



WETS'07 - Rapporteur's Report

MORNING SESSIONS :

Chairman : Susumu SAKUMA, Viscas corporation, Japan
Rapporteur : Christian AUCOURT, RTE, France

Summary of the Morning Sessions

SESSION N°1

Topic 1 – Long length links in the world : Characteristics

Mr Jensen (Danish TSO) presented the Danish experience in HV cables : 400 kV XLPE cable in Copenhagen area, with direct burial laying and compensators directly connected to the line, 150 kV cable for offshore wind farm. During the discussion, the author explained the absence of regulation about EMC and laying protections against external effects in case of breakdown.

Mr Monterubio (Spain) presented the main existing and future EHV cables projects of REE : mainly in 220 kV in Barcelona area (tunnel, directly buried, ducts) and in 400 kV with the Barajas project (tunnel – 2x13 km – 2500 mm² – XLPE insulation), Spain-Morocco 400kV AC interconnection (Submarine and land cable in OF design) commissioned in 1997 and 2006, and the new HVDC project between continental Spain and Mallorca (HVDC bipole 2x200 MW +250 kV – mass impregnated paper insulation) planned for a commissioning in 2010/2011.

During discussion Mr Monterubio mentioned a future link between the islands (Mallorca, Ibiza) under AC – 200-300 m depth – 100 km;

In the long length cables circuits, compensations are installed mainly for economical reasons or for “n-1” situation. A fire protection paint (flame retardant) is installed on the jacket of cables in tunnel installation.

The network upgrading around the city of Tunis were presented (220 kV and 90 kV network) by Mr Santana (Prysmian) with a special attention for the crossing Bizerte inlet channels near Tunis (1000 m by directional drilling technique with steel and HDPE tubes). Other projects were mentioned : turn key project for RTE (Plouay-Lozmalo) in 2006 with innovative laying solutions (long length of PEHD pipes, pushing floating techniques, ...).

Mr Swingler (UK), Convenor of the Cigre WGB1.07, presented the overview of significant undergrounds cable projects constructed since 1996.

Japan developed for many years long length links, into megacities : first OF cables, now with XLPE design.

Some projects have been presented by Mr Sakuma (VISCAS Corporation), in 500 kV XLPE (40km), in 500 kV OF (22km) or in 275 kV XLPE (27 km). For connections between islands, 500 kV cable are installed in the frame of the bridges. Flame retardant PVC jacket are also used for tunnel installation.

Mr Nishiyama (Chubu / Japan) mentioned the importance to decrease the number of joints for a cable link : cost of jointing, traffic disturbing during installation, potential higher risk of trouble in joint ... So the Japanese utility ask to manufacturers to develop innovative solutions to increase the length of cable on drum : optimized design (screen-jacket complex, ...), special drums, transporting solutions ...

Two examples were presented : 500 kV(275kV) XLPE cable – 2500 mm² / with a max length between joint of 1800 m (2500m).

Some existing AC submarine links in Norway were presented by Mr Balog (Nexans) in different technologies : Mass impregnated (250 kV – 2x 121 km – depth 550 m), OF (420 kV 6x8km – max depth 300 m) and XLPE (52kV – 67 km – Max depth 350 m) cables.

Mr Joyce from New Zeland (Transpower) presented the Auckland 220 kV cable transmission network with the commissioning of new cables links from 2011 to 2020 to connect the north shore city and south, crossing Auckland city.

A major project of PG&E (US) described by Mr Zenger, 230 kV Jefferson-Martin Line, contributes to supply San Francisco and San Mateo areas. 44 km of 230 kV XLPE cables with compensation were energized in 2006.

During the discussion, the technical choices were mentioned : compensation at both ends (shunt reactors), cross bonding, open trench installation with fluidized thermal back fill.

The environment aspects were important (different proposed routes, opposition, compensation dispositions, ...)



SESSION n°2

Topic 2 – Long length links in the world : Compensation of the reactive power

Mr Zaccone (Prysmian associated with Nexans) presented the GCC project, development of the interconnection between the Gulf States.

A double Overheadline (OHL) 400 kV – 694 km - connects Al Zour (Kuwait) to Salva (South Arabia). From this line, a connection is derived to Bahrain.

A 40 km OHL in series with a 42.5 km submarine cable and 9km land cable connect the double circuit line to Barhain. The total power is 650 MVA per circuit.

Due to the length of the cables, a compensation by shunt reactors have been placed in the 2 ends of the 400 kV cables link (4x125 MVAR for one end / 2x125 MVAR + 2x300 MVAR for the other end). The level of reactive compensation is about 96 %.

Mr Nozaki (J-Power Systems, on behalf of Tepco / JP) described the outlines of compensation of the 500 kV Shin-Toyosu Line composed by 500 kV XLPE cable – 39,5 km – 2 circuits – 900 MW/circuit and the possible transient voltage problem occurred in long underground transmission line.

The presentation and discussion mentioned : a total compensation by reactance of the line and shunt reactor banks.

The best solution is to install shunt reactor to both ends of the cable in order to limit the overvoltage at the termination of the cable and when the cable line is opened.

To reduce cost installation and components, the shunt reactors banks must be installed in the lower voltage part.

An other example of compensation system presented by Mr Balog (Nexans in association with Prysmian) for the Vancouver Island project. (35 km) with 3 locations of the reactive banks (both ends and intermediate point on the Texada island)

Mr Karlstrand (Sweden – ABB) explained the influencing parameters in case of long length cables and the benefit of reactive power compensation. Some economical data are given for the case of 220 kV / 400 MW .

The application for a pre-study was presented (Cigre 21-201 / 2002) : 132 kV XLPE cable of 200 km crossing Iceland with 18 reactors banks every 20 km.

Some discussions were about the necessity to take into account the losses in the shunt reactors.

Mr. Bolza summarized the morning session and Mr Sakuma thanked the contributors.

Christian Aucourt

RTE-France

Rapporteur of the morning sessions

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