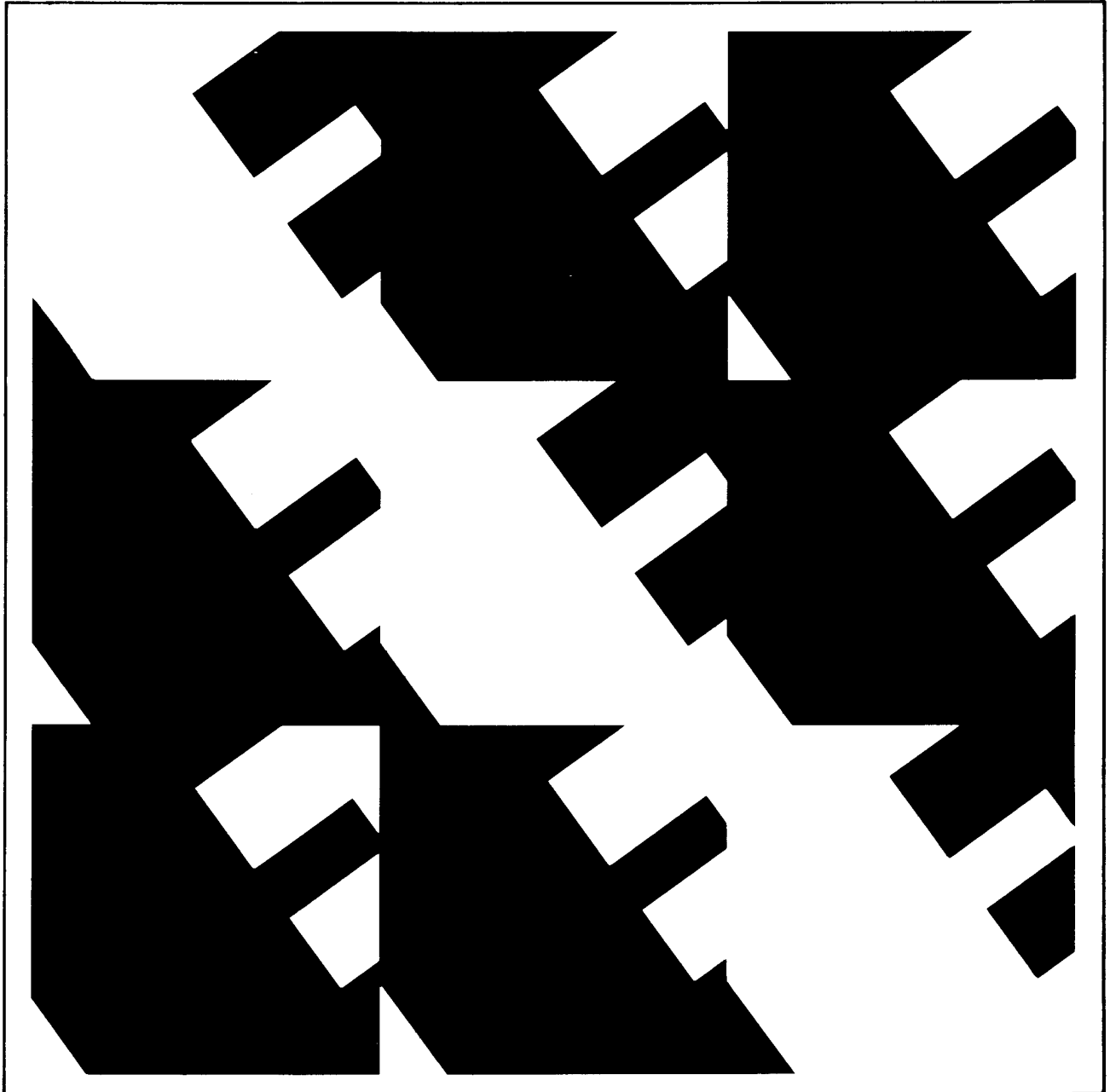


IEEE Standard for Shunt Power Capacitors



ANSI/IEEE Std 18-1980



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**IEEE Standard for
Shunt Power Capacitors**

Sponsor

**Transmission and Distribution Committee of the
IEEE Power Engineering Society**

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Foreword

(This Foreword is not a part of ANSI/IEEE Std 18-1980, IEEE Standard for Shunt Power Capacitors.)

This standard was revised in response to a need created by the continuing changes in capacitor technology. Its principal objectives are: (1) to provide a basis for uniformity in designs and testing; (2) to assist users in the application of shunt capacitors, particularly those of comparatively recent manufacture; and (3) to serve as a basis for the next revision which is already in progress.

This standard was revised by an IEEE/NEMA Working Group sponsored by the Capacitor Subcommittee of the Transmission and Distribution Committee of the IEEE Power Engineering Society.

At the time it approved this standard the Capacitor Subcommittee had the following membership:

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An American National Standard

IEEE Standard for Shunt Power Capacitors

1. Scope

This standard applies to capacitors rated 216 V or higher, 5 kvar or more, and designed for shunt connection to alternating current transmission and distribution systems operating at a nominal frequency of 50 or 60 Hz.

2. Definitions

ambient temperature. The temperature of the medium such as air, water, or earth into which the heat of the equipment is dissipated.

NOTES:

(1) For self-ventilated equipment, the ambient temperature is the average temperature of the air in the immediate neighborhood of the equipment.

(2) For air or gas cooled equipment with forced ventilation or secondary water cooling, the ambient temperature is taken as that of the ingoing air or cooling gas.

(3) For self-ventilated enclosed (including oil-immersed) equipment considered as a complete unit, the ambient temperature is the average temperature of the air outside of the enclosure in the immediate neighborhood of the equipment. See 5.7 and Table 2.

capacitor bank. An assembly at one location of capacitors and all necessary accessories, such as switching equipment, protective equipment, controls, etc., required for a complete operating installation. It may be a collection of components assembled at the operating site or may include one or more factory-assembled equipments.

capacitor equipment. An assembly of capacitors with associated accessories, such as fuses, switches, etc., all mounted on a common frame

for handling, transportation, and operation as a single unit.

discharge device. An internal or external device intentionally connected in shunt with the terminals of a capacitor for the purpose of reducing the residual voltage after the capacitor is disconnected from an energized line.

enclosed capacitor. A capacitor having enclosed terminals. The enclosure is provided with means for connection to a rigid or flexible conduit.

fused capacitor. A capacitor having fuses mounted on its terminals, or inside a terminal enclosure, or inside the capacitor case for the purpose of interrupting a failed capacitor

indoor (prefix). Not suitable for exposure to the weather.

NOTE: For example, an indoor capacitor unit is designed for indoor service or for use in a weather-proof housing. (See also **outdoor**.)

kilovar (1000 vars). The practical unit of reactive power, equal to the product of the rms voltage in kilovolts (kV), the rms current in amperes (A), and the sine of the angle between them.

metal-enclosed or housed equipment. A capacitor equipment assembly enclosed in a metal enclosure or metal house, *usually grounded*, to prevent accidental contact with live parts.

outdoor (prefix). Designed for use outside buildings and exposure to the weather.

power capacitor. An assembly of dielectric and electrodes in a container (case), with terminals

brought out, which is intended to introduce capacitance into an electric power circuit.

NOTE: The abbreviated term capacitor is used interchangeably with **power capacitor** throughout this standard.

proof (suffix). Apparatus is designated as splashproof, dustproof, etc, when so constructed, protected, or treated that its successful operation is not interfered with when subjected to the specified material or condition.

The meaning of other terms used in this standard shall be as defined in ANSI/IEEE Std 100-1977, Standard Dictionary of Electrical and Electronics Terms.

3. Standards References

- [1] ANSI C107.1-1974, Guidelines for Handling and Disposal of Capacitor- and Transformer-Grade Askarels Containing Polychlorinated Biphenyls¹
- [2] ANSI Z55.1-1967, Gray Finishes for Industrial Apparatus and Equipment
- [3] ANSI/IEEE Std 21-1976, General Requirements and Test Procedures for Outdoor Apparatus Bushings
- [4] ANSI/IEEE Std 100-1977, Standard Dictionary of Electrical and Electronics Terms
- [5] ANSI/NFPA 70-1978, National Electrical Code
- [6] NEMA 107-1964, Methods of Measurement of Radio Influence Voltage (RIV) of High-Voltage Apparatus²

4. Service Conditions

NOTE: For additional information on service conditions, see Section 8.

¹ANSI documents are available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

²NEMA documents are available from the National Electrical Manufacturers Association, 2101 L Street, NW, Washington, DC 20037.

4.1 Normal Service Conditions. Capacitors shall be suitable for operation at their specified rating when:

- (1) The ambient temperature is within the limits specified in 5.7. (Capacitors may be exposed to the direct rays of the sun.)
- (2) The altitude does not exceed 6000 ft (1800 m) above sea level. See 6.6.2 and Table 4.
- (3) The voltage applied between terminals does not exceed the rated voltage by more than the tolerance specified in 5.2.3.
- (4) The voltage applied between terminals and case does not exceed the insulation class specified in 5.5.
- (5) The applied voltage does not contain harmonics in excess of the limits specified in 5.2.3(2).
- (6) The nominal operating frequency is equal to the rated frequency.

4.2 Abnormal Service Conditions. If capacitors are required to operate under abnormal service conditions, such as the following, the application should be brought to the attention of the manufacturer:

- (1) Exposure to damaging fumes or vapors
- (2) Exposure to conducting or explosive dust
- (3) Exposure to abnormal mechanical shock or vibration, including earthquakes
- (4) Exposure to radiated heat from surfaces (other than the sun) which are hotter than the ambient temperature limits for capacitors given in 5.7
- (5) Mounting and arrangement which prevents adequate ventilation
- (6) Operation in ambient temperatures outside the range specified in 5.7
- (7) Altitude higher than 6000 ft (1800 m) above sea level (see 6.6.2 and Table 4)
- (8) Momentary duty exceeding that listed in 8.3.2
- (9) Service conditions other than those listed in 4.1

5. Ratings

5.1 Standard Ratings. This standard establishes the following ratings:

- (1) Voltage, rms (terminal-to-terminal)