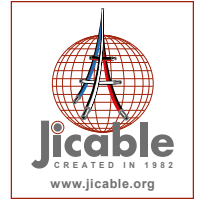


# Achievement and experience in service of long length High Voltage AC electrical links by insulated power cables

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The power transmission network has been developed during the last decades based on the use of overhead lines (OHL). EHV underground cables systems have been available since a long time, but their development has been limited by large capacitance and dielectric losses as well as relatively low current rating compared to OHL. However with the use of new materials and processing technology the situation has changed significantly, so that the constraints on maximum length and power transfer have largely been overcome.

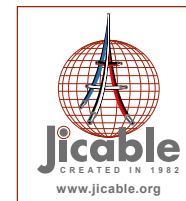
The difficulties in installing new overhead lines are making it essential to consider the use of longer underground cables links; this is demonstrated by the increasing numbers of long underground cable projects that have been carried out in many countries during the past 20 years. There are however still considerable technical challenges to consider whilst planning such new cable installations, the most sensitive topics are those concerning reliability, impact on the transmission grid and installation.

The need for such information became very much apparent at the Jicable conferences and WETS workshops in 2007 and 2011. These WETS meetings have been the main focus for the development of information on this topic. Cigre SCB1 has responded to the WETS initiative by forming a task force to determine what information needs to be collected. The taskforce met in June 2013 and developed the following definition:-

“A long length of insulated cable is one where the load due to the capacitive current needs to be taken into account in the system design. Typically this would be 40 km for voltages less than 220 kV and 20 km for 220 kV or greater”

This presentation will review more than 40 projects worldwide that have been addressed by the above criteria. It will highlight some of the challenges for implementation, system design and installation. Some of the topics covered being, the feasibility, opportunity for hybrid circuits, new cable designs, reduction in power losses and maintaining the cable route environment. System design issues such as reactive power compensation, sheath bonding, impact on the network and the thermal/mechanical forces due to linear expansion with long lengths. Construction issues such as transportation in remote areas, mechanisation of laying, testing and commissioning. Also online monitoring, security, fault location and repair times.

It needs to be acknowledged that information on this topic is still quite limited. Hence the Cigre task force believes that a Technical Brochure could be a very valuable document which could be referenced by any Utility, Government agency or Investor looking to put in to an underground system in lieu of an overhead line in terms of appreciating what can be done or has been done. One of the objectives for such a working group will naturally also be to have a paper on this topic presented at Jicable in June 2015 and discussion at the WETS 15 workshop.



## Kenneth Barber

### Biography



Ken has been employed in the Electric Cable industry since 1961. He has worked for Cable plants in UK, India, Malaysia and Australia, and for 34 years commencing in 1976 was responsible for Olex Australia's R&D and HV cable systems. He was the Chairman of the Australia Standards committee for Insulated cables for more than 20 years and on standards committees for Bare conductors and the Australia Wiring rules. He was Group Technical Manager and later General Manager High Voltage and Engineering. He has been involved in supply and installation of 2000 km of HV and EHV cable for more than 200 projects in the Asia Pacific region and has authored numerous technical papers. After the acquisition of Olex by Nexans in 2006, Ken became part of the Nexans HV team based in Asia Pacific as the Sales Director for HV cables in Asia Pacific region.

He retired from Nexans in June 2012 to develop his own consulting business but has been retained by Nexans for the past 12 months as a consultant, representing them on various organizations such as CIGRE, AESIEAP & JICABLE.

He is a member of the IET, Life Member of IEEE and Convener of the CIGRE Asia-Oceania Regional Council (AORC) B1 panel. He is a member of CIGRE SC B1 Strategic Advisory Group and recently took on the role of Convener of a CIGRE B1 Task Force to consider the development of a Technical Brochure on the "Technical Issues relative to Long Length AC cable systems".