



B.1.3.

Measurement of the rigidity of polymeric cables

JORGENSEN H.J., DEFU a.m.b.a., Denmark
BENJAMINSEN J.T., Sintef Energy Research, Norway
NIELSEN N.H., NKT Cables A/S, Denmark
LARSEN P.B., RYEN A., Nexans Norway AS, Norway
ENGER S., Draka Norsk Kabel, Norway

Abstract: Since 1988, a method for measuring the rigidity and elasticity of MV cables has been used by some utilities and cable manufacturers in the Nordic countries. However, the results obtained were not always reproducible, especially when the method was applied to LV cables. A mechanical analysis and a comparison of how the users carried out the test has led to the identification of a number of details in the test procedure that had to be improved or specified more precisely. The revised method has been tested by several cable manufacturers and is now proposed as an international standard.

Keywords: Polymeric cables, rigidity, elasticity, standard

1. Introduction

It is difficult to install stiff LV and MV cables in compact MV/LV substations. The cost of the installation and the risk of industrial injury or cable damage can be reduced by using a cable, which more easily is bent into the shape needed for the installation. However, information about the rigidity of the cables is not included in the present cable specifications, as no standardised measuring method has been available so far.

Therefore, in 1998, an investigation was started to improve a previously developed method for measuring the rigidity and elasticity of a cable [1]. The work was carried out in a co-operation between users and manufacturers of cables in Norway, Sweden and Denmark and it resulted in a revised test method, which is described in this paper.

The method can be used on single phase as well as three phase cables with conductor cross-sections of

Résumé: Depuis 1988 une méthode pour la mesure de la rigidité et de la élasticité des câbles MT a été utilisée par des services publics et des producteurs des câbles dans les pays de Nord. Cependant, les résultats obtenus n'étaient pas toujours reproductibles, surtout quand la méthode était appliquée à des câbles BT. Une analyse mécanique et une comparaison de la façon, en laquelle les utilisateurs ont réalisé l'épreuve, a abouti à une identification des détails de la méthode qui devaient être modifiés ou précisés. La méthode révisée a été éprouvée des producteurs des câbles et est maintenant proposée comme standard international.

Mots clés: Câbles polymériques, rigidité, élasticité, standard

95 mm² and above. If applied to cables with smaller cross-sections, larger standard deviations are to be expected.

2. Description of the test set-up

The test set-up could look like the one shown in Figure 1 and Figure 2, and shall include:

- A steel frame including two rollers with a diameter of 50 mm with parallel axes placed in the same horizontal plane and with an infinitely variable spacing or steps of not more than 100 mm.
- Four sets of vertical guiding beams with adjustable spacing, which will prevent a curved test object from rotating during the bending.
- Pulling equipment which is able to pull the centre of the test object at a speed of 40±5 mm/s. The pulling force is transmitted to the test object by means of a flat, unpadded strap with a width of 25-35 mm. Steady speed shall be obtained within 0,5 s.