

★ 4-stage Gas Compressor

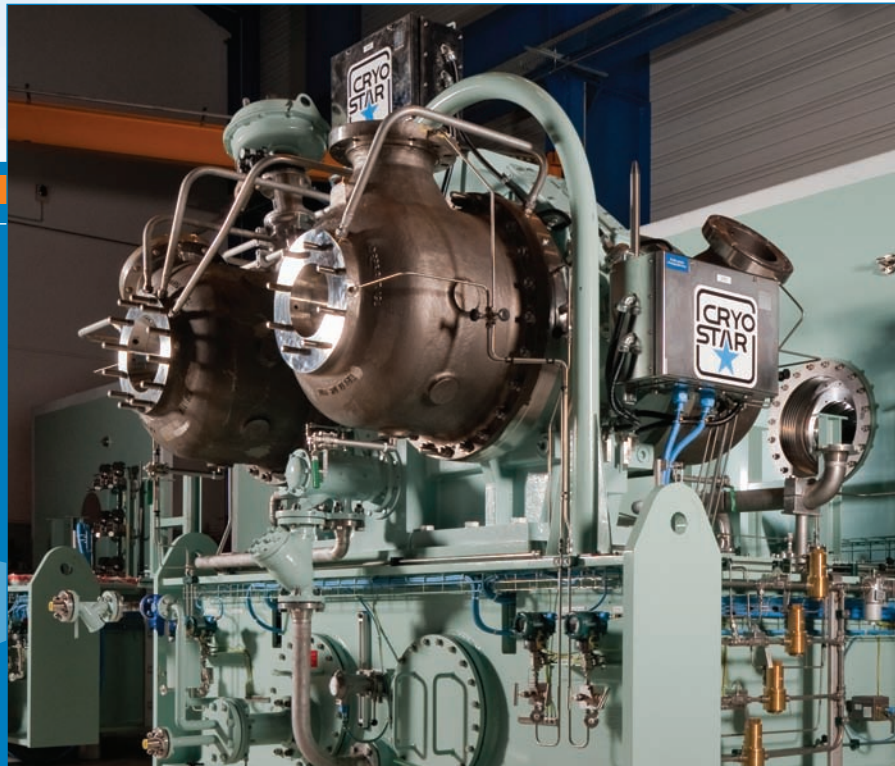
for Dual Fuel Engine Gas Supply on DFDE LNG Carriers

Electric motor driven four-stage cryogenic/warm compressor, with variable diffusor vanes on first stage, complete with lube oil system, seal gas system, and accessories.

Typically this machine delivers up to 5'500 m³/h of boil-off gas with an inlet temperature as high as -20°C, at a delivery pressure of 6.5 bar a.

The unit is installed on a single, rigid skid, with bulkhead, bulkhead seal and heavy-duty gearbox.

For marine applications full certification is included.

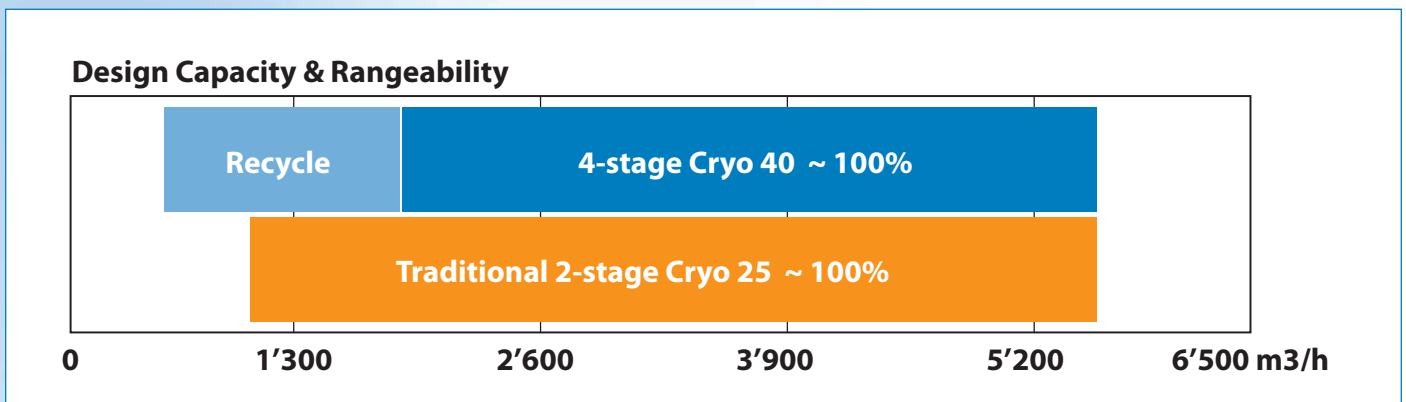
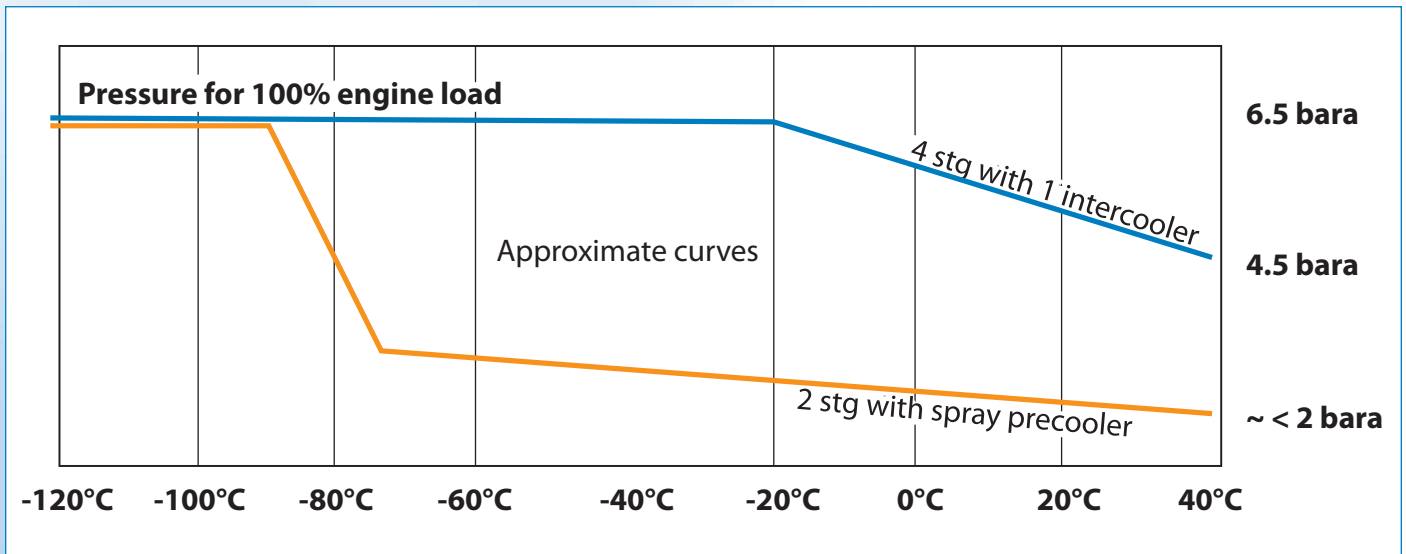


★ Key Advantages of Cryostar 4-stage Boil-off Gas Compressors:

- ★ **Compact, space saving arrangement**
Simple onboard integration, and access for operation and maintenance.
- ★ **Rigid heavy-duty skid**
Proper stability of the motor/compressor arrangement, for trouble-free operation.
- ★ **High efficiency and performance**
Smaller motor sizes squeeze cost and assure economic operation.
- ★ **Advanced, oil-lubricated bulkhead seal**
Accessibility for shaft alignment, no sealgas consumption, reliability and safe operation.
- ★ **Integrated local panel**
Cabling and tubing done in the factory thus reduced installation cost for the shipyard.
- ★ **Process Integration with the Cargo Handling System**
Cryostar provides a combined, well-integrated package with the Gas Heaters/Vaporizers.
- ★ **IAS Integration**
As an option, serial link to IAS, or fully redundant integration with selected IAS vendor.



★ 4-Stage and 2-Stage relative performances : discharge pressure & flow range



4-Stage BOG Compressor operation envelope - key facts:

- ★ Full 6.5 bara pressure from -140 to -20 degC WITH NO SPRAY PRECOOLING REQUIRED !
- ★ HEEL-OUT OPERATION possible to DF engines

And also

- ★ Massflows down to 500 kg/h are possible
- ★ More than 4 bara at +40 degC
- ★ No VFD speed control
- ★ Limited recycling
- ★ Water cooling
- ★ No continuously running pumps for spray precooling

Retrofit of 4-stage compressor in place of 2-stage compressors is also feasible

★ Applications:

- ★ For LNG carriers,
as Fuel Gas compressor to maintain the cargo tank pressure while supplying boil-off gas as fuel to the dual fuel engines and/or gas combustion unit during the voyage.
- ★ For land - based plants
these units are supplied as Cryogenic Compressors, without bulkhead and designed according to API617 if required (with separate lube oil system for special purpose oil systems).

