

Floating LNG – optimized designs

Molecular sieves are commonly used for drying purpose in LNG plants. This is the general case for Floating LNG units, too, except that the sieves can bring you more for a secure and reliable unit operation.

	CASE 1a Drying only Standard Grade	CASE 1b Drying only OPTISIEVE	CASE 2 Drying and CO2 removal
Water	Saturated at 25°C	Saturated at 25°C	Saturated at 25°C
CO2	50 ppmV	50 ppmV	400 ppmV
Internal vessel diameter	2500 mm	2300 mm	3800 mm
System	2 + 1	2 + 1	2 + 2
Total bed volume all adsorbers	59 m3	50 m3	255 m3
Regeneration gas flow	22 MMSCFD	21 MMSCFD	22 MMSCFD
Adsorption time	16 hrs	16 hrs	4 hrs
Product flow	250 MMSCFD	250 MMSCFD	228 MMSCFD

For Natural Gases with a typical composition it is necessary to remove water and CO2 before their liquefaction. CO2 is usually removed by an Amine unit.

Onshore these units are reliable. But what about offshore units? Some absorption units, eg Glycol units are already proven technology but Amine units not yet. This is due to the fact that in order to meet the very stringent CO2 specs an Amine unit needs a significant amount of separation trays on the top of the column to cope with the thermodynamic limits of mass transfer, absorption kinetics and chemical reaction in the gas phase.

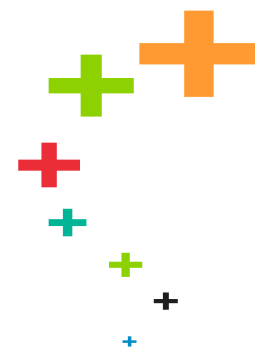
Possible hull motion may lead to unequal distribution of the Amine solution leading a certain gas flow not being treated or being treated only partially. The direct consequence is a CO2 outlet concentration above specs, probably in the range of 200-400 ppmV.

Molecular sieves can be used to adsorb the CO2 slipping through the Amine unit. In certain cases they might even replace the Amine unit. For the CO2 removal special design know how of the molecular sieve unit is necessary: short adsorption time and internal heat insulation to reduce the regeneration gas flow rate.

Based on a flow rate of 250 MMSCFD, 25°C, 56 bar, saturated Natural Gas two design comparisons are given: example 1a with a standard drying grade, example 1b with OPTISIEVE molecular sieves for drying (see previous ON SPEC newsletter) and example 2 with a design removing additionally 400 ppmV CO2. For example 1a/b the regeneration gas is recycled, while it is not recycled for example 2.

The regeneration gas containing water and CO2 could be recycled through an Amine unit. In this case the molecular sieve unit would increase in size.

For more details please contact us to get the paper "How molecular sieve designs can answer to Amine unit performance?" presented at the GPA Europe conference in February 2009 in London.



Each case is specific. Don't hesitate to ask CECA specialists. They have a leading experience in designing optimized mixed beds of beads or pellets.

In the next issue, we will give you recommendations for an appropriate vessel design.



Adsorption solution provider for drying and purification of gases or liquids
Contact us for your process optimization - our specialists at your service
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