CIGRE Study Committee B1

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG N° B1.64	**Name of Convenor:** Ronny Stølan (NORWAY) **E-mail address**: ronny.stolan@nexans.com
Strategic Directions #[2]: 1	**Technical Issues #[3]: 9**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 1, 2, 3, 6	
Title of the Group: Evaluation of Losses in Armoured Three Core Power Cables	

Scope, deliverables and proposed time schedule of the Group:

Background:

Several publications have highlighted that IEC 60287 may overestimate the losses of three core armoured power cables. The current IEC 60287 standard is based on semi empirical work on smaller conductor cross sections with common sheath and therefore does not fully address the current design trend of the cables. The increasing number of offshore installations with larger conductors and higher voltages makes it important to calculate losses more accurately in order to provide cost optimized solutions. Overestimation of armour losses may lead to larger conductor sizes and over dimensioning of the cables which leads to increased cost of manufacturing and installation (overall project cost).

A standardized method of loss measurement is important due to the increase in numbers of measurements as verifications of non-IEC rating. New analytical formulae based on physical models are required. Computational tools and advancements in computer science enable new evaluation methods to be utilized and these can be used in support of rating calculations and loss measurements.

Scope:

The focus of the scope is losses in three core cables with magnetic armour

1. Review loss factors of IEC 60287-1-1
2. Review publications
3. Review available measurements
4. Propose standardized method for measurements
5. Propose formulas for calculation of cable losses
6. Consider application of the proposed formulae on cables with non-metallic elements in the armour package
7. Verification of proposed formulae based on available measurements
8. List methods for computer analysis of cable losses, describe challenges and possible inaccuracies

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule: start: February 2018 **Final Report**: February 2021

Approval by Technical Committee Chairman:

Date: 11/02/2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (ref. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit