



IEEE Standard Requirements for Conversion of Power Switchgear Equipment

IEEE Power Engineering Society

Sponsored by the
Switchgear Committee



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IEEE Standard Requirements for Conversion of Power Switchgear Equipment

Sponsor

**Switchgear Committee
of the
IEEE Power Engineering Society**

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Abstract: Directions and requirements are provided for the conversion of qualified power switchgear equipment. Examples such as low-voltage power circuit breakers; high-voltage outdoor, and medium-voltage indoor drawout power circuit breakers; medium-voltage fused contactors; medium-voltage ground and test devices; medium-voltage fused load interrupter switches; and all metal-enclosed switchgear are covered. Existing design standards are referenced with appropriate guidance on design testing necessary to design-verify the conversions. Reconditioning, which concerns the maintenance of existing equipment without alteration, is not covered.

Keywords: circuit breakers, conversion, interrupters, power switchgear equipment, qualified design, retrofit, switchgear, vacuum

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Introduction

This introduction is not part of IEEE Std C37.59-2007, IEEE Standard Requirements for Conversion of Power Switchgear Equipment.

This revised standard covers conversions of power switchgear equipment only, rather than a complete power switchgear equipment replacement. A conversion of power switchgear equipment reuses some portion of the qualified design switchgear.

The technology and extent of conversions is a continually changing and expanding practice. This revised standard addresses clarifications needed on the required performance of a converted product such as those involved in low-voltage circuit breaker control system replacements as well as additional types of conversions such as improved, arc-resistant field conversions. The references to low-voltage ground and test devices were also deleted, as no product standards define requirements for such devices. Subclause 6.1.5.4 has been expanded to clarify the minimum design testing required for trip system modifications, following reports of instances of inadequate testing of such conversions.

Converted circuit breakers may or may not be interchangeable with existing nonconverted circuit breakers. Where converted circuit breakers are not interchangeable with nonconverted circuit breakers, it shall be so indicated in the converter's instruction book and the blocking/rejection interlock shall be changed.

It is stressed that at least the minimum design tests recommended and outlined in specific references are to be carried out as applicable on each differing design (or model) of a converted device. Reliance only on production tests with statements that the conversion has been "ANSI tested," unsubstantiated by formal documented design verification, can mislead users and may result in field failures. Production tests are not design tests. The basic and fundamental philosophy of this standard is that a converted product is a new design and shall be design verified to substantiate that it meets its nameplate ratings as well as applicable standards. A recommended design verification form is included.

The lack of design verification of some conversions was the reason for the creation of the original 1991 version of this document. Experience gained with use of the original document and the 1996 and 2002 revisions is incorporated into this revision of the standard.

Many forms of conversion exist, and this document provides the logic that should cover all power switchgear equipment conversions, with examples of current areas of conversion and testing. As additional types of switchgear products are converted, criteria for the new conversion products will be added in future revisions of this standard.

Annex A, although not a normative part of this standard, is provided for guidance in the design verification of the converted power switchgear equipment. It provides additional guidance regarding conversion examples and the minimum testing required for design verifications.

Examples of components that may be converted include, but are not limited to:

- a) Circuit breakers
 - 1) Frame
 - 2) Insulation structures
 - 3) Contacts, supports, and primary disconnecting devices
 - 4) High-voltage arc-interrupting structures
 - 5) Low-voltage arc-interrupting structures

NOTE—These conversions include substitution of low-voltage and medium-voltage alternating current fused contactors in place of circuit breaker elements.

- 6) Low-voltage direct-acting trip systems
- 7) Drawout parts/interlocking and auxiliary functions
- 8) Mechanism parts and control wiring
- b) Switchgear vertical sections
 - 1) Drawout parts/interlocking and auxiliary functions
 - 2) Frame
 - 3) Bus, bus connections, and insulation
 - 4) Instrumentation and control wiring
- c) Ground and test devices
- d) Metal-enclosed interrupter switchgear
 - 1) Addition or substitution of power fuses

This revised standard is not intended to cover maintenance procedures when reconditioning power switchgear equipment in accordance with the manufacturer's instruction manuals.

Conversions are sometimes incorrectly termed “retrofits.”

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Contents

1. Overview	1
1.1 Scope	2
1.2 Other conversions	2
2. Normative references.....	2
3. Definitions	4
4. Service conditions	5
5. Ratings.....	6
6. Conversion and testing	6
6.1 Circuit breakers and related conversions	6
6.2 Switchgear vertical sections	15
6.3 Metal-enclosed interrupter switchgear fuse conversions	16
6.4 Conversion of switchgear to arc-resistant.....	17
6.5 Modifications of arc-resistant switchgear	18
6.6 Conversions using a compartment adaptor to allow use of a drawout circuit breaker in the existing switchgear structure (low voltage only).....	18
7. Production testing.....	19
8. Nameplates	19
9. Manuals	20
10. Design verification form.....	21
Annex A (informative) Clarification of conversion processes	22
Annex B (informative) Bibliography.....	32