

Submarine Cable Link

The SwePol Link HVDC Connection Sweden / Poland



Cable data

Voltage	450 kV DC
Power	600 MW
Length	250 km
Conductor	2100 mm ² Cu
Insulation	MIND
Weight	67 kg/m
Customer	SwePol Link
Year	2000

Project content

- HVDC cable and accessories
- HVDC converter stations
- Cable system design
- Project management
- Installation (on land and at sea)

The world record from 1994, for the longest HVDC cable with the highest capacity, was equalled in 2000 with the successful completion of the Swedish-Polish HVDC transmission link between Sweden and Poland:

1. Stretching over 250 km, it is one of the two longest submarine HVDC cables ever laid.
2. At 600 MW, the cable is one of the most powerful HVDC cables in commercial operation.
3. At 450 kV DC, this cable together with the cable between Sweden and Germany, has the highest voltage rating of all existing submarine HVDC cables.

ABB was the turnkey contractor for the project and was responsible for supplying the cables as well as the converter stations at both ends. The wide range of know-how within the ABB Group, proved to be vital for the rapid and successful development and completion of the project.

The Cable

The SwePol Link is a MIND cable: mass-impregnated, non-draining, paper-insulated HVDC cable. It has a 2100 mm² copper conductor consisting of concentric layers of keystone-shaped strands, optimising a smooth surface with very compact construction.

A layer of semi-conducting carbon paper on the surface of the conductor eliminates any possible unevenness, which would otherwise increase the field-strength locally. The paper insulation is 20 mm thick and consists of over 250 thin layers of sulphate cellulose paper, which is first vacuum-dried and then impregnated with a high-viscosity insulating oil. Outside the paper insulation is a conductive layer of carbon and metallized paper. A hermetically



sealed lead sheath with a PE jacket protects the insulation from moisture or water penetration. The mechanical strength of the cable is provided by steel tape and two layers of steel-wire armour. The steel wires are applied in opposite directions to form a counter-helix, which eliminates any torsional stress. An outer serving of bitumen-bonded polypropylene yarn protects the cable from corrosion.

MCR System (Metallic Current Return Cables)

The MCR cables consist of two standard XLPE insulated 20 kV cables which together gives a sufficient conductor area for the return current. The two MCR cables together with the single HVDC cable gives a completely closed HVDC cable system. The design and the installation of the cable have throughout the project been guided by environmental concerns. As the design includes MCR cables, all possible risks of corrosion or chlorite generation have been avoided.

Production

The complete SwePol Link Cable was manufactured in our Karlskrona factory, which is specially designed to cater for the production of long, powerful, submarine high voltage cables. The cable was produced in four continuous lengths of about 60,000 metres and the entire cable was completed in less than 15 months.

Cable Route

The cable route begins at Stårnö Converter Station, Karlshamn with a land section of 2,3 km. From there the MIND cable and the two return cables run parallel across the bottom of the Baltic Sea to Poland. The route was chosen to minimise the impact on fishing areas and where a bottom suitable for burying the cable was found. The land section of the cable in Poland is about 13 km long and it ends in the Slupsk Converter Station.

Installation

The submarine cable laid across the Baltic Sea has a length of 239 km and weighs some 20,000 metric tons. Since no cable-laying ship currently in existence can cope with such a weight, the cable had to be laid in four sections, joined by field splices. All sections of the cable were loaded directly on board the laying ship at our factory's deep-sea port at Karlskrona. For the landing of the cable in Poland, the very sensitive shore environment consisting of high sand dunes, was passed by means of 500 metres directional drilling under the sand dunes and out in the sea in order not to disturb the natural dunes.

Commissioning

The SwePol HVDC Cable System was taken over by the customer April 19, 2000, launching a new era of power transmission and power exchange in Europe.

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