C37.20.2 IEEE Standard for Metal-Clad Switchgear

A Brief Overview

Michael Wactor, C37.20.2 Working Group Chair 1995 - 2022

IEEE Std C37.20.2

History

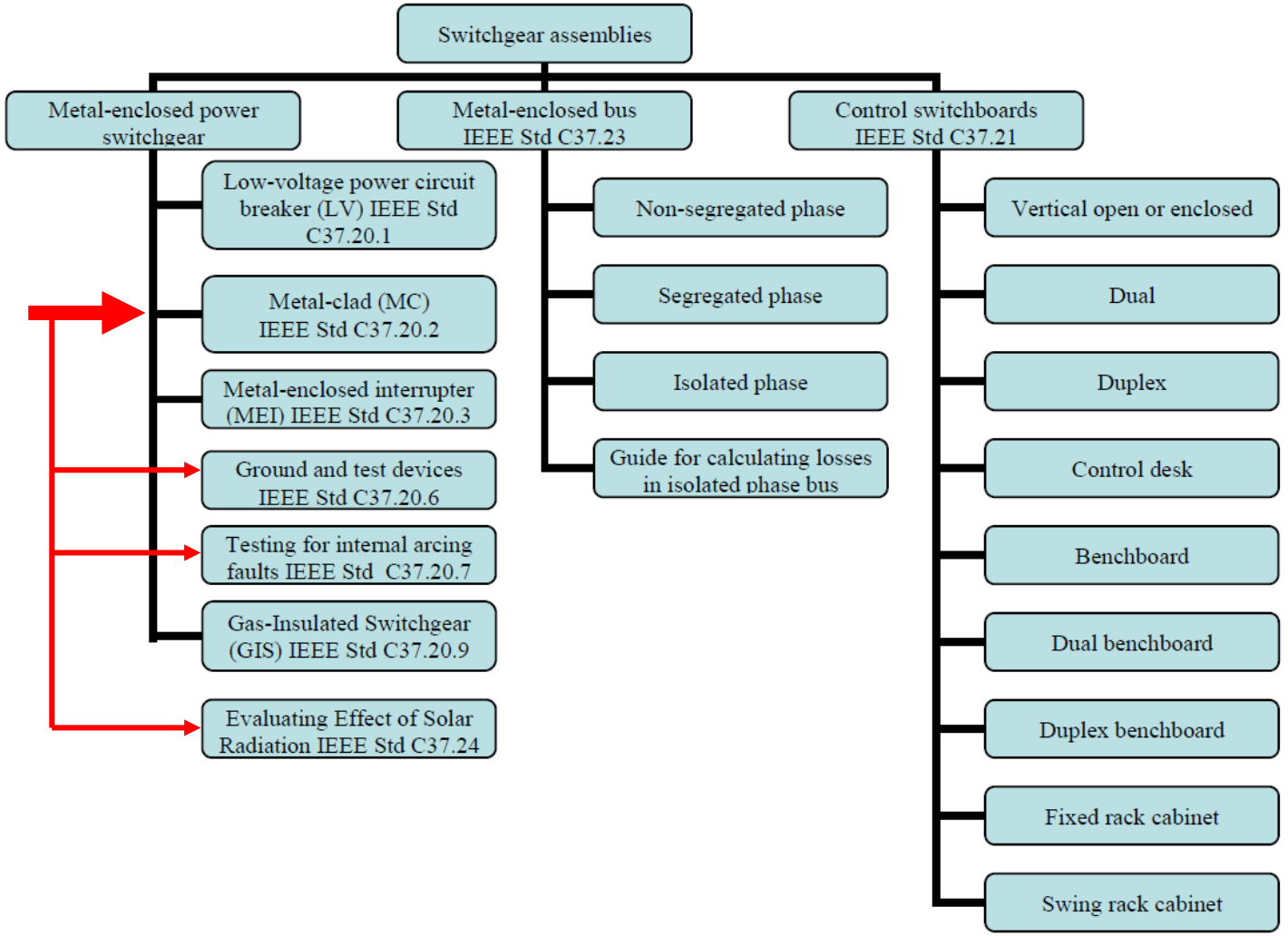
- The 1974 Consolidated edition of IEEE Std C37.20-1969 covered all switchgear assemblies, including metal-enclosed bus.
- Standards committees of the IEEE Switchgear Assemblies Subcommittee and the NEMA Power Switchgear Assemblies Technical Committee recommended that the document be further developed so the various sections be identified with their own standards. The next revision to C37.20 split out all the different equipment into separate design and conformance documents.
- NEMA controls the Conformance Test Procedure Standards. The IEEE controls the Construction and Design Testing Standards.
- IEEE C37.20.2 includes only the construction and testing requirements for metal-clad switchgear.

IEEE Std C37.20.2

Relationship

All the sections of C37.20 pertaining to switchgear fall under the heading Metal-Enclosed Power Switchgear

Additional documents were written to cover special requirements, applications, and types of equipment



IEEE Std C37.20.2

Scope

- This standard covers metal-clad switchgear assemblies where air at ambient pressure is the primary insulating medium.
- The switchgear contains, but is not limited to, such devices as power circuit breakers, other interrupting devices, switches, control, instrumentation and metering, and protective and regulating equipment.
- It includes, but is not specifically limited to, equipment for the control and protection of apparatus used for power generation, conversion, and transmission and distribution.
  - Included is equipment that is part of primary and secondary unit substations.
  - Gas-insulated substation equipment is not included.
- This standard is concerned with enclosed, rather than open, indoor and outdoor switchgear assemblies rated above 1000 V ac.

IEEE Std C37.20.2

Definition

Metal-enclosed power switchgear characterized by the following necessary features:

a) The main switching and interrupting device is of the removable (drawout) type arranged with a mechanism for moving it physically between connected and disconnected positions and equipped with self-aligning and self-coupling primary disconnecting devices and disconnectable control wiring connections.

b) Major parts of the primary circuit, that is, the circuit switching or interrupting devices, buses, voltage transformers, and control power transformers, are completely enclosed by grounded metal barriers that have no intentional openings between compartments except for small openings for wires, wire bundles, mechanical linkages, or items of similar nature. Specifically included is a metal barrier in front of, or a part of, the circuit interrupting device so that, when in the connected position, no primary circuit components are exposed by the opening of a door.

c) All live parts are enclosed within grounded metal compartments.

d) Automatic shutters cover primary circuit elements when the removable element is in the disconnected, test, or removed position.

e) Primary bus conductors and connections are covered with insulating material throughout.

f) Mechanical interlocks are provided for proper operating sequence under normal operating conditions.

g) Instruments, meters, relays, secondary control devices, and their wiring are isolated by grounded metal barriers from all primary circuit elements, with the exception of short lengths of wire such as at instrument transformer terminals.

h) The door through which the circuit-interrupting device is inserted into the housing may serve as an instrument or relay panel and also may provide access to a secondary or control compartment within the housing.

IEEE Std C37.20.2

Ratings

- Voltage range: 4.76 kV to 48.3 kV
- Current rating: 1200 A, 2000 A, 3000 A, and 4000 A for the main bus.
- A full battery of testing is defined to validate the performance ratings including:
  - Thermal Evaluation (Continuous Current)
  - Dielectric Evaluation (Power Frequency Withstand and Impulse Withstand)
  - Short-Circuit Evaluation (Short-time Current Withstand and Peak (momentary) Current Withstand
  - Mechanical Life Evaluation for all draw-out components

IEEE Std C37.20.2

Requirements and Features

- Construction details
  - Material type and thickness of structural components
  - Allowable openings (ventilation, view windows, access covers)
  - Finishes
- Components
  - Auxiliary devices (Control Power Transformers, Fuses, Voltage Transformers)
  - Current transformers, Rowgowski coils
  - Accessory devices (Ground and Test)
  - Insulation

IEEE Std C37.20.2

Requirements and Features

- Interlock functions
- Requirements for the Switching device (circuit breaker)
  - Interlock functions specific to Metal-Clad
  - Circuit breaker operation and capabilities
  - Draw-out (racking) functions

IEEE Std C37.20.2

Requirements and Features

- Application Guide
  - Altitude De-rating Factors
  - Cumulative Loading Guidance
  - Current Overload Guidance

IEEE Std C37.20.2

What's New In The 2022 Edition?

- Harmonization of control wiring requirements by adding the content of C37.20.2 Amendment A
- Clarification of ground and test device testing requirements
- Clarification of test requirements for drawout auxiliary components
- Clarification/expansion of the requirements for viewing window placement
- Deletion of requirements for air temperature surrounding cables in the cable compartment
- Updates to Annex C for partial discharge testing and Annex D for voltage dividers

IEEE Std C37.20.2

QUESTIONS