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IEEE Standard Procedure for the Determination of the Ampacity Derating Factor for Fire-Protected Cable Systems

IEEE Power and Energy Society

Sponsored by the
Insulated Conductors Committee

IEEE
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USA

IEEE Std 848™-2015
(Revision of
IEEE Std 848-1996)

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Abstract: A detailed test procedure is provided for determining the ampacity derating factor in the following cable installation configurations: block-out or sleeve-type cable penetration fire stops; conduits covered with a protective material; tray covered with a protective material; cable directly covered or coated with a fire-retardant material; and free-air drops enclosed with a protective material.

Keywords: ampacity derating factor, cable penetration fire stops, electrical separation wrap systems, fire-protected cable system, fire-protected conduits, IEEE 848™

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Introduction

This introduction is not part of IEEE Std 848™-2015, IEEE Standard for Procedure for the Determination of the Ampacity Derating Factor for Fire-Protected Cable Systems.

Many cable installations in nuclear and fossil fuel generating stations require the installation of a fire stop, fire-protective materials/coatings, and electrical separation wrap materials over the cables or the raceway for fire protection or electrical separation purposes. Appendix R of the Code of Federal Regulations for Nuclear Equipment may require some electrical circuits enclosed in a fire-protective material. IEEE Std 634™-2004 specifies requirements for cable penetration fire stops at fire rated walls and floors. Compliance with IEEE Std 384™-2008[a] may require installation of a wrap material over free air drop cables or solid covers on cable trays.

Building codes for commercial and industrial facilities in some states require power cables, used in emergency power systems, to remain functional during a fire exposure. This may also necessitate the use of the fire-protective material.

Utility generating stations use cable ampacities provided in IEEE Std 835™-1994 and IEEE Std 135™ for conduits, spaced cable tray installations, and duct bank installations. NEMA WC51-2009/ICEA P-54-440 is used for cable installation in random filled open-top trays. Commercial, industrial, and non-utility owned generating stations utilize cable ampacities published in NFPA 70-2011, National Electric Code® (NEC®). The NEC permits the use of IEEE Std 835-1994 and NEMA WC51-2009/ICEA P-54-440 under the direction of engineers.

Fire-protection related products may reduce the heat transfer characteristics associated with the ampacities provided in IEEE Std 835-1994 and NEMA WC51-2009/ICEA P-54-440. In future revisions, these ampacity standards may incorporate the effects of these new installation conditions on cable ampacity. Not all products, however, may be covered by changes in the ampacity standards due to their limited use to the generating station market. Hence, ampacity testing to determine ampacity derating of fire-protected cable systems is necessary.

Several analytical cable ampacity methods are listed in the bibliography to address fire stops, tray enclosure materials, and cable wrap material. The user may consider the applications of these analytical methods to avoid testing of minor differences in the installation of a given product.

[a] Information on references can be found in Clause 2.

Contents

IEEE Standard for Procedure for the Determination of the Ampacity Derating Factor for Fire-Protected Cable Systems

1. Overview

1.1 Scope

This standard provides a test procedure for determining the ampacity derating factor in the following cable installation configurations:

- Block-out or sleeve-type cable penetration fire stops
- Conduits covered with a protective material
- Trays covered with a protective material
- Cable directly covered or coated with a fire-retardant material
- Free-air drops enclosed with a protective material

The standard is applicable to cables installed and sized to IEEE Std 835™ for conduits and free-air drops, and NEMA WC51/ICEA P-54-440 for cable tray.[1] IEEE Std 135™ does provide ampacities for cables in a tray with a fixed spacing and may be used for cable penetration fire stop configurations only.

[1] Information on references can be found in Clause 2.