



Nexans project briefing NorNed submarine high-voltage link

Deep water cables for the world's longest submarine high-voltage link

At 580 km, the NorNed link between Kvinesdal, Norway and Eemshaven in the Netherlands is currently the world's longest high-voltage submarine power cable. Nexans has manufactured two 156 km lengths of cable for the deep water section – laid at depths of up to 410 m – as well as a shorter length of cable to bring the link ashore in Norway. Nexans specialist cable ship 'C/S Nexans Skagerrak' has also installed all the submarine cables, including the ABB elements.

The reason for the link

Statnett and TenneT, the Norwegian and Dutch national transmission system operators, each own 50 percent of the link, which is estimated to have cost 560 million Euros. The principal reasons for building the NorNed link are to improve electric power supply reliability in both countries and to reduce price fluctuations. Since Norwegian generation is almost entirely hydropower, below-normal precipitation can affect its power system. On the other hand, power production in the Netherlands is based on fossil-fuel-fired thermal generation.

Technical details

The NorNed HVDC (high voltage direct current) link has a maximum power capacity of 700 MW and an operating current of 824 A. In order to reduce cable costs and losses, it features two fully insulated 450 kV cables, even though it is a monopolar link. This enables the current to be kept small and the cable losses low, but requires a higher converter voltage.

Cable specification

The cable, manufactured at Nexans' specialist facility in Halden, Norway is a MIND (mass impregnated non-draining) cable, a type well established for submarine HVDC applications. It features a copper conductor and the insulation consists of layers of paper impregnated with a high viscosity oil. The cable requires no external pressurisation, and even in the event of it being completely severed by accident only a very tiny amount of insulating medium will escape – hence the term 'non draining'. There is a lead alloy sheath on top of the insulation, and mechanical protection is provided by steel tape and steel wire armouring.

A typical HVDC single core cable has a diameter of around 120 mm and weighs approximately 40 kg/m in air

Cables for this type of project are not supplied 'off-the shelf'. Instead, Nexans carried out a comprehensive design, type-testing and approval process to develop the ideal cable for this link. At the same time a tight delivery, installation and commissioning schedule had to be met to ensure that NorNed was ready for operation early in 2008.

Cable installation

The entire length of the NorNed cable, some 850 km, was laid by the C/S Nexans Skagerrak – the first purpose-built vessel to be designed specially for the transport and installation of submarine high-voltage power cables and umbilicals. Currently, there are only two vessels of this kind in the world. The vessel is equipped with a 7,000 tonne capacity 29 m diameter turntable, a computer based laying control system and a state of the art dynamic positioning system.

The cable has been protected on the sea bed by burial at depths of between 1 to 5 m using Nexans' specialist Capjet ROV trenching systems. In areas where the nature of the seabed prevented burial, the cable has been protected by rock-dumping.

About Nexans

With energy as the basis of its development, Nexans, the worldwide leader in the cable industry, offers an extensive range of cables and cabling systems. The Group is a global player in the infrastructure, industry, building and Local Area Network markets. Nexans addresses a series of market segments from energy, transport and telecom networks to shipbuilding, oil and gas, nuclear power, automotive, electronics, aeronautics, handling and automation.

With an industrial presence in more than 30 countries and commercial activities worldwide, Nexans employs 22,000 people and had sales in 2007 of 7.4 billion euros. Nexans is listed on Euronext Paris, compartment A. More information on <http://www.nexans.com/>

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