A.9.3.

Ampacity program of IEC 60287 and JCS 168 ^{E} suitable for KEPCO

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Abstract: Recently Korea Electric Power Corp.(KEPCO) has changed the base of its standard for the calculation of the permissible current-carrying capability of underground power cables from JCS 168E to IEC 60287. As a result, ampacity for the directly buried cables has been decreased while that for the cables installed in the free air protected from solar radiation has been increased. It is because JCS 168E takes into account various correction factors for the calculation of ampacity unlike IEC 60287. This paper examines various correction factors used by JCS 168E and introduces an ampacity calculation program developed by KEPCO which is based on IEC 60287.

Keywords: Ampacity, Correction Factors

Résumé : Récemment, Korea Electric Power Corporation (KEPCO) a changé le référentiel de ses normes de calcul de capacité de transport maximale admissible pour les câbles de puissance souterrains, de JCS 168E vers CEI 60287. En conséquence, la capacité de transport calculée des câbles directement enfouis a diminué, alors que celle des câbles à l'air libre a augmenté. Cette tendance s'explique par le fait que la JCS 168E prend en compte différents facteurs de correction pour le calcul de la capacité de transport, contrairement à la CEI 60287. Cet article étudie différents facteurs de correction utilisés par la JCS 168E et présente un logiciel de calcul de capacité de transport développé par KEPCO, établi sur la CEI 60287.

1. Introduction

Two standards have been used to calculate the current-carrying capability of underground power cables. These are based on the analytical method presented in "The Calculation of the Temperature Rise and Load Capability" published by J.H. Neher and M.H. McGrath in 1957. IEC 60287(1994) "Calculation of the Continuous Current Rating of Cables(100% Load Factor)" is mostly used in Europe while JCS 168E(1995) "The Permissible Current-Carrying Capability for Power Cables" is mostly used in Japan and Korea.

Recently Korea Electric Power Corp.(KEPCO) has changed the base of its standard for the calculation of the permissible current-carrying capability of underground power cables from JCS 168E to IEC 60287. As a result, ampacity for the directly buried cables has been decreased while that for the cables installed in the free air protected from solar radiation has been increased. It is because JCS 168E takes into account various correction factors for the calculation of ampacity unlike IEC 60287 and thus the external thermal resistance is reduced for underground power cables, which results in higher ampacity.

This paper examines various correction factors used by JCS 168E and introduces an ampacity calculation program developed by KEPCO which is based on IEC 60287.

2. Correction Factors

Correction factors and/or reduction factor adopted by JCS 168E, IEC 60287 and KEPCO in relation to the calculation of ampacity are shown in Table 1.

Table 1 Types of correction factors

Factor	JCS 168E		IEC 60287 and KEPCO	
	Symbol	Application	Symbol	Application
Reduction factor for groups of cables in free air	η_0	Ampacity Formula	η_0	Ampacity Formula
Correction factor for thermal resistance of shield	η_1	R_1		
Correction factor for the external thermal resistance for underground water	η_2	R_5		
Correction factor for the external thermal resistance for underground water	η_3	R_7		
Correction factor for the thermal resistance between sheath and outer covering	η_4	R_3'		