



A.5.1

Development of factory-expanded cold-shrinkable joint for EHV XLPE cables
KOBAYASHI S., MUTO D., TANAKA S., LIZUKA H., The Furukawa Electric Co. Ltd, Japan
NIINOBE H., Fujikura Ltd, Japan
SUETSUGU M., Viscas Corporation, Japan

Abstract: We studied the installation process, interfacial property, insulating property, elastic property, and thermal behaviour of joints for EHV XLPE cables, and succeeded in applying cold-shrinkable technology to one-piece premoulded joints using silicone rubber, which has superior elasticity and good insulating properties. One rubber unit is applicable to various cable sizes, allowing it to be used to joint cables of different sizes (e.g., 1800 mm² – 800 mm²).

Keywords: one-piece premoulded joint, EHV, XLPE cable, cold-shrinkable joint, interfacial pressure

1. Introduction

We have been pursuing the ideal application of one-piece premoulded joints to EHV XLPE cables. We studied the quality function deployment of EHV XLPE cable joints and found that factory-expanded cold-shrinkable technology provides an ideal solution for such a joint.

We studied the installation process, interfacial property, insulating property, elastic property, and thermal behaviour of premoulded joints up to 400 kV-class, and succeeded in applying cold-shrinkable technology to premoulded joints using silicone rubber, which has superior elasticity and good insulating properties. With cold-shrinkable technology, a premoulded rubber unit is shipped expanded onto the carrier pipe. The carrier pipe is made of a plastic string and can be removed easily by hand. The user therefore requires no tools for assembly at the jointing site and simply has to pull out the carrier pipe. The required insulating properties of the rubber unit can be tested in the factory, and the expansion process of

Résumé: Nous avons étudié le procédé d'installation, les propriétés d'interface et le comportement thermique d'un joint pour câble XLPE à extra haute tension (EHT). Nous avons réussi à appliquer la technique de rétraction à froid à des joints prémoulés d'une pièce en caoutchouc aux silicones. Ce joint a des caractéristiques d'élasticité et d'isolement remarquables. Le même joint de caoutchouc peut être adapté à diverses sections de câble et permet également la jonction de câbles de section différente. (par exemple: 1800 et 800mm²).

Mots clés: Joint prémoulé d'une pièce; EHT; câbles XLPE; joint rétractable à froid; pression d'interface.

the rubber unit is carried out in the clean, controlled conditions of the factory. The installation process can thus maintain the high reliability of the insulating properties of the joint.

In a one-piece premoulded joint, the interfacial property is important as a guarantee of quality because the insulating property inside the rubber unit can be tested in the factory. Interfacial pressure is an important parameter of the interfacial insulating property. The interfacial pressure between a one-piece premoulded joint and the cable insulation is caused by the expansion of the rubber. We therefore studied the interfacial insulating property and elastic property of the rubber and found that silicone rubber gives excellent results in terms of both properties, enabling the rubber unit to be expanded up to 300% and to maintain the expanded state for over several years. Because the rubber unit can be expanded up to 300%, the inside diameter of the carrier pipe can be larger than the cable jacket even in case of metallic corrugated sheath. The overall size of the joint