

Guide Specification for Harmonics Suppression System for Three-Phase Wye Distribution Systems

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PART 1 - GENERAL

1.1 REFERENCES

- A. This section covers the specification of Harmonics Suppression System for use on three-phase, 4-wire distribution systems powering phase-neutral connected loads.
- B. Refer to Sections 16010, 16050, 16400, GENERAL CONDITIONS and SUPPLEMENTARY GENERAL CONDITIONS and other applicable sections for other general requirements.

1.2 RELATED DOCUMENTS

- A. Instructions to Bidders, A.I.A. Document A201, "The General Conditions of the Contract for Construction," latest edition, the Supplementary General Conditions, and Division 1 General Requirements are a part of this Section and shall be binding on the contractor and/or subcontractor who performs this work. Note also all Addenda.

1.3 SCOPE

- A. Provide labor, materials, equipment, services and transportation necessary for complete and operational systems as shown on the Contract Drawings and specified herein, including, but not limited to, the following:
 - 1. Harmonics Suppression System (HSS)
 - 2. Grounding of HSS
- B. It is the intent of this section to provide HSS as follows:
 - 1. HSS shall be a passive device to be installed at the secondary of a wye-connected distribution transformer at a voltage of 208/120 and at a frequency of 60Hz. The HSS shall reduce the 3rd harmonic current flowing in the phase wires and the neutral wire from the transformer to the farthest outlet.

1.4 SUBMITTALS

- A. Submit for review and approval shop drawings and other requested information for the following equipment:
 - 1. Harmonics Suppression System
- B. Shop drawings shall include the following information:
 - 1. Product specification sheet
 - 2. Product dimensional data
 - 3. Delivery, installation and testing schedule
 - 4. Wiring and interconnection diagram of HSS
 - 5. Schedule of proposed shut down, if required
- C. Submit shop drawing and other submittals per the requirements of applicable specification sections.

1.5 STANDARDS

A. All work of this section shall conform to the following standards:

1. National Electrical Code, NFPA 70
2. Applicable State and Local Codes
3. Applicable ANSI Standards
4. Applicable IEEE Standards
5. Applicable NFPA Codes and Standards

1.6 PRODUCT LISTINGS

A. Equipment, materials and components for which there are UL, ETL, CSA approvals shall bear the appropriate labels.

B. The specified units shall be designed, manufactured, and tested in accordance with one or more of the following standards:

1. Underwriters Laboratory, UL, 508A
2. Canadian Standards Association, CSA, Equivalent

1.7 QUALITY ASSURANCE

A. Install all equipment in accordance with National Electrical Code and all applicable regional and local codes.

B. All products shall be manufactured by a company engaged in the commercial design and production of HSS for a minimum period of 10 years.

1.8 PERFORMANCE SPECIFICATION

- A. The HSS shall be totally passive in operation and shall not contain any electronic switching devices such as transistors, SCRs, etc.
- B. The HSS shall be entirely self-contained in its own enclosure and shall not require any external enclosures.
- C. The HSS shall consist of a single unit per transformer in a three-phase wye-connected power system.
- D. The HSS will be operative to remove harmonic currents on all three-phase wires and the neutral wire of a power system loaded with single-phase non-linear loads connected phase to neutral.
- E. The HSS shall be protected by the same fuses or circuit breakers that protect the phase wires for the transformer and shall not require any separate fusing for protection.
- F. The HSS shall be capable of handling the full rated load of the transformer and shall not require resizing as the transformer is loaded to its full capacity with non-linear loads.
- G. The HSS shall block the flow of harmonic current of the 3rd harmonic frequency of the fundamental (180Hz in the case of a 60Hz fundamental).
- H. The HSS shall reduce 3rd harmonic current flow, measured at the secondary of the transformer, in each of the three-phase wires from the transformer out to the farthest outlet.
- I. The HSS shall reduce rms current flow, measured at the secondary of the transformer, in each of the three-phase wires from the transformer out to the farthest outlet.
- J. The HSS shall reduce 3rd harmonic current flow, measured at the secondary of the transformer, in the neutral wire from the transformer out to the farthest outlet.
- K. The HSS shall reduce rms current flow, measured at the secondary of the transformer, in the neutral wire from the transformer out to the farthest outlet.
- L. The reduction of harmonic currents in the phase wires and neutral shall result in increased system capacity to power useful loads.
- M. In the event that each circuit consists of a phase wire and an individual neutral wire to each load, the HSS shall reduce 3rd harmonic current flow in every neutral wire in the entire distribution system, from the secondary of the transformer out to the farthest load.

1.9 SEQUENCE/SCHEDULE

- A. All proposed interruptions of existing electrical services to critical loads shall be reviewed and approved by the owner's representative.
- B. Coordinate scheduled interruptions of electrical service with all concerned parties prior to beginning work.

1.10 WARRANTY

- A. Unless otherwise specified, the harmonic suppression system is warranted to be free of defects in materials and workmanship under normal use and service for a period of five years from the date of purchase.

1.11 SUBSTITUTIONS

- A. The preferred supplier for these products is **Harmonics Limited, Brookfield, CT, 877-437-3688**. Proposed product substitutions shall be accompanied by a fully completed compliance review documenting that the proposed substitution is in full compliance with all 13 items (1.8, A-M) of the performance specification. Substitutions that are not fully compliant with all requirements of the 13 specifications shall be deemed unacceptable.

PART 2 - PRODUCTS

2.1 HARMONIC SUPPRESSION SYSTEM

1. Table of 208/120-Volt HSSs manufactured by the preferred supplier, Harmonics Limited.

MODEL	FULL LOAD kVA	RATING AMPS
HLSM015	15	42
HLSM030	30	83
HLSM045	45	125
HLSM075	75	208
HLSM112	112.5	311
HLSM150	150	416
HLSM225	225	625
HLSM300	300	833
HLSM500	500	1390
HLSM750	750	2080
HLSM1000	1000	2775
HLSM1500	1500	4150

PART 3 - EXECUTION

3.1 INSTALLATION OF HARMONIC SUPPRESSION SYSTEM

- A. Confirm voltage, kVA rating, and frequency of HSS with load and building distribution system characteristics prior to installation.
- B. Coordinate exact locations and mounting of HSS with architect/owner/owner's representative/other trades prior to installation.
- C. Provide mounting or seismic restraints as required by local codes, if any.
- D. Make sure that the system onto which the HSS is to be installed is de-energized before starting installation.
- E. Install per manufacturer's written instructions making sure to implement proper wiring and grounding.

3.2 GENERAL WIRING TESTS

- A. Prior to energizing the HSS, verify the following:
1. System voltage and frequency are correct
 2. HSS is properly rated for loads being served
 3. Wiring is in full compliance with manufacturer's instructions