



The ›Snow White-Project‹

The first European Gas Liquefaction Plant for the International Distribution of Natural Gas from the Barent Sea

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Figure 1: Gas liquefaction plant and LNG-terminal on the island Melkøya

Hafslund Security and Stahl-Syberg AS of Norway, are cooperating on the security access system for the Hammerfest liquefied natural gas-terminal at Melkøya, where the entire island is classified as a hazardous area. This LNG-terminal is the first export facility of its kind in Europe for liquefied natural gas (LNG) and the second largest worldwide. Here the oil operating company Statoil will take onshore gas from the Snøhvit (Snow White), Albatross and Askeladd fields.

Snøhvit – a true adventure

Snøhvit is the first offshore development in the Barents Sea, and it also embraces the Albatross and Askeladd fields. The Snøhvit project represents new subsea technology, which means no offshore installations are visible, and it can be over-trawled. An enormous amount of gas – 5.7 billion cubic meters of natural gas per year – from these tree fields will be taken onshore to Melkøya, which is the world's northernmost export facility for LNG.

Deliveries from the Snøhvit development will provide Statoil with its entry ticket into the fast-growing US market for natural gas. When Snøhvit comes into operation during 2006, 2.4 billions cubic metres of natural gas will be shipped to Cove Point receiving terminal located on the east coast of the United States. Spain and France are also important markets for the LNG from Snøhvit, where a total of 3.3 billion cubic metres of natural gas will be delivered.

Specially constructed LNG-carriers are due to ship gas from the LNG plant to the receiving terminals. Each load will carry the equivalent of energy that 35,000 households consume in one year.

The liquefaction by refrigeration and the subsequent shipment of the gas is the most effective method of transport, particularly when the distances are more than 3000 kilometres. At the receiving terminals the refrigerated gas will be heated up to its normal gas form. The gas can then be used for heating and cooking, or generating electricity.

Statoil and the German company Linde have developed a special refrigeration process to liquefy natural gas at a temperature of -163°C . This conversion process reduces the original volume of the gas 600-fold, simplifying storage and transport.

The LNG-terminal on Melkøya is the world's most efficient one. When compared to similar terminals, it discharges considerably less waste water into the sea and in this way reduces the environmental pollution.

The cooling process is very energy-intensive and 1.5 terawatt-hours will be required to maintain production for 330 days. Some of the natural gas from Snøhvit, will also fuel Melkøya's own power station.

The huge LNG storage tanks hold 125,000 cubic metres of liquefied gas. These are added by one tank with 75,000 cubic metres of condensate (light oil) and one tank with 45,000 cubic metres for liquefied petroleum gas (LPG). Well isolated walls comprising several layers of steel and concrete keep the contents liquid until they can be shipped out.

Hafslund Security

Hafslund Security is one of the leading suppliers of electronic safety-systems in Norway. They deliver complete and innovative safety-solutions adjusted to the customer's needs and wishes. They are one of the leading suppliers of large integrated systems, where the demands of customer applications and adjustments are high.

One of the core business areas of Hafslund is high security products for onshore and offshore applications. Along with the Snøhvit project for Statoil, the Ormen Lange project and the Langedal project should be mentioned here.

Hafslund Security delivers safety installations to countries such as: Norway, France, Great Britain, Turkey, Germany, Iran, USA and Russia.

The security access system

Hafslund Security and Stahl-Syberg AS have cooperated to establish an ATEX certified security access system at the Melkøya LNG-terminal, qualified for the use in hazardous areas in conformity with the requirements of the ATEX Directive 94/9/EC.

Hafslund Security delivers the card readers for the personnel and the trucks. When entering into the area, all personnel encounter an access control column. There they must use a special access card and enter their own personal safety code. The column also has a microphone and a speaker in order to contact the control room in case of any problems.

The electronic delivered by Hafslund Security consist of Mifare card readers and fibre optic converters. Stahl-Syberg AS is responsible for the explosion protection of the columns. This includes the explosion protected electrical equipment, the installation and the engineering and assembling of the separate parts into the column.

At the LNG-terminal there are a total of 18 columns with different configurations. 8 columns secure the access of small and big vehicles, while the rest give access for personnel only to specific areas inside the LNG-terminal.

One of the highlights of the system is that the Mifare (touch free) technology has been used in all 18 columns. In 8 of the columns there is also an integrated vehicle registration. An electronic module is installed in the vehicles, so that automatic registration will take place at both the access to Melkøya as well as at different areas inside. Antennas are placed in the roads and linked up to the electronic system mounted in the columns. This is for safety reasons, so that in the case of a gas leakage the control room can know at all times where all personnel and vehicles are located. Included in the system are also physical barriers such as access gates and bars.

Technical concept of the explosion protection

The 18 columns to be delivered for the access control system at the LNG terminal at Melkøya, are made of stainless steel (SS316). The different devices installed in the columns have their own explosion protection-certificate or are installed as components in a control box of type of protection Increased Safety $\text{I} > \text{e} <$.

The explosion protected apparatus and equipment that are mounted inside or in front of each column:

- Ex d-control panel type 8264 with flange mounted Ex e-connection chambers, for the electronic components for the intercom and the access control system, mounted inside
- Ex d-control panel 8261, for the electronic for the automatic registration of the vehicles
- Ex e-terminal box for internal wiring
- Ex de-key pad type 8218
- Ex de-loudspeaker, microphone and call buttons connected to the intercom unit
- Ex m-LED indicator light, for the indication of access status
- EEx m-Mifare touch free card reader →

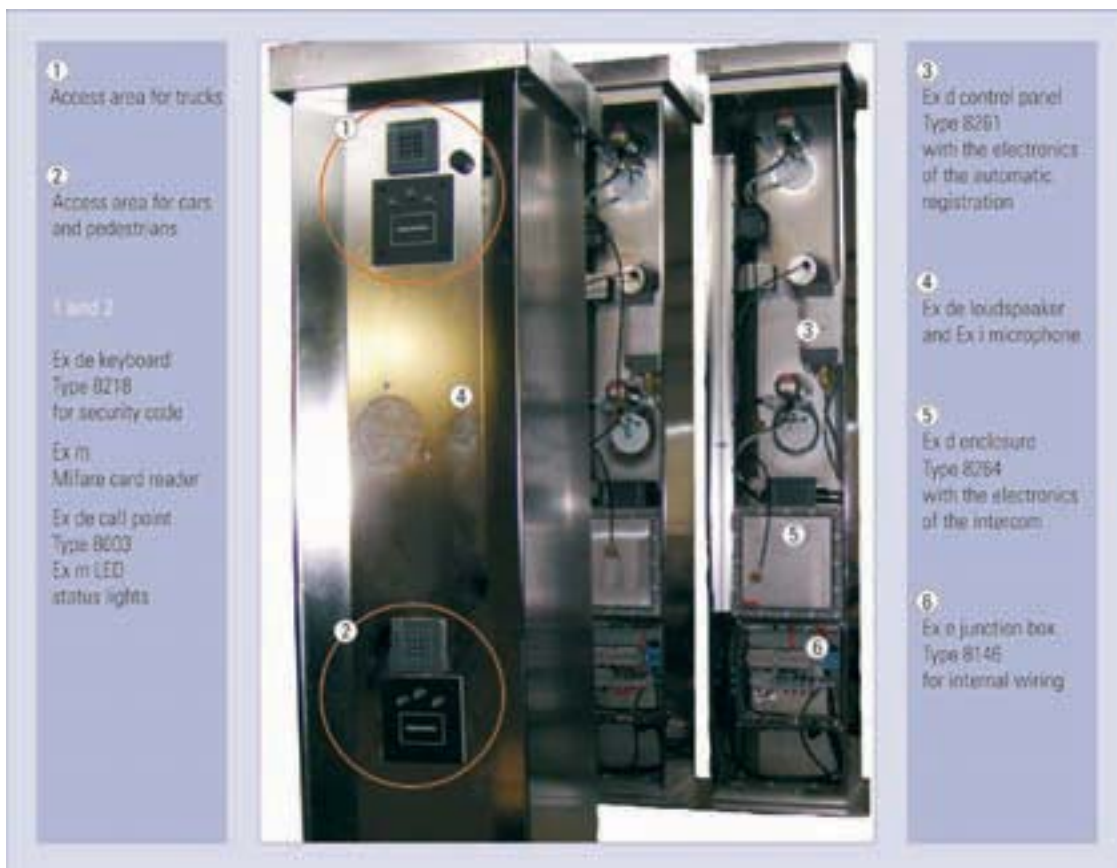


Figure 2: Explosion protected security access column

This solution is very unique due to the design and the combination of many different modules, both explosion protected and not explosion protected. All put together into one system that means the access control for both big and small vehicles, and pedestrians are communicating by RS485 fibre optic to the main control system.

The explosion protected part of the complete solution is designed and engineered by Stahl-Syberg AS in Oslo. Stahl-Syberg AG is the leading company in Northern Europe when it comes to explosion protected electrical equipment and specially engineered solutions. Stahl-Syberg AS is the main supplier of the explosion protected equipment and systems to the Snøhvit project.

Aside from the security access columns the delivery includes:

- › junction boxes in stainless steel (SS316) and in glass fibre reinforced polyester (GRP)
- › control stations in stainless steel and GRP
- › plug and sockets, from 16 A to 125 A
- › motor starters
- › control systems
- › operator interfaces (HMI)
- › remote I/O systems on the LNG carriers
- › cable glands and accessories

Outlook

Hafslund and R. STAHL are very proud to have cooperated on such an enormous project. The Hammerfest LNG terminal as well as its explosion protected security control system is state of the art. The engineering and design of the explosion protected systems will thus be a blue print for further projects in Northern Europe, and beyond. Hafslund and R. Stahl have already started working together for Norsk Hydro on their next big project, ›Langede‹, the world's longest submarine gas pipeline.