Pre-insulation – tomorrow's solutions for LNG terminals

Ten good reasons for choosing LOGSTOR

- Optimum insulation capacity throughout the service life
- 30 year, maintenance free, design life
- 100% waterproof insulation system
- Triple sealed field joints
- Salt, chemical and UV resistant HDPE jacket
- Solid construction - high impact strength
- Pipe supports clamped directly on jacket
- Greatly reduced on-site installation costs
- Quick installation
- Fast and dependable delivery

References

LOGSTOR has supplied pre-insulated pipe for cryogenic applications throughout the last 2 decades. In the spring of 2002, LOGSTOR was awarded 2 contracts for the supply of pipe insulation to LNG carriers built at Samsung Heavy Industries in Korea for A.P Moller and BG. In order to minimize transportation and reduce time of delivery, the pipes will be insulated at our mobile production unit set up at the shipyard solely for this purpose.

LLOYD'S REGISTER QUALITY ASSURANCE · ISO9001

[We document the difference]

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LOGSTOR Oil & Gas

Facts and figures of the Isle of Grain project

Dimensions and quantities:

- **ø355/710: 4,561 m and 105 elbows**
- **ø762/1100: 303 m and 25 elbows**
- **ø914/1300: 4,453 m and 101 elbows**
- **Joints: 800 pcs.**
- **Heat gain: Overall max. 30 W/m² (Reference OD Steel pipe)**
- **Steel quality: AISI 304 L**

Wall thickness:

Steel pipes and bends ø355 = 4.77 mm	PE jacket pipe ø710 = min. 11 mm
Steel pipes and bends ø762 = 7.92 mm	PE jacket pipe ø1,100 = min. 13 mm
Steel pipes and bends ø914 = 9.53 mm	PE jacket pipe ø1,300 = min. 15 mm

Production time using pre-insulation: 8 weeks (Production time using traditional insulation: 50 man-years)

The Isle of Grain LNG import terminal was commissioned during the first quarter of 2005.

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The world's first supply of easy-to-install pre-insulated pipes for an LNG Terminal in England shows the way. Jacket dimensions from 710 mm to 1300 mm.

At an early stage of the design process, it was decided that pre-insulated pipe would be the selected option for this project. The operating costs are reduced because there is limited maintenance once the system is installed. The construction is tough and rigid, so much so that people can actually walk on the pipes without damaging the insulation or the sealing. The system will stay watertight during the entire life of the pipeline.

LOGSTOR spent 6 years of intensive research and testing to find the right thermal and mechanical properties for the insulation, including verification of the system. Most of this work has been carried out in close co-operation with Sintef Test institute in Norway.

LOGSTOR was contracted to deliver and install a complete pre-insulated pipe system to be used on the Isle of Grain terminal, located in the Thames Estuary only 50 miles away from central London. The terminal is an existing peak shaving plant, which will be converted to an import terminal. Peak shaving plants produce LNG that can be regasified when gas consumption peaks during wintertime. In 2004, the terminal was particularly interesting because it was probably the longest LNG pipeline built so far. The pipeline is 4.5 km long and comprises a 36" main line and a 14" vapour return line.

LOGSTOR has formerly manufactured several LNG / LPG marine carriers, but this is the first application to onshore LNG terminals.

Insulating pipes in situ is traditionally a time consuming and expensive process, and maintenance costs are often significant. LOGSTOR's pre-insulated pipes are insulated in a factory environment ensuring unique and uniform insulation properties. Installation is extremely fast and the entire system does not need any maintenance once installed. LOGSTOR has further developed the technology of pre-insulation to withstand the extreme requirements of LNG / LEG / LPG applications. Numerous tests have confirmed that pre-insulated pipe systems are capable of sustaining the stress and strain caused by the thermal expansion and contraction of the inner steel pipe, and this makes them the ideal choice not only for terminals but also for carriers and other offshore LNG / LEG / LPG applications.

Pre-insulated advantages

A pre-insulated LNG system is superior to traditionally insulated systems in many ways. The main difference between this system and alternative ones is that the insulation material, polyurethane foam (PU), is bonded to the steel pipe and the casing material made of HDPE (high density polyethylene). In alternative systems the steel pipe will slide inside the insulation and due to the contraction of the steel pipe, jacket contraction joints must be built into the system at approximately every 3 meters. However, the highly flexible PUR foam used as insulation material in LOGSTOR's pre-insulated pipes is so strong that it can transmit the forces induced by thermal expansion and contraction of the steel inner pipe to the casing made of HDPE (high density polyethylene). As a consequence the casing will follow the inner pipe expansion and there is no movement of the carrier pipe within the insulation. The pipes are combined into a system using field joints. The joints are installed by using electrically welded joints (EW joints). This ensures that loads are transferred from one pipe to the other because an electric weld keeps the same properties for the field joints as for the rest of the system.

The insulation density is uniform throughout the system and pipe supports are positioned directly on the casing. The uniform density eliminates the risk of thermal bridges at the pipe supports. On-site insulation is limited to installation of a relatively small number of heat shrinkable field joints. The installation process is fast and simple and LOGSTOR offers the training of fitters as an integral part of the project, thus enabling the use of local labour. Last but not least, the 100% watertight system has a maintenance-free design life of at least 30 years.