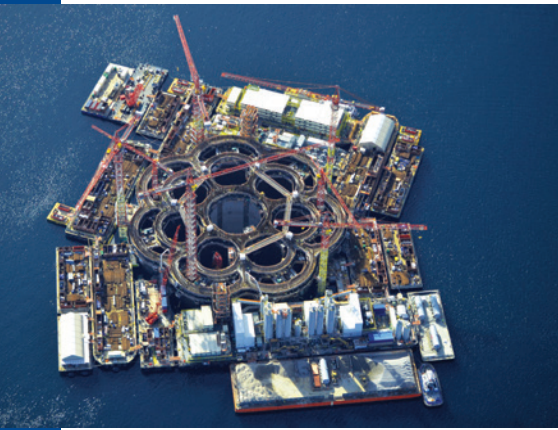


# ■ Freyssinet post tensioning system for offshore oil&gas structures



FREYSSINET





Hebron, Canada

## ► PRESTRESSED CONCRETE FOR OIL AND GAS OFFSHORE PLATFORMS

The growing demand on energy has been leading to the increase in terms of quantity, size, production capacity and location of onshore and offshore oil and gas facilities all over the world.

Prestressed concrete has been employed on a number of important offshore projects and remains a very efficient technology for fixed platforms and for floating structures used for the drilling, extraction, production or storage of crude oil or natural gas in shallow waters and/or harsh environment.

Prestressing 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.

The advantageous characteristics of prestressed concrete perfectly match the stringent requirements of offshore constructions :

### **Durable, safe and easy to maintain in aggressive marine environment :**

- Excellent fatigue behaviour
- Good resistance to abrasion
- Limited crack propagation
- Slow chloride migration
- Watertight
- Good resistance in case of fire or ice
- Very good resistance to impacts (icebergs and boats) or earthquakes
- Less inspections for a better service availability and a reduction of the strains on the structure due to the warm up and cool down operations

### **Structural advantages :**

- Low centre of gravity reducing motions and giving better station keeping characteristics
- No size limitation of the structures

### **Cost effective construction :**

- Local materials procurement
- Local labour employment
- Optimised construction schedule thanks to efficient construction methods

### **Efficient behaviour for specific cryogenic applications :**

- Good isolating properties for the storage of LNG or LPG
- Excellent resistance in the event of a leakage since prestressing tendons remain ductile while concrete becomes stronger at low temperatures : the prestressed concrete is not embrittled and can continue to contain the cryogenic liquid.



Hibernia, Canada



Adriatic, Italy



Ninian, Scotland

## ► FREYSSINET OFFSHORE PRESTRESSING: INNOVATION AND EXPERTISE TO REACH THE BEST

As a world leader in post-tensioning, Freyssinet has been involved in offshore projects for more than thirty years and has developed the Freyssinet Offshore Prestressing in order to meet the specific requirements of these specialized construction works.

The most optimised design of the structure, the best quality of the materials and the strongest experience in construction are mandatory to reach the highest performance and longest durability of the prestressed concrete structure.

Freyssinet, Inventor of the prestressed concrete, proposes a complete range of innovative products and efficient processes designed for the aggressive environment and hard work conditions of offshore projects.

The performance of the Freyssinet Offshore Prestressing, resulting of continuous research and development work of more than seventy years, makes it the solution of excellence for the building of oil and gas offshore structures.

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 certificate n°1683 - CPD-0004.

### Freyssinet integrated offer: from studies to construction

- Design, engineering and testing
- Construction methods
- Materials and equipments supply
- Works implementation, technical assistance
- Maintenance



ETAG 013 - "European Technical Approval" and the associated "CE Declaration of Conformity"



Stressing operation on offshore concrete structure



Freyssinet C-system anchorage

Such engineering contractor culture makes Freyssinet the ideal partner for specialized construction 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.

## Reference list of major offshore platforms with Freyssinet Post-tensioning System

Field	Operator	General Contractor	Country	Concrete structure designer	Water depth	Strands quantity	Year installed
HEBRON	Exxon Mobil	Kiewit-Kværner Contractors	Canada	Kværner	95 m	2 600 tons	2016
ADRIATIC	ExxonMobil/Qatar Petr/Edison	Aker Kværner	Italy	Aker Kværner	29 m	3 860 tons	2008
HIBERNIA	Mobil	Hmdc	Canada	Doris	60 m	8 000 tons	1997
FRIGG TCP 2	Elf	Condeep Group	Norway	Groner	104 m	600 tons	1977
NINIAN	Chevron	Howard/Doris	Scotland	Howard/Doris	139 m	4 000 tons	1977
BRAZIL	Petrobras	Campenon Bernard	El Salvador	Campenon Bernard	15 m	300 tons	1977
FRIGG MP2	Total	Howard/Doris	Sweden	Howard/Doris	94 m	2 600 tons	1976
DUNLIN	Shell	Andoc	Holland	Andoc	152 m	2 200 tons	1976
FRIGG CDP 1	Total	Howard/Doris	Norway	EEG	96 m	2 600 tons	1975
BERYL	Mobil	Condeep Group	Norway	Dr. Olav Olsen	120 m	820 tons	1975
BRENT	Shell	Condeep Group	Norway	Dr. Olav Olsen	140 m	1 270 tons	1975
EKOFISK 1	Phillips	CG Doris	Norway	EEG for Doris	70 m	3 300 tons	1973



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SUSTAINABLE TECHNOLOGY



[www.freyssinet.com](http://www.freyssinet.com)



### Americas

Argentina  
Brazil  
Canada  
Chile  
Colombia  
French Guyana  
Mexico  
Panama  
Peru  
El Salvador  
United States of America  
Venezuela

### Europe

Belgium  
Bulgaria  
Cyprus  
Czech Republic  
Denmark  
Estonia  
France  
Hungary  
Iceland  
Ireland  
Italy  
Latvia  
Lithuania  
Luxembourg  
Macedonia  
Netherlands  
Norway  
Poland  
Portugal  
Romania  
Russia  
Serbia  
Slovenia  
Spain  
Sweden  
Switzerland  
Turkey  
United Kingdom

### Africa and Middle East

Algeria  
Egypt  
Jordan  
Kuwait  
Morocco  
Oman  
Qatar  
Saudi Arabia  
South Africa  
Tunisia  
United Arab Emirates

### Asia

Hong Kong  
India  
Indonesia  
Japan  
Macau  
Malaysia  
Pakistan  
Philippines  
Singapore  
South Korea  
Taiwan  
Thailand  
Vietnam

### Oceania

Australia  
New Zealand