

■ Freyssinet post-tensioning and anti-seismic systems for liquefied natural gas tanks

PRESTRESSED CONCRETE TANKS FOR

The Freyssinet Group

Freyssinet brings together an unrivalled set of skills in the specialist civil engineering sector. It implements solutions with high added value in two major fields: construction and repairs.

Freyssinet is involved in numerous projects across five continents, making it the world leader in its specialist areas of:

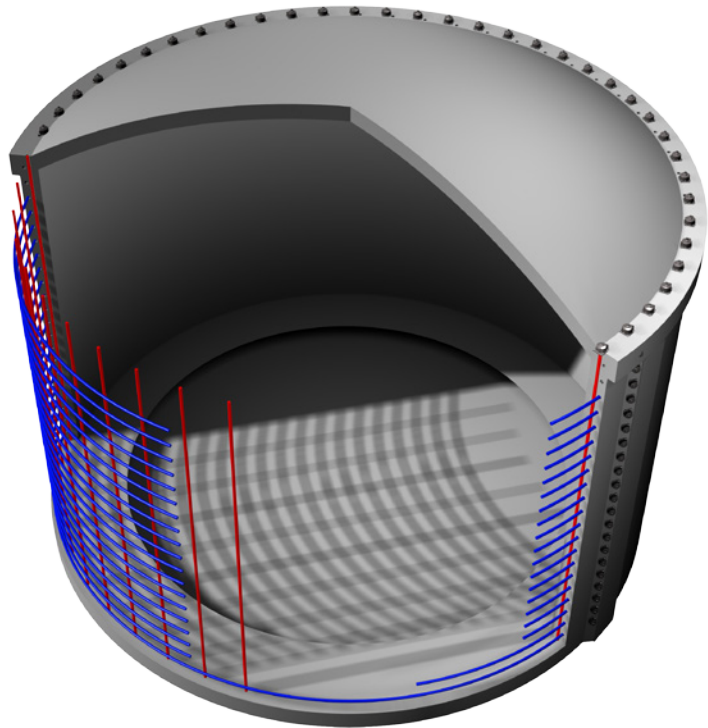
- Prestressing
- Construction methods
- Cable-stayed structures
- Structural accessories
- Repairs
- Structural reinforcement and maintenance

Freyssinet is highly involved in sustainable development issues, and has set up a number of initiatives, particularly to reduce the environmental impact of its projects and enhance its social responsibility policy.

Freyssinet is a subsidiary of the Soletanche Freyssinet Group, a world leader in the soils, structures and nuclear sectors.

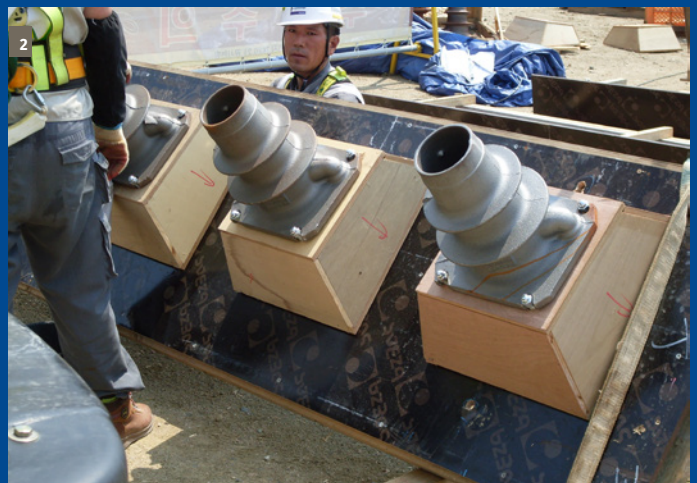
*Cover photo:
Yamal (Russia) - 4 tanks of 160,000 m³ cap.*

Liquefied natural gas (LNG) is natural gas that has been super cooled to a temperature around -162°C whereby it condenses into a liquid form. The liquid, which remains at normal atmospheric pressure, occupies 600 times less space than gas and weighs 45% of an equivalent amount of water, making LNG easy to transport and store. The outer shell of a typical LNG tank is a containment vessel made in prestressed concrete.



Post-Tensioning technology consists in applying permanent compressive stresses induced by high-strength steel tendons stressed in the concrete in order to strengthen the structure and ensure the liquid tightness of the LNG at very low temperature.

The quality and performance of the Freyssinet cryogenic post-tensioning system make it the solution of excellence for the building of LNG storage tanks.



CRYOGENIC USE



Freyssinet expertise

Innovation and Excellence to meet the requirements of your project

Freyssinet, a world leader in post-tensioning, designs and implements technically and economically optimised solutions and brings together assets that contribute to LNG projects success.

As a result of continuous research and development work over more than seventy years, Freyssinet has developed a complete range of innovative products and processes designed to support its Clients and to meet the specific requirements of LNG tanks.



Freyssinet system complies with the European Technical Agreement Guideline (ETAG 013) known as one of the most stringent international standard for post-tensioning kits. Freyssinet is the holder of the ETA n°06/0226, covering the application under cryogenic conditions, and of the CE marking.

Freyssinet experience

More than 30 years of practice in LNG storage tanks to risk out your project

Over the past 30 years, Freyssinet has been working on more than 100 LNG storage tanks worldwide proposing an integrated offer from studies to construction:

- Design, engineering and tests,
- Construction,
- Materials and equipments supply,
- Technical assistance and works implementation.



This engineering contractor culture makes Freyssinet the ideal partner for LNG tanks projects in the respect of the highest quality and safety requirements.

The Freyssinet expertise goes hand-in-hand with the professionalism of its teams, located all over the world and trained within the Freyssinet PT Academy.



- 1 - Fos sur Mer (France), 3 tanks of 110,000 m³
- 2 - Freyssinet cryogenic trumplates in formwork
- 3 - Soyo (Angola), 2 tanks of 159,000 m³, 1 tank of 88,000 m³, 1 tank of 59,000 m³
- 4 - Dalian (China), 3 tanks of 160,000 m³
- 5 - Freyssinet post-tensioning jacks with hydraulic lock-off system
- 6 - Rayong (Thailand), 2 tanks of 160,000 m³

Most recent achievements LNG Tanks with Freyssinet Post-tensioning System

Project	Country	Date	Client	Tanks number & capacity
YAMAL	Russian Fed.	2014-2016	ENTREPOSE	4 x 160,000 m ³
PAGBILAO	Philippines	2013-2015	Slipform Engineering Group	1 x 160,000 m ³
SENGKANG	Indonesia	2013-2015	Slipform Engineering Group	1 x 160,000 m ³
HAINAN	China	2013-2015	IHI	2 x 160,000 m ³
SULAWESI	Indonesia	2013-2015	SHIMIZU Corp.	1 x 160,000 m ³
TIANJIN	China	2013-2015	CSCEC	1 x 160,000 m ³
TANGSHAN	China	2012-2014	HQCEC	4 x 160,000 m ³
ZHUHAI	China	2011-2013	Tecnidas Reunidas	3 x 160,000 m ³
MANZANILLO	Mexico	2009-2011	Samsung	2 x 150,000 m ³
NAOETSU TANKS	Japan	2009-2011	Shimizu Corp.	2 x 180,000 m ³
VYSOSTK	Russian Fed.	2016	TGE Gas	1 x 42,000 m ³
QINGDAO	China	2014	TGE Gas	1 x 80,000 m ³ (ethylene)



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SUSTAINABLE TECHNOLOGY



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