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# STANDARDS

FOR

## CAPACITORS

Approved as  
AMERICAN STANDARDS  
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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 were 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, 1912; 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 more than forty sections, each published as a separate pamphlet and dealing with a specific subject. Each section of the Standards has been formulated either by a Working Committee of the Standards Committee which was made as representative as possible for the work in hand or by a Sectional Committee organized according to the procedure of the American Standards Association. The division of the Standards into a number of separate publications simplifies the process of keeping the Standards revised to conform with the latest development 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.

This A.I.E.E. Standard on Capacitors was developed under the auspices of the Electrical Machinery Committee of the Institute and submitted to the American Standards Association under the existing standards procedure. It was approved by ASA on March 5, 1934.

The A.I.E.E. Standards Committee takes this occasion to draw attention to the value of suggestions based upon experience gained in the application of the Standards to 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.

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# STANDARDS

## OF THE

### American Institute of Electrical Engineers

#### CAPACITORS

(Adopted by the Board of Directors, August 4, 1931)  
(Approved as American Standard, March 5, 1934)

##### SCOPE

**18-1** The standards in this section apply to capacitors for the following types of service.

- (a) Power applications
  1. Power factor correction.
  2. High frequency induction furnaces.
  3. Capacitor motors.
- (b) Resonant shunts and filters.
- (c) Blocking capacitors
- (d) Power oscillator circuits.

##### SERVICE CONDITIONS

**18-50 Usual Service Conditions.**—Capacitors conforming with these standards shall be suitable for operation at their standard rating:

- (a) When the temperature of the cooling medium does not exceed 40 deg cent. The use of capacitors in cooling mediums having temperatures higher than 40 deg cent should be considered special.
- (b) Where the altitude does not exceed 1000 meters (3300 ft). The use of capacitors at altitudes greater than 1000 meters (3300 ft) should be considered special.

**18-51 Conditions Affecting Design and Application.**—

There are further conditions which, while not usually affecting the rating, may require special consideration. Where such conditions as the following exist they should be brought to the attention of the manufacturer.

- (a) Continuous operation at a voltage which exceeds the rated voltage more than 10 per cent.
- (b) Temporary over-voltage exceeding 20 per cent.
- (c) Momentary over-voltage to ground on ungrounded caused by contact with circuits of higher voltage or over-voltage caused by faulty apparatus.
- (d) Exposure to damaging fumes, vapor, salt air or damp conditions.
- (e) Exposure to bad dust conditions, especially conducting dust.
- (f) Exposure to abnormal vibration.
- (g) Circuits having bad wave form.
- (h) Where capacitors are used with capacitor motors, the starting and running voltages, and cycle of operation, should be specified.

##### DEFINITIONS

**18-100 Capacitor.**—A capacitor is an electrical device used primarily because it possesses the property of capacitance.

**18-101 Capacitor Dielectric.**—The capacitor dielectric is the composite insulation medium between the metal electrodes.

**18-102 Capacitor Equipment.**—An assembly of capacitor units including accessories to form a complete capacitor installation.

**18-103 Capacitor Unit.**—A single assembly with terminals brought out.

**18-104 Normal Working Voltage.**—The normal working voltage for determining the rated voltage of a capacitor is the average voltage over a 24-hour period.

**18-105 Temporary Over-voltage.**—Temporary over-voltage is defined as a voltage which exceeds the rated voltage more than 20 per cent, such as may occur due to line regulation or generator over-speed following loss of load.

##### CLASSIFICATION OF CAPACITORS

**18-150 As to Location.**—Indoor or outdoor.

**18-151 As to Type of Application.**—

- (a) Type of service.
- (b) Alternating current or direct current.
- (c) Kind of service—continuous or intermittent.

##### RATING OF CAPACITORS

**18-200 Rating Defined.**—A rating of a machine, apparatus, or device is an arbitrary designation of an operating limit. Capacitors have two main operating limits.

- (a) Voltage.
- (b) Current.

**18-201 Alternating-Current Capacitors.**—Capacitors intended for operation on alternating-current power circuits shall be rated in:

- (a) Kilovolt amperes.
- (b) Frequency.
- (c) Volts.
- (d) Phase.
- (e) For capacitor motor applications the microfarad rating shall be given also.