

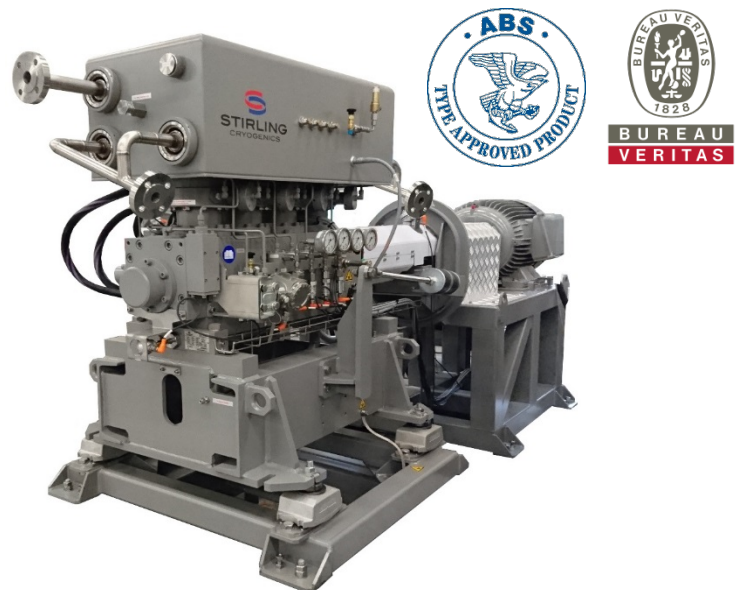
StirLNG-4 Cryogenerator

Liquefier for maritime LNG conditioning

Stirling Technology

For over sixty years Stirling Cryogenics has been designing and manufacturing gas liquefaction systems, serving customers all over the world under all possible conditions. This experience is incorporated in our Methane liquefiers called StirLNG. They have three specific fields of application:

- Micro scale production of LNG from a purified gas source such as pipe line or biogas.
- Re-liquefaction of boil off gas to compensate for losses in a cryogenic (storage) system (fuel stations, storage tanks, etc.).
- Re-liquefaction of boil-off gas on vessels.
- The StirLNG-4 is available in an adapted version specifically for maritime use.



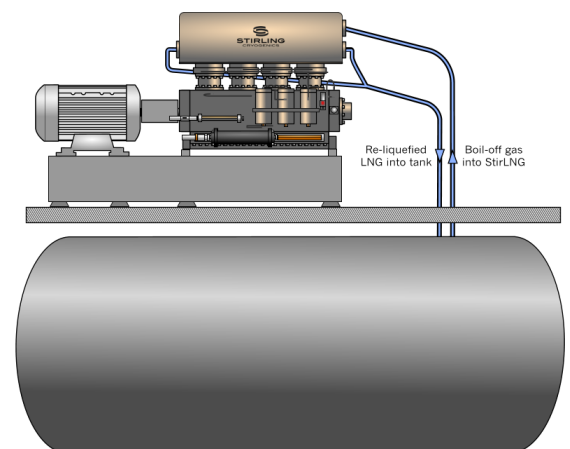
The cooling power of the StirLNG is created by the so called reversed Stirling cycle: compression and expansion of helium gas in a closed cycle by mechanical pistons. The gas to be liquefied is not used to create this cold: it will just flow through a cold heat exchanger where energy is extracted and the gas will liquefy. The gas will only encounter a phase change and there is no pressure difference between the gas and the liquid.

LNG conditioning with the StirLNG-4 Maritime

The StirLNG-4 is our SPC-4 Cryogenerator specifically modified for micro scale LNG re-liquefaction in maritime conditions. Depending on the gas pressure, the StirLNG-4 can re-liquefy around 1000-1800 kg/day of LNG (1,8 metric tpd, 1350 gal/day) per single unit (multiple units possible).

The Stirling Cryogenerator operates stand-alone, driven by an electrical motor and has its own control unit. Boil-off gas can be taken from a storage tank, re-liquefied by the StirLNG cooler, and back into the storage tank.

As an alternative, liquid can be taken from the bottom of the storage tank, sub cooled and sprayed back in the tank, reducing the overall pressure of the system, eliminating boil off gas.



For marine applications, e.g. on board LNG bunker vessels or vessels using LNG as fuel, the Stirling Cryogenics StirLNG cryogenerator can be certified, according the required class.



StirLNG-4 Maritime features and options

- Certification/approval by notified body (ABS, Lloyds or other)
- Optimized cryogenerator technology for roll and pitch requirements, according to ABS, DNV a.o. regulations.
- Corrosion prevention for maritime conditions
- Separation of Cryogenerator and motor through a bulkhead.
- Flexible set-up (multiple units) to fulfill customers demands in output and redundancy

StirLNG-4 Specifications

Gas Pressure	Temp. Liquid	CO (°)	Cooling Power	Electrical Input	Capacity based on pure methane				
Barg	K	PPM	W	kW	Nm ³ /hr	kg/hr	l/hr	T/day	Gal/day
0	111	66	6250	35,4	60,2	43,2	102,3	1,0	648
2	126	230	7350	32,3	75,4	54,1	135,4	1,3	858
4	135	486	7950	30,7	85,0	61,0	158,3	1,5	1004
6	141	800	8400	29,6	93,4	67,0	179,3	1,6	1137
8	146	1213	8750	28,8	100,9	72,4	198,9	1,7	1261
10	151	1837	9050	28,0	107,8	77,3	217,6	1,9	1380
12	155	2562	9300	27,5	114,6	82,2	236,7	2,0	1501
14	158	3287	9500	26,9	121,4	87,1	256,4	2,1	1626
16	161	4217	9700	26,5	128,4	92,2	277,3	2,2	1758
18	164	5412	9900	26,1	135,8	97,4	299,4	2,3	1898
20	167	6944	10050	25,7	142,3	102,1	320,6	2,4	2033

Specifications	
Explosion proof classification	ATEX Zone 2 or 1 Nec 500, Class 1 Div 2 or 1, gas group D Other, upon request
Max. gas pressure	20 barg 290 psig
Water consumption (incl. 20% EG)	4.000 l/hr @ 15°C
System size (l x w x h)	1,75 m 0,75 m 1,22 m
Feed gas composition limits	Main stream: CH CxHy (C2 to C4) 10% CxHy (C5+) < 1 ppm H ₂ O < -70°C dew point H ₂ S < 3,3 ppm Oil content < 0,01 mg/m ³ Particles < 0,1 micron N ₂ / O ₂ < 10% ⁽²⁾
Deviations from pure methane will affect capacity above.	
Please contact us with your gas composition for a specific calculation	
1: Solubility of CO ₂ as function of liquid TEMPERATURE.	
Pressure for indication only, relative to pure methane. Other components such as N ₂ will lower the liquid temperature relative to the saturated pressure, decreasing the allowable CO ₂ level.	

