

## Mechanical Connectors used inside M.V. Accessories: a system approach.

Dario **QUAGGIA**, Stéphane **TOGNALI**; Prysmian Cavi e Sistemi srl, Italy, [dario.quaggia@prysmiangroup.com](mailto:dario.quaggia@prysmiangroup.com), [stephane.tognali@prysmiangroup.com](mailto:stephane.tognali@prysmiangroup.com)

G rard **LENCOT**; Prysmian Cables et Syst mes France, France, [gerard.lencot@prysmiangroup.com](mailto:gerard.lencot@prysmiangroup.com)

### ABSTRACT

The so called Mechanical Connectors (MC), mainly using the shear-bolt technology, are now widely used inside the Medium Voltage Accessories to connect the cable conductors.

In parallel Cold Shrink (CS) accessories have demonstrated their reliability in many years of service, as well as their ability to cope with different types of cables and network configurations.

Coldshrink accessories, with their wide range-taking, have the same advantages of Mechanical Connectors in terms of jointing simplification, reduction of inventories and reduction of number of models.

This is why assemblies combining Mechanical Connectors with Coldshrink Accessories are thoroughly used by mainly utilities around the world.

However, the large number of suppliers of Mechanical Connectors showing a very variable level of quality and design is posing a problem of choice and selection for the manufacturer of accessories, and consequently for the end user.

Problems coming from Mechanical Connectors had not been identified during the specific tests of the connectors, but occurred both using Coldshrink accessories and traditional single-size accessories.

This is why it is so important to consider the couple "connectors + accessories" as a system.

### KEYWORDS

Mechanical Connectors; Cold-Shrink; Medium Voltage Accessories.

### INTRODUCTION

In order to ensure the connection of Medium Voltage Cables, many Utilities, at least in Europe, have recently switched from compression (hexagonal or deep indent) connectors to Mechanical Connectors. There are many technologies available (covered by an important number of Patents), but most of them are based on Shear Bolt connectors.

The major advantages of these devices for the end user are the wide "range-taking" (i.e. one Mechanical Connector size is suitable for covering a large range of cable conductors) and the "tool-free" solution (i.e. no heavy tools are necessary on site for the connectors application).

Consequently, an important reduction of inventories and number of models is also possible.

They also introduced the use of electrical cordless wrenches to minimize the effort of the jointers during installation.

For the above reasons Mechanical Connectors became

very popular and well accepted by the jointers, as well as the purchasing and logistics managers.

These connectors are offering a wide cross section range of application (for example from 50 to 240 mm<sup>2</sup>) and generally one single model can be used with different cable conductor constructions: (aluminum/copper) (solid/stranded/compacted or not compacted) (round shape/sectoral shape).

### STATE OF THE ART

#### State of the Art of Mechanical Connectors

The advantages of Mechanical Connector compared to the compression conductors are summarized here below:

Mechanical connectors (see Figure 1)	Compression connectors (see Figure 2)
<b>Advantages:</b> <ul style="list-style-type: none"> <li>▪ Wide cross section range which leads to reduced inventory ;</li> <li>▪ One connector for all type of cable cores;</li> <li>▪ Easy mounting, no special tools needed;</li> <li>▪ No risk of errors on dies and punches;</li> <li>▪ No maintenance of hydraulic tools.</li> </ul>	<b>Advantages:</b> <ul style="list-style-type: none"> <li>▪ Slimmer design;</li> <li>▪ Price;</li> <li>▪ Good contact properties if well adapted to cable conductor design and crimped properly;</li> <li>▪ Very large field experienced technology.</li> </ul>
<b>Drawbacks:</b> <ul style="list-style-type: none"> <li>▪ Bigger diameter;</li> <li>▪ Higher price (while the Total Cost of Ownership is more interesting)</li> <li>▪ Eventual presence of sharp-edges on the shear bolts, at the section where are broken;</li> <li>▪ Not enough experience on cable big cross sections.</li> </ul>	<b>Drawbacks:</b> <ul style="list-style-type: none"> <li>▪ One model of connector per cross section;</li> <li>▪ Material cooperation must be respected;</li> <li>▪ Compression tools are necessary;</li> <li>▪ Heavy maintenance of the hydraulic tools and of the compression dies.</li> </ul>