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**IEEE 3006 STANDARDS:**  
POWER SYSTEMS RELIABILITY

# IEEE Std 3006.8™ - 2018

Recommended Practice for  
Analyzing Reliability Data  
for Equipment Used in  
Industrial and Commercial  
Power Systems



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# IEEE Recommended Practice for Analyzing Reliability Data for Equipment Used in Industrial and Commercial Power Systems

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IEEE Industry Applications Society**

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**IEEE-SA Standards Board**

**Abstract:** Data supporting the reliability evaluation of existing industrial and commercial power systems are described. This recommended practice is likely to be of greatest value to the power-oriented engineer with limited experience in the area of reliability. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

**Keywords:** availability, IEEE 3006.8™, mean down time (MDT), mean time between failures (MTBF), mean time to maintain (MTTM), mean time to repair (MTTR), reliability analysis, reliability data

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## Introduction

This introduction is not part of IEEE Std 3006.8-2018, IEEE Recommended Practice for Analyzing Reliability Data for Equipment Used in Industrial and Commercial Power Systems.

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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 included in the 13 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, Operation, 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.

### IEEE Std 3006.8™

Knowledge of the reliability of electrical equipment is an important consideration in the design and operation of industrial and commercial power distribution systems. Each of the hundreds of components installed at a facility has an operational signature defined by its failure statistics. When these signatures are analyzed in the context of their relationship in a power system, designers and operators can understand—and more importantly, predict—system performance over time. In response, this recommended practice offers the best facility equipment data currently available. The data that follow represent five decades, millions of dollars, and thousands of hours of labor in the collection of data from more than 300 diverse facilities.

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# IEEE Recommended Practice for Analyzing Reliability Data for Equipment Used in Industrial and Commercial Power Systems

## 1. Overview

### 1.1 Scope

This recommended practice describes how to analyze reliability data for equipment used in industrial and commercial power systems. Equipment reliability data collected over the years is presented. This is followed by a discussion of key equipment reliability metrics, such as failure rate, downtime to repair in hours per failure, and probability of starting (operating).

## 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.

*Historical Reliability Data for IEEE 3006 Standards: Power System Reliability*<sup>TM, 1,2</sup>

IEEE Std 3006.2-2016<sup>TM</sup>, Recommended Practice for Evaluating the Reliability of Existing Industrial and Commercial Power Systems.

## 3. Definitions

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