Hammond Power Solutions Inc.

Typical Specification

1.2kV Class
Energy Efficient Drive Isolation Transformer

Compliant to NRCan-EE act SOR/2018-201 amend.14 (effective as of April 30th, 2019) and ON Reg.404-12 sch.6 (effective as of January 1st, 2018)

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1 GENERAL

1.1 SCOPE

A This section defines dry-type low voltage, super low loss transformers designed to (where applicable) to supply power to DC or variable speed Ac drives and rated in accordance with efficiency levels defined in Natural Resources Canada Energy regulations;

i. NRCan (Natural Resources Canada), Energy Efficiency Act SOR/2018-201, amendment 14 effective April 30th, 2019.
ii. Ontario Green Energy Act, revised by ON Reg.404-12 effective January 1st, 2018

B Optional: Output Transformer suitable for input power from a variable speed AC drive. Such transformers have additional design features to withstand harmonics.

1.1 RELATED DOCUMENTS

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

1.2 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 Natural Resources Canada, Canada Energy Efficiency Act, Energy Efficiency Regulations, SOR/2018-201 amendment 14 effective April 30th, 2019.
D Ontario Green Energy Act, revised by ON Reg.404-12 schedule 6 effective January 1st, 2018, last amendment O.Reg.318/17, August 1, 2017

E UL 1561, CSA C9-02 & C22.2 No. 47.

1.3 ENERGY EFFICIENCY LEVELS

A NRCan 2019 effective as of April 30th, 2019 and ON Reg.404-12 – effective as of Jan. 1, 2018 (in Ontario)

1.4 TESTING & QUALITY CONTROL

A Production tests: each unit according to:
- NEMA ST-20, CSA C9 & C22.2 No. 47
- DOE 10 CFR Part 431 sub part K and NEMA TP2

B Test each model design and submit report on request
C Standard production tests to include:
- Applied potential test
- Induced voltage test
- Impedance voltage and load loss test
- Voltage ratio test
- No load and excitation current test

D Additional type test should be made available on request include:
- Short circuit test, BIL – basic impulse insulation level test
- Sound level test
- Temperature rise test

1.5 SUBMITALS

A Submit shop drawing and product data for approval and final documentation in the quantities listed according to the Conditions of the contract. Customer name, customer location and customer order number shall identify all transmittals.

B Product Data including kVA rating, average winding temperature rise, detailed enclosure dimensions, primary & secondary nominal voltages, primary voltage taps, no load & full load losses, impedances, unit weight, warranty.
  i Efficiency under linear load at 15%, 25%, 35%, 50%, 65%, 75% and 100% of name plate rating.
  ii Percentage regulation at 35% & 100% load at 80% & 100% power factor.

1.6 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.

1.7 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 Transformers rated at 15kVA and larger shall be ventilated type, convection air cooled. All three phase transformers shall be constructed with three coils and a single 3- leg core. The primary side of each transformer shall, if applicable, be provided with taps that meet or exceed NEMA standards.
B Transformers shall be designed, constructed and rated in accordance with UL, CSA, and NEMA standards. If shipping to Europe, transformer will carry a CE mark.
C Scott-T designs not acceptable.

2.2 VOLTAGE AND kVA REQUIREMENTS:

A Primary Voltage: [460], [480], [575], [other]
B Secondary Voltage: [208Y/120], [240D], [380Y/220], [480Y/277], [600Y/347], [other] Volts
B kVA Rating: [20][27][34][40][51][63][75][93][118][145][175] [220][275][330][440][550][660] [other] kVA

C System Frequency: 60, [other] Hertz

2.3 KEY REQUIREMENTS:

A Typical impedance at 60Hz: 1.8% to 7.5%
B Nameplate Rating: Linear load, 60Hz.
C Efficiencies:
  i NRCan (Natural Resources Canada), Energy Efficiency Act SOR/2018-201, amendment 14 effective April 30th, 2019 and
  ii Ontario Green Energy Act, revised by ON Reg.404-12 effective January 1st, 2018
  iii Energy efficiency levels defined at 35% of full rated load under a linear load (K1) profile.
  iv Efficiencies and load losses will be calculated at temperature reference of 75°C at Unity Power Factor (UPF).

D In-rush currents not to exceed 15 x RMS.

2.4 BASIC REQUIREMENTS:

A Insulation Class: 220°C system [other]

B Temperature Rise: 150°C [115°C], [80°C], [other].
C Taps: To NEMA ST 20 [2 x ± 5% (1FCAN, 1FCBN)], [4 x ± 2.5% (2FCAN, 2FCBN)])
D Core construction: high grade non-aging, fully processed silicon steel laminations or better.
E Coil conductors: copper [aluminum] windings, with terminations brazed, welded or bolted.
F Impregnation: vacuum pressure impregnated core and coils.
G Excitation current: 3% of full load current rating (max.)
H Sound level: NEMA ST-20.
I Enclosure: Ventilated, Type 3R, [other].
J Enclosure Finish: ANSI 61 Grey suitable for UL50 outdoor applications [other].
K Transformers shall terminate in mounting pads or mechanical lugs. Primary and secondary terminations are to have terminals on the same side of the transformer mounted on separate insulated supports, with the HV terminations in the upper half of the enclosure and LV terminations in the lower half. Mechanical type lugs shall be included on primary, secondary and neutral customer terminations on all aluminum and copper units up to and including 270 amp ratings. Contractors shall provide all necessary lugs not already provided with transformer.
L Anti-vibration pads/isolators shall be used between the transformer core and coil and the enclosure.
M UL listed, CSA approved, [CE Mark]
N 10 kV BIL for both PV and SV coils.
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. Cannot block ventilation slots per N.E.C. 2014.
Q Thermostat: Over-temperature switches wired to internal terminal strip.
R Electrostatic Shield
S Neutral: Must be rated for 125% FLA for general purpose units and 200% FLA any units with a k-factor greater than 1.0
T Mounting:
i Ventilated units up to 750 lbs.: [wall], [floor] or [ceiling] mounting (drip plate required).
ii Ventilated units over 750 lbs.: Suitable for floor mounting only.
U Provide bottom entry provisions at the front of the enclosure bottom plate.
C Seismic: Transformers shall be designed and seismically qualified according to the International Building Code (IBC) 2018, and the American Society of Civil Engineers ASCE 7-16 specifications.
Compliance must be demonstrated by testing. (Applicable to floor mounted units only.)
Transformers can be designed to be approved for O.S.H.P.D California.

OPTIONS:

- Vibration Isolators
- Low Sound level: [-3 dB], [-5 dB], [-8 dB], [other]
- Enclosures: [Type 3R – Stainless Steel], [Type 3R – Enhanced], [Type 4], [Type 4X Stainless Steel], [Type 12], [other]
- Strip Heater
- Marine Duty (meet ABS requirements)
- SPD (Surge Protection Device)

2.5 ACCEPTABLE PRODUCT AND MANUFACTURER:

A **HPS TRIBUNE E ®** brand transformers or similar manufactured by: 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 a written approval from the Consulting Engineering firm at least 10 days prior to bid closing.

3 EXECUTION

3.1 INSTALLATION

A The installing contractor shall install the HPS Tribune E Energy Efficient Drive Isolation Transformer per the manufacturer's recommended installation practices as found in the installation, operation, and maintenance manual in compliance with all applicable national and local codes.

B Transformers cannot be back (reverse) fed unless specifically designed for and marked accordingly.
C Make sure that the transformer is levelled.
D Check for damage and loose connections.
E Mount transformer to comply with all applicable codes.
F Install optional vibration isolation pads between transformer enclosure and the mounting surface as needed.
G Install seismic restraint where indicated on the drawing.
H Coordinate all work in this section with all work of other sections.
I Prior to putting transformer into service, verify secondary voltages and if necessary adjust primary taps.