

Submarine Cable Link

The Baltic Cable HVDC Connection Sweden / Germany



Cable data

Voltage	450 kV DC
Power	600 MW
Length	250 km
Conductor	1600 mm ² Cu
Insulation	MIND
Weight	55 kg/m
Customer	Baltic Cable AB
Year	1994

Project content

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

*World record holder for
length, voltage and power*



Four new world records were set in 1994 by ABB, with the successful completion of the Baltic Cable HVDC transmission link between Sweden and Germany:

- 1) Stretching over 250 km, it was the longest submarine HVDC cable ever laid.
- 2) At 600 MW, the Baltic Cable is one of the most powerful HVDC cables in commercial operation.
- 3) With 450 kV DC, the cable has the highest voltage rating of all existing submarine HVDC cables.
- 4) The 5.3 km land section of the cable in Sweden was laid in one continuous length in an open-cut trench.

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 Baltic Cable is a MIND cable: mass-impregnated, non-draining, paper-insulated HVDC cable. It has a 1600 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 19 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.

Electrode System

Since the cable system is a monopole installation, the return current is transmitted via a sea-electrode system. To guard against the possibility of the electrode current causing corrosion in the armour of the main cable, the electrodes and the main cable are separated. The anode consists of a titanium wire-mesh, while the cathode is a large copper ring.

Production

The complete Baltic 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 continuous lengths of about 130,000 metres, and the entire cable was completed in less than 20 months.

Cable Route

The Västra Kärrstorp converter station in Sweden was built close to an existing transformer station at Arrie, south of Malmö and about 17 km from the coast. The link was first routed through a 12 km overhead line, then by land for about 5.3 km to the coast. From there it runs across the bottom of the Baltic Sea to the mouth of the River Trave in Germany. The cable then follows the course of the Trave for a distance of 12 km until it reaches the Herrenwyk converter station in the outskirts of Lübeck in Germany. The total length of the link is 262 km, of which 250 km are HVDC power cables. In addition ABB supplied almost 100,000 m of XLPE electrode cables.

Installation

The submarine cable laid across the Baltic Sea has a length of 233 km and weighs some 13,000 metric tons. Since no cable-laying ship currently in existence can cope with such a weight, the cable had to be laid in two sections, joined with a field splice. Both sections of the cable were loaded directly on board the laying ship at our factory's deep-sea port at Karlskrona. The River Trave installation was carried out using a barge, and the electrode systems were also installed using ordinary vessels.

Commissioning

The Baltic Cable HVDC link came into commercial operation on December 1, 1994, launching a new era of power transmission and power exchange within Europe.

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