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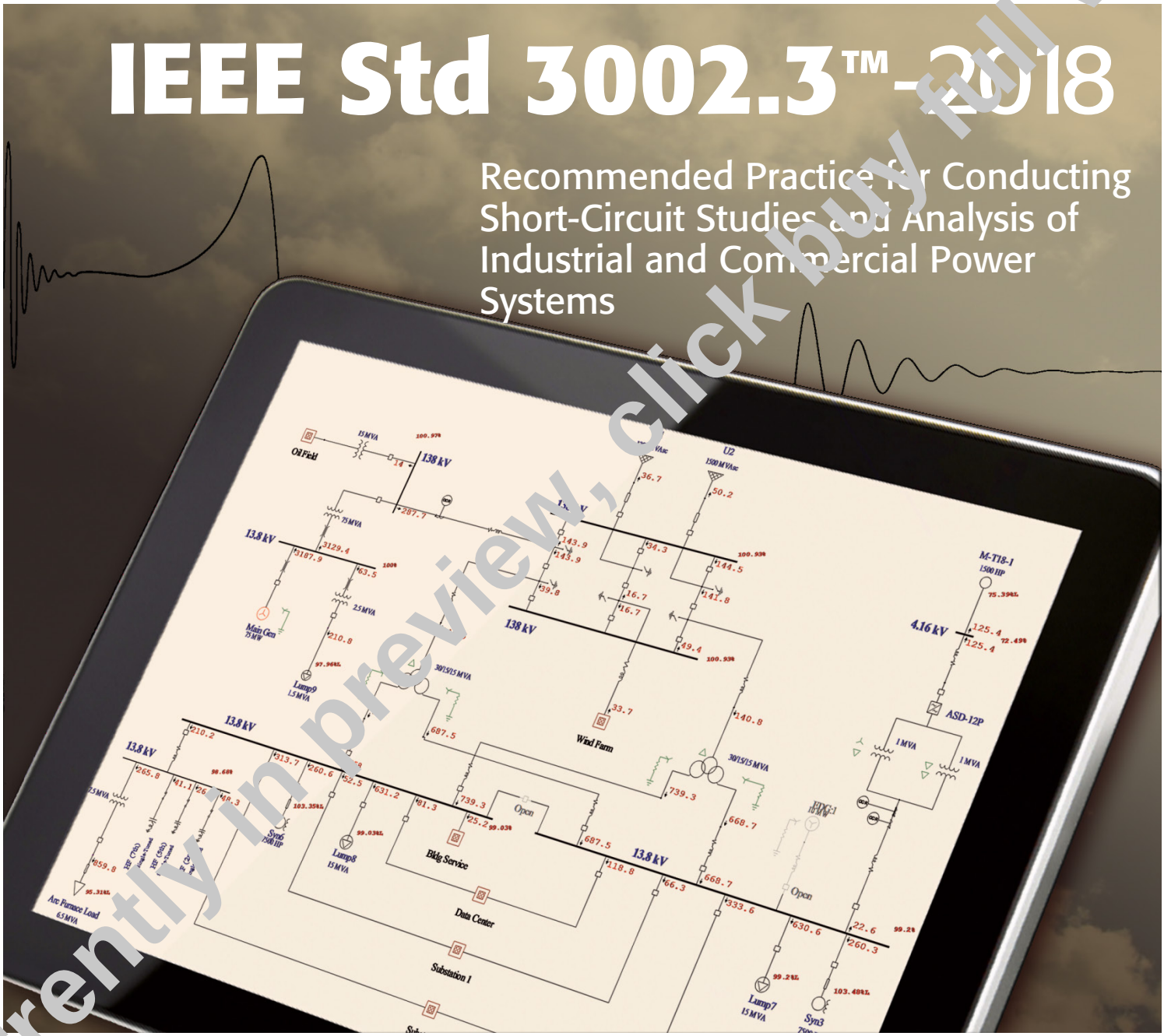
IEEE Std 3002.3™-2018

Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems



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IEEE Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems

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IEEE-SA Standards Board

Abstract: Activities related to short-circuit analysis, including design considerations for new systems, analytical studies for existing systems, as well as operational and model validation considerations for industrial and commercial power systems are addressed. Fault current calculation and device duty evaluation is included in short-circuit analysis. Accuracy of calculation results primarily relies on system modeling assumptions and methods used. The use of computer-aided analysis software with a list of desirable capabilities recommended to conduct a modern short-circuit study is emphasized. Examples of system data requirements and result analysis techniques are presented.

Keywords: ac decrement, asymmetrical fault current, available fault current, bolted fault, breaking capacity, breaking duty, data collection, dc component, dc decrement, dc offset, device duty calculation, fault calculation, fault duty, IEEE 3002.3, interrupting capacity, interrupting duty, making capacity, making duty, momentary capacity, momentary duty, short-circuit analysis, short-circuit current, short-circuit studies, short-circuit withstand, symmetrical component, symmetrical fault current, system modeling, system validation, *X/R* ratio

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Farrokh Shokooh, *Chair*

Jun Qiu, *Vice-chair*

Duane Leschert
Haijun Liu
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The following members of the individual balloting committee voted on this recommended practice. Balloters may have voted for approval, disapproval, or abstention.

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Introduction

This introduction is not part of IEEE Std 3002.3-2018, IEEE Recommended Practice for Conducting Short-Circuit Studies and Analysis of 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™:

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— Power Systems Grounding (3003 series)

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

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IEEE Std 3002.3™

The material in this recommended practice partially comes from IEEE Std 551™, IEEE Recommended Practice for Calculating AC Short-Circuit Currents in Industrial and Power Systems (*IEEE Violet Book*™) and IEEE Std 399™, IEEE Recommended Practice for Industrial and Commercial Power System Analysis.[1, 2]

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Contents

IEEE Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems

1. Scope

This recommended practice describes how to conduct short-circuit studies and analysis of industrial and commercial power systems. It is likely to be of greatest value to the power-oriented engineer with limited experience in this area.

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.

ANSI/IEEE Std C37.5™, IEEE Guide for Calculation of Fault Currents for Application of AC High-Voltage Circuit Breakers Rated on a Total Current Basis.[1]

IEC 60909, Short-circuit currents in three-phase a.c. systems.[2]

IEC 61363-1:1998, Electrical installations of ships and mobile and fixed offshore units—Part 1: Procedures for calculating short-circuit currents in three-phase a.c.

IEEE Std 141™, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (*IEEE Red Book*™).[3, 4]

IEEE Std 241™, IEEE Recommended Practice for Electric Power Systems in Commercial Buildings (*IEEE Gray Book*™).

IEEE Std 242™, IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (*IEEE Buff Book*™).

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