With the support of CIGRE
Committee B1 : Insulated Cables

WETS’15 *QUESTIONNAIRE*

WETS’15　アンケート
World Energy Transmission System
世界の送電システム

Form N° …

Achievement and experience in service of long length (> 10 km), HV, EHV and UHV electrical links by AC and DC insulated power cables

長距離（>10km）の HV、EHV、UHV／AC、DC 送電ケーブルの運用実績

The results of the surveys for WETS'05 / WETS'07 / WETS’11 are available on the site jicable.org page Workshops. See also CD Roms WETS'07 and WETS’11
WETS'05 / WETS'07 / WETS’11 での調査結果は、jicable.org のホームページにおけるワークショップのページにて閲覧可能です。

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1 – HV, EHV and UHV Insulated power cables AC links

1.1 – Geographical situation of the link:送電線の運用箇所

Country :国 _Japan_

Area :地区 _Honshu (Okayama pref.) –Shikoku (Kagawa Pref.)_

1.2 – Characteristics of the link: 送電線の特徴

Network :電力会社 _Electric Power Development Co., Ltd. (J-Power)_

Link name :線路名 _Honshi Interconnecting Transmission Line_

Nominal power (MW): _2400_

Nominal voltage (kV): _500_

Link length (km) : _127.0 (OHL; 104.9 + cable 22.1)_

Number of circuits : _2_

1.3 – Characteristics of the cables:ケーブルの特徴

Cable type :ケーブル種別 _Oil Filled_
Manufacterer(s)製造社
Installation: underground (in tunnels, in ducts, in concrete, directly buried…), submarine (embedding depth, cable protections…) 布設状況：地中（洞道、管路、等）、あるいは海底（埋設深さ、ケーブル防護等）
Hitachi Cable, Sumitomo, Furukawa, Fujikura, Showa Cable

Along bridges and underground in tunnels

Forced cooling: 強制冷却

Yes : ☒ , type : _Blowers_

No : ☐

Insulating material : _Oil and PPLP (Polypropylene Laminated Paper)_
polymer, paper, …
絶縁材料
Metallic screens _Aluminium_

bonding :接地システム: Direct Earthing

Lineic inductance : 線路インダクタンス _____

Lineic capacitance : 線路キャパシタンス _____

Testing of the link (before commissioning, and during operation): 線路の試験（運開前、及び運転中） _(Before commissioning) DC withstand voltage test_

1.4 – Is a compensation of the reactive power achieved? 線路補償の有無

Yes : ☒ No : ☐

Why? :なぜ上記の回答となった判断をしたか？ _____

_____

Position of the compensation : At the end, intermediary, Why? 補償設備の位置（端部・中間部）及びその理由 _At the end, Land for the compensation reactors were limited._____

1.5 – Characteristics of the compensation:線路補償の特徴

Nominal power (Mvar) : 補償容量 _500_____

Technology :適用技術 _____

Occupied space (m^2): 専有面積 _____

Cost (€ or US$) : 価格（€1=120 円で） _____

1.6 – How are considered the problems of cable integration into the system? ケーブル設備を送電系統に組み込む際に考慮した課題はどうであったか？

- Stability of voltage and frequency:

- Propagation of slow transients, resonances:

- Distribution of currents related to the different impedances

_____

_____

_____

_____

_____

1.7 – **Operating results of the compensated link:**補償設備導入した線路の運用結果

Technical and economical performances :

_____

_____

1.8 – **Publications or available documents concerning this link:**当該線路に関する公開文献情報

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_____

_____

_____

_____

2 – HV, EHV and UHV insulated power cables DC links

2.1 – **Geographical situation of the link:** 送電線の運用箇所

Country :国 Japan

Area :地区 Hokkaido –Honshu (Aomori Pref.)

2.2 – **Characteristics of the link:** 送電線の特徴

Network :電力会社 _Electric Power Development Co., Ltd. (J-Power)__

Link name :線路名 _Hokkaido – Honshu HVDC Link_____

Nominal power (MW): _600_____

Nominal voltage (kV): _+/- 250 kV_____

Link length (km) : _167.4 (OHL; 124.1 + Submarine cable; 42.1 + Land cable; 1.2)

Number of circuits : _Bi – poles, 1_____

2.3 – **Characteristics of the cables and accessories:** ケーブルと付属品の特徴

Cable type :ケーブル種別 _Pole #1; Oil Filled, Pole #2; XLPE_____

Manufacterer(s)製造社

Installation: underground (in tunnels, in ducts, in concrete, directly buried…), submarine (embedding depth, cable protections…)

_Pole #1; Hitachi Cable, Sumitomo, Furukawa, Fujikura, Pole #2; J-Power Systems

_Submarine section; Embedding (the embedding depth depend on the depth of water), Cast iron pipe, Concrete covering
Land section; in ducts

Forced cooling: 強制冷却

Yes : ☐ , type : _____

No : ✕

Insulating material : polymer, paper, … 絶縁材料 _Pole #1; Oil and Paper, Pole #2; XLPE_____

Characteristics of the accessories:付属品の特徴 _Pole #1; Oil supply pump facilities at the both ends of the OF cable

Testing of the link (before commissioning, and during operation): 線路の試験（運開前、及び運転中） _(Before commissioning) Pole #1; DC withstand voltage test, Pole #2; Zero load DC system voltage test

2.4 – **What are the reasons for choosing this technology?** この技術導入の理由

_Pole #1; Due to the high seawater temperature, OF cable has been applied.

_Pole #2; Due to high seawater temperature and avoiding oil leakage, XLPE cable has been applied.

2.5 – What are the difficulties of integration of the conversion station in the network and the solutions (problem of protection of the link and of the network…)? 変換設備を導入する際の難しさは何があったか？　また、その解決法は？（送電線及び送電網の保護、などなど）

2.6 – **Operating results of the link:線路の運用結果**

DC link and Converters:DC 送電線及び変換器

_It is mentioned in CIGRE B4 Session Paper. The report has been updated every two years.

2.7 – **Publications or available documents concerning this link:** 当該線路に関する公開文献情報

CIGRE Session paper 21-03_1980; +/- 250 kV direct current submarine cable for Hokkaido-Honshu link

B1-110_2014; Practical application of +/-250kV DC-XLPE cable for Hokkaido-Honshu HVDC Link

3 – General issues concerning terrestrial or submarine insulated power cables AC or DC links
陸上あるいは海底の **AC** および **DC** ケーブル送電線の一般的な問題･･･大問 **1** または **2** に示したプロジェクトについての質問と思われます。

3.1 – What is the logistics of major projects and planning issues in particular in the case of tunnel (e.g., the problem of routing of large drums ...)?
洞道布設の線路における輸送に関する問題は何か？（大サイズドラムの輸送ルートの問題など具体的に）
_Limitation of transportable cable drum size_____

_____

_____

3.2 – What are the results of studies on the failure rate of these links taking into account the number of joints (elementary sections related to the capacity of drums). What is the estimated reliability of these links? What repairing solutions to reduce the duration of unavailability in case of failure?
これらのケーブル送電線に対する事故確率に対して、ジョイント数を考慮に入れた結果はどのようであったか（ドラム巻き量に関係するスパン長など）？　これらのケーブル送電線の信頼度評価結果は？　事故が発生した場合、運転停止期間を短縮するために採用した、復旧に関わる解決策は？
_Repair joints and spare cable have been prepared._____

_____

_____

3.3 – How did react suppliers in terms of availability and responsiveness to the different phases: design, supply, repair?
設計、製造、復旧の各フェーズにおいて、納入者はどのように関わり、またその責任範疇はどのようであったか？
_Construction; Full turnkey contract including defects liability period_____

_Repair work after defects liability period; new contract to be concluded_____

_____

3.4 – Are there any diagnostic methods for assessing the health status of a submarine link of 100 km? （日本では**100km**超の海底線はないので、回答不要）
_____

N/A

3.5 – What are the acceptance tests for significant long length links?
長距離線路の受入れ試験（竣工試験）はどのような方法を採用したか？

In 2000 or earlier; DC withstand voltage test

After 2000; Zero load System voltage test

3.6 – What are the technical solutions to realize links with three ends?
（おそらくDC3端子系統に関わる質問故、回答不要）

N/A (No three terminal DC system we have)

3.7 – What is estimated cost of the investment and operation of these links (the distribution of these costs to the supply, installation work and assembly / test)?
これらのケーブル線路の設備投資および運転に関わる見積もりコストは？（物品供給、布設および組立、試験に関わるコスト比率は？）

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