



Press Release

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**Direct Electrical Heating (DEH) technology keeps subsea flowlines flowing
as oil and gas projects go deeper and longer**

*Nexans has pioneered the DEH technology that prevents hydrate and wax formation
with a robust, field proven and efficient method for flow assurance*

Paris, May 6, 2015 - Nexans invites visitors to OTC 2015 to meet its experts on Booth 5553 to discover the latest developments in Direct Electrical Heating (DEH) technology for subsea flowlines. Nexans was a DEH pioneer and in 2000 installed the first system on the Åsgard field, operated by Statoil. With a track record that now includes the delivery of 9 out of the 10 fields with DEH in operation today, Nexans is able to offer a wealth of practical experience in the design, manufacturing and installation of this innovative, effective and environmentally friendly method of flow assurance.

Flow challenges

Oil and gas exploration and production is moving towards harsher environments, such as deeper water far from shore and longer subsea tie-backs. This trend causes new potential flow assurance challenges for operators. In deep water in particular, the high pressure and low temperature found at the ocean floor increase the chances of hydrate and wax formation. Wax and hydrates are the “cholesterol” of the subsea flowlines, which might slow or even completely block the flow of oil and gas.

Hydrates can be formed when water is present in the untreated well stream. The water content varies, but typically ranges from 10 percent to 80 percent of the fluid in the tail production period. At high pressures hydrate might start to form at temperatures up to 25-30°C, increasing the risk for hydrate blockage of the flowline. Problems occur when hydrates agglomerate together into a slush-like material, typically during shutdown situations in long tiebacks.

Wax is another source of blockages that occurs in some flowlines. When the temperature of the fluid drops below the wax appearance temperature (WAT), wax precipitates out. It hardens and adheres to the inside surface of the pipe, sometimes enough to cause a plug.

Flow assurance solutions

Typically, methods of preventing hydrate formation usually involved injecting chemicals into the well stream but this is not a green solution and it requires valuable space topside for processing the chemicals.

To find a better solution, a Joint Industry Project (JIP) was formed by Nexans, Statoil and the research organization Sintef, among others. The outcome was DEH, a technology which was qualified in 1998. The low maintenance cost and minimal OPEX of DEH compared to traditional systems with chemicals and pressure evacuation makes it an economical attractive solution.

How DEH works

DEH is a single phase electrical heating system that heats the flowline above the hydrate and wax formation temperature by transmitting an AC current through the flowline. Cables supply the current (and hydraulics if needed for other functions) from the topside power system down to the Piggyback Cable that is strapped to the length of flowline to be heated.

Current is then transmitted via the Piggyback Cable and returns through the flowline and sea. Due to magnetic field set up by this cable the flowline then becomes the primary return conductor in the system which is heated due to its own electrical resistance and the majority of the heat development takes place in the flowline.

Ongoing DEH projects and previously installed systems

Nexans has delivered the DEH system at 9 out of 10 fields with this technology. The longest flowline with DEH technology currently in operation is Tyrihans, operated by Statoil. The production line is an 18" 42 km flowline. This system was the first installation with fibre optics used for break detection, another Nexans patent.

To mitigate the risk of trawl impact or dropped objects, break detection turn offs the power immediately if the cable is damaged, which prevents damage to the flowline. To minimize the potential risk from such incidents, Nexans has developed both Mechanical Protection Structures (MPS) and Integrated Protection Structures (IPS) to protect the Piggyback Cable.

Lianzi

With a water depth of between 390 and 1,070 meters, the Lianzi oil field development in a unitized offshore zone between the Republic of Congo and the Republic of Angola, will be the world's deepest DEH system. The field, operated by Chevron Overseas, ties back to the Benguela Belize Lobito Tomboco (BBLT) platform located in Angola Block 14. The design of the system was developed and qualified for Chevron over a three year period before inauguration of the project.

The complete DEH system will include DEH Riser Cable, Armored Feeder Cable, a 43 km long Piggyback Cable and all associated accessories for connection to the flowline that will connect the Lianzi Development Project subsea facilities with the BBLT platform. The Piggyback Cable incorporates Nexans' IPS and fiber for break detection and temperature monitoring. The DEH system is design for both wax and hydrate management.

Shah Deniz

The Shah Deniz field, located in the Azerbaijan sector of the Caspian Sea, is the world's largest and most challenging DEH project to date. A total of 130 km of the cable system will be supplied to provide flow assurance for 10 subsea flowlines. The DEH systems, including Riser Cables, Piggyback Cables (with IPS) and accessories, were designed, engineered and manufactured at Nexans' specialized subsea cable and umbilical facility in Halden, Norway.

About Nexans

Nexans brings energy to life through an extensive range of cables and cabling solutions that deliver increased performance for our customers worldwide. Nexans' teams are committed to a partnership approach that supports customers in four main business areas: Power transmission and distribution (submarine and land), Energy resources (Oil & Gas, Mining and Renewables), Transportation (Road, Rail, Air, Sea) and Building (Commercial, Residential and Data Centers). Nexans' strategy is founded on continuous innovation in products, solutions and services, employee development, customer training and the introduction of safe, low-environmental-impact industrial processes.

In 2013, Nexans became the first cable player to create a Foundation to introduce sustained initiatives for access to energy for disadvantaged communities worldwide.

We have an industrial presence in 40 countries and commercial activities worldwide, employing close to 26,000 people and generating sales in 2014 of 6.4 billion euros. Nexans is listed on NYSE Euronext Paris, compartment A. For more information, please consult: www.nexans.com

Contacts:

Press

Angéline Afanoukoe

Tel.: +33 (0)1 73 23 84 12

Angeline.afanoukoe@nexans.com

Investor relations

Michel Gédéon

Tel.: +33 (0)1 73 23 85 31

Michel.gedeon@nexans.com