



Hammond Power
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1.2kV Class Energy Efficient Autotransformer Typical Specification

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1 **GENERAL**

1.1 SCOPE

- A This section defines dry-type, enclosed & ventilated non-isolated Autotransformer as indicated.
- B Transformers shall be designed, constructed and rated in accordance with NEMA TP1 and CSA C802.2 efficiency standards.

1.2 RELATED DOCUMENTS

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

1.3 REFERENCES

- A ANSI C57.12.01/NEMA ST-20 Dry-Type Transformer For General Applications
- B IEEE C57.110-1998
- C UL, CSA
- D NEMA TP1, CSA 802.2

1.4 SUBMITALS

- A Submit shop drawing and product data for approval and final documentation in the quantities listed according to the Conditions of the contract.
 - i Customer name. Customer location and customer order number shall identify all transmittals.
 - ii Product data including kVA rating, temperature rise, detailed enclosure dimensions, primary & secondary nominal voltages, primary voltage taps, no load & full load losses per NEMA ST-20, impedances, unit weight, warranty, Efficiency per TP1/C802.2.

1.5 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 transformer housing and if necessary, apply temporary heat where required to obtain suitable service conditions.
- B Handle transformer using proper equipment for lifting and handling, use when necessary lifting eye and/or brackets provided for that purpose.

1.6 WARRANTY

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

2 **PRODUCTS**

2.1 GENERAL CONSTRUCTION:

- A Three phase energy efficient autotransformers shall be either ventilated type or encapsulated. All three phase transformers shall be constructed with three windings and a single core. Convection air cooled.
- B Transformers shall be designed, constructed and rated in accordance with UL, CSA, and NEMA standards. If shipping to Europe, transformer will also have to be manufactured in accordance to CE standards and carry a CE mark.
- C Auto Transformers have no isolation from primary to secondary and the neutral (optional) is only a mid point and should not be grounded as a distribution isolated transformer.
- D If transformer is to be used for non-linear load applications, the transformer shall be derated as per ANSI/IEEE C57.110.

2.2 VOLTAGE AND KVA REQUIREMENTS:

- A Primary Voltage: [208][216][240][400][480][600][other] Volts
- B Secondary Voltage: [208][216][240][400][480][600][other] Volts
- C kVA Rating: [3][6][9][15][30][45][75][112.5][150][225][300][500][other] kVA
- D System Frequency: 60 [50][other] Hertz

2.3 BASIC REQUIREMENTS:

- A Standard impedance at 60Hz: 2% to 5% (up to 10kVA), 4% to 6.5% (above 10kVA)
- B Nameplate Rating: Linear load, 60Hz
- C Insulation Class: 220°C system [200][other]
- D Temperature Rise: 150°C [130°C][115°C][80°C][other]
- E Efficiencies:
 - i Meets *NEMA TP1* and *CSA C802.2* efficiencies at 35% of rated load.
 - ii Efficiencies are calculated under a linear load profile.
 - iii Efficiencies, no-load losses, load losses and impedance values will be calculated at temperature reference of 75°C at Unity Power Factor (UPF).
- F Transformer core construction: high grade non-aging, fully processed silicon steel laminations or better.
- G Coil conductors: continuous aluminum [copper] windings, with terminations brazed, welded or bolted.
- H Impregnation: vacuum impregnated polyester resin.
- I Sound level to meet NEMA ST-20
- J Enclosure: ventilated, NEMA 3R [NEMA 4][NEMA 4X][NEMA 12][other].
- K Enclosure Finish: ANSI 61 Grey suitable for UL50 outdoor applications [other].
- L Transformers shall terminate in mounting pads. Mounting lugs will be included on all aluminum and copper units up to and including 270 amp ratings. Contractors shall provide all necessary lugs not already provided with transformer.
- M Anti-vibration pads/isolators shall be used between the transformer core and coil and the enclosure.
- 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 Ground core & coil assembly to enclosure with a flexible copper grounding strap or equivalent.
- Q Mounting:
 - i Ventilated units up to 750 lbs.: Suitable for wall, floor or ceiling mounting (drip plate required).
 - ii Ventilated units over 750 lbs.: Suitable for floor mounting only.
 - iii Encapsulated units up to 285 lbs.: Suitable for wall or floor mounting.
 - iv Encapsulated units over 286 lbs.: Suitable for floor mounting only.

OPTIONS:

- 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]
- TVSS
- Manufacturer has the ability to guarantee EMF levels as low as 10mG on the enclosure top and four sides from a distance of 1 meter for most units and kVA ranges. (Contact manufacturer for details on pricing and availability.)
- Load profile K-factor rated available.
- Voltage Taps
- Neutral Termination
- Vibration Isolators
- Low Sound [-3 dB][-5 dB][-8 dB]
- Strip Heaters
- Marine Duty (meet ABS requirements)

2.4 ACCEPTABLE PRODUCT AND MANUFACTURER:

- A Hammond Power Solutions Inc. (Canada: 1-888-798-8882 / U.S.: 1-866-705-4684).
- B 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 Energy Efficient Autotransformer per the 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 transformer is level.
- C Check for damage and loose connections.
- D Mount transformer to comply with all applicable codes.
- E Install optional vibration isolation pads between transformer 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 Take Infrared Picture to verify connections accuracy or deficiencies.
- I Prior to energizing transformer, verify secondary voltages and if necessary adjust secondary taps.
- J Report for the Commission of the transformer shall include:
 - i Primary & Secondary Voltages
 - ii Primary & Secondary THDi & THDv