

## Asymmetric joints for extruded and fluid-filled cables – Traditional use and new applications

Riccardo **BODEGA**, Prysmian Group, (Netherlands), [riccardo.bodega@prysmiangroup.com](mailto:riccardo.bodega@prysmiangroup.com)

Panagiotis **TSAKONAS**, Prysmian Group, (Netherlands), [panos.tsakonas@prysmiangroup.com](mailto:panos.tsakonas@prysmiangroup.com)

Henk **GEENE**, Prysmian Group, (Netherlands), [henk.geene@prysmiangroup.com](mailto:henk.geene@prysmiangroup.com)

Paolo **BOFFI**, Prysmian Group, (Italy), [paolo.boffi@prysmiangroup.com](mailto:paolo.boffi@prysmiangroup.com)

Mohamed **MAMMERI**, Prysmian Group, (France), [mohamed.mammeri@prysmiangroup.com](mailto:mohamed.mammeri@prysmiangroup.com)

### ABSTRACT

*An asymmetric joint is a joint to connect two different cables. There are many types of design for this component. In this paper, an overview is given of the compact 1-piece prefabricated asymmetric joint with plug-in installation technology and some example is presented of the plug-in asymmetric joint application in performed projects.*

### KEYWORDS

Asymmetric joint; Prefabricated joint; Transition joint; Plug in / plug out; Branch joint;

### INTRODUCTION

According to International Vocabulary [1] a joint is defined as an accessory for making a connection between two cables to form a continuous circuit. The joint has the following main functions:

- To establish a mechanical and electrical connection between the cable conductors.
- To insulate the conductor connection ensuring the same performance requirements as that of the cables.
- To ensure continuity of the cable sheath/screens or allow their special bonding connection.
- To protect the main joint body from the surrounding environment.

An asymmetric joint is not specifically defined in IEC but as the name implies the mirror image of the one half of the joint is not identical with the other half of the joint. In general it refers to a joint that connects two different cables.

The majority of cable system projects concern one type of cable to be jointed. Nevertheless asymmetric joints are also very often used. A typical example of it is the sea-land joint, to connect an extruded submarine cable to an extruded land cable. However, the ability of connecting different extruded cables can also be used for new applications when the asymmetric joint makes use of the plug-in technology. Some example of those new solutions are:

- cost-effective semi-temporary connections for replacement through phases of existing circuits;
- efficient modular emergency stock;
- use of the asymmetric joint to terminate a circuit, allowing on-site voltage testing of sections of a circuit without the need to use additional outdoor sealing ends;
- incorporation of the asymmetric joint into transition joints, to transfer above advantages to transition joints for connecting fluid-filled cables to extruded cable; [3]

- incorporation of the asymmetric joint into branched joints, to transfer above advantages to branched joints for connecting three (3) different cables [2];

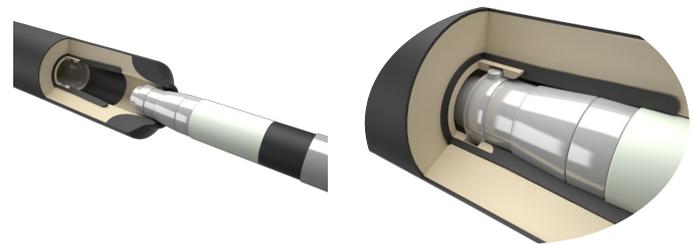


Fig. 1: Plug in technology for prefabricated joints

### TYPES OF ASSYMETRIC JOINTS

The main cable parameters under which a joint can be identified as asymmetric are:

1. Conductor specifications:
  - Material (e.g. Copper, Aluminium)
  - Construction (e.g. solid, stranded, Milliken).
  - Cross-section.
2. Insulation specifications:
  - Technology (e.g. plastic, fluid filled, gas filled); in this case the term transition joint is used.
  - Material (e.g. XLPE, EPR)
  - Insulation thickness (voltage class).
3. Metallic sheath specifications:
  - Material (e.g. copper, aluminum, lead)
  - Construction (e.g. Winded, welded, corrugated)
  - Conductor cross-section
4. Metallic sheath continuity (sectionalizing joint)
5. Installation specifications (e.g. underground, submarine)
6. Number of cables:
  - Straight joint: one cable to one cable
  - Branch joint: two cable to one cable
  - Blind joint: one to zero
7. Core arrangement (e.g. trifurcating joint [1]: between a three-core cable and three single-core cables)