Product Description

General Information

The Square D™ Distribution Transformer is designed to supply power throughout the building. The transformer permits multiple voltages to be leveraged in the design of the system.

Advantages to designing a system with low voltage transformers:

- Distributes a voltage higher than required by the load to limit wire losses and voltage drop.
- Adds source impedance to the system, reducing common overcurrent at normal voltages.
- Mitigates harmonics through an internal magnetic circuit.
- Allows system grounding closer to the load which reduces capacitive noise.
- Utilizes multiple voltage equipment since transformers can be designed for any output voltage that is required.

Disadvantages to designing a system with low voltage distribution transformers:

- Reduces overall efficiency of the system due to internal losses within the transformer.
- Adds heat to the building if installed indoors (and in the HVAC system).

The impact on the efficiency of the system and the concerns for improvements in the market for energy consumption are why low voltage distribution transformers have been regulated through the Energy Policy and Conservation Act.

The first improvement to transformer efficiency was the development of NEMA TP1 – 1996 (updated 2002). This was a volunteer standard to increase the efficiency of transformers. The second was the 2005 Energy Act which mandated the NEMA TP1 – 2002 levels for all units manufactured after January 1, 2007. EPAct2005 also authorized the Department of Energy to evaluate whether or not more stringent levels should be mandated.

The Department of Energy evaluated low voltage transformers as part of an overall Distribution Transformer analysis in 2010 and 2011. They published their advanced rule in 2012 increasing the levels slightly, but chose to increase to the maximum improvement in energy efficiency that was technologically feasible. This increase occurred after multiple comments from stake holders requesting that the levels be increased beyond the levels published in 2012. The final levels which were published in April 2013 effect all transformers manufactured after January 1, 2016. The increase in efficiency only effects three-phase units.

Department of Energy (DOE) Compliance

10 CFR 431 – Energy Conservation standards

431.196 (a) Low Voltage Transformers

(2) The efficiency of low voltage dry-type distribution transformers manufactured on or after January 1, 2016 shall be no less than that required for their kVA rating in the Table 1.

Table 1: Efficiency Ratings of Low Voltage Dry-Type Distribution Transformers

Single-phase[1]		**Three-phase**	
kVA	**Efficiency (%)**	**kVA**	**Efficiency (%)**
15	97.70	15	97.89
25	98.00	30	98.23
37.5	98.20	45	98.40
50	98.30	75	98.60
75	98.50	112.5	98.74
100	98.60	150	98.83
167	98.70	225	98.94
250	98.80	300	99.02
333	98.90	500	99.14
—	—	750	99.23
—	—	1000	99.28

NOTE: All efficiency values are at 35 percent of nameplate-rated load, determined according to the DOE Test Method for Measuring the Energy Consumption of Distribution Transformers under Appendix A to Subpart K of 10 CFR part 431.

1 Single-phase ventilated transformer efficiencies remain the same as the 2007 levels. Single-phase transformers retain their design, EE prefix, and catalog numbering structure. For information on single-phase products, refer to the Energy Efficient Single Phase and Single Phase Watchdog section in Digest 177, Section 14 and to catalog no. 7400CT0601.

Low-voltage, dry-type distribution transformers with kVA ratings not appearing in Table 1 have their minimum efficiency level determined by linear interpolation of the kVA and efficiency values immediately above and below that kVA rating.

The new Type EX Energy Efficient Low Voltage Dry-Type Distribution Transformers comply with the new levels of efficiency.

Figure 1: Type EX Energy Efficient Low Voltage Dry-Type Distribution Transformer

Product Features

New Energy Efficient Transformer Family – EX

The efficiency levels set by the U.S. Department of Energy necessitated completely new transformer designs. Components used within Schneider Electric™ transformers were optimized for performance, including:

- Coil—Computer designed to reduce the losses with customized wire configurations used exclusively by Schneider Electric. Computer winding equipment to minimize variability during the winding process. Available as standard with aluminum conductor, but also available with copper.
- Insulation System—The system consists of a conductor wrap or coating, layer insulation, air gap spacing, and varnish material. The system is UL listed for a specific maximum temperature for average temperature rise, hot spot, and ambient temperature. Schneider Electric's EX family of transformers have a 428°F (220°C) insulation system, with an average temperature rise maximum of 302°F (150°C). The design also allows further reduction in conductor losses, while also offering the product with an average temperature rise of 239°F (115°C) or 176°F (80°C).

Figure 2: Insulation System

- Core—Transformers are designed with high grade grain oriented, non-aging silicon steel laminations with high magnetic permeability and low hysteresis and eddy current losses. The computer design program allows the design to keep the magnetic flux densities well below the saturation point. The laminations are carefully and evenly stacked in one of two core configurations: distributive gap or full step mitre. Then they are clamped together to ensure the most efficient magnetic circuit while providing a quiet quality offering of low voltage transformers.
- Terminals—Sized to allow the lugs to align with all corresponding Schneider Electric equipment (such as: circuit breakers, switches, panels, switchboards, and so forth). Layout separates the Primary and Secondary terminals and meet the NEC minimum bending requirements. Lugs are not shipped with the transformers to give the installer the flexibility to meet any distribution system conductors requested. All incoming terminals are sized for 125% or 250% lug landing.

  NOTE: Both mechanical and compression lug kits are available from Schneider Electric.

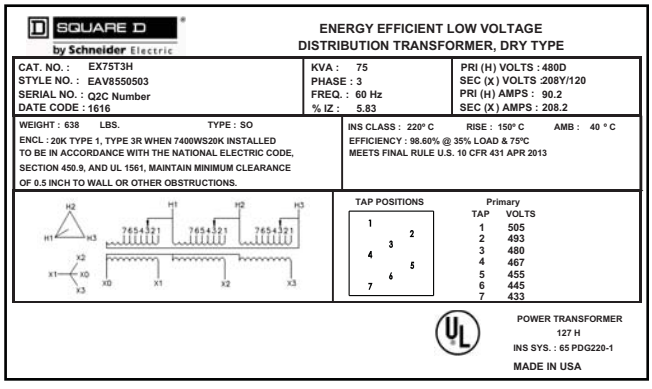
- Enclosure—Two new enclosure styles: K and J. See Figure 3.
  - — **Style K** units are designed with no top or rear ventilation and alcove tested with ½ in.(12.7 mm) clearance from the rear and sides. The front and rear panels are designed to attach to the cover, increasing the support strength of the tops. The base is vented and designed with a conduit entry and three locations for mounting a ground terminal bar.
  - — **Style J** units are designed with no rear ventilation and alcove tested at ½ in.(12.7 mm) clearance from the rear and sides. The front and rear panels are designed to attach to the cover via a u-shaped lip, increasing the support strength of the tops. The open design of the enclosure base includes three locations for mounting a ground terminal bar.

  Both enclosures have mounting holes on the side allowing for the use of a floor mounting kit, to more easily bolt the unit to the floor.

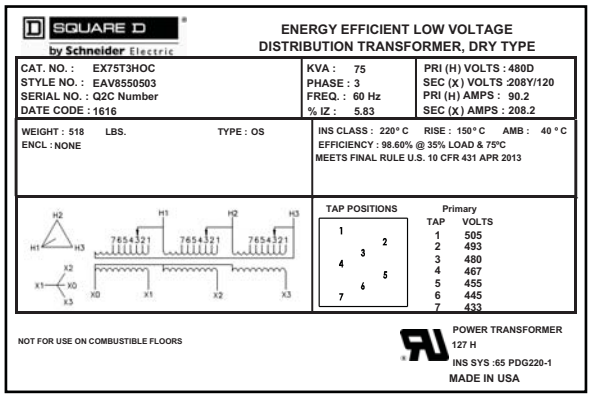
Figure 3: Style K and J Enclosure

- Nameplate—Two nameplates are supplied with each unit (see Figure 4). One on the front cover which is required by standards, the second nameplate is attached to the core and coil, providing installation information inside the unit. The second nameplate also carries a UR listing for the core and coil, allowing the enclosure to be removed and the device installed in other equipment.

Figure 4: Sample Nameplates



Attached to the Front Cover



Attached to the Core and Coil

- Testing—All designs are tested at state of the art test labs, UL certified, and part of the test program.
  - — UL 1561 and NEMA ST-20 design and prototype testing are done on initial design
  - — DOE product verification testing is completed yearly in compliance with 10 CFR 429
  - — Routine testing is completed on 100% of all units shipped from the facilities.

  Testing is performed on all units shipped.
- Packaging—Shipping materials are updated to insure the new designs arrive undamaged from handling and logistics. Pallets are designed to increase clearances between units, and spacers are added underneath the box to prevent small dings in the enclosure. The enclosure design is also enhanced to prevent damage during shipments.
- Quiet Quality—All units are designed and tested to sound levels 3–6 dB below the NEMA ST-20 tables. Because each 3 dB cuts the audible sound in half, this new offering has the quietest units in the marketplace.
- Manufacturing—All units are built in two ISO registered facilities.
- Product Environmental Profile:
  - — RoHS compliant
  - — REACH compliant
  - — Eco-Passport

Electrical Data

Table 2: Product Specifications / Catalog Numbers—Temp. Rise 150°C, Aluminum Wound

kVA	Primary Winding Delta	Full Capacity Taps	Secondary Winding	Efficiency @ 35% 167°F / 75°C	Temp. Rise (°C)	Inc Class	Sound Level	Catalog No.	Weight (lb.)	Enclosure
15	480	6–2.5% 2+4–	208Y/120	98.17%	150	220	39 dB	EX15T3H	245	17K
30				98.38%			39 dB	EX30T3H	400	18K
45				98.60%			39 dB	EX45T3H	490	18K
75				98.69%			44 dB	EX75T3H	710	20K
112.5				98.83%			44 dB	EX112T3H	920	21K
150				99.00%			47 dB	EX150T3H	1170	22K
225				99.06%			49 dB	EX225T3H	1825	25J
300				99.13%			49 dB	EX300T3H	1975	25J
500		4–2.5% 2+2–		99.24%			56 dB	EX500T68H	3100	30J
750				99.34%			58 dB	EX750T68H	4125	31J

Table 3: Product Specifications / Catalog Numbers—Temp. Rise 150°C, Copper Wound

kVA	Primary Winding Delta	Full Capacity Taps	Secondary Winding	Efficiency @ 35% 167°F / 75°C	Temp. Rise (°C)	Inc Class	Sound Level	Catalog No.	Weight (lb.)	Enclosure
15	480	6–2.5% 2+4–	208Y/120	98.10%	150	220	39 dB	EX15T3HCU	250	17K
30				98.48%			39 dB	EX30T3HCU	400	18K
45				98.57%			39 dB	EX45T3HCU	495	18K
75				98.70%			44 dB	EX75T3HCU	755	20K
112.5				98.94%			44 dB	EX112T3HCU	1025	21K
150				99.06%			47 dB	EX150T3HCU	1270	22K
225				99.04%			49 dB	EX225T3HCU	1545	25J
300				99.12%			49 dB	EX300T3HCU	1975	25J
500		4–2.5% 2+2–		99.32%			56 dB	EX500T68HCU	3705	30J
750				99.36%			58 dB	EX750T68HCU	4400	31J

Table 4: Product Specifications / Catalog Numbers—Temp. Rise 115°C, Aluminum Wound

kVA	Primary Winding Delta	Full Capacity Taps	Secondary Winding	Efficiency @ 35% 167°F / 75°C	Temp. Rise (°C)	Inc Class	Sound Level	Catalog No.	Weight (lb.)	Enclosure
15	480	6–2.5% 2+4–	208Y/120	98.20%	115	220	39 dB	EX15T3HF	245	17K
30				98.41%			39 dB	EX30T3HF	400	18K
45				98.62%			39 dB	EX45T3HF	490	18K
75				98.71%			44 dB	EX75T3HF	920	20K
112.5				98.78%			47 dB	EX112T3HF	1170	21K
150				98.78%			49 dB	EX150T3HF	1825	22K
225				99.08%			49 dB	EX225T3HF	1825	25J
300				99.15%			49 dB	EX300T3HF	1975	25J
500		4–2.5% 2+2–		99.26%			56 dB	EX500T68HF	3100	30J
750				99.35%			58 dB	EX750T68HF	4125	31J