



Hammond Power
Solutions Inc.

600V Class
HPS Line Reactors

Iron Core Line Reactor
Typical Specification

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1 GENERAL

1.1 SCOPE

- A This section defines three phase iron core line reactor as indicated.

1.2 NON LINEAR LOADS DEFINITION

- A Non-Linear loads are defined as per UL 1561 & further explained in IEEE 519 Harmonic Spectrum for Switching Power supply & IEEE C57.110 and IEEE 1100.

1.3 RELATED DOCUMENTS

- A Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1.4 REFERENCES

- A [NEMA ST-20 Dry-Type Transformer for General Applications.](#)
- B [IEEE C57.110 Recommended Practice for establishing transformer capability when feeding non-sinusoidal load currents.](#)
- C [UL 508, CSA C9 and CSA 22.2 No.47.](#)

1.5 TESTING & QUALITY CONTROL:

- A Production tests: each unit according to:
 - i [NEMA ST20](#)
 - ii [CSA C22.2](#)
 - iii [NEMA TP2](#)
- B Perform a Type Test for each model design and submit report.
- C Type test to include:
 - i [Positive sequence impedance.](#)
 - ii [Heat run test for K-factor rating compliance per UL & CSA.](#)
 - iii [Demonstrated temperature rise with non-linear load \(with K13 load\).](#)
 - iv [Percentage regulation at 100% and provide regulation at 80% power factor.](#)
 - v [No load and full load losses in watts.](#)
 - vi [Efficiency under linear load & non-linear with a load profile up to K20 at 35%, 50% and 65%. Non-linear load test bench results must be used as the source of test data.](#)
 - vii [Sound level in decibels.](#)

1.6 SUBMITALS

- A. Submit shop drawing and product data for approval and final documentation in the quantities listed according to the Conditions of the contract.
 - a. Customer name. Customer location and customer order number shall identify all transmittals.
 - b. Product Data including Horse Power rating, Current Amps, Temperature Rise, Detailed enclosure dimensions, Primary nominal voltages, Horse power ratings, Impedances, unit weight, warranty.

1.7 STORAGE AND HANDLING

- A Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from potential damage from weather and construction operations. Store so condensation will not form on or in the line reactor housing and if necessary, apply temporary heat where required to obtain suitable service conditions.
- B Handle line reactor using proper equipment for lifting and handling, use when necessary lifting eye and/or brackets provided for that purpose.

1.8 WARRANTY

- A The line reactor shall carry a 10 year limited warranty.
(For details, refer to the manufacturers published warranty)

2 **PRODUCTS**

2.1 GENERAL CONSTRUCTION:

- A Three phase line reactors shall be open style. All three phase line reactors shall be constructed with three coils. Terminals may be terminal blocks or mechanical lugs. Terminals shall be marked with A1, B1, C1, A2, B2, and C2.
- B Line reactors shall be designed, constructed and rated in accordance with UL, CSA and NEMA standards.

2.2 VOLTAGE AND KVA REQUIREMENTS:

- A Primary Voltage: [208/240VAC][480VAC][575/600VAC][690VAC][other] Volts
- B Fundamentals Maximum Voltage: [600VAC] for UL and CSA, CE up to [690VAC]
- C Impedance Rating: [3% - 5%]
- D System Frequency: [50 Hertz][60 Hertz]

2.3 BASIC REQUIREMENTS:

- A Positive & negative sequence impedance at 60Hz: +15% to -10%
- B Nameplate Rating: Shall include Catalog #, Nominal Motor Amps, 3Ph, 60 Hz, 600V, Temp Rise, Maximum Ambient, Rating, as required by standards
- C Terminal Torque Values on nameplate if not already on terminals Insulation Class: 200°C system or higher

- D Temperature Rise: 115°C system
- E Altitude (de-rating): Comply with NEMA ST20-1992(lapsed)
- F Audible: maximum 65dB at 2 meters
- G Dielectric: 4000 volts RMS (2200 volts peak repetitive)
- H Coil conductors: continuous copper windings, with terminations brazed, welded or bolted.
- I Impregnation: vacuum impregnated polyester resin.
- J Sound Level: NEMA ST-20
- K Enclosure: (When specified) Ventilated, Type 3R [Type 3RE][other].
- L Enclosure Finish: ANSI 61 Grey suitable for UL50 outdoor applications [orange][other].
- M Line Reactors shall terminate in mounting brackets. Provide mechanical lugs on primary, and secondary for customer terminations. Mounting brackets will be included on all units up to and including 270 amp ratings. Contractors shall provide all necessary lugs not already provided with line reactors.
- N UL listed, CSA approved, [CE Mark].
- O Built to NEMA ST-20 and in accordance with all applicable UL, CSA and ANSI/IEEE standards.
- P Mounting:
- i Units up to 750 lbs.: Suitable for wall, floor or ceiling mounting (drip plate required).
 - ii Units over 750 lbs.: Suitable for floor mounting only.
- Q Seismic: are designed and manufactured to comply with the specification, *"IBC 2006; Section 1613; Earthquake Loads"* with the site specific parameters of *"Occupancy Category III: Special Occupancy": IP=1.25* and *"Site Profile Type: SD= Stiff Soil"* with the seismic forces defined as *"Spectral Acceleration for Short Periods: SS= 1.0g"*. (Applicable to floor mounted units only.)

OPTIONS:

- Single Phase: Derated using only two coils for single phase 208/240 VAC application from 0.5 to 10.0 HP and 0.25 to 0.5 HP for 120 VAC
- [Vibration Isolators](#)
- Low Sound: [-3dB][-5 dB][-8 dB]
- Enclosures: [Type 4][Type 4X][Type 12] other
- Over-Temperature switches wired to internal terminal strip. Temperatures specified for use with class 220°C insulation systems. Standard configuration is N.C. opening on high temperature. Optional configuration is N.O. closing on high temperature. Installation options: [one switch: 170°C or 200°C on center coil][two switches: 170°C and 200°C on center coil][six switches: one 170°C and one 200°C on each of the 3 coils]
- Strip Heaters
- Marine Duty (meet ABS requirements)
- SPD (Surge Protection Device)

2.4 ACCEPTABLE PRODUCT AND MANUFACTURER:

- A Hammond Power Solutions Inc. (Canada: 1-888-798-8882 / U.S.: 1-866-705-4684).

- B Non-Linear test bench certified. Custom design and/or packaging to meet this specification are not acceptable.
- C Substitutions are permitted, subject to meeting all requirements of this specification and also having written approval by engineering 10 days prior to bid closing.

3 **EXECUTION**

3.1 INSTALLATION

- A The installing contractor shall install the line reactors per manufacturer's recommended installation practices as found in the installation, operation, and maintenance manual and comply with all applicable codes.
- B Make sure that the line reactor is level.
- C Check for damage and loose connections.
- D Mount line reactor to comply with all applicable codes.
- E [Install optional vibration isolation pads between line reactor enclosure and the mounting surface.](#)
- F Install seismic restraint where indicated on the drawing.
- G Coordinate all work in this section with all work of other sections.
- H Prior to energizing line reactors, verify secondary voltages.