IEEE Standard Requirements for High-Voltage Switches

Sponsor

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Abstract: Required ratings and constructional requirements for switches above 1000 V are described.
Keywords: high-voltage switches

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Introduction

(This introduction is not part of IEEE Std C37.30-1997, IEEE Standard Requirements for High-Voltage Switches.)

This standard is a revised and updated version of IEEE Std C37.30-1992 that incorporates improvements reflecting the state of the art in high-voltage switch technology.

a) By deleting the adjective “air” from “air switch,” the document’s scope now covers switches that are insulated with media other than air. This will provide a consistent base for applying and comparing the various insulating technologies available in switches today. However, this document focuses on air switches and will require considerably more development before it is the desired “generic” switch standard.
b) Dielectric withstand voltages have been “unbundled” from rated maximum voltage, thus acknowledging the practice of using many different dielectric withstand capabilities for the same operating voltage, depending upon specific insulation coordination needs.
c) Momentary current ratings are now defined in terms of a peak value, instead of the former “rms symmetrical total current.”
d) The short-time ratings have been separated into a rated current magnitude and a rated duration of that current.
e) Some higher temperatures are allowed in Table 2.
f) Altitude correction factors are being developed by the C37.100.1 Working Group on Common Clauses.

Because of the concurrent development of PC37.39, Proposed Standard for Interrupter Switches for Alternating Current Rated Above 1000 V, the clauses dealing with interrupter switches were largely left unchanged. It is the intention of the working group to remove these clauses from this standard after PC37.39 is published.

This revision is the consummation of the efforts of the C37.30 Revisions Working Group of the High-Voltage Switch Subcommittee of the Switchgear Committee of the IEEE Power Engineering Society. The working group had the following membership:

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Upon recommendation of the IEEE Switchgear Committee, this standard was voted on by the Accredited Standards Committee on Power Switchgear, C37, and was subsequently approved as an American National Standard.

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CLAUSE PAGE

IEEE Standard Requirements for High-Voltage Switches

1. Overview

This standard applies to all high-voltage enclosed indoor or outdoor, and non-enclosed indoor or outdoor, switches rated in excess of 1000 V. This includes such switch types as disconnecting, selector, horn-gap, grounding, etc., for manual or power operation. The following switch types are not covered by this standard: distribution-enclosed, single-pole switches and distribution cutouts fitted with disconnecting blades; switches used in metal-enclosed gear covered by IEEE Std C37.20.2-1993, IEEE Std C37.20.3-1987, and IEEE Std C37.20.4-1996; and switches used in pad-mounted switchgear covered by IEEE Std C37.71-1984, ANSI C37.72-1987, and PC37.73 (Draft 8, Feb. 95).

NOTE — PC37.39, Proposed Standard for Interrupter Switches, is currently under development. Upon its approval and publication, all references to interrupter switches in this standard will be superseded.

This standard defines terms and words that uniquely apply to high-voltage switches and are not included in IEEE Std C37.100-1992. It also defines terms used for rating high-voltage switches and ratings that must be included on nameplates for high-voltage switches.

2. References

ANSI C37.32-1990, American National Standard for Switchgear—High-Voltage Air Switches, Bus Supports, and Switch Accessories—Schedules of Preferred Ratings, Manufacturing Specifications, and Application Guide.[1]

IEEE Std C37.34-1994, IEEE Standard Test Code for High-Voltage Air Switches (ANSI).[2]

IEEE Std C37.36b-1990 (Reaff 1996), IEEE Guide to Current Interruption with Horn-Gap Air Switches (ANSI).

IEEE Std C37.37-1996, IEEE Standard Loading Guide for AC High-Voltage Air Switches (in Excess of 1000 volts) (ANSI).

[1]ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.
[2]IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

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

IEEE Std 1-1986 (Reaff 1992) IEEE Standard General Principles for Temperature Limits in the Rating of Electric Equipment and for the Evaluation of Electrical Insulation (ANSI).

NEMA SG 6-1995, Power Switching Equipment.[3]

3. Definitions

For definitions, see IEEE Std C37.100-1992, IEEE Standard Definitions for Power Switchgear. The definitions of terms contained in this standard, or in other standards referred to in this standard, are not intended to embrace all legitimate meanings of the terms. They are applicable only to the subject treated in this standard.

3.1 rated making current: The maximum current that the switch shall be required to close (initiate) and carry under specified conditions. For transient currents, fault initiation, capacitive discharge, etc., the rated making current shall be the prospective current available from the circuit without the influence of the switching device.

4. Service conditions

4.1 Usual service conditions

High-voltage switches conforming to this standard shall be suitable for operation at or within their ratings, provided that

a) The temperature of the cooling air (ambient temperature) is within the range of –30 °C to +40 °C.
b) The altitude does not exceed 1000 m (3300 ft).
c) The wind velocity does not exceed 37 m/s (80 mi/h).

NOTE — This wind velocity will produce a force of approximately 770 N/m^2 (16 lb/ft^2) of projected area on cylindrical surfaces (see NEMA SG 6-1995).

4.2 Unusual service conditions

a) Equipment that depends on air for its insulating and cooling medium will have a higher temperature rise and a lower dielectric strength when operating at higher altitudes than when operating at lower altitudes.
b) For altitudes above 1000 m (3300 ft), correction factors should be applied to the switch ratings. Altitude-correction factors are being developed.
c) Where other unusual conditions exist, they should be brought to the attention of those responsible for the design and application of the equipment. Examples of such conditions are:
    1) Contamination, such as damaging fumes or vapors, excessive or abrasive dust, explosive mixtures of dust or gases, steam, or salt spray.
    2) Abnormal vibration, shocks, earthquakes, or tilting.
    3) Excessively high or low ambient temperatures.
    4) Unusual transportation or storage conditions.
    5) Unusual space limitations.
    6) Unusual operating duty, frequency of operation, difficulty of maintenance, poor current wave form, unbalanced voltage, special insulation requirements, etc.

[3] NEMA publications are available from the NEMA Standards Sales Office, 2101 L Street, N.W., Washington, DC 20037 USA.

7) Parallel connected capacitances, either of which has an operating current greater than the “rated switching current for parallel-connected capacitance” for interrupter switches.[4]
8) A condition of resonance when switching capacitance.[5]
9) Switches used in enclosures where the temperature rise is based upon the ambient temperature outside the enclosure.

5. Ratings

Ratings are the designated limit(s) of the rated operating characteristic(s) of a device.

The ratings of equipment covered by this standard include the items indicated by an “X” in Table 2. Preferred ratings for air switches are found in ANSI C37.32-1990.

5.1 Rated maximum voltage

The rated maximum voltage is the highest rms line-to-line voltage at which the switch is designed to operate. Specific requirements keyed to this rating are

- Interrupting ratings
- Making ratings
- Limit of corona and radio-influence voltage
- Rating at which switching-surge tests are required

5.2 Rated dielectric withstand voltages

The rated dielectric withstand voltage is the voltage that the switch shall withstand when voltage is applied under the following specified conditions:

- Rated lightning-impulse withstand voltage 1.2×50 μs positive and negative withstand voltage
- Rated power frequency dry withstand voltage
- Rated power frequency wet withstand voltage
- Rated power frequency dew withstand voltage (enclosed switches only)
- Rated switching-impulse withstand voltage 250×2500 μs (switches with rated maximum voltages of 362 kV and higher)

5.3 Rated power frequency

The rated power frequency of a device, or an assembly, is the fundamental steady-state supply frequency of the circuit for which it is designed.

5.4 Rated continuous current

The rated continuous current of a switch is the maximum rms current, in amperes at rated frequency, that it will carry continuously without exceeding the limit of observable temperature rise for any of its parts, as listed in Column 2 of Table 2.

[4]This item will be superseded by PC37.39, Proposed Standard for Interrupter Switches, when it is approved.
[5]See Footnote 4.

5.4.1 Allowable continuous current

The allowable continuous current of a switch at specific ambient temperature is the maximum alternating current, in amperes rms at rated frequency, that a switch will carry without exceeding the allowable maximum temperature for any of its parts, as listed in Column 1 of Table 2.

The allowable continuous current may be determined from the equation,

$$I_A = I_R\left(\frac{\theta_{max} - \theta_A}{\theta_r}\right)^{0.5}$$

where

θ_A = ambient temperature (in °C)
I_A= allowable continuous current at ambient temperature, θ_A
I_R= rated continuous current
θ_{max}= allowable maximum temperature (in °C) of switch part, from Table 2
θ_r= limit of observable temperature rise (in °C) at rated current of switch part, from Table 2

5.4.2 Loadability

The loadability of an air switch is the ratio of allowable continuous current, at 25 °C ambient temperature, to rated current.

NOTE — Loadability is a measure of the allowable continuous current over the average of ambient temperatures from 10–40 °C for the air surrounding air switches. The loadability of 30 °C rise switches of previous standards is 1.22 at 25 °C. The limits of observable temperature rise at rated current in Table 2 have been selected to maintain a minimum 1.22 loadability at 25 °C.

The loadability of switches used in enclosures is covered by other standards and is the ratio of allowable continuous current, at 25 °C ambient temperature outside the enclosure, to rated current. This loadability may be different than 1.22.

5.4.3 Switch-part class designation

The switch-part class designation of a switch is a code that identifies the curve that relates the loadability factor, *LF*, of the switch to the ambient temperature, θ_A. This factor is determined by the allowable maximum temperature, θ_{max}, and the limit of observable temperature rise, θ_r, using the following formula:

$$LF = \frac{I_A}{I_R} = \left(\frac{\theta_{max} - \theta_A}{\theta_r}\right)^{0.5}$$

The switch-part class designations are given in Table 2.

5.4.4 Allowable continuous-current class (ACCC) designation

The ACCC designation of an air switch is a code that identifies the composite curve relating the loadability factor, *LF*, of the switch to the ambient temperature, θ_A, as determined by the limiting switch-part class designations. The first term of the ACCC designation is obtained from the first letter of the class designation of the switch part having the lowest limit of observable temperature rise. The middle term is the letter Z, designating loadability at 25 °C ambient. The last term is obtained from the numeral of the class designation of the switch part having the highest limit of observable temperature rise.

NOTES:

1 — For switch-part class designations, see Table 2.

2 — For switch-part class designation curves, ACCC designation curves, and corresponding tables, see IEEE Std C37.37-1979.

5.4.5 Observable temperature rise

The observable temperature rise of any part of the switch is the steady-state temperature rise above ambient temperature, when the switch is tested in accordance with Clause 6 of IEEE Std C37.34-1994.

5.4.6 Limits of observable temperature

The maximum value of observable temperature rise of any part of a switch, when tested in accordance with Clause 6 of IEEE Std C37.34-1994, shall be in accordance with Table 2.

The limit of observable temperature rise, θ_r, at rated current shall be determined from the following formula to maintain an air switch loadability of 1.22.

For non-enclosed switches,

$$\theta_R = \left(\frac{\theta_{\max} - \theta_n}{1.5}\right)$$

For enclosed switches, the lesser of

$$\theta_r = \left(\frac{\theta_{\max} - \theta_{e1}}{1.5}\right)$$

or

$$\theta_r = \theta_{\max} - \theta_{e2}$$

where

θn = 25 °C, the standard ambient temperature
θe_1 = 40 °C
θe_2 = 55 °C
1.5 = $(1.22)^2$, where 1.22 is the loadability of the switch at θ_n

5.5 Rated peak-withstand and short-time (symmetrical) withstand currents

5.5.1 Rated peak-withstand current

The rated peak-withstand current is a measure of the switch's ability to withstand the magnetic forces associated with a short circuit.

It is the maximum instantaneous current at the first major peak of an offset-rated power-frequency current, having a total duration of not less than 0.166 s, that the switch shall be required to carry when closed. The dc component of this current shall have a decay time constant that is no longer than 45 ms (X/R = 17).

5.5.2 Rated short-time (symmetrical) withstand current

The rated short-time (symmetrical) withstand current is a measure of the switch's ability to withstand the heat generated by a short-time current.

5.5.2.1 Rated short-time (symmetrical) withstand current magnitude

The rated short-time (symmetrical) withstand current magnitude is the maximum rms current of rated power frequency, expressed in symmetrical amperes, that the switch shall be required to carry for the rated short-time duration, expressed in seconds, while closed.

NOTES:

1 — For practical purposes, the current can be measured at the end of one-third of the rated duration.

2 — The temperatures can be calculated using the formulas given in ANSI C37.32-1990.

5.5.2.2 Rated short-time (symmetrical) withstand current duration

The rated short-time (symmetrical) withstand current duration is the time, in seconds, that the current in 5.5.2.1 must be carried. Preferred ratings are found in ANSI C37.32-1990.

5.6 Rated making current

5.6.1 Rated load-making current

The rated load-making current of a switch is the highest prospective rms current that a switch shall be required to make and carry at its rated maximum voltage.

5.6.2 Rated fault-making current

The rated fault-making current is the maximum prospective rms power frequency current, expressed in symmetrical amperes, that the switch shall be required to make and carry at its rated maximum voltage, for a specified duration. The switch shall have the related capability of making and carrying the asymmetrical current [based on a dc time constant of 45 ms (X/R = 17)] with a peak current of 2.6 times the rated fault-making current.

Only switches whose closing speed is independent of the operator can have a fault-making current rating. Switches whose closing speed is dependent on the operator may have a fault-making capability dependent on the proper closing of the switch.

5.7 Limit of corona and radio-influence voltage

Outdoor switches, rated 121 kV and above, when tested at voltage levels that are 110% of the line-to-ground equivalent of rated maximum voltage and are in accordance with IEEE Std C37.34-1994, shall be free of visible corona plumes or spikes produced by the corona discharge. The limits of radio-influence voltage are given in Table 1, column 14, of ANSI C37.32-1990.

5.8 Rated closing time (for power-operated switches)

The rated closing time of a switch is the specified interval in a closing operation between the energizing of the close coil, at the lower limit of the rated control-voltage range, and the making of the current-making switch contacts.

5.9 Rated ice-breaking ability

The rated ice-breaking ability is the maximum thickness of ice deposited on a device that will not interfere with its successful opening or closing.

5.10 Rated mechanical operations

The rated mechanical operations is the minimum number of operating cycles that a switch can perform without requiring readjustment or the replacement of parts. A specified number of operations must be accomplished with various terminal loads.

5.11 Rated mechanical terminal load

The rated mechanical terminal load is the static force equivalent to the external load, applied at each terminal in specified directions, that a switch shall withstand.

5.12 Rated load-interrupting current[6]

The rated load-interrupting current of an interrupter switch is the highest rms current, in amperes, between unity and 0.7 power factor lagging that a device shall be required to interrupt without requiring maintenance, at its rated maximum voltage and at rated power frequency, for a number of operations equal to its expected switching endurance for this duty.

See IEEE Std C37.36b-1990 for suggested current interruption values for horn-gap switches.

5.13 Ratings for switching shunt capacitance[7]

5.13.1 Rated interrupting current, single capacitance[8]

The rated interrupting current, single capacitance, is the rms symmetrical value of the highest single-capacitance load current, in amperes, that a device shall be required to interrupt a number of times equal to its expected switching endurance for this duty. This shall be done at rated maximum voltage, rated power frequency, and within the range of its rated differential-capacitance voltage without exceeding its rated capacitance-switching transient-overvoltage ratio.

5.13.2 Rated switching current, parallel-connected capacitance[9]

The rated switching current, parallel-connected capacitance, is the rms symmetrical value of the highest parallel-connected capacitance load current, in amperes, that a device shall be required to make and interrupt a number of times equal to its expected switching endurance for this duty. This shall be done at rated maximum voltage, rated frequency, within the range of its rated differential-capacitance voltage, and with the unswitched parallel-connected capacitance equal to the switched capacitance. This shall be done without exceeding the rated capacitance-switching transient-overvoltage ratio.

[6]This subclause will be superseded by PC37.39, Proposed Standard for Interrupter Switches, when it is approved.
[7]See Footnote 6.
[8]See Footnote 6.
[9]See Footnote 6.

5.13.3 Rated differential-capacitance voltage (maximum)[10]

The rated differential-capacitance voltage (maximum) is the greatest value of differential-capacitance voltage under which the interrupter switch shall be required to make and interrupt all values of capacitance current up to its rated switching current.

5.13.4 Rated differential-capacitance voltage (minimum)[11]

The rated differential-capacitance voltage (minimum) is the least value of differential-capacitance voltage under which the interrupter switch shall be required to make and interrupt all values of capacitance current up to its rated switching current.

5.13.5 Rated capacitance-switching transient-overvoltage ratio[12]

The rated capacitance-switching transient-overvoltage ratio is the largest value of transient-overvoltage ratio that a device will produce at either its source or load terminals when switching its rated capacitance-switching current.

5.14 Rated unloaded transformer interrupting current[13]

The rated unloaded transformer switching-current interrupting rating of an interrupter switch is the highest rms current, in amperes, of an actual unloaded power transformer that a device shall be required to interrupt without requiring maintenance, at its rated maximum voltage and at rated power frequency, for a number of operations equal to the expected switching endurance for this duty.

5.15 Expected switching endurance[14]

5.15.1 Load-interrupter switch[15]

The expected switching endurance of a load-interrupter switch shall be expressed as the number of operations that the switch is capable of successfully performing when it is new and tested at its rated interrupting current under the conditions specified in IEEE Std C37.34-1994. It should be recognized that the interrupting element of the switch may need to be replaced after the switch has completed its expected switching endurance. The expected switching endurance may increase when the switch interrupts current below its rating. If greater endurance is desired, the manufacturer should be consulted.

5.15.2 Fault-initiating switch

The expected switching endurance of a fault-initiating switch is the number of closing operations, at rated making current, that a switch is capable of performing when it is new and tested at its rated making current. After the last rated closing operation, the switch must be capable of being opened.

[10]This subclause will be superseded by PC37.39, Proposed Standard for Interrupter Switches, when it is approved.
[11]See Footnote 10.
[12]See Footnote 10.
[13]See Footnote 10.
[14]See Footnote 10.
[15]See Footnote 10.

Table 1— Switch ratings and required tests

Switch rating	Disconnecting switch	Interrupter switch	Fault-initiating switch	Grounding switch
	Column 1	**Column 2**	**Column 3**	**Column 4**
Rated power frequency	X	X	X	X
Rated maximum voltage	X	X	X	X
Rated continuous current	X	X	—	—
Rated dielectric withstand voltages	X	X	X	X
Rated lightning-impulse withstand (BIL)	X	X	X	X
Rated switching-impulse withstand (for rated maximum voltage of 362 kV and above)	X	X	X	X
Rated power frequency dry withstand	X	X	X	X
Rated power frequency wet withstand (outdoor)	X	X	X	X
Rated dew power frequency withstand (indoor)	X	X	X	X
Rated peak-withstand current	X	X	O	X
Rated short-time (symmetrical) withstand current	X	X	O	X
Rated short-time (symmetrical) withstand current duration	X	X	O	X
Rated mechanical operations	X	X	—	X
Rated mechanical terminal load	X	X	X	X
Rated ice-breaking ability—manual (outdoor)	X	X	X	X
Rated ice-breaking ability—power: single attempt opening and closing (outdoor)	X	X	X	X
Rated ice-breaking ability—power: single attempt opening, multiple attempt closing (outdoor)	X	X	—	X
Rated load-making current	O	X	—	O
Rated fault-making current		—	X	—
Rated switching parameters[*]				
Rated capacitance-switching overvoltage ratio[*]	—	X[†]	—	—
Rated minimum differential-capacitance voltage[*]	—		—	—
Rated maximum differential-capacitance voltage[*]	—	X[†]	—	—
Rated load-interrupting current and expected switching endurance[*]	—	O[‡]	—	—
Rated unloaded transformer interrupting current and expected switching endurance[*]	—	O[‡]	—	—
Rated single-capacitance interrupting current and expected switching endurance[*]	—	O[‡]	—	—
Rated parallel-connected capacitance-switching current and expected switching endurance[*]	—	O[‡]	—	—
NOTE — “X” indicates required rating; “O” indicates optional rating; “—” indicates not applicable.				

*.Related to interrupter switches and will be superseded by IEEE PC37.39 when it is completed and approved.
†.Required if the interrupter switch has capacitance-switching ratings.
‡.At least one current-interrupting rating is required for interrupter switches.

Table 2— Temperature limitations for air switches (continued)

Switch part	Allowable maximum temperature, θ_{max} (°C)	Non-enclosed indoor and outdoor switches		Enclosed indoor and outdoor switches	
		Limit of observable temperature rise at rated current, θ_r (°C)*	Switch-part class designation	Limit of observable temperature rise at rated current, θ_r (°C)	Switch-part class designation
	Column 1	Column 2	Column 3	Column 4	Column 5
(a) Contacts in air†					
(1) Copper or copper alloy	75	33	BO2	20	QO_33
(2) Copper or copper alloy to silver or silver alloy, or equivalent	90	43	DO4	33	RO4
(3) Silver, silver alloy, or equivalent	105	53	FO6	43	TO6
(4) Other‡	—	—	—	—	—
(b) Conducting mechanical joints					
(1) Copper or aluminum	90	43	DO4	33	RO4
(2) Silver, silver alloy, or equivalent	125	67	FO6	57	TO6
(3) Other‡	—	—	—	—	—
(c) Switch terminals with bolted connections	90	43	DO4	33	RO4
(d) Welded or brazed joints or equivalent	105	53	FO6	43	TO6
(e) Other current-carrying parts					
(1) Copper or copper alloy castings	105	53	FO6	43	TO6
(2) Hard-drawn copper parts**	80	37	CO3	25	PO_22
(3) Heat-treated aluminum alloy parts	105	53	FO6	43	TO6
(4) Woven-wire flexible connectors	75	33	BO2	20	QO_33
(5) Other materials‡	—	—	—	—	—
(f) Insulator caps and pins and bushing caps	110	57	GO7	47	UO7
(g) Current-carrying parts in contact with insulating materials					
(1) Insulation class 90 °C	90	43	CO3	33	PO_22
(2) Insulation class 105 °C	105	53	EO5	43	SO5

Switch part	Allowable maximum temperature, θ_{max} (°C)	Non-enclosed indoor and outdoor switches		Enclosed indoor and outdoor switches	
		Limit of observable temperature rise at rated current, θ_r (°C)*	Switch-part class designation	Limit of observable temperature rise at rated current, θ_r (°C)	Switch-part class designation
	Column 1	Column 2	Column 3	Column 4	Column 5
(3) Insulation class 130 °C	130	70	HO8	60	VO8
(4) Insulation class 155 °C	155	87	IO9	77	WO9
(5) Insulation class 180 °C	180	103	JO10	93	XO10
(6) Insulation class 220 °C	220	130	KO11	120	YO11
(7) Oil††	90	43	DO4	33	RO4
(8) SF_6	350	307	—	297	—
(h) Nonenergizable parts subjected to contact by personnel					
(1) Handled by operator‡‡	50	10	—	10	—
(2) Accessible to operator‡‡	70	30	—	30	—
(3) Not accessible to operator***	—	—	—	—	—
(i) Entire switch in accordance with IEEE Std C37.30-1992					
(1) Outdoor	70	30	AO1	—	—
(2) Indoor	85	—	—	30	NO1

*.The limit of observable temperature rise listed in this column is suitable for use in rating switches for application in enclosures of IEEE Std C37.20.2-1993 and IEEE Std C37.20.3-1987, if the corresponding allowable maximum temperature listed in column 1 is not exceeded when in the enclosure. These temperature rises are chosen to give a loadability of 1.22 at 25 °C.

†.Contacts as used here include: (a) stationary and moving contacts that engage and disengage, and (b) contacts that have relative movement but remain engaged.

‡.Other materials may become available for contacts, conducting mechanical joints, and other current-carrying parts that have a different allowable maximum temperature, θ_{max}. Their limit of observable temperature rise at rated continuous current, θ_r, shall be related to their θ_{max}, in accordance with 5.4.

**.If annealing will not impair switch operation or reduce ability to meet any of the ratings, 105 °C may be used for θ_{max} and the corresponding increase in θ_r as determined in 5.4.

††.The top oil (upper-layer) temperature shall not exceed 80 °C total. The 90 °C value refers to the hottest-spot temperature of parts where they contact the oil.

‡‡.It is assumed that any parts handled by or accessible to an operator will be in ambient air with a temperature that does not exceed 40 °C.

***.The maximum temperature of any nonenergizable part that is not accessible to the operator shall not exceed a temperature that will necessitate maintenance or replacement of parts during the life of the switch.

6. Test procedure

The test procedures in IEEE Std C37.34-1994 shall be followed in the performance of design tests. There are no required routine tests.

7. Nameplate markings

7.1 General

Nameplates for switches shall carry the following minimum information, where applicable:

a) Manufacturer's name and address
b) Manufacturer's type, designation number, and serial number
c) Month and year of manufacture
d) Rated maximum voltage
e) Rated continuous current
f) Rated short-time (symmetrical) withstand current magnitude and duration
g) Rated peak-withstand current
h) Rated lightning-impulse withstand voltage (BIL)
i) Rated power frequency
j) Allowable continuous-current class[16]
k) Rated making current, rated closing time
l) Rated no-load mechanical operations[17]

7.2 Interrupter switches

Nameplates for interrupter switches shall carry all the information required in 7.1, plus the following:

a) Expected switching endurance
b) Rated switching-current parallel-connected capacitance
c) Rated differential-capacitance voltage (maximum)
d) Rated differential-capacitance voltage (minimum)
e) Rated capacitance-switching transient-overvoltage ratio

7.3 Fault-initiating switches

Nameplates for fault-initiating switches shall carry all the information required in 7.1, except (e), (f) and (j), plus:

m) Expected switching endurance at rated making current.

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[16] For ACCC designation curves and tables, see IEEE Std C37.37 [9].
[17] This item will be superseded by PC37.39, Proposed Standard for Interrupter Switches, when it is approved.