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IEEE Std 3006.7™-2013

IEEE Recommended Practice for Determining the Reliability of 7×24 Continuous Power Systems in Industrial and Commercial Facilities

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IEEE Recommended Practice for Determining the Reliability of 7x24 Continuous Power Systems in Industrial and Commercial Facilities

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Abstract: Methods for determining the reliability of 7×24 continuous power systems in industrial and commercial facilities are described in this recommended practice. The method of reliability analysis by probability methods is described first. This is followed by a discussion of how to evaluate the results and how to implement changes to ensure that the expected degree of reliability is achieved.
Keywords: availability, failure rate, fault tree analysis, IEEE 3006.7™, mean time between failure, mean time to repair, reliability, reliability block diagram

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Introduction

This introduction is not part of IEEE Std 3006.7-2013, IEEE Recommended Practice for Determining the Reliability of 7x24 Continuous Power Systems in Industrial and Commercial Facilities.

IEEE 3000 Standards Collection™

This recommended practice was developed by the Technical Books Coordinating Committee of the Industrial and Commercial Power Systems Department of the Industry Applications Society as part of a project to repackage the popular IEEE Color Books®. The goal of this project is to speed up the revision process, eliminate duplicate material, and facilitate use of modern publishing and distribution technologies.

When this project is completed, the technical material in the thirteen IEEE Color Books will be included in a series of new standards—the most significant of which will be a new standard, IEEE Std 3000™, IEEE Recommended Practice for the Engineering of Industrial and Commercial Power Systems. The new standard will cover the fundamentals of planning, design, analysis, construction, installation, startup, operation, and maintenance of electrical systems in industrial and commercial facilities. Approximately 60 additional dot standards, organized into the following categories, will provide in-depth treatment of many of the topics introduced by IEEE Std 3000™:

— Power Systems Design (3001 series)

— Power Systems Analysis (3002 series)

— Power Systems Grounding (3003 series)

— Protection and Coordination (3004 series)

— Emergency, Standby Power, and Energy Management Systems (3005 series)

— Power Systems Reliability (3006 series)

— Power Systems Maintenance, Operations, and Safety (3007 series)

In many cases, the material in a dot standard comes from a particular chapter of a particular IEEE Color Book. In other cases, material from several IEEE Color Books has been combined into a new dot standard.

This recommended practice is an update and expansion of the material in Chapter 8 of IEEE Std 493™ (*IEEE Gold Book™*).

IEEE Std 3006.7™

The explosive growth of computer technology has literally changed the way business is conducted. Cell phones, text messaging, and e-mail have become the norm and the Internet provides a communication medium not previously available. Stock trading and banking, along with an incredible diversity of retail sales, occur daily via the Internet.

With the broad expansion of computer technology comes the necessity of providing an infrastructure capable of supporting it. The ITIC susceptibility curve, from IEEE Std 1100™-2005 (*IEEE Emerald Book™*) shows that electronic equipment can be disrupted by a momentary sag of 20 ms. Two voltage immunity standards currently available have it as 10-ms minimum ride-through time; EN55024 from Special International Committee on Radio Interference (CISPR) and International Electrotechnical Commission (IEC) 61000-6-1, 2005-03. Momentary interruptions of the electrical power can have huge financial consequences. Therefore, specialty equipment, such as uninterruptible power supplies

(UPS), emergency generators, and automatic static transfer switches (STSs) are used to supplement utility power.

Initially, special facilities were designed for mainframe computers, used primarily for banking and finance, called *data centers*. As the use of computers broadened and support of the Internet became a significant market, along with divestiture of the telecommunications industry, the term *7×24 facility* became common. This term is derived from the requirement that the facility operates 7 days a week, 24 hours per day.

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IEEE Recommended Practice for Determining the Reliability of 7x24 Continuous Power Systems in Industrial and Commercial Facilities

1. Overview

1.1 Scope

This recommended practice describes how to determine the reliability of 7×24 continuous power systems in industrial and commercial facilities. The method of reliability analysis by probability methods is described first. This is followed by a discussion of how to evaluate the results and how to implement changes to ensure that the expected degree of reliability is achieved.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.