Specification for:

IEEE STATION CLASS HOLLOW CORE HOUSED SURGE ARRESTERS

1.0 Scope

1.1 This specification covers polymer and porcelain type hollow core station class metal oxide varistor (MOV) surge arresters.

1.2 Arresters shall be gapless type.

1.3 Arresters shall be tested according to the station class requirements of the latest edition of IEEE C62.11.

1.4 If a conflict exists between the above referenced standard and this specification, this specification shall prevail.

2.0 General Requirements

2.1 Guarantee

2.1.1 Bidder must provide certification that the supplier has at least 30 years of experience in manufacturing gapless hollow core station class surge arresters and have an installed base of at least 500,000 of these arresters in service.

2.1.2 Bidder installed product base must include both polymer and porcelain housed hollow core arresters.

2.1.3 Bidders that cannot comply with section 2.1.1 and 2.1.2 will not be considered.

2.2 Information supplied with bid

2.2.1 The bid documentation supplied will include as a minimum the following information:

- 2.2.1.1 Outline drawings of the arrester including the external mounting hardware
- 2.2.1.2 Discharge voltage levels
- 2.2.1.3 Design test reports in accordance with the latest revision of IEEE C62.11
- 2.2.1.4 Example routine test report with tests as required in IEEE C62.11
- 2.2.1.5 ISO 9001 quality certification
- 2.2.1.6 ISO 14001 environmental certification

2.2.2 All of the documentation will be supplied in English.

3.0 Applicable Standards

3.1 IEEE C62.11 (Latest Revision)

4.0 General Characteristics

4.1 The arrester shall be gapless MOV type.

4.2 The accepted housing materials shall be silicone rubber or porcelain. The bidder shall offer both design types.

4.3 Each arrester shall be supplied with NEMA 4-hole terminal pad for line end connection. The bidder shall offer other hardware options, as required.

4.4 Each arrester shall be supplied with line and ground terminal connectors suitable for clamping conductors from 0.25 inches (7 mm) to 0.81 inches (21 mm) in diameter. The bidder shall offer additional clamping options for other applications, as required.

4.5 All external metal parts shall be stainless steel, zinc plated or hot dip galvanized, unless otherwise approved.

4.6 Nameplate data shall include the following information:

- 4.6.1 Arrester classification
- 4.6.2 Manufacturer's name or trademark
- 4.6.3 Manufacturer's product type and identification number
- 4.6.4 MCOV rating of the arrester
- 4.6.5 Duty-cycle voltage rating of the arrester
- 4.6.6 Year of manufacture
- 4.6.7 Pressure relief capability
- 4.6.8 Serial number

4.7 The arrester will have a minimum fault current withstand capability of 63 kA when tested per section 8.18 of IEEE Standard C62.11-2012.

4.8 The arrester shall offer means of directing the resulting pressure and associated outgassing in a controlled direction, in the unlikely event of arrester failure.

4.9 The bidder shall offer means to mount the arrester in an upright or underhung configuration. Both options may require a different part number to differentiate the mounting style.

4.10 If required, grading rings shall be provided by the bidder. All grading rings will be aluminum and have a sand blasted finish to prevent surface scratches and scuff marks.

4.11 If required, seismic capability shall be determined according to the requirements of IEEE 693. The bidder shall provide seismic capability reports for each product family. The reports shall be stamped by a licensed Structural Engineer (SE) or Professional Engineer (PE).

4.12 Physical Dimensions and Mechanical Capability

- 4.12.1 Leakage distance – The arrester shall have a minimum external leakage distance of 1 inch (25.4 mm) for each 1 kV rms of duty-cycle voltage rating.
- 4.12.2 Height – The height of the arrester with and without the terminal pad shall be provided.
- 4.12.3 Strike distance – The arrester strike distance shall be provided.
- 4.12.4 Clearances – The recommended phase-to-phase and phase-to-ground clearances shall be provided.
- 4.12.5 Maximum Design Cantilever Load (MDCL) – MDCL capability shall be at least 35,000 in-lbs (3,950 Nm) for polymer-housed hollow core arresters.
- 4.12.6 Ultimate Mechanical Strength (UMS) – UMS capability shall be at least 150,000 in-lbs (16,950 Nm) for porcelain-housed hollow core arresters.
- 4.12.7 Arresters shall have three mounting feet spaced 180^0 apart on a 10-inch (254 mm) bolt circle, with holes sized to accommodate 0.5-inch (12 mm) mounting bolts. An alternative mounting configuration with a 16.5-inch (419 mm) bolt circle and mounting feet with holes sized to accept 0.75-inch (19 mm) bolts is permitted.

4.13 Electrical Characteristics

- 4.13.1 Discharge Voltages – Arresters shall be assembled with the correct number of MOV blocks to obtain proper operating characteristics for a given MCOV. The sum of the discharge voltages of blocks assembled in an arrester will be reported by the manufacturer.

4.13.2 Temporary Overvoltage (TOV) Capability – The bidder shall provide both prior and no-prior duty TOV capability curves.

4.13.3 Switching Surge Energy Rating Capability – The bidder shall provide a 2-shot switching surge energy rating for each arrester in kJ/kV-MCOV.

4.13.4 Repetitive Charge Transfer Rating Capability – The bidder shall provide a repetitive charge rating for each arrester in Coulombs.

4.13.5 Insulation Withstand – The bidder shall provide lightning, switching and power frequency insultation withstand capabilities.

5.0 Routine and Quality Assurance Testing

5.1 MOV block requirements

5.1.1 Routine (100%) tests:

5.1.1.1 Discharge voltage (10 kA) - Each MOV block shall be subjected to a 10 kA discharge with a wave shape of 8/20 and the resulting discharge voltage shall be measured with an accuracy of 1.5%. This measured value must be stamped on the block and used as the basic reference value in assembling multiple blocks into complete arresters.

5.1.1.2 Rated Energy Test - Each block shall receive multiple high energy square wave impulses. The magnitude of the discharge current shall be maintained such that the resulting total energy per test is greater than 193 ± 10 percent J/cc of block material.

5.1.2 Quality assurance tests:

5.1.2.1 The following tests shall be performed on samples of MOV blocks taken from each manufacturing batch of blocks.

5.1.2.2 Square-wave energy test – Sample blocks shall be subjected to a two shot series of high energy discharges which are increased in magnitude on successive series until the block fails. This indicates the ultimate energy capability by the magnitude of the energy absorbed on the last shot prior to failure. The minimum energy of the block shall exceed 210 J/cc block material.

5.1.2.3 High Current Test 100kA – Sample blocks shall be subjected to two 100 kA discharges with permissible wave shape 4-6/10-15. After a minimum one-hour cooling period, blocks shall have a maximum increase in 10 kA discharge voltage of less than 3%.

5.1.2.4 AC Tests – Sample blocks shall be energized to ≥30 mApk, following which the current shall be reduced to Irefpk and the reference voltage measured (Vrefpk). The voltage shall then be reduced to MCOV and the watts loss and capacitive current are measured. The measured watts loss shall not exceed ≤0.065 Watts per kV of 10 kA discharge voltage for the block under test.

5.1.2.5 Accelerated aging test – A sample of blocks from each batch shall be subjected to an accelerated aging test in which the blocks shall be energized at ≥ MCOV at 135°C for 160 hours. At the conclusion of the test, the curve of watts loss vs. time shall exhibit a negative slope. The final/minimum watts loss shall not exceed 1.08 and the final watts loss is less than or equal to the initial watts loss.

5.2 Arrester routine test requirements:

5.2.1 The following tests shall be performed on 100% of assembled arrester units.

5.2.2 Reference Voltage – The voltage necessary to produce a manufacturer determined reference current shall be measured and shall not be less than the minimum value designated by the manufacturer for the arrester unit.

5.2.3 Partial Discharge (PD) – The power-frequency voltage shall be raised to the duty-cycle voltage rating of the arrester unit, held for at least 2 seconds and then lowered to 1.05 times MCOV. The arrester PD shall be measured at 1.05 times MCOV and shall not exceed 10 pC.

5.2.4 Power Frequency Test – Each arrester unit shall be energized at 1.20 times MCOV for a minimum of 1 second during which time the watts loss shall be measured. The watts loss shall not exceed the maximum value designated by the manufacturer for the arrester unit.

5.2.5 Seal Test – Each arrester unit shall be subjected to a seal test using a helium mass spectrometer technique to verify that the seal leak rate is not greater than 1x10-7 cm3/s with a one atmosphere pressure differential between inside and outside of the unit under test.

5.2.6 Current Sharing – This test only applies to arrester units consisting of two or more parallel columns of MOV blocks. Current sharing between any two columns shall not exceed the limit specified by the manufacturer.

5.3 Documentation – Upon request the manufacturer shall supply certification that all of the above tests have been performed and that all requirements were met. It shall not be necessary to provide actual test values.

5.4 Facility requirements

5.4.2 All arresters shall be manufactured in an ISO 9001 certified facility.

5.4.3 All arresters shall be manufactured in an ISO 14001 certified facility.

This specification does not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to Hubbell Power Systems, Inc.