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(Revision of
IEEE Std C37.71-1984)

IEEE Standard for Three-Phase, Manually Operated Subsurface and Vault Load-Interrupting Switches for Alternating-Current Systems

Sponsor

Switchgear Committee
of the
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Abstract: Requirements are given for three-phase group operated subsurface and vault load-interrupting switchgear with maximum ratings of 600 A and 38 kV, and for utilizing separable insulated connectors. Definitions are given, and service conditions and ratings are discussed. Design tests, production tests, and construction requirements are included.

Keywords: subsurface switchgear, switched way, vault switchgear

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Introduction

(This introduction is not part of IEEE Std C37.71-2001, IEEE Standard for Three-Phase, Manually Operated Subsurface and Vault Load-Interrupting Switches for Alternating-Current Systems.)

This standard is a revision to the original IEEE Std C37.71-1984 for submersible switchgear.

The major revisions to this standard are as follows:

- Inclusion of switchgear used in below-grade enclosures that allow space for personnel access
- Adoption of limits of local temperature and temperature rise values that are consistent with limits in proposed standard C37.73-1998
- Inclusion of inherent transient recovery voltage values for the load-switching tests
- Adoption of the three-by-nine method for impulse withstand testing

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IEEE Standard for Three-Phase, Manually Operated Subsurface and Vault Load-Interrupting Switches for Alternating-Current Systems

1. Scope

This standard applies to three-phase, group operated, 60 Hz, subsurface and vault, load-interrupting switches with maximum ratings of 600 A and 38 kV, and the utilization of separable insulated connectors.

2. References

This standard shall be used in conjunction with the following publications. When the following standards referred to in this document are superseded by a revision, the latest revision shall apply.

ANSI C37.85-1989 (Reaff 1995), Interrupters Used in Power Switchgear X-Radiation Limits for AC High-Voltage Power Vacuum.¹

ANSI C57.12.26-1993, Pad-Mounted Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors, High-Voltage, 34 500 Grd/19 920 Volts and Below; 2500 kV and Smaller.

IEEE Std 4-1995, Standard Techniques for High-Voltage Testing.²

IEEE Std 386-1995, Separable Insulated Connector Systems for Power Distribution Systems Above 600 V.

IEEE C37.09-1999, Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

IEEE C37.100-1992, IEEE Standard Definitions for Power Switchgear.

¹ANSI publications are available from the Sales Department, American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

²IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA (<http://standards.ieee.org/>).

3. Definitions

The definitions of terms contained in this standard, or in other standards referred to in this document, are not intended to embrace all the legitimate meanings of the terms. They are applicable only to the subject treated in this standard. For additional definitions, see IEEE C37.100-1992.³

3.1 bus: A three-phase junction common to two or more ways.

3.2 subsurface switch: A submersible switching assembly suitable for application in a below-grade enclosure that does not allow space for personnel access.

3.3 surface operable: A term indicating that the switch and its accessories are operable from above grade.

3.4 switched way: A way connected to the bus through a three-pole, group operated switch.

3.5 tapped way: A way solidly connected to the bus.

3.6 vault switch: A submersible switching assembly suitable for application in a below-grade enclosure that allows space for personnel access.

3.7 way: A three-phase circuit entrance to a switching assembly.

NOTE—For clarification of definitions, see Figure 1.

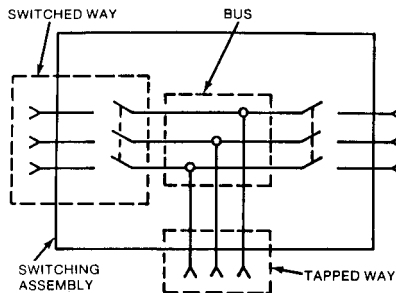


Figure 1—Example using definitions from Clause 3 (three-way switching assembly shown)

4. Service conditions

4.1 Usual service conditions

Switches conforming to this standard as follows, shall be suitable for operation at their nameplate rating:

- The ambient air temperature within the below-grade enclosure is not above 50 °C nor below –30 °C
- The altitude does not exceed 1000 m
- The switch is installed in a below-grade enclosure subject to occasional flooding to a depth not exceeding 3 m

³For information on references, see Clause 2.

4.2 Unusual service conditions

4.2.1 Abnormal ambient temperatures

Switches may be applied at higher or lower ambient temperatures than specified, but performance may be affected. Special consideration shall be given to these applications.

4.2.2 Altitudes above 1000 m

This subclause is currently under review. The results will be incorporated in the next revision of this standard.

4.2.3 Other conditions that may affect design and applications

Other existing unusual conditions should be brought to the manufacturer's attention. An unusual condition is considered to be any installation, application, or operation outside the requirements defined in this standard.

5. Ratings and test requirements

5.1 Rating information

The switch ratings shall include the following:

- a) Rated frequency
- b) Rated maximum voltage
- c) Rated impulse withstand voltage
- d) Rated continuous and load-interrupting current
- e) Rated momentary, making, and 1 s current
- f) Rated cable-charging interrupting current
- g) Rated magnetizing interrupting current

5.2 Voltage ratings and related test requirements

These ratings and requirements are detailed in Table 1.

5.3 Current test values

For detailed information see Table 2 and Table 3.

5.3.1 Conditions of continuous current rating

Switches shall meet the continuous current rating when operated according to the following conditions:

- a) Switches are used under the usual service conditions defined in 4.1.
- b) Current ratings shall be based on the total temperature limits of the materials used for such parts. A temperature rise reference is given to permit testing at reduced ambient temperature.
- c) Switches installed in nonventilated, below-grade enclosures shall have their ratings based on a 40 °C ambient temperature outside the enclosure, with an ambient temperature rise of 10 °C inside the enclosure.