With the support of CIGRE
Committee B1 : Insulated Cables

WETS’15 *QUESTIONNAIRE*

World Energy Transmission System

Form N° 7

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

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

Contact:

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

1.1 – **Geographical situation of the link:**

Country : _Korea_____

Area : _Incheon _____

1.2 – **Characteristics of the link:**

Network : _345kV Gajung-Shinbupyong_____

Link name : _345kV Gajung-Shinbupyong T/L _____

Nominal power (MW): _3000MW_____

Nominal voltage (kV): _345kV_____

Link length (km) : _6.9 km_____

Number of circuits : _3 circuits_____

1.3 – **Characteristics of the cables:**

Cable type : _XLPE clable_____
Manufacterer(s)
Installation: underground (in tunnels, in ducts, in concrete, directly buried…), submarine (embedding depth, cable protections…)
_____ In tunnels _____

_____

Forced cooling: **NO**

Yes : ☐ , type : _____

No : ■

Insulating material : ___Cross-linked polyethylene_
polymer, paper, … _____ ____

Metallic screens ___Corrugated Aluminum sheath ___
bonding : Cross-bonding system_____

Lineic inductance : _This Project is under construction. so_after construction we can get a real data for inductance

Lineic capacitance : __0.22 uF/km(calculated data)_____

Testing of the link (before commissioning, and during operation): __AC withstanding voltage test (1 hour) _____

1.4 – **Is a compensation of the reactive power achieved?**

Yes : ☐ No : ☐

Why? : __Side load Voltage swell__ _____

_____

Position of the compensation :
At the end, intermediary, Why? _Substation both ends,
Impossible to secure intermediary site__

1.5 – **Characteristics of the compensation:**

Nominal power (Mvar) : ___200MVar_____

Technology : ____Shunt Reactor _____

Occupied space (m^2): ___100 m^2_____

Cost (€ or US$) : ____About 2 to 2.5 millian USD_____

1.6 – How are considered the problems of cable integration into the system?

- Stability of voltage and frequency:

- Propagation of slow transients, resonances

- Distribution of currents related to the different impedances

__We don’t consider Stability of voltage and frequency, Propagation of slow transients, resonances and Distribution of currents related to the different impedances for cable integration into the system

_____

1.7 – **Operating results of the compensated link:**

Technical and economical performances :

__Voltage in the bus is maintained well with shunt reactors and KEPCO don’t have special problems for operation the long cable lines

1.8 – **Publications or available documents concerning this link:**

__ We don’t have any public publications and available documents.

We just have internal documents._____
_____

_____

_____

_____

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

2.1 – **Geographical situation of the link:**

Country : _Korea_____

Area : _Jeju_____

2.2 – **Characteristics of the link:**

Network : _Jindo-Jeju _____

Link name : _Jindo-Jeju #2 HVDC T/L ____ _____

Nominal power (MW): _400MW_____

Nominal voltage (kV): _±250 _____

Link length (km) : __113 km_____

Number of circuits : __Double Bi-pole system__ _____

2.3 – **Characteristics of the cables and accessories:**

Cable type : ___MI (Mass Impregnated) cable _____
Manufacterer(s)
Installation : underground (in tunnels, in ducts, in concrete, directly buried…), submarine (embedding depth, cable protections…)
_____

_Submarine (Maximum depth : undersea 160m) , _Rock-berm etc._____

Forced cooling: NO

Yes : ☐ , type : _____

No : ■

Insulating material : ___Paper_____
Polymer, paper, …

Characteristics of the accessories: ___1 joint (undersea)__ _____

Testing of the link (before commissioning, and during operation) : ___$1.4U_0$__(350kV, 15min)_____

2.4 – **What are the reasons for choosing this technology?**

__MI cable is a common cable in HVDC part. Most of HVDC projects are consisted of the MI cables. MI cable is suitable for LCC converter system.
_____

_____

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…)?

_The coordination is lack of between converter company and cable manufacturer. _____

_____

_____

_____

2.6 – **Operating results of the link:**

DC link and Converters:

_There is no problem until now. So far, It has been operating without any problems. _____

_____

2.7 – **Publications or available documents concerning this link:**

We don’t have any public publications and available documents. We just have internal documents. _____

_____

3 – General issues concerning terrestrial or submarine insulated power cables AC or DC links

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 ...)?

_____

We just obey the domestic law. So, the weight of large drum is 40 ton.

_____ _____

In the long Tunnel, we install the joints 500m apart.

_____

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?

_____

We usually install the Joints 500m apart. According to the number of joint,

_____

We don’t estimate reliability of the link. And we use the pre-molded joint method for saving the duration of repairing in case of failure. _____

3.3 – How did react suppliers in terms of availability and responsiveness to the different phases: design, supply, repair (Question for power utilities)?

_____

Many utility companies have completed the standardization work for the joint box design of suppliers. so We did try to make it available to support each other. therefore there is no probrem in case of failure

3.4 – Are there any diagnostic methods for assessing the health status of a submarine link of 100 km?

There are no methods for assessing the health status of a submarine link of 100 km in our current technology

Only for the AC Line, We apply PD test and diagnostic methods using a thermal camera.

3.5 – What are the acceptance tests for significant long length links?

We give an Acceptance test according to “Electra 189” test method concerning the long length cable

3.6 – What are the technical solutions to realize links with three ends?

There is no links with three ends in the domestic

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)?

When constructing cable, Suppliers are supposed to pay all cost about the supply, installation work and assembly / test.

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