

# IEEE Recommended Practice for Electrical Installations on Shipboard— Design

IEEE Industry Applications Society

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# IEEE Recommended Practice for Electrical Installations on Shipboard— Design

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**Petroleum & Chemical Industry Committee  
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IEEE Industry Applications Society**

Approved 23 March 2017

**IEEE-SA Standards Board**

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**Abstract:** Recommendations for the design of electrical power generation, distribution, propulsion, loads systems, and equipment on merchant, commercial, and naval vessels are covered in this document.

**Keywords:** IEEE 45.1™, marine electrical engineering, marine vessels, naval vessels, ship, shipboard electrical systems

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The Institute of Electrical and Electronics Engineers, Inc.  
3 Park Avenue, New York, NY 10016-5997, USA

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PDF: ISBN 978-1-5044-4142-1      STD22656  
Print: ISBN 978-1-5044-4143-8      STDPD22656

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## Introduction

This introduction is not part of IEEE Std 45.1-2017, IEEE Recommended Practice for Electrical Installations on Shipboard—Design.

The IEEE Std 45™ series comprises nine recommended practices addressing electrical installations on ships and marine platforms. IEEE Std 45.1 provides recommended practice for design recommendations for ac power systems, dc power systems, emergency power systems, shore power, power quality and harmonics, electric propulsion and maneuvering systems, motors and drives, thrusters, and steering systems installed shipboard and is intended for use with the IEEE Std 45 series of documents. The topics covered in this document should be considered from the beginning of the project and throughout the design and construction processes, and thereby should facilitate the integration of electrical systems at the shipyard level. Adherence to the IEEE 45.1 design process provides an effective set of integration requirements and identifies key issues and recommended solutions or options.

Previous editions of IEEE Std 45 were developed as single documents addressing all areas. On 9 June 2005, PAR 45 for the Revision of IEEE Std 45-2002 was approved and the revision of IEEE Std 45 as a single document began. It soon became apparent that attempting to cover all issues in a single document would produce a document that was very large and, therefore, difficult to ballot due to the wide range of issues needing to be addressed. In September 2008 it was decided that the revision of IEEE Std 45™ should be developed as a base document with separate documents addressing specific areas.

On 10 December 2008 separate Project Authorization Requests (PARs) were approved for seven separate recommended practices. Additional PARs were approved on 11 September 2009 for Switchboards and 9 December 2009 for Cable Systems bringing the total number of standards in the IEEE Std 45 series to nine, including:

- IEEE Std 45™, IEEE Recommended Practice for Electrical Installations on Shipboard
- IEEE Std 45.1™-2016, IEEE Recommended Practice for Electrical Installations on Shipboard—Design
- IEEE Std 45.2™-2011, IEEE Recommended Practice for Electrical Installations on Shipboard—Controls and Automation
- IEEE Std 45.3™-2015, IEEE Recommended Practice for Shipboard Electrical Installations—Systems Engineering
- IEEE P45.4™, Recommended Practice for Electrical Installations on Shipboard—Marine Sectors and Mission Systems
- IEEE Std 45.5™-2014, IEEE Recommended Practice for Electrical Installations on Shipboard—Safety Considerations
- IEEE Std 45.6™-2016, IEEE Recommended Practice for Electrical Installations on Shipboard—Electrical Testing
- IEEE Std 45.7™-2012, IEEE Recommended Practice for Electrical Installations on Shipboard—AC Switchboards
- IEEE Std 45.8™-2016, IEEE Recommended Practice for Electrical Installations on Shipboard—Cable Systems

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# IEEE Recommended Practice for Electrical Installations on Shipboard—Design

## 1. Overview

### 1.1 Introduction

These recommendations establish the minimally acceptable guidelines for the design, selection, and installation of systems and equipment aboard both Navy combatant and commercial marine vessels applying electrical apparatus for power, propulsion, steering, automation, navigation, lighting, and communications. These recommendations describe present-day acceptable marine electrical engineering methods and practices. The primary focus of these IEEE Std 45.1™ guidelines is overall electrical power system and subsystem design. Guidelines for some key electrical power system components (including electrical power switchboards, cable systems, and control systems), safety considerations, and system testing are discussed elsewhere in this IEEE Std 45™ series, which comprises nine recommended practices addressing electrical installations on ships and marine platforms.

It is recognized that changes and improvements in shipboard requirements may develop that are not specifically covered herein; such changes, if incorporated in the design, should be equal to the safety and reliability levels established herein and generally in accord with the intent of these standards.

In developing these recommendations, consideration was given to the electrical and engineering requirements promulgated by various regulatory agencies, classification societies, and by the International Maritime Organization's International Convention for the Safety of Life at Sea (IMO SOLAS), as amended.

This recommended practice was developed by a voluntary consensus body to provide assistance and guidance to regulatory agencies governing electrical engineering requirements.

### 1.2 Scope

The recommendations for electrical power generation, distribution, and electric propulsion system design for use on shipboard are established by this document. These recommendations reflect the present-day technologies, engineering methods, and engineering practices.

This document is intended to be used in conjunction with the IEEE Std 45 series.