

JEDEC Tentative Standard No. 12



Suggested Standard for Selenium Surge Suppressors

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TITLE: SUGGESTED STANDARDS FOR SELENIUM SUPPRESSORS

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SELENIUM SURGE SUPPRESSORS

- 1.0 SCOPE: The Suppressor furnished under this Standard shall be a product which has been tested and meets the definitions and minimum requirements specified herein.
- 2.0 DEFINITIONS: The following definitions shall apply to the various technical terms wherever such terms appear in this specification.
- 2.1 SELENIUM SURGE SUPPRESSOR CELL: A Selenium Surge Suppressor Cell is a polycrystalline semiconductor having an asymmetrical voltage-current characteristic. The cell functions as a surge suppressor when it is operated in the reverse region of the voltage-current characteristic.
- 2.2 SELENIUM SURGE SUPPRESSOR: A Selenium Surge Suppressor is an integral assembly of one or more selenium surge suppressor cells with appropriate terminal connections.
- 2.3 POLARIZED SELENIUM SURGE SUPPRESSOR: A Polarized Selenium Surge Suppressor is an integral assembly of one or more surge suppressor cells with terminal connections in which the suppressor cells are connected in series in one conducting direction.
- 2.4 NON-POLARIZED SELENIUM SURGE SUPPRESSOR: A Non-Polarized Selenium Surge Suppressor is an integral assembly of two or more suppressor cells with appropriate terminal connections in which half of the cells are connected in series in the opposite electrical direction to the other half.
- 2.5 TERMINAL: A terminal of a Selenium Surge Suppressor is the externally available connection for joining the suppressor into the circuit.
- 2.6 POSITIVE TERMINAL: The positive terminal of a Selenium Surge Suppressor is that terminal that is to be connected to the positive side of the circuit to which it is to be applied. When color coded it will be Red.
- 2.7 NEGATIVE TERMINAL: The negative terminal of a Selenium Surge Suppressor is that terminal that is to be connected to the negative side of the circuit to which it is to be applied. When color coded it will be Black.
- 2.8 AC TERMINAL: The ac terminal(s) of a Selenium Surge Suppressor is that terminal that is to be connected to the ac side of the circuit to which it is to be applied and when color coded it will be Yellow.
- 2.9 FORM FACTOR: The form factor of the wave form is the ratio of the rms value of the wave to the average value.
- 2.10 ACTIVE CELL AREA: The active cell area of a Selenium Surge Suppressor cell is that area of the device which carries the surge current. In most cases this will not be the total area of the cell.

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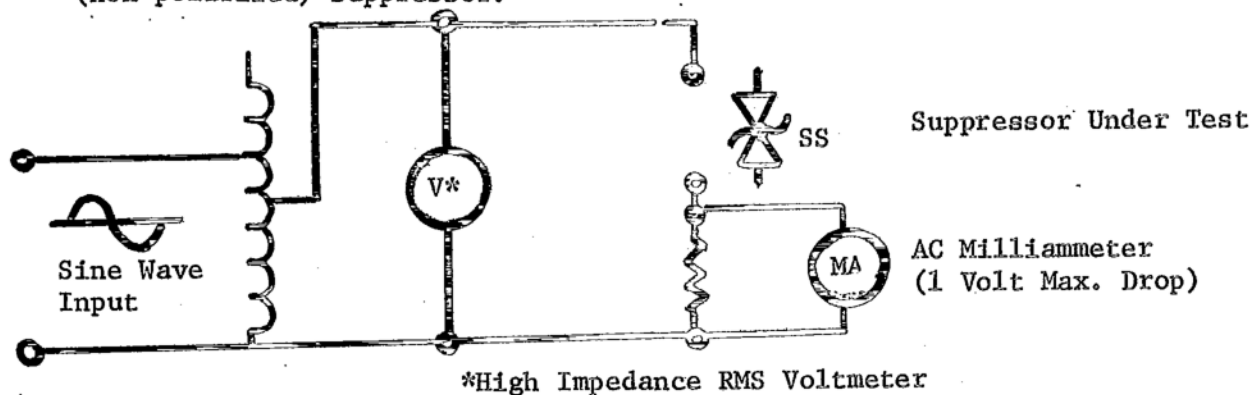
- 2.11 STEADY STATE CURRENT: The steady state current is the current which flows through a surge suppressor when the steady-state voltage is impressed upon it.
- 2.12 STEADY STATE VOLTAGE: The steady state voltage of a Selenium Surge Suppressor is that maximum continuous voltage across the device consistent with allowable power dissipation. This voltage excludes all repetitive and non-repetitive transient voltages.
- 2.13 SURGE CURRENT OR DISCHARGE CURRENT: The surge current or discharge current of a Selenium Surge Suppressor is the peak current that flows internally when the device is functioning as a surge suppressor.
- 2.14 CLAMPING CHARACTERISTIC: The clamping characteristic of a Selenium Surge Suppressor is that characteristic whereby the device changes from a high resistance at steady-state voltage to a low resistance at clamping voltage.
- 2.15 CLAMPING VOLTAGE: The clamping voltage is the instantaneous voltage resulting from the flow of rated discharge current through the suppressor.
- 2.16 CLAMPING FACTOR: The clamping factor is the ratio of the actual clamping voltage per cell to the rated steady-state cell voltage.
- 2.17 SPARKING VOLTAGE: The sparking voltage of a Selenium Surge Suppressor is the instantaneous voltage across the device at which localized dielectric failure occurs.
- 2.18 REPETITIVE TRANSIENT VOLTAGE: The repetitive transient voltage is the instantaneous voltage value of all recurring transient voltages but excluding all non-repetitive transient voltages which occur across a surge suppressor.
- 2.19 NON-REPETITIVE TRANSIENT VOLTAGE: The non-repetitive transient voltage is the instantaneous voltage value of all non-recurring transient voltages but excluding all repetitive transient voltages which occur across a surge suppressor.
- 2.20 FORMING: Forming is the electrical and/or the thermal treatment of a Selenium Surge Suppressor for the purpose of increasing its steady-state voltage capabilities and stabilizing its clamping voltage characteristic.
- 2.21 DIELECTRIC STRENGTH: Dielectric strength of the suppressor insulation is the measurement of voltage the suppressor will withstand between any cell or terminal and ground.
- 2.22 FINISHES:
 - 2.21.1 COMMERCIAL FINISH: The commercial finish consists of at least one coat of paint which will protect the Selenium Surge Suppressor against normal conditions of temperature and humidity as encountered indoors in most commercial installations.
 - 2.21.2 ENVIRONMENTAL FINISHES: The environmental finishes are special finishes designed to provide varying levels of protection against moisture, salt, spray, fungi, and mildly corrosive atmospheres. Each manufacturer has his own specifications and should be consulted.

3.0 MINIMUM REQUIREMENTS:

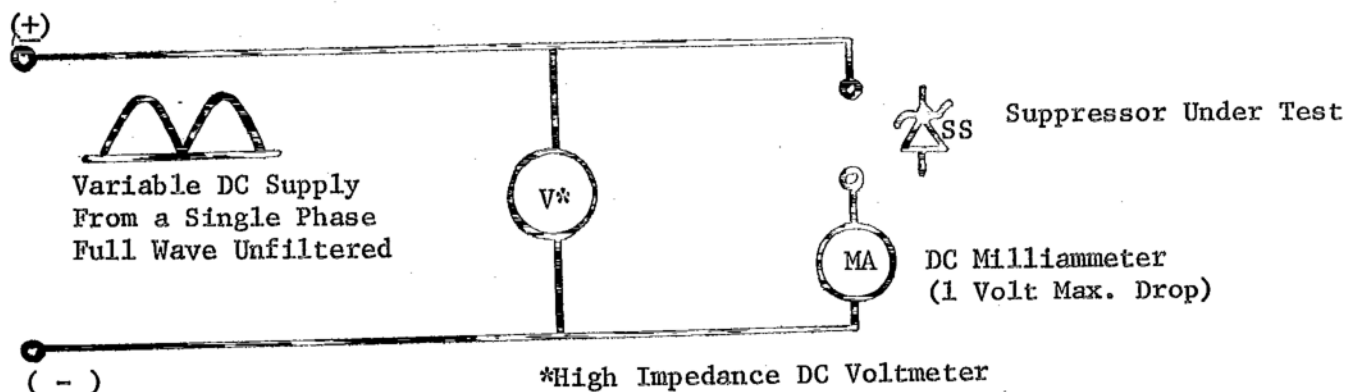
- 3.1 TERMINALS AND CONNECTIONS: Terminals shall be provided for external connections and shall be so located as to be readily accessible. Sufficient terminals are to be color coded so as to adequately identify polarity of the suppressor.
- 3.2 STORAGE: The Surge Suppressor cells shall be suitable for storage at temperatures from -20°C to $+55^{\circ}\text{C}$ for a period of one year without deforming to the point where they will not be suitable for the original application. The manufacturer should be contacted for specific details.
- 3.3 NON-REPETITIVE SURGE CHARACTERISTIC: Each manufacturer has his own published ratings; however, all manufacturers' suppressors should meet the minimum requirement of withstanding a single 10 ampere per square inch of active cell area, 300 microsecond square wave pulse, without sparking.
- 3.4 STEADY-STATE CURRENT: At rated steady-state voltage, the current through the surge suppressor shall not exceed 20 milliamperes per square inch of active cell area. For an ac suppressor, the current will be measured in ~~rms~~ values. For a dc suppressor, the current will be measured in ~~dc~~ average values from a single phase full wave unfiltered source.
- 3.5 STEADY-STATE VOLTAGE: Each manufacturer will have his own published ac and dc ratings; however, when operated at this voltage, without being subjected to voltage transients, the temperature rise of the surge suppressor will not exceed 15°C when conditions of para 6.8 are applied.
- 3.6 PERFORMANCE STABILITY CHARACTERISTICS: With a surge current pulse of 20 microseconds duration and a 60 Hz repetition rate which produces 0.5 ampere peak per square inch of active area, the voltage shall not exceed three times the rated steady-state voltage and the steady-state current shall not exceed 20 milliamperes per square inch of active area after 100 hours of continuous operation. In case of a polarized Surge Suppressor the pulse is to be applied in the reverse direction.
- 3.7 DIELECTRIC STRENGTH: The dielectric strength shall be two times the steady-state voltage plus 1000 volts.

4.0 RECOMMENDED TEST CIRCUITS:

4.1 Test circuit for steady-state current measurements of ac (non-polarized) suppressor.



4.2 Test circuit for steady-state current measurements of dc (polarized) suppressor



4.3 Test circuit for measuring non-repetitive surge currents and voltages.

