an identifying tag plate.



The Teeblender can optimise the propane enrichment requirement of biomethane



NOTES

1. The use of good quality, engineered, gaskets is recommended such as 'Spiral Wound'.
2. It is not recommended to hydrostatically pressure test the containment pipework with the Teeblender cones in situ as the jetting holes could restrict the dispersion of the water.
3. Contact nZero Group for enquiries outside of the referenced size ranges.
4. Pressures may be expressed as absolute values, in N/m^2 (7 bar gauge would appear as $800,000N/m^2$)
5. 'Species Concentrations' are expressed as the proportion of mixer gas.

   For example, a value of 0.125 concentration means that the mixer gas represents 0.125 of the total, i.e. 1/8th

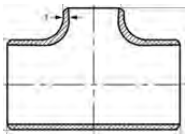
   This corresponds to 1 part mixer gas, 7 parts main gas (1:7).
6. nZero Group has a policy of continual development; images in this document may not fully represent our current version, performance will be equal or improved.

DATA

Biomethane to grid flow range: (examples)

DN 200mm		
Min	75 scmh	(at 2 barg)
Max	1800 scmh	(at 7 barg)

DN 100mm		
Min	325 scmh	(at 41 barg)
Max	6000 scmh	(at 75 barg)

								Raised Face to Raised Face Dimension of Fabricated Spool (+/- 3mm) (Teeblender cone flange thickness) (mm)			
	Flange Raised Face to Weld Neck Length Dimension				Length Dimension	Flange Raised Face to Weld Neck Length Dimension							
	DIN PN 16	Class 150	Class 300	Class 600		DIN PN 16	Class 150	Class 300	Class 600	DIN PN 16	Class 150	Class 300	Class 600
DN 100 (4")	52	75	84	102	210	52	75	84	102	317 (10)	363 (10)	381 (12)	417 (12)
DN 150 (6")	55	87	97	117	286	55	87	97	117	399 (10)	463 (10)	483 (12)	523 (20)
DN 200 (8")	62	100	110	133	356	62	100	110	133	483 (10)	559 (10)	579 (12)	625 (25)
DN 300 (12")	78	113	129	155	508	78	113	129	155	667 (10)	737 (10)	768 (12)	822 (25)
DN 400 (16")	85	125.5 (4.94")	144.5	177.8 (7")	610	85	125.5 (4.94")	144.5	177.8 (7")	783 (10)	864 (10)	902 (12)	969 (25)

All dimensions in mm (unless stated otherwise)

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