

---

# *Type Test of a 245 kV Cable System*

*Churdpong Maneesin*

*Steve Campbell*

*Phelps Dodge International Thailand Limited*



**Spring ICC Meeting 2010, Nashville. TNL 23 rd March**

# Background

- Phelps Dodge International Thailand Limited became member of General Cable Corporation in 2007. Two extrusion lines are in service (HV/EHV).
- There were agreements between Phelps Dodge International Thailand Limited and SILEC Cable to conduct a type test on a 220 kV cable system composed of cable from Phelps Dodge International Thailand Limited and accessories from SILEC Cable, both part of General Cable Corporation.
- The type test of the 220 kV cable system in accordance with IEC 62067 at KEMA laboratory was started on 14 September 2009 and successfully completed on 29 January 2010.



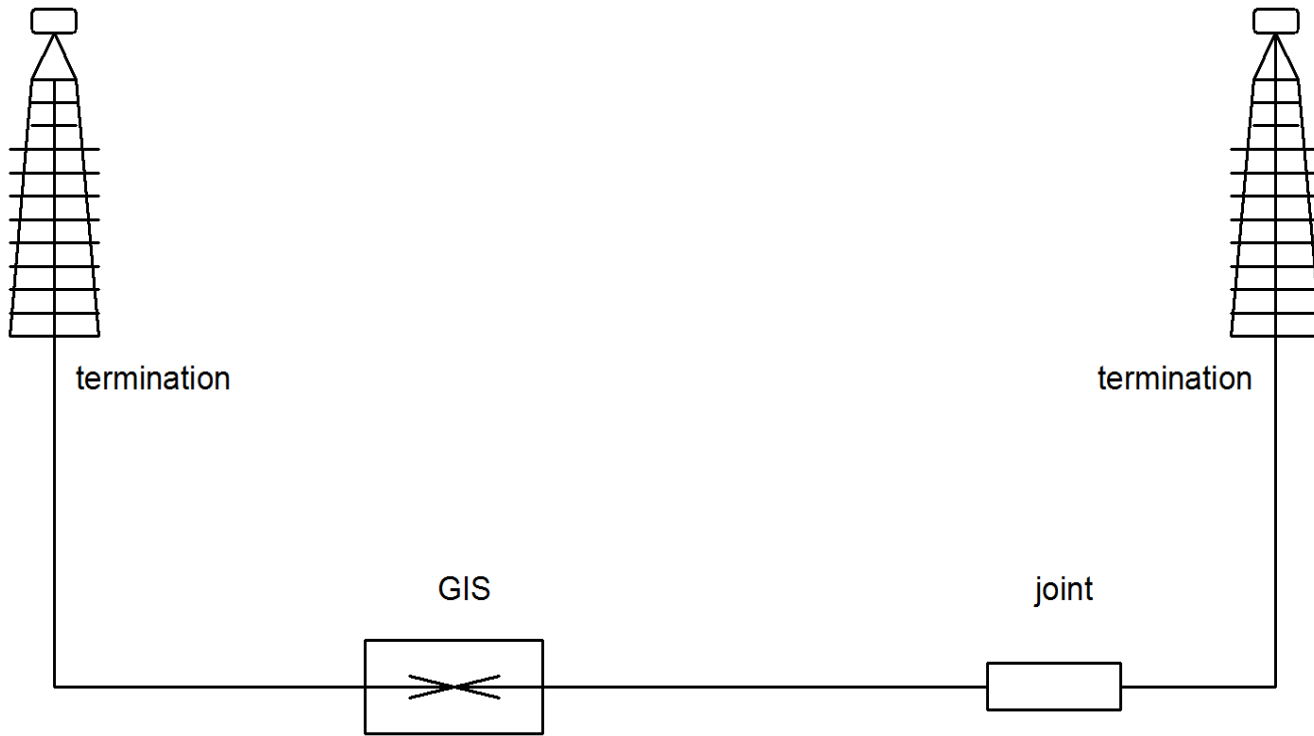
## *Equipments under the test*

---

- 220 kV EHXLP1600 mm<sup>2</sup> from Phelps Dodge International Thailand Limited
- 2 Outdoor oil terminations from SILEC
- 2 GIS from SILEC
- 1 One Piece Premolded splice from SILEC

# Lay out of the test loop

---



# Test loop during installation in Kema Laboratory



# *Test set up of the cable system*

---



# 220kV 1600 mm<sup>2</sup> Cu/XLPE/CWS/LS/HDPE



**Phelps Dodge International (Thailand) Limited**

Construction Drawing of 220 kV 1600 SQ.MM Single Core Milliken Copper Conductor, XLPE insulation, Copper Wire Screen, Alloy E Lead Sheath, and HDPE Oversheath Cable

DWG. NO. 220 KV 1600 SQ.MM-00

REV 0

By

Wattana Rachakrai

May 21, 2009

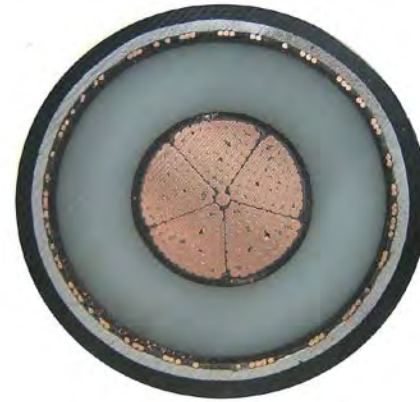
Not in Scale

Dimension in mm

Page 1 of 1

# 220kV 1600 mm<sup>2</sup> Cu/XLPE/CWS/LS/HDPE

- 1600 mm<sup>2</sup> Copper



# Summary of the type test program

---

## • Electrical Type Tests

- Bending test followed by a partial discharge test
- Tan delta measurement
- Heat cycle voltage test
- Partial discharge test at ambient and high temperature
- Lightning impulse test followed by a power frequency voltage test
- Test of outer protection for buried joint
- Examination of the tested cable and accessories
- Resistivity of semi-conducting screens

## • Non-electrical Type Tests

- Check of cable construction
- Mechanical properties of the insulation ,before and after ageing
- Mechanical properties of oversheaths, before and after ageing
- Ageing tests on pieces of complete cable to check compatibility of materials
- Pressure test at high temperature on oversheath
- Hot set test for insulation
- Measurement of carbon black content of black PE oversheaths
- Water penetration test

# ***Examination of the components after type test : Full success!***

---



## *Conclusion*

---

- New Sourcing
  - New Reliable Solutions
  - Accessories with excellent service records
- 
- New competitive player!

---

***Thank You for your attention!***

***Questions?***