

# PROJECT REFERENCE

## DALIAN PROJECT

### Armaflex® Cryogenic Systems



- **Summary**

At the end of 2011, China National Petroleum Corporation (CNPC), China's largest state-owned oil and gas company, began trial operation of its new LNG plant in Nianyu Bay near the port of Dalian. For the insulation of the cryogenic pipework in the largest LNG plant in China so far CNPC relied on Armaflex Cryogenic Systems, the flexible multilayer systems for line temperatures down to -180 °C made by Armacell.

- **Place**

Nianyu Bay, China

- **Specifier / Engineer**

China Huanqiu Contracting & Engineering Corporation (HQCEC)

- **Market segment**

Oil and gas industry

- **Application**

Cryogenic pipework/ LNG process

- **Insulation systems used**

Armaflex Cryogenic Systems



Armaflex Cryogenic Systems were used on a large scale for the first time in the Chinese Dalian LNG project.



The LNG process pipework was insulated with the multilayer Armaflex Cryogenic System.

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Liquefied natural gas (LNG) is becoming more and more important for the energy supply. By cooling natural gas to  $-162\text{ }^{\circ}\text{C}$ , it is reduced to one six-hundredth of its volume and can therefore be transported economically by LNG tankers.

The storage and transportation of cryogenic media such as LNG, LPG, LEG or methanol and ammonia require high-performance insulation systems, because if the insulation system is damaged, the consequences are much greater in cryogenic applications.

With Armaflex Cryogenic Systems, Armacell is the first manufacturer of insulation materials to offer flexible insulation systems specially developed for applications at extremely low temperatures. The multilayer systems for temperatures ranging from  $-180$  to  $+125\text{ }^{\circ}\text{C}$  ensure exceptional thermal insulation, reduce the risk of corrosion under insulation (CUI) and allow significant cost savings during the installation process. Armaflex Cryogenic Systems maintain their flexibility even at extremely low temperatures. Thus the insulation is protected against thermal stress and cracking.

Armaflex Cryogenic Systems were installed for the first time on a large scale on the Chinese Dalian project. In summer 2007, CNPC, China's largest state-owned oil and gas company, began to build its first LNG plant in Nianyu Bay near the port of Dalian with a total investment of over 1 billion euros. The result is the country's largest LNG port, where tankers with a capacity of up to  $200\,000\text{ m}^3$  can dock. The project is being realized in two phases: initially, 3 million tonnes of LNG are to be converted into  $4.2\text{ billion m}^3$  of natural gas annually; in the second phase, the capacity is to be doubled to 6 million

tonnes of LNG. The liquid natural gas is sourced mainly from Australia and Qatar.

For insulating the cryogenic pipework and other installations on the Dalian LNG terminal the Beijing-based consultant engineering firm, China Huanqiu Contracting & Engineering Corporation (HQCEC), specified Armacell's flexible multilayer insulation systems for cryogenic applications.

On the Dalian project, all LNG process and vaporization pipes (including pumps, valves and other fit-tings) were insulated with the multilayer system. The pipes had diameters of 1 to 40 inches (outer diameters of  $33.7 - 1\,016\text{ mm}$ ) and were protected against condensation and energy losses using insulation thicknesses of 50 to 175 mm. In total, Da Shun Petrochemical Engineering Company (DPEC) from Dongying (Shangdong Province) installed  $15\,000\text{ m}^2$  of Armaflex LTD,  $27\,000\text{ m}^2$  of Armaflex LT sheets and  $3\,000\text{ m}$  of Armaflex tubes. Depending on the requirements, between two and seven layers of insulation material were used.

Throughout the specification and installation phase of this highly demanding project, the 80 DEPC employees were supported by five teams of Armacell application specialists. They were responsible for project management, calculating insulation thicknesses and supervision and also provided regular application training. The insulation work on the pipeline, which is around 7 km long, was carried out from January to September 2011. At the end of the year, CNPC began trial operation of the LNG plant.

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