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A. I. E. E. STANDARDS



Oil Circuit Breakers **(Revised)**



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Development of the Standards of the American Institute of Electrical Engineers

Recognizing the importance in the development of electrical engineering, of standardization in the electrical field, the A. I. E. E. in 1898 appointed a Committee on Standardization, consisting of seven members having qualifications and experience from designing, manufacturing and operating standpoints. The report of this Committee was accepted at a meeting of the Institute in June 1899.

Experience gained in applications of the standards and further developments in electrical apparatus and methods showed the necessity of revision, and a committee was appointed which after consultation with manufacturing and operating engineers presented the first revised report on Standardization Rules of the A. I. E. E. in June 1902.

The next revision was undertaken by a committee of ten, which presented its report in May 1906.

In September 1906, a Standards Committee of eleven members was appointed for further revision, and its report was presented in June 1907.

The appreciation of the importance and value of standardization resulted in the formation of a Standing Committee, with the title of Standards Committee of the A. I. E. E. This became effective in the Constitution of June 1907. The scope and amount of work necessitated increasing the number of members from time to time until in 1922 there were 37 members divided into a number of subcommittees specializing on various subjects.

A. I. E. E. Standards published in a single volume as each revision was adopted have been generally accepted as Standards of the electrical industry of the United States since the adoption of the first report in 1899. Subsequent reports on Standards were made and published, in some cases in several editions. The dates of adoption by the Board of Directors of such reports are as follows: June 20, 1902; June 21, 1907; June 27, 1911; July 10, 1914; June 30, 1915; June 28, 1916; November 8, 1918; October 8, 1920, and June 29, 1922.

On June 29, 1922, in view of the increasing complexity of the work, a reorganization of the Standards Committee was effected, and a working organization established which provided for an increase in standardization work and for the appointment on Working Committees of the Standards Committee of non-Institute members.

The present plan under which the Institute Standards are being issued involves the separation of the complete body of Standards into forty—or more—sections, each published as a separate pamphlet and dealing with a specific subject. The division of the Standards into a number of separate publications simplifies the process of keeping the Standards revised to conform with the latest developments and enables those interested in a particular field to obtain in concise form the material relating to that field. In framing the Institute Standards the chief purpose has been to define terms and conditions which characterize the rating and behavior of electrical machinery and apparatus, with special reference to the conditions of acceptance tests.

The Standards Committee takes this occasion to draw attention to the value of suggestions based upon experience gained in the application of the Standards of general practise. Any suggestions looking toward improvement in the Standards will be welcomed for the guidance of the Committee in preparation of future editions, and should be communicated to the Secretary of the A. I. E. E. Standards Committee, 33 West 39th Street, New York.

The revised A. I. E. E. Oil Circuit Breaker Standards contained in this pamphlet were developed by the Committee on Protective Devices of the Institute. A Sectional Committee on Power Switchgear working under the rules of procedure of the American Standards Association and the sponsorship of the Electrical Standards Committee, is now engaged in the development of an American Standard, having largely as the basis of its work this A. I. E. E. Standard No. 19. As it was not expected that the American Standard would be completed for some time the Institute agreed to the approval and publication of this material as an A. I. E. E. standard in order that users might have available in the interim the latest data in approved form.

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STANDARDS

OF THE

American Institute of Electrical Engineers

OIL CIRCUIT BREAKERS

(Adopted by the Board of Directors, March 29, 1938.)

SCOPE

These standards apply to all types of oil circuit breakers, whether for indoor or outdoor service.

SERVICE CONDITIONS

19-1 Usual Service Conditions.—Oil circuit breakers conforming to these standards shall be suitable for operating at their standard ratings:

(a) When and where the temperature of the cooling medium does not exceed 40C.

(b) Where the altitude does not exceed 3300 feet (1000 meters).

19-2 Unusual Service Conditions.—The use of apparatus in cooling media having temperatures higher than 40C., or at altitudes greater than 3300 feet (1000 meters) should be considered as special.

Voltage Rating: For application at altitudes greater than 3300 feet (1000 meters) it is recommended that the standard voltage rating of the apparatus should be multiplied by the following factors to obtain the modified voltage rating:

Altitude in Feet	Correction Factors
3300 (1000 meters)	1.00
4000 (1200 meters)	0.98
5000 (1500 meters)	0.95
10000 (3000 meters)	0.80

Temperature Rise: For apparatus intended for service at altitudes greater than 3300 feet (1000 meters) it is provisionally agreed that the permissible temperature rises (as determined by test at low altitude, 3300 feet or less) shall be less than those specified in these standards by four-tenths of one per cent of the specified rise for each 330 feet (100 meters) of altitude in excess of 3300 feet (1000 meters) at which the actual installation is to take place (See 19-250).

19-3 Conditions Affecting Construction or Protecting Features.—There are further unusual conditions which where they exist should receive special consideration. Such conditions should be brought to the attention of those responsible for the application, manufacture and operation of the equipment. Apparatus for use in such cases may require special construction or protection. Among such unusual conditions are:

(a) Exposure to damaging fumes or vapors, excessive or abrasive dust, explosive mixtures of dust or gases, steam, salt spray, excessive moisture or dripping water, etc.

(b) Exposure to abnormal vibration, shocks, or tilting.

(c) Exposure to excessively high or low temperatures.

(d) Exposure to unusual transportation or storage conditions.

(e) Unusual space limitations.

(f) Unusual operating duty, frequency of operation, difficulty of maintenance, etc.

DEFINITIONS

Definitions as given herein apply specifically to the apparatus treated in this section. They will be included with all other standard definitions in a separate section.

General

19-50 Circuit Breaker.—A circuit breaker is a device for interrupting a circuit between separable contacts under normal or abnormal conditions. Ordinarily circuit breakers are required to operate only infrequently, although some classes of breakers are suitable for frequent operation.

Oil Circuit Breaker.—An oil circuit breaker is a circuit breaker in which the interruption occurs in oil.

Construction

19-51 Accessories.—Accessories are devices which perform a secondary or minor duty as an adjunct or refinement to the primary or major duty of a unit of equipment.

19-52 Alarm Switch.—An alarm switch is a switch controlled by the automatic opening of a circuit breaker and designed to close the circuit to a bell or other signalling device.

19-53 Arcing Contacts.—Arcing contacts are the contacts on which the arc is drawn after the main contacts of a circuit breaker have parted. (See 19-93 for definitions of stationary and moving contacts.)

19-54 Attachments.—Attachments are accessories to be attached to switchgear apparatus, as distinguished from auxiliaries.

19-55 Auxiliaries.—Auxiliaries are accessories to be used with switchgear apparatus but not attached to it, as distinguished from attachments.

19-56 Auxiliary Switch.—An auxiliary switch is a switch actuated by some main device, such as a circuit breaker, for signalling, interlocking, or other purpose.

- 19-57 **Baffle (Deflector).**—A baffle is a device for deflecting oil or gas in a circuit breaker.
- 19-58 **Barrier.**—A barrier is a partition for the insulation or isolation of electric circuits or electric arcs.
- 19-59 **Base.**—See Top Frame.
- 19-60 **Bearing Support.**—A shaft bearing bracket or bearing support is a support provided for the bearing of a shaft.
- 19-61 **Bell Crank.**—A bell crank is a lever with two or more arms placed at an angle diverging from a given pivot point, by means of which the direction of motion of a mechanism is changed.
- 19-62 **Bell Crank Hanger.**—A bell crank hanger is a support for a bell crank.
- 19-63 **Break.**—The break of a circuit opening device is the minimum distance between the stationary and movable contacts when these contacts are in the open position.
 (a) A single break is as defined above.
 (b) The length of a multiple break (breaks in series) is the sum of several breaks.
- 19-64 **Bushing (Insulating).**—A bushing is a lining for a hole intended to insulate and/or protect from abrasion, one or more conductors which pass through it.
 Note: The term bushing as related to circuit breakers is frequently employed to designate an assembly of the insulating member and the conductor passing through it.
- 19-65 **Calibration Scale.**—A calibration scale is a set of graduations marked to indicate values such as current, voltage or time at which an automatic device can be set to operate.
- 19-66 **Cell.**—A cell is a compartment for enclosing circuit breakers or other electrical equipment.
- 19-67 **Cell Door.**—A cell door is a door for closing the front or rear of a cell.
- 19-68 **Cell Structure.**—A cell structure is a group of two or more cells.
- 19-69 **Circuit Breaker Mechanism.**—A circuit breaker mechanism is the assembly of levers and other parts which actuates the moving contacts of the circuit breaker.
 (a) A Pole Unit Mechanism is an assembly which actuates the moving contacts of a pole unit.
 (b) An Operating Mechanism is a power operated or manual mechanism by which the contacts of all poles of a circuit breaker are actuated.
 (c) A Tripping Mechanism is an electrically or mechanically operated device which releases the holding means and permits the contacts of the circuit breaker to open.
- 19-70 **Clevis.**—A clevis is a fitting having a "U" shaped end and arranged for attaching to the end of a pipe or rod.
- 19-71 **Closing Coil.**—A closing coil is a coil used in the electromagnet which supplies power for closing a circuit breaker.
- 19-72 **Conducting Parts.**—Conducting parts of apparatus are those parts designed to carry current or which are conductively connected thereto.
- 19-73 **Conduit Connections.**—Conduit connections are the means provided for bringing leads into or out of a circuit breaker through conduit.
- 19-74 **Connection Diagram.**—A connection diagram is a diagram showing the relations and connections of devices and apparatus of a circuit or group of circuits.
 Note: This term is used instead of wiring diagram.
- 19-75 **Contact.**—A contact is a conducting part which co-acts with another conducting part to complete or to interrupt a circuit.
- 19-76 **Contact Wear Allowance.**—Contact wear allowance is the total thickness of material which may be worn away before the contact of two associated surfaces becomes inadequate to carry its rating.
- 19-77 **Contact Surfaces.**—Contact surfaces are the surfaces of contacts which meet and through which the current is transferred when the contacts are closed.
- 19-78 **Closing Relay.**—A closing relay is a form of auxiliary relay used with an electrically operated device to control the closing and opening of the operating circuit of the device so that the main operating current does not pass through the control switch or other initiating device.
- 19-79 **Control Switch.**—A control switch is a switch for controlling electrically operated devices.
- 19-80 **Coverplate and Handle (Operating Lever).**—A coverplate and handle (operating lever) comprises the mounting bracket, handle lever and auxiliary parts for the manual operation of a circuit breaker from a panel or its equivalent.
- 19-81 **Cross Bar.**—A cross bar is that part to which the moving contact rods of a circuit breaker are attached.
- 19-82 **Cross Head (Cross Bar).**—See 19-81.
- 19-83 **Dashpot.**—A dashpot is a device using a gas or liquid to absorb the energy, or retard the movement, of the moving parts of a circuit breaker or other electrical device.
- 19-84 **Faceplate and Handle.**—See 19-80. (Coverplate and Handle or Operating Lever.)
- 19-85 **Grounded Parts.**—Grounded parts are those parts which are effectively connected to ground.
- 19-86 **Indicating Control Switch.**—An indicating control switch is a control switch provided with means for indicating its last operation.
- 19-87 **Indicating Lamp.**—An indicating lamp is a small lamp used in connection with the control system of a circuit breaker or other device to indicate the position of the device or condition of the circuit.