

DEVELOPMENT OF 500kV XLPE CABLE ACCESSORIES

Guoji LI, SWCC SHOWA CABLE SYSTEMS Co., LTD, Japan, k.ri071@cs.swcc.co.jp

Akihisa KUWAKI; SWCC SHOWA CABLE SYSTEMS Co., LTD, Japan, a.kuwaki022@cs.swcc.co.jp

Tsutomu SUMIMOTO; SHOWA-TBEA (SHANDONG) CABLE ACCESSORIES CO., LTD, China, t.sumimoto583@cs.swcc.co.jp

Kenji TAKAHASHI; EXSYM CORPORATION, Japan, k.takahashi372@cs.swcc.co.jp

Zhaojian LIU; TBEA SHANDONG LUNENG TAISHAN CABLE CO., LTD, China, lzj8003@126.com

ABSTRACT

XLPE cable accessories for 500kV underground power transmission lines are developed, and have undergone type test and prequalification test in accordance with IEC62067, in attendance of the reputable independent third part certification authority.

The developed cable accessories consist of straight through joint, outdoor sealing end and SF₆ gas immersed sealing end. A Rubber Block insulated type Joint, whose main insulation component is made of cold shrinkable rubber, is developed as the straight through joint for 500kV XLPE cable. The factory expansion technology is firstly applied on 500kV class, because it allows reduction of construction times due to its skill-less assembly processes. Moreover, the outdoor sealing end was developed which consist of a rubber stress relief cone with the application of the factory expansion technology, porcelain bushing or composite bushing with heavy pollution level, and liquid insulating compound. The SF₆ gas immersed sealing end was developed with a traditional prefabricated structure, an epoxy bushing, a rubber stress relief cone and a spring compression device for rubber stress relief cone.

KEYWORDS

500kV, XLPE cable accessory, pre-moulded one piece joint, factory expansion technology

1. PREFACE

With cable technology advances and market demand for energy continues to expand, 500kV cable system has gradually been applied in urban power network with long distances. In order to keep up with market demand and better service to customers, we developed the 500kV cable systems (cables and accessories), and carried out the type test and prequalification test in accordance with the IEC 62067 specification at QITC¹ (WUHAN, China) and TICW² (SHANGHAI, China).

After the type test completed successfully in October 2012 at QITC (WUHAN, China), the prequalification was started from December 2012, had undergone one year heating cycle voltage test and completed successfully in April 2014. The tested cable system is comprised one porcelain outdoor sealing end, one composite outdoor sealing end, one insulation joint for direct buried with copper tube and protective casing, one normal joint for culvert which is

1 Quality Inspection and Test Center for Equipment of Electric power, P.R. of China

2 China National Center for Quality Supervision and Test of Electric Wire and Cable

protected by copper tube coated anticorrosion layer, and two SF₆ gas immersed sealing ends (back and back configuration) using 500kV CAZV 2500mm² cable.

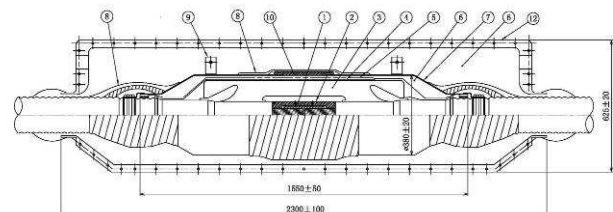
Meantime, we carried out the type test and prequalification test at TICW (SHANGHAI, China) in October 2013 to April 2015, using 500kV CV 1000mm² cable, according to the practical project requirements. Moreover, additional tests had carried out at cable system after finished one year heating cycle voltage test and residual performance tests specified IEC62067.

This paper describes the specifications and the test results of the developed cable accessories.

2. SUMMARY OF SPECIFICATION

2.1 Straight through joint

Two types of straight through joint (hereinafter RBJ) were prepared to satisfy customers with different laying conditions. Type A is for direct buried with copper tube and protective casing, shown in figure 1, and type B is for culvert which is protected by copper tube coated anticorrosion layer, shown in figure 2. According to the difference of cable grounding system, copper tube can be designed to pass through or isolation.



1	Connector	7	Copper tube
2	Connector cover	8	Anticorrosive layer
3	Rubber block insulator	9	Earthing terminal
4	Shielding layer	10	Insulating section
5	Protection layer	11	Protection casing
6	Water-proof compound		

Figure 1: Straight through joint (Type A)