PC37.30.5™/D1.2
Draft Standard for Definitions for AC High-Voltage Air Switches Rated Above 1000 V

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Abstract: The terms and definitions in this standard cover all high-voltage enclosed and non-enclosed, indoor and outdoor air switches rated in excess of 1000 V used primarily in connection with generation, transmission, distribution, and conversion of electric power. This includes such switch types as disconnect, horn gap, fault initiation, and ground for manual or power operation. The following switch types are not covered by this standard: distribution cutouts fitted with disconnecting blades, and switches used in metal enclosed and pad mounted switchgear. This standard also does not apply to load break separable insulated connectors, circuit breakers, circuit switchers, or reclosers.

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Introduction

This introduction is not part of PC37.30.5/D1.2, Draft Standard for Definitions for AC High-Voltage Air Switches Rated Above 1000 V.

This standard constitutes a compilation of terms and definitions relating to high-voltage air switches, and should be considered to reflect common and current usage of that industry. The size of this standard has been kept to a minimum by omitting all terms satisfactorily covered in readily available dictionaries. In some instances, terms and definitions of related products exhibiting minor variations have been combined for greater clarity. Specifications and ratings have been excluded from definitions. This information is included in standards covering specific product types. This standard contains, in addition to many additions and modifications, the relevant terms from IEEE Std C37.100, which is scheduled to be withdrawn when its validity expires in 2018.

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Draft Standard for Definitions for AC High-Voltage Air Switches Rated Above 1000 V

1. Overview

1.1 Scope

The terms and definitions in this standard cover all high-voltage enclosed and non-enclosed, indoor and outdoor air switches rated in excess of 1000 V used primarily in connection with generation, transmission, distribution, and conversion of electric power. This includes such switch types as disconnect, horn-gap, fault-initiation, and ground for manual or power operation.

The following switch types are not covered by this standard: interrupter switches, distribution cutouts fitted with disconnecting blades, and switches used in metal-enclosed and pad-mounted switchgear. This standard also does not apply to load-break separable insulated connectors, circuit-breakers, circuit-switchers, or reclosers.

1.2 Purpose

The definitions of terms and explanatory notes relating thereto contained in this standard are not intended to encompass all possible meanings of the terms. They are intended for the sole purpose of establishing only those meanings of terms used in standards for switchgear assemblies. They do not purport to encompass other meanings that the terms may properly have when used in connection with other subjects.

In some instances, terms and definitions that are not identical to those in this standard have been developed by other branches of industry. Where this situation exists, the definitions in this standard shall be used for AC High-Voltage Air Switches Rated Above 1000 V covered by the C37 series of standards.

2. Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.[1]

accessories: Devices that perform a secondary or minor duty as an adjunct or refinement to the primary or major duty of a unit of equipment.

air switch: A switching device designed to close and open one or more electric circuits by means of guided separable contacts that separate in air.

arc reach: The distance from a point midway between the arc extremities to the most remote point of the arc at the time of its maximum length.

arcing horn: One of a pair of diverging electrodes on which an arc is extended to the point of extinction after the main contacts of the switching device have parted.

attachments: Accessories to be attached to switchgear apparatus, as distinguished from auxiliaries.

bell crank: A lever with two arms placed at an angle diverging from a given point, thus changing the direction of motion of a mechanism.

bell crank hanger: A support for a bell crank.

blade (disconnecting blade) (of a switching device): The moving contact member that enters or embraces the contact clips.

blade guide (switch): An attachment to help assist in proper alignment of the blade and contact clip when closing the switch.

blade latch: A latch used on a switch to hold the switch blade in the closed position.

break distance (of a switching device): The minimum open-gap distance between the main-circuit contacts, or live parts connected thereto, when the contacts are in the open position.

bus support: An insulating support for a bus. It includes one or more insulator units with fittings for fastening to the mounting structure and for receiving the bus.

center break switching device: A mechanical switching device in which both contacts are moveable and engage at a point substantially midway between their supports.

clips: *See:* **contact clips (of a mechanical switching device)**

closing operating time (of a switch): The interval during which the contacts move from the fully open position to the fully closed position.

[1] *IEEE Standards Dictionary Online* subscription is available at: http://www.ieee.org/portal/innovate/products/standard/standards_dictionary.html.

conducting mechanical joint: The juncture of two or more conducting surfaces held together by mechanical means.

conductive outrigger (of a switching device terminal): An attachment that is fastened to and extends the terminal pad of a switching device to maintain electrical clearance between the conductor and other parts.

connecting rod or shaft: A component of a switch operating mechanism designed to transmit motion from an offset bearing or bell crank to a switch pole unit.

contact: A conducting part that coacts with another conducting part to make or break a circuit.

contact clip (of a mechanical switching device): The clip that the blade enters or embraces.

contact position indicator: A device that is located at or near the operating mechanism to indicate whether the main contacts are in the closed or open position. Typically colors are used to indicate a closed or open position; red will typically signify closed and green will typically signify open.

contact surface: That surface of a contact through which current is transferred to the coacting contact.

creepage distance: The shortest distance between two conducting parts measured along the surface or joints of the insulating material between them.

current-carrying part: A conducting part intended to be connected in an electric circuit to a source of voltage.

direct operation: Operation by means of a mechanism connected directly to the main operating shaft or an extension of the same.

disconnecting blade: *See:* **blade (disconnecting blade) (of a switching device).**

disconnecting or isolating switch (disconnector, isolator): A mechanical switching device used for changing the connections in a circuit, or for isolating a circuit or equipment from the source of power.

double break switch: A mechanical switching device that opens a conductor of a circuit at two points.

enclosed switches, indoor or outdoor: Switches designed for service within a housing restricting heat transfer to the external medium.

fault initiating switch: A mechanical switching device used in applied fault protection to place a short circuit on an energized circuit and to carry the resulting current until the circuit has been de-energized by protective operation.

grounded parts: Parts that are intentionally connected to ground.

grounding switch: A mechanical switching device by means of which a circuit or piece of apparatus may be electrically connected to ground.

group operation: The operation of all poles of a multipole switch device by one operating mechanism.

high speed grounding switch: *See:* **fault initiating switch.**

high speed short circuiting switch: *See:* **fault initiating switch.**

hinge clip (of a switching device): The clip to which the blade is movably attached.

horn-gap switch: A switch provided with arcing horns.

hook ring (air switch): A ring provided on a switch blade for operation of the switch with an insulated switch (hook) stick.

hook stick: *See:* **switch stick (switch hook).**

ice proof: So constructed or protected that ice of a specified composition and thickness will not interfere with successful operation.

ice tests: Design tests made to determine the rated ice-breaking capability of the switching equipment.

indirect manual operation (of a switching device): Operation by hand through an operating handle, mounted at a distance from and connected to the switching device by mechanical linkage.

indirect operation (of a switching device): Operation by means of an operating mechanism connected to the main operating shaft or an extension of it, through offset linkages and bearings.

indoor: Designed for use only inside buildings, or weather-resistant enclosures.

interlock: A device actuated by the operation of some other device with which it is directly associated, to govern succeeding operations of the same or allied devices.

NOTE — An interlock system is a series of interlocks applied to associated equipment in such a manner as to allow operation of the equipment only in a prearranged sequence. Interlocks are classified into three main divisions: mechanical interlocks, electrical interlocks, and key interlocks, based on the type of interconnection between the associated devices.

interphase rod or shaft: A component of a switch-operating mechanism designed to connect two or more poles of a multipole switch for group operation.

interrupter: An element designed to interrupt specified currents under specified conditions.

interrupter blade (of an interrupter switch): A component used in the interrupter for breaking the circuit.

interrupter switch: An air switch, equipped with an interrupter, for making or breaking specified currents, or both.

interrupting aid: A current interrupting device that can be attached to an air switch to improve its interrupting capability.

interrupting (breaking) current: The current in a pole of a switching device at the instant of the initiation of the arc.

interrupting tests: Tests that are made to determine or check the interrupting performance of a switching device.

isolator: *See:* **disconnecting or isolating switch**

leakage distance of external insulation: *See:* **creepage distance.**

lifting insulator switch: A mechanical switching device in which one or more insulators remain attached to the blade, move with it, and lift it to the open position.

load interrupter switch: An interrupter switch designed to interrupt a specified steady state current.

manual operation: Operation by hand without the use of any other source of power.

mechanical operation (of a switch): Operation by means of an operating mechanism connected to the switch by mechanical linkage.

mechanism (of a switching device): The complete assembly of levers and other parts that actuates the moving contacts of a switching device.

minimum clearance between poles (phases): The shortest distance between any live parts of adjacent poles (phases).

CAUTION

Differentiation should be made between clearance and spacing or center-to-center distance.

minimum clearance to ground: The shortest distance between any live part and adjacent grounded parts.

moving contact: A conducting part that bears a contact surface arranged for movement to and from the stationary contact.

nonenclosed switches, indoor or outdoor: Mechanical switching devices designed for service without a housing restricting heat transfer to the external medium.

offset (outboard) bearing (air switch): A component of a switch-operating mechanism designed to provide support for a torsional operating member and a crank that provides reciprocating motion for switch operation.

open operation (of a switching device): The movement of the contacts from the normally closed to the normally open position.

opening operating time (of a switch): The interval of time it takes during switch operation to move from the fully closed to the fully open position.

opening operation (of a switching device): *See:* **open operation (of a switching device)**.

outrigger (of a switching device terminal): An attachment that is fastened to or adjacent to the terminal pad of a switching device to maintain electrical clearance between the conductor and other parts or, when fastened adjacent, to relieve mechanical strain on the terminal, or both.

overhead line charging current: Current supplied to an unloaded overhead line.

parallel connected capacitance (as applied to interrupter switches): Capacitances are defined to be parallel connected when the crest value of inrush current to the capacitance being switched exceeds the switch inrush current capability for single capacitance.

phase spacing (of a switching device): The distance between center-lines of the current carrying parts of the adjacent poles of the switching device.

protective gap: A gap placed between live parts and ground to limit the maximum overvoltage that may occur.

quick break: A term used to describe a device that has a high contact opening speed independent of the operator.

quick make: A term used to describe a device that has a high contact closing speed independent of the operator.

remote manual operation: *See:* **indirect manual operation (of a switching device).**

resistant (used as a suffix): So constructed, protected, or treated that damage will not occur readily when the device is subjected to the specified material or condition.

rotating insulator switch: A mechanical switching device in which the opening and closing travel of the blade is accomplished by the rotation of one or more insulators supporting the conducting parts of the switch.

selector switch: A switch arranged to permit connecting a conductor to any one of a number of other conductors.

short-time current: The current carried by a device, an assembly, or a bus for a specified short-time interval.

shunt (air switch): A flexible electrical conductor comprised of braid, cable, or flat laminations designed to conduct current around the mechanical joint between two conductors.

side break switch: A mechanical switching device in which the travel of the blade is in a plane parallel to the base of the switch.

single break switch: A mechanical switching device that opens each conductor of a circuit at one point only.

single capacitance (as applied to interrupter switches): A capacitance is defined to be a single capacitance when the crest value of its inrush current does not exceed the switch inrush current capability for single capacitance.

sleet hood (of a switch): A cover for the contacts to minimize the possibility of sleet or ice interfering with successful operation of the switch.

stationary contact member: A conducting part having a contact surface that remains substantially stationary.

stick (hook) operation: Manual operation of a switching device by means of an insulated switch (hook) stick.

switch inrush current capability for single capacitance (as applied to interrupter switches): This capability is a function of the rated switching current for single capacitance, the rated differential capacitance voltage (minimum) and the maximum design voltage of the switch.

NOTE - This can be calculated from the equation:

Capability, in Peak Amperes =

$$\sqrt{2I_C}\sqrt{1+\frac{0.8160E_m}{\Delta V_{\min}}}$$

where

I_C = Rated switching current for single capacitance
ΔV_{min} = Rated differential capacitance voltage, minimum
E_m = Switch rated maximum voltage, in volts, rms

switch stick (switch hook): A device with an insulated handle and a hook or other means for performing stick operation of a switching device.

switching device (switch): *See:* **non-mechanical switching device, mechanical switching device:** A device designed to close or open, or both, one or more electric circuits.

NOTE - The term *switch* in international (IEC) practice refers to a mechanical switching device capable of opening and closing rated continuous load current.

terminal pad: A usually flat conducting part of a device to which a terminal connector is fastened.

tilting-insulator switch: A mechanical switching device in which the opening and closing travel of the blade is accomplished by a tilting movement of one or more of the insulators supporting the conducting parts of the switch.

torsional mechanism: An operating mechanism that transfers rotary motion from the operating means through a pipe or shaft to open or close the switching device.

transfer switch (a high-voltage switch): A mechanical switching device arranged to permit transferring a conductor connection from one circuit to another without interrupting the current.

1) A tandem transfer switch is a switch with two blades, each of which can be moved into or out of only one contact.

2) A double-blade double-throw transfer switch is a switch with two blades, each of which can be moved into or out of either of two contacts.

trussed blade (of a switching device): A blade that is reinforced by truss construction to provide stiffness.

vertical break switch: A mechanical switching device in which the travel of the blade is in a plane perpendicular to the plane of the mounting base. The blade in the closed position is parallel to the mounting base.

vertical reach switch: A mechanical switching device in which the stationary contact is supported by a structure separate from the hinge-mounting base. The blade in the closed position is perpendicular to the hinge-mounting base.

vertical rod or shaft: A component of a switch-operating mechanism designed to transmit motion from an operating handle or power operator to a switch offset bearing or bell crank, or a direct drive.

visible corona: A luminous discharge due to ionization of the air surrounding a device, caused by voltage gradient exceeding a certain critical value.

Annex A

(informative)

Bibliography

Bibliographical references are resources that provide additional or helpful material but do not need to be understood or used to implement this standard. Reference to these resources is made for informational use only.

[B1] IEEE Std C37.100™-1992 (R 2001), IEEE Standard Definitions for Power Switchgear