



Communication BIV-1

Examen de l'expérience italienne sur les câbles sous-marins moyenne tension isolés avec un matériau synthétique extrudé.

Review of Italian experience on M.V. submarine cables insulated with synthetic extruded materials.

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RESUME

Le type de câble à isolation synthétique adopté en Italie pour les installations sous-marines n'a pratiquement pas changé pendant les 30 dernières années.
La tendance et la pratique sont d'avoir les conducteurs isolés sous écran en contact direct avec l'eau (câble mouillé).
En effet l'emploi de gaines dites "imperméables", constituées de matériaux extrudés, n'est pas considéré comme nécessaire, et peut même être dangereux.
La présence nécessaire d'une armure en fils d'acier galvanisé impose simplement un matelas textile protégeant les conducteurs situés au-dessous, des sollicitations mécaniques, en particulier de la compression exercée par l'armure pendant la construction, la pose et le relevage du câble.
Nous croyons utile d'informer les utilisateurs de câbles sous-marins de l'expérience favorable enregistrée pendant les dernières décennies sur plus de 500 km de conducteurs comportant ce type de construction, dont les particularités, si nous les comparons aux autres types de construction, sont les suivantes :

- simplicité de la conception
- dimensions et coûts réduits
- fiabilité prouvée

1. - HISTORICAL OUTLINES

One of the first mention to rubber insulated cables for high voltage transmission and underwater installation is to be found in a publication issued in 1934 on the occasion of the fiftieth anniversary of the Edison Company Milan.

Mr. L.P. Emanuelli of Società Pirelli wrote as follows:

"The increased value of the working voltages and the imperfections of the paper insulated cable construction implied a preference trend towards vulcanized rubber as dielectric. As a consequence of a well known paper by Jona, presented at the conference in Saint Louis in 1904, came the time of the "graduated cable" in which the insulation consisted of parts having different specific inductive capacity, so that the voltage stress in the dielectric became uniform.

In 1906 at the Exhibition in Milan a sample of "graduated cable", having the construction shown in figure 1 was exposed and energized with 150.000 V.

Installations with rubber cables for such high voltages have never been carried out: the maximum operating voltage up to now was only 25.000 V and rubber cables have a development only in those cases in which the paper insulated cables showed some uncertainties.

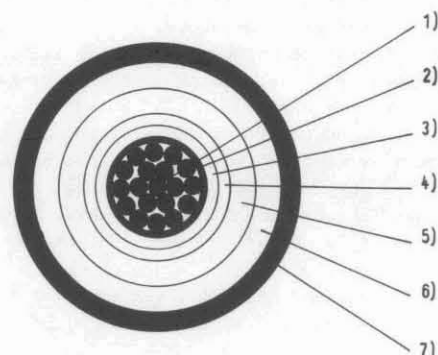
ABSTRACT

The type of synthetic insulation cable adopted in Italy for underwater installation has not been practically changed during the last thirty years: the trend and practice is that of having screened cores in direct contact with water (wet design). The use of the so called impervious sheaths consisting of extruded materials is in fact considered as not necessary and even potentially detrimental.

The mandatory presence of the galvanized steel wire armour simply requires a fibrous material bedding protecting the underlying cores from mechanical stresses and from the compression exerted by the armour during manufacture, laying and retrieval.

It is deemed useful here to inform the underwater cable users about the favourable experience recorded during the last decades on more than 500 km of cable cores having this type of design, whose peculiarities, if compared to any other type of construction, are:

- design simplicity
- reduced dimensions and costs
- proved reliability



- 1) Conductor, external diameter 16,5 mm
- 2) Lead, external diameter 18,0 mm
- 3) Rubber, thickness 2,5 mm
- 4) Rubber, thickness 2,3 mm
- 5) Rubber, thickness 4,5 mm
- 6) Paper, thickness 5,2 mm
- 7) Lead sheath, thickness 3,25 mm
external diameter 53,5 mm

Figure 1: Cable with "graduated insulation" (1906)