

Turbo-Brayton subcooler

for Liquefied Natural Gas (LNG) boil-off reliquefaction



The Air Liquide Turbo-Brayton cooling system is an optimal solution for natural gas reliquefaction. Combining performance, reliability and compactness, it can be integrated on small or large LNG carriers to re-liquefy boil-off gases, but also on bunker barges or vessels and LNG fuelled vessels.

key benefits of the Turbo-Brayton

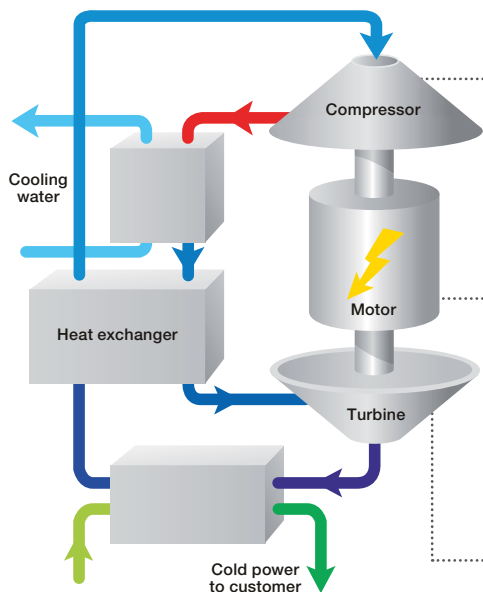
- **Single skid solution**
 - Easy installation
 - Plug and play design
 - Short start-up
 - Low foot-print
- **Easy integration** thanks to subcooling
- **Safety** with inert and non flammable gas, leak tight
- **High reliability:** with contact free, oil free technology, MTBF (Mean Time Between Failure) = 105,000h
- **Utility free:** no compress air, no oil, no nitrogen or any process gas make-up
- Vibration free
- **Drastically reduced maintenance:** few days each 5-years
- **Fully automatic,** unmanned operation
- **Turndown** between 0% and 100% and **high efficiency** on all operation range



Turbo-Brayton TBF-1050

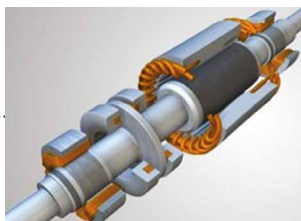
Reverse Turbo-Brayton principle

Air Liquide's innovative reverse Turbo-Brayton process essential innovation concerns the assembly of all active elements on a single shaft.



1 Centrifugal compressor

- High efficiency
- Oil-free



2 High-speed synchronous motor and active magnetic bearings

- Direct drive
- No gear box
- High compacity
- Contact free
- Unsurpassed lifetime



3 Centripetal expander

- More than 50 years experience in the design and manufacture of expanders
- High efficiency

References

Air Liquide's Turbo Brayton subcooling system is a reference on the market:

- Most of the LNG bunker vessels are equipped with Turbo-Brayton subcooler,
- More than 30 Turbo-Brayton ordered for LNG Carriers reliquefaction,
- More than 10 shipyards have contracted for integration of Turbo-Brayton,
- A portfolio of several patents regarding Air Liquide Turbo-Brayton technology.



Turbo-Brayton TBF-1225

Off-shore Turbo-Brayton range

Name	Reliquefaction range (t/h)	Electrical consumption (kW)	Weight (t)	Footprint (L x W x H) (m)
TBF-175	0 — 0.2 t/h	210	15	9.5 x 1.7 x 3
TBF-350	0 — 0.5 t/h	420	17	11 x 1.7 x 3
TBF-700	0 — 1 t/h	840	35	13.5 x 4.5 x 3.5
TBF-1050	0 — 1.35 t/h	1,260	40	13.5 x 4.5 x 3.5
TBF-1225	0 — 1.5 t/h	1,470	45	14 x 4.5 x 3.5

Values given for 36°C cooling water, pure methane.

Contacts

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