

Capacitor Related Definitions

July 2005

This is an assembly of definitions used in various standards related to power capacitors. The listing is intended to include all of the definitions in IEEE Standards 18 (Capacitors), 1036 (Application Guide), 824 (Series Capacitors) and 1531 (Filter Guide); and definitions from other standards and references where they are similar to those listed or are otherwise relevant. The purpose is to allow convenient comparison of the definitions used in various standards.

In a number of cases the same term is defined differently in different standards. Where there are multiple definitions, the preferred definition is indicated. As various standards are updated, the preferred definition can be used.

Please send any comments relative to this document and any of the definitions in this document to John E. Harder at harder97@compuserve.com or 97 North Hartstrait Road, Bloomington IN 47404 9700, Phone 812 335 8362. The Capacitor Subcommittee will review these comments, and appropriate revisions will be made to this document.

The abbreviations for the source documents are:

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| IEEE 18 | IEEE Std 18 - 2002 | IEEE Standard for Shunt Power Capacitors |
| IEEE 1036 | P1036/D12 | Draft Guide for Application of Shunt Power Capacitors |
| P824 | P824/D8.1 | Draft Standard for Series Capacitor Banks in Power Systems |
| IEEE 1531 | IEEE Std 1531 - 2003 | IEEE Guide for Application and Specification of Harmonic Filters |
| C37.99 | IEEE Std C37.99-2000 | IEEE Guide for the Protection of Shunt Capacitor Banks |
| IEEE 100 | IEEE Std 100-1996 | The IEEE Standard Dictionary of Electrical and Electronics Terms |

Definitions and statements from Definition clauses of various standards

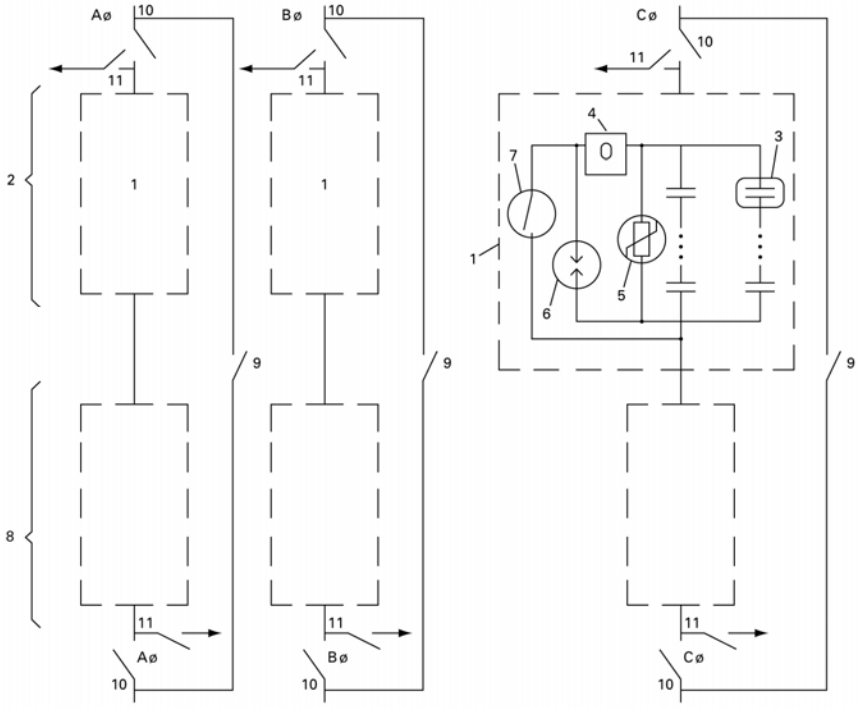
| Clause | Definition or item | Source |
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| | <p>See preferred wording – next to last item in this list.</p> <p>The following definitions supplement the definitions in the IEEE Dictionary (IEEE Std 100). Where the definitions differ, the definition below is the one used in this document.</p> | IEEE 1036 |
| 3. | <p>See preferred wording – next to last item in this list.</p> <p>The meaning of other terms used in this standard shall be as defined in <i>The Authoritative Dictionary of IEEE Standards Terms</i>, Seventh Edition [B1]²</p> | P824 |
| 3.1 | <p>See preferred wording below.</p> <p>ambient temperature: The temperature of the medium, such as air, water, or earth, into which the heat of the equipment is dissipated.</p> <p>NOTES</p> <p>1—For self-ventilated equipment, the ambient temperature is the average temperature of the air in the immediate neighborhood of the equipment.</p> <p>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.</p> <p>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).</p> | IEEE 18 |
| 3.1 | <p>See preferred wording below.</p> <p>ambient temperature: The temperature of the medium, such as air, water, or earth, into which the heat of the equipment is dissipated.</p> <p>NOTES</p> <p>1—For self-ventilated equipment, the ambient temperature is the average temperature of the air in the immediate vicinity of the equipment.</p> <p>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.</p> <p>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 vicinity of the equipment. See 5.7 and Table 1* of IEEE Std. 18.</p> <p>* Should be Table 2 of IEEE Std 18.</p> | IEEE 1036 |
| | <p>Preferred wording.</p> <p>ambient temperature: The temperature of the air into which the heat of the equipment is dissipated.</p> | P824 |

| Clause | Definition or item | Source |
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| | <p>See preferred wording above.</p> <p>ambient temperature</p> <p>(1) (electrical heating systems) The environmental temperature surrounding the object under consideration. For objects enclosed in thermal insulation, the ambient temperature is the temperature external to the thermal insulation.</p> <p>(IA) 844-1991</p> <p>(2) The temperature surrounding the object under consideration. Where electrical heating cable is enclosed in thermal insulation, the ambient temperature is the temperature exterior to the thermal insulation.</p> <p>(BT/IA) 152-1953s, 515.1-1995</p> <p>(3) (electric equipment) The temperature of the ambient medium.</p> <p>(Std100)</p> <p>(4) (neutral grounding devices) (power and distribution transformers) (shunt power capacitors) 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 vicinity 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.</p> <p>(PE/PSPD/T&D) 18-1992, 32-1972r, C57.12.80-1978r</p> <p>(5) (free air temperature) (light-emitting diodes) The air temperature measured below a device, in an environment of substantially uniform temperature, cooled only by natural air convection and not materially affected by reflective and radiant surfaces.</p> <p>(EEC/IE) [126]</p> <p>(6) (nuclear power generating station) The average of air temperature readings at several locations in the immediate neighborhood of the equipment.</p> <p>(PE) 649-1980s</p> <p>(7) (packaging machinery) The temperature of the surrounding cooling medium, such as gas or liquid, that comes into contact with the heated parts of the apparatus.</p> <p>(IA) 333-1980w</p> <p>(8) The temperature of the surrounding medium that comes in contact with the device or equipment.</p> | IEEE 100 |

| Clause | Definition or item | Source |
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| | <p>(PE/SWG) C37.100-1992, C37.40-1993</p> <p>(9) The temperature of the surrounding air that comes in contact with the bushing and device or equipment in which the bushing is mounted.</p> <p>(PE) 21-1976, C57.19.03-1996</p> <p>(10) The temperature of the medium such as air, gas, or water, into which the heat of the equipment is dissipated.</p> <p>(PE/T&D) 824-1994</p> <p>(11) The temperature of the medium, usually air, surrounding the battery charger.</p> <p>(IA) 602-1996</p> | |
| 3.2 | <p>Preferred wording.</p> <p>back-to-back capacitor bank switching. Switching a capacitor bank in close electrical proximity to one or more other energized capacitor banks.</p> | IEEE 1036 |
| 3.1 | <p>See preferred wording above.</p> <p>back-to-back capacitor bank switching</p> <p>Switching a capacitor bank with and in close electrical proximity to one or more other capacitor banks.</p> | C37.99 |
| | <p>See preferred wording above.</p> <p>back-to-back switching</p> <p>The switching of a capacitor bank that is connected in parallel with one or more other capacitor banks.</p> <p>(PE/T&D) 1036-1992</p> | IEEE 100 |
| 3. | <p>bypass current: The current flowing through the bypass switch, protective device, or other devices, in parallel with the series capacitor.</p> | P824 IEEE 100 |
| 3. | <p>Preferred wording.</p> <p>bypass gap: A system of specially designed electrodes arranged with a defined spacing between them in which an arc is initiated to form a low impedance path around one segment or a subsegment of the series capacitor bank. The conduction of the bypass gap is typically initiated to limit the</p> | P824 |

| Clause | Definition or item | Source |
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| | voltage across the series capacitors and/or limit the duty to the varistor connected in parallel with the capacitors. The bypass gap includes the electrodes that conduct the bypass current, the triggering circuit (if any) and an enclosure. (See Figure 1.) | |
| | <p>See preferred wording above.</p> <p>bypass gap</p> <p>A gap, or systems of gaps, to protect either the capacitor against overvoltage or the varistor against thermal overload, by carrying load or fault current around the protected equipment for some specified time. The bypass gap normally consists of a power gap and a trigger circuit.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | <p>Preferred wording.</p> <p>bypass switch: A device such as a switch or circuit breaker used in parallel with a series capacitor and its protective device to bypass or insert line current for some specified time or continuously. This device shall also have the capability of bypassing the capacitor during specified power system fault conditions. The operation of the device is initiated by the capacitor control, remote control or an operator. The device may be mounted on the platform or on the ground near the platform. (See Figure 1.)</p> | P824 |
| | <p>See preferred wording above.</p> <p>bypass switch</p> <p>A device such as a switch or circuit breaker used in parallel with a series capacitor and its protective device to shunt line current for some specified time or continuously. This device may also have the capability of inserting and bypassing the capacitor into a circuit carrying a specified level of current.</p> | IEEE 100 |
| 3.2 3.3 3.2 | <p>capacitor bank: An assembly at one location of capacitors and all necessary accessories, such as switching equipment, protective equipment, controls, etcetera, required for a complete operating installation. It may be a collection of components assembled at the operating site or may include one or more piece(s) of factory-assembled equipment.</p> | IEEE 18 IEEE 1036 C37.99 IEEE 100 |
| | <p>capacitor bus: The main conductors that serve to connect the capacitor assemblies in series with the line.</p> | IEEE 100 |
| 3.4 | <p>Preferred wording.</p> <p>capacitor control. The device required to automatically operate the switching</p> | IEEE 1036 |

| Clause | Definition or item | Source |
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| | device(s) to switch shunt power capacitor banks. | |
| 3.3 | <p>See preferred wording above.</p> <p>capacitor control</p> <p>The device required to automatically switch shunt power capacitor banks.</p> | C37.99 IEEE 100 |
| 3.3 3.5 3. | <p>Preferred wording.</p> <p>capacitor element: The basic component of a capacitor unit consisting of two electrodes separated by a dielectric.</p> | IEEE 18 IEEE 1036 P824 |
| 3.4 | <p>See preferred wording above.</p> <p>capacitor element (or element)</p> <p>A device consisting essentially of two electrodes separated by a dielectric.</p> | C37.99 |
| | <p>See preferred wording above.</p> <p>capacitor element</p> <p>(1) (series capacitor) An individual part of a capacitor unit consisting of coiled conductors separated by dielectric material.</p> <p>(PE/T&D) [26]</p> <p>(2) The smallest unit of a capacitor consisting of metallic foil plates separated by a dielectric film made typically of a polymer, paper, or combination of the two materials.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3.4 3.6 | <p>Preferred wording.</p> <p>capacitor equipment: A complete assembly of capacitors, including accessories such as buses, connectors, dischargers, and fuses, suitable for connection to a power system.</p> | IEEE 18 IEEE 1036 |
| | <p>See preferred wording above.</p> <p>capacitor equipment</p> <p>(shunt power capacitors) 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.</p> | IEEE 100 |

| Clause | Definition or item | Source |
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| | (PE/T&D) 18-1992 | |
| | <p>capacitor fuse</p> <p>A capacitor fuse that provides an externally visible indication of fuse operation.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| | <p>See “capacitor assembly” for preferred term.</p> <p>capacitor group</p> <p>(series capacitor) An assembly of more than one capacitor connected in parallel between two buses or terminals.</p>  <p>1—Capacitor segment (1φ) 2—Capacitor switching step/Capacitor module (3φ) 3—Capacitor group 4—Discharge current limiting damping device 5—Varistor 6—Bypass gap 7—Bypass switch 8—Additional switching steps when required 9—External bypass disconnect switch 10—External isolating disconnect switch 11—External grounding disconnect switch</p> <p>Typical series capacitor bank nomenclature</p> <p>capacitor group</p> | IEEE 100 |

| Clause | Definition or item | Source |
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| | (PE/SWG/T&D) 824-1994, C37.82-1971s | |
| 3.5 | <p>See “Inrush current” for preferred term.</p> <p>capacitor inrush current. The transient charging current that flows in a capacitor when a capacitor bank is initially connected to a voltage source.</p> <p>[For IEEE 1036, see 3.14 inrush current. The definition is identical.]</p> | C37.99 IEEE 100 |
| 3.7 | <p>Preferred wording.</p> <p>capacitor line fuse (capacitor group fuse). A fuse applied to disconnect a faulted phase of a capacitor bank from a power system.</p> | IEEE 1036 |
| 3.6 | <p>See preferred wording above.</p> <p>capacitor line fuse (capacitor group fuse). A fuse applied to disconnect a faulted phase of its capacitor bank from a power system.</p> | C37.99 IEEE 100 |
| 3.7 | <p>See “outrush current” for preferred term and wording.</p> <p>capacitor outrush current</p> <p>The high-frequency, high-magnitude current discharge of one or more capacitors into a short circuit, such as into a failed capacitor unit connected in parallel with the discharging units, or through a breaker closing into a fault.</p> | C37.99 |
| | <p>See “outrush current” for preferred term and wording.</p> <p>capacitor outrush current</p> <p>The high-frequency, high-magnitude current discharge of one or more capacitors into a short circuit—such as into a failed capacitor unit connected in parallel with the discharging units, or into a breaker closing into a fault.</p> <p>(PE/T&D) 1036-1992</p> | IEEE 100 |
| | <p>See preferred wording below.</p> <p>capacitor rack: A frame that supports one or more capacitors.</p> | IEEE 100 |
| 3. | Preferred wording. | P824 |

| Clause | Definition or item | Source |
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| | <p>capacitor rack: A frame that supports one or more capacitor units.</p> | |
| | <p>capacitor segment</p> <p>A single-phase assembly of groups of capacitors that has its own voltage-limiting device and relays to protect the capacitors from overvoltages and overloads. See also: capacitor group.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | <p>Preferred wording.</p> <p>capacitor unit: See Power Capacitor</p> | P824 |
| 3.8 | <p>See preferred wording above.</p> <p>capacitor unit</p> <p>The module which includes the capacitor elements, connections, discharge resistor(s), internal fuses (internally fused capacitor units only) etc. in a can with bushing(s); which is used in externally fused, internally fused, fuseless, and unfused banks.</p> | C37.99 |
| | <p>See preferred wording above.</p> <p>capacitor unit</p> <p>(1) (general) A single assembly of dielectric and electrodes in a container with terminals brought out. See also: alternating-current distribution; indoor; outdoor.</p> <p>(PE/T&D) 18-1980s</p> <p>(2) (series capacitor) An assembly of one or more capacitor elements in a single container, with one or more insulated terminals brought out.</p> <p>(PE/T&D) [26]</p> | IEEE 100 |
| | <p>discharge current limiting device</p> <p>A reactor or equivalent device to limit the current magnitude and frequency of the discharge of the capacitors during closing operations of the bypass switch or gap.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |

| Clause | Definition or item | Source |
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| | <p>discharge current limiting reactor: A reactor to limit the current magnitude and provide damping of the oscillatory discharge of the capacitors during a closing operation of the bypass switch or start of conduction of the bypass gap. (See Figure 1.)</p> | P824 |
| 3.5 | <p>See preferred wording below.</p> <p>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 a network.</p> | IEEE 18 |
| 3. | <p>Preferred wording.</p> <p>discharge device: An internal or external device permanently connected in parallel with the terminals of a capacitor for the purpose of reducing the trapped charge after the capacitor bank is disconnected from the energized power system.</p> | P824 |
| 3.9 | <p>See preferred wording above.</p> <p>discharge device</p> <p>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.</p> | C37.99 |
| | <p>See preferred wording above.</p> <p>discharge device</p> <p>(1) 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.</p> <p>18-1992</p> <p>(2) An internal or external device permanently connected in parallel with the terminals of a capacitor for the purpose of reducing the residual voltage after the capacitor is disconnected from an energized line.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | <p>external fuse (of a capacitor unit): A fuse located outside of the capacitor unit that is connected in series with the unit.</p> | P824 |
| | <p>See preferred wording below.</p> | |

| Clause | Definition or item | Source |
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| | external line fault: A fault that occurs on lines or equipment other than the transmission line that includes the series capacitor installation. | IEEE 100 |
| 3. | Preferred wording. external line fault: A fault that occurs on adjacent lines or equipment other than the transmission line that includes the series capacitor installation. | P824 |
| 3.6 | See preferred wording below. externally fused capacitor bank. A capacitor bank with fuses external to the (power) capacitors. | IEEE 18 |
| 3.8 | Preferred wording. externally fused capacitor bank. A capacitor equipment with fuses external to the (power) capacitors. | IEEE 1036 |
| 3.9 | Preferred term and wording. filter capacitor. Capacitor(s) utilized with inductors and/or resistors for controlling harmonic voltages and currents in the power system. | IEEE 1036 |
| 3.10 | See preferred term and wording above. filter capacitors Capacitors utilized with inductors and/or resistors for controlling harmonic problems in the power system, such as reducing voltage distortion due to large rectifier loads or arc furnaces. | C37.99 IEEE 100 |
| 3.11 | See preferred term and wording below. fixed bank A capacitor bank that does not have a capacitor control and must be manually switched. | C37.99 IEEE 100 |
| 3.10 | Preferred term and wording. fixed capacitor bank. A capacitor bank not designed for automatic operation or frequent switching. | IEEE 1036 |

| Clause | Definition or item | Source |
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| 3. | <p>Preferred term and wording.</p> <p>forced-triggered bypass gap: A bypass gap that is designed to operate on external command on quantities such as varistor energy, current magnitude, or rate of change of such quantities. The spark over of the gap is initiated by a trigger circuit. After initiation, an arc is established in the power gap. Forced-triggered gaps typically spark over only during internal faults.</p> | P824 |
| | <p>See preferred term and wording above.</p> <p>forced-triggered gap: A bypass gap that is designed to operate on external command on quantities such as varistor energy, current magnitude, or rate of change of such quantities. The sparkover of the gap is initiated by a trigger circuit. After initiation, an arc is established in the power gap. Forced-triggered gaps typically sparkover only during internal faults.</p> | IEEE 100 |
| 3.7 3.12 | <p>See preferred wording below.</p> <p>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 current flow to a failed capacitor.</p> | IEEE 18 C37.99 |
| 3.11 | <p>Preferred wording.</p> <p>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 element, unit of group.</p> <p>Last phrase should be changed to read “for the purpose of disconnecting a failed capacitor element, unit, or group”.</p> | IEEE 1036 |
| | <p>See preferred wording above.</p> <p>fused capacitor</p> <p>(1) (series capacitor) A capacitor in combination with a fuse, either external or internal to the case.</p> <p>(PE/T&D) 824-1994</p> <p>(2) 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.</p> <p>(PE/T&D) 18-1992</p> | IEEE 100 |

| Clause | Definition or item | Source |
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| 3.8 | <p>See preferred wording below.</p> <p>fuseless capacitor bank. A capacitor bank without any fuses, internal or external, which is constructed of (parallel) strings of capacitor units.</p> | IEEE 18 |
| 3.12 3. | <p>Preferred wording.</p> <p>fuseless capacitor bank. A capacitor bank without any fuses, internal or external, which is constructed of (parallel) strings of capacitor units. Each string consists of capacitor units connected in series.</p> | IEEE 1036 P824 |
| 3.13 | <p>See preferred wording above.</p> <p>fuseless capacitor bank</p> <p>A capacitor bank without any fuses, internal or external, which is constructed of parallel strings of series connected capacitor units between line and neutral (wye connection) or between line terminals (delta or single phase) (See also Unfused capacitor bank).</p> | C37.99 |
| 3.14 | <p>Preferred wording.</p> <p>individual capacitor fuse. A fuse applied to disconnect an individual faulted capacitor from its capacitor bank.</p> | C37.99 |
| | <p>See preferred wording above.</p> <p>individual capacitor fuse</p> <p>A fuse applied to disconnect an individual faulted capacitor from its bank. (PE/T&D) 1036-1992</p> | IEEE 100 |
| 3.9 | <p>See preferred wording below.</p> <p>indoor (prefix): Not suitable for exposure to the weather.</p> <p>NOTE—For example, an indoor capacitor unit is designed for indoor service or for use in a weatherproof housing. (<i>See also: outdoor.</i>)</p> | IEEE 18 |
| 3.13 | <p>Preferred wording.</p> <p>indoor (prefix): Not suitable for exposure to the weather.</p> <p>NOTE—For example, an indoor capacitor unit is designed for indoor service or for use in a weatherproof housing.</p> | IEEE 1036 |

| Clause | Definition or item | Source |
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| | <p>See preferred wording above.</p> <p>indoor</p> <p>(1) Not suitable for exposure to the weather. Note: For example, an indoor capacitor unit is designed for indoor service or for use in a weatherproof housing See also: outdoor.</p> <p>(PE/T&D) 18-1992, C57.12.80-1978r</p> <p>(2) Designed for use inside buildings or weatherproof (weather-resistant) enclosures. Note: Because of the wide variety of enclosures available, when a fuse that is designed for indoor application is installed inside an outdoor enclosure, such installations should be verified with the fuse manufacturer.</p> <p>(PE/SWG) C37.40-1993</p> <p>(3) Designed for use only inside buildings, or weather-resistant enclosures.</p> <p>(PE/SWG) C37.100-1992</p> | IEEE 100 |
| 3.14 | <p>Preferred term and wording.</p> <p>inrush current. The transient charging current that flows in a capacitor when a capacitor bank is initially connected to a voltage source.</p> <p>[For C37.99 and IEEE 100, see capacitor inrush current. The definition is identical.]</p> | IEEE 1036 |
| 3. | <p>Preferred wording.</p> <p>insertion: The opening of the capacitor bypass switch to insert the series capacitor bank in series with the line.</p> | P824 |
| | <p>See preferred wording above.</p> <p>insertion</p> <p>(1) The opening of the capacitor bypass device to place the series capacitor in service with or without load current flowing.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | Preferred wording. | P824 |

| Clause | Definition or item | Source |
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| | <p>insertion current: The rms (root mean squared) current that flows through the series capacitor bank after the bypass switch has opened. This current may be at the specified continuous, overload or swing magnitudes.</p> | |
| | <p>See preferred wording above.</p> <p>insertion current</p> <p>The steady state root-mean-square current that flows through the series capacitor after the bypass device has opened.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | <p>Preferred wording.</p> <p>insertion voltage: The peak. voltage appearing across the series capacitor bank upon the interruption of the bypass current with the opening of the bypass switch.</p> | P824 |
| | <p>See preferred wording above.</p> <p>insertion voltage</p> <p>The steady state root-mean-square voltage appearing across the series capacitor upon the interruption of the bypass current with the opening of the bypass device.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | <p>insulation level: The combination of power frequency and impulse test voltage values that characterize the insulation of the capacitor bank with regard to its capability of withstanding the electric stresses between platform and earth, or between platform-mounted equipment and the platform.</p> | P824 IEEE 100 |
| 3.10 3.15 | <p>See preferred term and wording below.</p> <p>internal fuse of a capacitor. A fuse connected inside a capacitor unit, in series with an element or a group of elements.</p> | IEEE 18 C37.99 |
| 3.15 | <p>See preferred term and wording below.</p> <p>internal fuse. A fuse connected inside a capacitor unit, in series with an element or a group of elements.</p> | IEEE 1036 |

| Clause | Definition or item | Source |
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| 3. | <p>Preferred term and wording.</p> <p>internal fuse (of a capacitor): A fuse connected inside a capacitor unit, in series with an element or a group of elements.</p> | P824 |
| 3. | <p>internal line fault: A fault that occurs on the transmission line section that includes the series capacitor installation.</p> | P824 IEEE 100 |
| 3.11 3.16 3.16 | <p>See preferred term and wording below.</p> <p>internally fused capacitor (unit). A capacitor unit which includes internal fuses.</p> | IEEE 18 IEEE 1036 C37.99 |
| 3. | <p>Preferred term and wording.</p> <p>internally fused capacitor unit: A capacitor unit, which includes internal fuses.</p> | P824 |
| 3.12 | <p>See preferred wording below.</p> <p>internally fused capacitor bank. A capacitor bank with internally fused capacitor units.</p> | IEEE 18 |
| 3.17 | <p>Preferred wording.</p> <p>internally fused capacitor bank. A capacitor equipment with internally fused capacitor units.</p> | IEEE 1036 |
| 3.18 | <p>Preferred wording.</p> <p>isolated capacitor bank. A capacitor bank whose inrush current is limited by the inductance of the source and its own capacitance. Other capacitor banks and cables are not sufficiently coupled to the bank to influence the inrush current.</p> | IEEE 1036 |
| | <p>See preferred wording above.</p> <p>isolated capacitor bank</p> <p>A capacitor bank that is not in parallel with other capacitor banks.</p> <p>(PE/T&D) 1036-1992</p> | IEEE 100 |

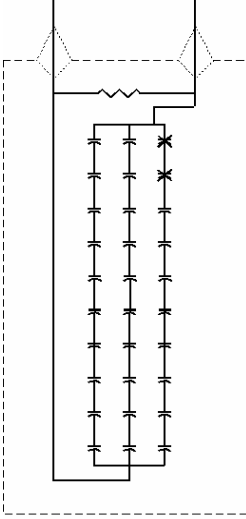
| Clause | Definition or item | Source |
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| 3.17 | <p>kilovar (1000 vars)</p> <p>The practical unit of reactive power, equal to the product of the rms voltage in kilovolts (kV), the rms current in amperes (A), and the sine of the angle between them.</p> | C37.99 IEEE 100 |
| 3.1 | <p>kvar (1.) (pronounced kay var, with emphasis on first syllable) The size or magnitude of a reactive power source which would usually be measured in (units of) kilovar. (2.) abbreviation for kilovar, a unit of reactive power.</p> | IEEE 1531 |
| 3. | <p>main gap: The part of the bypass gap that carries the fault current after spark over of the bypass gap.</p> | P824 |
| 3.19 | <p>metal-enclosed (prefix): A capacitor equipment assembly enclosed in a metal enclosure or metal house, usually grounded, to prevent accidental contact with live parts. <i>Syn:</i> metal-housed.</p> | IEEE 1036 |
| 3.13 | <p>metal-enclosed equipment: A capacitor equipment assembly enclosed in a metal enclosure or metal house, usually grounded, to prevent accidental contact with live parts. <i>Syn:</i> metal-housed equipment.</p> | IEEE 18 IEEE 100 |
| 3.20 | <p>metal-housed (prefix): <i>See:</i> metal-enclosed.</p> | IEEE 1036 |
| 3.14 | <p>metal-housed equipment: <i>See:</i> metal-enclosed equipment.</p> | IEEE 18 IEEE 100 |
| 3.2 | <p>Mvar (1.) (pronounced em var, with emphasis on first syllable) The size or magnitude of a reactive power source which would usually be measured in the (units of) megavar. (2.) the abbreviation for megavar, a unit of reactive power.</p> | IEEE 1531 |
| 3.15 | <p>Preferred term and wording.</p> <p>outdoor (prefix): Designed for use outside buildings and to withstand exposure to the weather.</p> | IEEE 18 |
| | <p>See preferred term and wording above.</p> <p>outdoor</p> <p>(1) (power and distribution transformers) Suitable for installation where exposed to the weather.</p> <p>(PE) C57.12.80-1978r</p> | IEEE 100 |

| Clause | Definition or item | Source |
|--------|---|-----------|
| | <p>(2) Designed for use outside buildings. (PE/SWG) C37.100-1992</p> <p>(3) (prefix) Designed for use outside buildings and to withstand exposure to the weather. (PE/T&D) 18-1992</p> <p>(4) Designed for use outside buildings or enclosures. (PE/SWG) C37.40-1993</p> | |
| 3.21 | <p>outrush current. The transient discharge current that flows when an energized capacitor bank is initially connected to a short circuit.</p> | IEEE 1036 |
| 3.18 | <p>parallel connected capacitor (unit)</p> <p>A capacitor unit with the elements connected in parallel groups, with the parallel groups connected in series between the line terminals. A capacitor unit which has only one string of capacitor elements between the capacitor terminals is considered to be parallel connected.</p> | C37.99 |
| 3. | <p>Preferred wording.</p> <p>platform: A structure that supports one or more segments of the bank and is supported on insulators compatible with line-to-ground insulation requirements.</p> | P824 |
| | <p>See preferred wording above.</p> <p>platform</p> <p>See: aerial platform; platform, aerial.</p> | IEEE 100 |
| 3. | <p>platform-to-ground communication insulator: An insulator that encloses communication signal paths between platform and ground level.</p> | P824 |
| | <p>platform-to-ground signaling devices</p> <p>Devices to transmit protection, control, and alarm functions to and from the platform. (PE/T&D) 824-1994</p> | IEEE 100 |

| Clause | Definition or item | Source |
|--------------|--|----------------------|
| 3.16 3.22 | <p>See preferred wording below.</p> <p>power capacitor (capacitor, capacitor unit): An assembly of dielectric and electrodes in a container (case), with terminals brought out, that is intended to introduce capacitance into an electric power circuit.</p> <p>NOTE—The abbreviated term “capacitor” or “capacitor unit” is used interchangeably with “power capacitor” throughout this standard.</p> | IEEE 18 IEEE 1036 |
| 3. | <p>Preferred wording.</p> <p>power capacitor (capacitor, capacitor unit): An assembly of dielectric and electrodes in a container (case), with terminals brought out, that is intended to introduce capacitance into an electric power circuit.</p> | P824 |
| | <p>See preferred wording above.</p> <p>power capacitor</p> <p>An assembly of dielectric and electrodes in a container (case), with terminals brought out, that is intended to introduce capacitance into an electric power circuit.</p> <p>(PE/T&D) 18-1992</p> | IEEE 100 |
| | <p>power gap: The part of the bypass gap that carries the fault current after sparkover of the bypass gap.</p> | IEEE 100 |
| 3.17 | <p>proof (suffix): An apparatus is designated as dustproof, splashproof, etc., when so constructed, protected, or treated that its successful operation is not interfered with when subjected to the specified material or condition.</p> | IEEE 18 IEEE 100 |
| 3. | <p>Preferred wording.</p> <p>protective device: A bypass gap, varistor, or other device that limits the voltage on the capacitor segment or subsegment to a predetermined level when overcurrent flows through the series capacitor.</p> | P824 |
| | <p>See preferred wording above.</p> <p>protective device</p> <p>A bypass gap, varistor, or other device that limits the voltage on the capacitor segment to a predetermined level when overcurrent flows through the series capacitor (that is, during system faults, system swings, or other abnormal events), and that is capable of carrying capacitor discharge, system fault, and load current for the specified duration.</p> | IEEE 100 |

| Clause | Definition or item | Source |
|--------|---|----------|
| | (PE/T&D) 824-1994 | |
| 3. | <p>Preferred term and wording.</p> <p>protective level: The magnitude of the maximum peak of the power frequency voltage allowed by the protective device during a power system fault. The protective level may be expressed in terms of the actual peak voltage across a segment or subsegment or in terms of the per unit of the peak of the rated voltage across the segment or subsegment. (See 5.5)</p> | P824 |
| | <p>See preferred term and wording above.</p> <p>protective level of the bypass gap</p> <p>The maximum instantaneous voltage (including tolerance) appearing across the capacitor immediately before or during operation of the bypass gap.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| | <p>See preferred term and wording above.</p> <p>protective level of the varistor</p> <p>The maximum instantaneous voltage appearing across the capacitor at a specified current through the varistor.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | <p>Preferred wording.</p> <p>reinsertion: The restoration of load current to the series capacitor from the bypass path.</p> | P824 |
| | <p>See preferred wording above.</p> <p>reinsertion</p> <p>The restoration of load current to the series capacitor from the bypass path (see the corresponding figure).</p> <p>(PE/T&D) 824-1994</p> | |
| | <p>See preferred wording below.</p> <p>reinsertion current: The transient current, load current, or both, flowing through the series capacitor after the opening of the bypass path.</p> | IEEE 100 |

| Clause | Definition or item | Source |
|--------|---|------------------|
| 3. | <p>Preferred wording.</p> <p>reinsertion current: The transient current, power frequency current, or both, flowing through the series capacitor bank after the opening of the bypass path.</p> | P824 |
| 3. | <p>reinsertion voltage: The transient voltage, steady-state voltage, or both, appearing across the series capacitor after the opening of the bypass path.</p> | P824 IEEE 100 |
| 3. | <p>segment: A single-phase assembly of capacitor units and associated protective device, discharge current limiting reactor, protection and control functions and one phase of a bypass switch. (see figure 1). Segments are not normally separated by isolating disconnect switches. More than one segment can be on the same insulated platform.</p> | P824 |
| 3. | <p>Preferred wording.</p> <p>series capacitor bank: A three-phase assembly of capacitor units with the associated protective devices, discharge current limiting reactors, protection and control system, bypass switch and insulated support structure that has the primary purpose of introducing capacitive reactance in series with an electric circuit.</p> | P824 |
| | <p>See preferred wording above.</p> <p>series capacitor bank</p> <p>(series capacitor) An assembly of capacitors and associated auxiliaries, such as structures, support insulators, switches, and protective devices, with control equipment required for a complete operating installation.</p> <p>(PE/T&D) 824-1994</p> | IEEE 100 |
| 3. | <p>series capacitor installation: An installed series capacitor bank complete with disconnect switches.</p> | P824 |
| 3.19 | <p>series connected capacitor (unit)</p> <p>A capacitor unit with the elements connected in series with each other between the line terminals, with more than one such series strings within a capacitor unit.</p> | C37.99 |

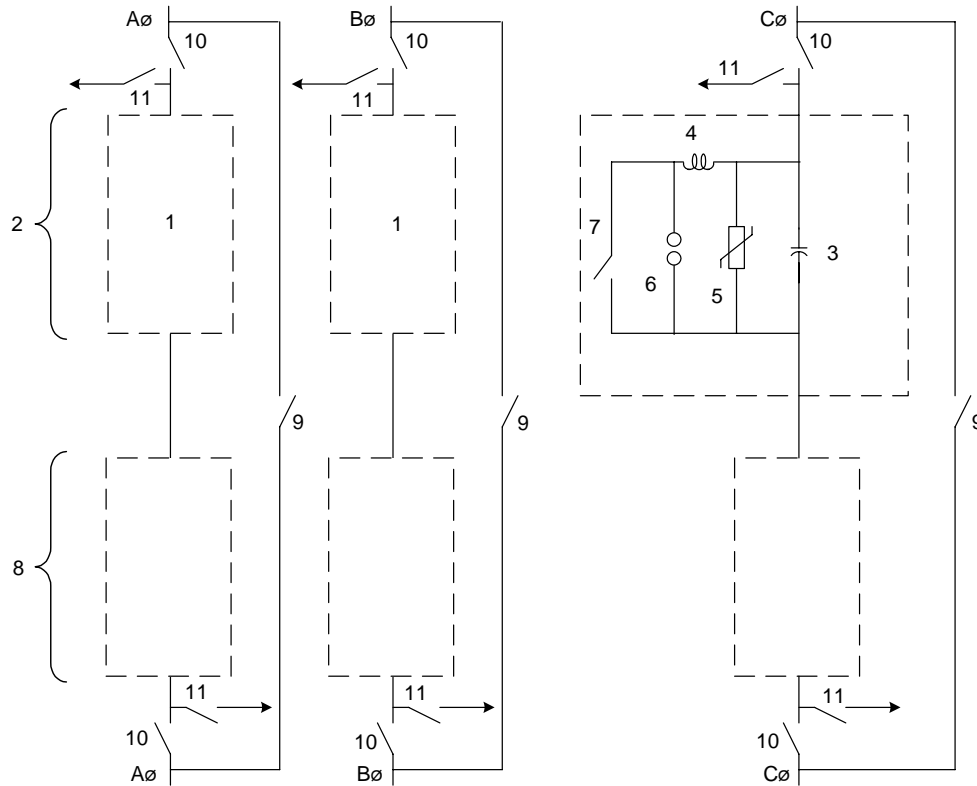
| Clause | Definition or item | Source |
|--------|---|--------------------|
| |  <p data-bbox="378 806 1162 905">Figure 3.1. Series connected capacitor unit with 3 strings of 10 elements (showing 2 shorted elements in one string)</p> | |
| 3.18 | <p data-bbox="347 974 764 1010">See preferred wording below.</p> <p data-bbox="347 1043 1195 1104">string (string of capacitors). Capacitors connected in series between two terminals without parallel connection(s).</p> | IEEE 18 |
| 3.23 | <p data-bbox="347 1173 610 1209">Preferred wording.</p> <p data-bbox="347 1243 1195 1304">string (string of capacitors) (string of capacitor elements). Capacitors connected in series between two terminals without parallel connection(s).</p> | IEEE 1036 |
| 3.20 | <p data-bbox="347 1373 768 1409">See preferred wording above.</p> <p data-bbox="347 1442 964 1478">string (string of capacitors) (string of capacitor elements)</p> <p data-bbox="347 1509 964 1545">Capacitors connected in series between the line terminals.</p> | C37.99 |
| 3. | <p data-bbox="347 1604 1195 1728">sub-segment: A portion of a segment that includes a single-phase assembly of capacitor units and associated protective device, discharge current limiting reactor, and selected protection and control functions but does not have a dedicated bypass switch. (See Figure 1)</p> | P824 |
| 3.21 | <p data-bbox="347 1803 899 1839">See preferred term and wording below.</p> <p data-bbox="347 1873 513 1908">switched bank</p> <p data-bbox="347 1942 899 1978">A capacitor bank designed for controlled operation.</p> | C37.99 IEEE 100 |

| Clause | Definition or item | Source |
|--------|--|-------------------------|
| 3.24 | <p>Preferred term and wording.</p> <p>switched capacitor bank. A capacitor bank designed for controlled operation and/or frequent switching.</p> | IEEE 1036 |
| 3. | <p>switching step: A three-phase assembly that consists of one segment per phase, with a three phase operating bypass switch for bypassing or inserting the capacitor segments (see figure 1). This is sometimes referred to as a capacitor module.</p> | P824 |
| 3.25 | <p>Synchronous closing: closing each phase of a capacitor switching device at a point on the system voltage wave such that initial conduction through each set of contacts is at or close to the point where the voltage between those contacts is zero.</p> | IEEE 1036 (proposed) |
| | <p>See preferred term and wording below.</p> <p>thyristor-controlled reactor (TCR)</p> <p>A series connection thyristor controller, typically connected between two halves of a reactor, that forms one leg of the connected circuit. The thyristor controller consists of antiparallel phase angle controlled thyristors for vernier control of the reactor susceptance (current).</p> <p>(PE/SUB) 1303-1994</p> | IEEE 100 |
| 3.22 | <p>Preferred term and wording.</p> <p>thyristor-controlled-reactors (TCR)</p> <p>The effective value of the reactor is changed by using thyristors to control the flow of current by phase controlling the turn on signal to the thyristors.</p> | C37.99 |
| 3. | <p>thyristor protected series capacitor bank (TPSC): A fixed series capacitor bank equipped with thyristor valve configured to fast bypass and/or provide capacitor overvoltage protection. (see Annex A.3) The thyristor valve circuit consists of a services of anti-parallel thyristor levels and a current limiting reactor. In a TPSC application the thyristor is switched to a conductive condition at the specified protection level by the control and protection system. When the line current returns to nominal value or bypass switch closes the thyristor valve is blocked.</p> | P824 |
| | <p>See preferred wording below.</p> <p>thyristor-switched capacitor (TSC)</p> | IEEE 100 |

| Clause | Definition or item | Source |
|--------|---|----------|
| | <p>A series connection thyristor switch, typically connected between a capacitor bank and a current limiting reactor, that forms one leg of the connected circuit. The thyristor switch consists of antiparallel thyristors that are blocked or fired for full conduction (on/off control).</p> <p>(PE/SUB) 1303-1994</p> | |
| 3.23 | <p>Preferred wording.</p> <p>thyristor-switched capacitors (TSC)</p> <p>Capacitors switched on and off by thristor control action.</p> | C37.99 |
| 3. | <p>trigger circuit: The part of the bypass gap that initiates the spark over of the bypass gap at a specified voltage level or by external command.</p> | P824 |
| 3.24 | <p>unfused capacitor bank</p> <p>Any capacitor bank without fuses, internal or external.</p> | C37.99 |
| 3.25 | <p>unfused capacitor (unit)</p> <p>A capacitor without any internal fuses.</p> | C37.99 |
| 3. | <p>Preferred term and wording.</p> <p>valve element (of a varistor unit): A single nonlinear resistor disc used in a surge arrester or varistor unit.</p> | P824 |
| | <p>See preferred term and wording above.</p> <p>valve element</p> <p>(metal-oxide surge arresters for ac power circuits) A resistor that, because of its nonlinear current-voltage characteristic, limits the voltage across the arrester terminals during the flow of discharge current and contributes to the limitation of follow current at normal power-frequency voltage.</p> <p>(PE/PSPD) C62.1-1981s, C62.11-1993, C62.22-1991</p> | IEEE 100 |
| 3. | <p>Preferred wording.</p> <p>varistor: An assembly of varistor units that limit overvoltages to a given value. In the context of series capacitors, the varistor is typically defined by its ability to divert fault current around the series capacitor units, limiting the</p> | P824 |

| Clause | Definition or item | Source |
|--------|--|-----------|
| | voltage to a specified protective level while absorbing energy. The varistor is designed to withstand the temporary overvoltages and continuous operating voltage across the series capacitor units. | |
| | <p>See preferred wording above.</p> <p>varistor</p> <p>(A) A two-terminal resistive element, composed of an electronic semiconductor and suitable contacts, that has a markedly nonlinear volt-ampere characteristic. (B) A two-terminal semiconductor device having a voltage-dependent nonlinear resistance. Note: Varistors may be divided into two groups, symmetrical and nonsymmetrical, based on the symmetry or lack of symmetry of the volt-ampere curve. See also: semiconductor.</p> <p>(ED) 216-1960w</p> | IEEE 100 |
| 3. | <p>varistor coordinating current: The varistor current magnitude associated with the protective level. The varistor current waveform has a virtual front time of 30-50 μs. The tail of the waveform is not significant in establishing the protective level voltage.</p> | P824 |
| 3. | <p>varistor energy rating: The maximum energy the varistor can absorb within a short period of time without being damaged due to thermal shock or due to thermal runaway during the subsequent applied voltage. This rating is based on the duty cycle defined by the purchaser. This is the useable rating after taking into account factors such as current sharing among parallel columns. The additional energy absorption capability of the spare units is not normally included in this rating.</p> | P824 |
| 3. | <p>varistor maximum continuous operating voltage: The rated rms voltage of the capacitor segment that the varistor is connected across.</p> | P824 |
| 3. | <p>varistor unit: A single insulated enclosure containing one or more valve elements in series and possibly in parallel.</p> | P824 |
| 3. | <p>voltage-triggered bypass gap: A bypass gap that is designed to spark over on the voltage that appears across the gap terminals. The spark over of the gap is normally initiated by a trigger circuit set at a specified voltage level. A voltage-triggered bypass gap may be used for the primary protection of the capacitor and may sparkover during external as well as internal faults.</p> | P824 |
| 3.26 | <p>weatherproof: An apparatus is designated as weatherproof, when so constructed, protected, or treated that its successful operation is not interfered with when subjected to adverse weather.</p> | IEEE 1036 |

| Clause | Definition or item | Source |
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| | <p>See preferred wording – next item.</p> <p>The meaning of other terms used in this standard shall be as defined in IEEE 100, The Authoritative Dictionary of IEEE Standards Terms.</p> | IEEE 18 |
| 3. | <p>Preferred wording – put at end of definitions.</p> <p>The meaning of other terms used in this standard shall be as defined in <i>The Authoritative Dictionary of IEEE Standards Terms</i>, Seventh Edition [B1]⁹</p> | IEEE 1531 |
| | <p>See preferred wording – previous item.</p> <p>The meaning of other terms used in this standard shall be as defined in IEEE Std 100-1992, The New IEEE Standard Dictionary of Electrical and Electronics Terms.</p> | C37.99 |



- 1 – Capacitor segment (1 \emptyset)
- 2 – Capacitor switching step (3 \emptyset) or Capacitor module (3 \emptyset)
- 3 – Capacitor assembly
- 4 – Discharge current limiting reactor
- 5 – Varistor
- 6 – Bypass gap
- 7 – Bypass switch
- 8 – Additional switching steps when required
- 9 – External bypass disconnect switch
- 10 – External isolating disconnect switch
- 11 – External grounding disconnect switch
- 2, 8 – Included in a series capacitor bank
- 2, 8, 9, 11 – Included in a series capacitor installation

Figure 1 – Typical series capacitor installation nomenclature