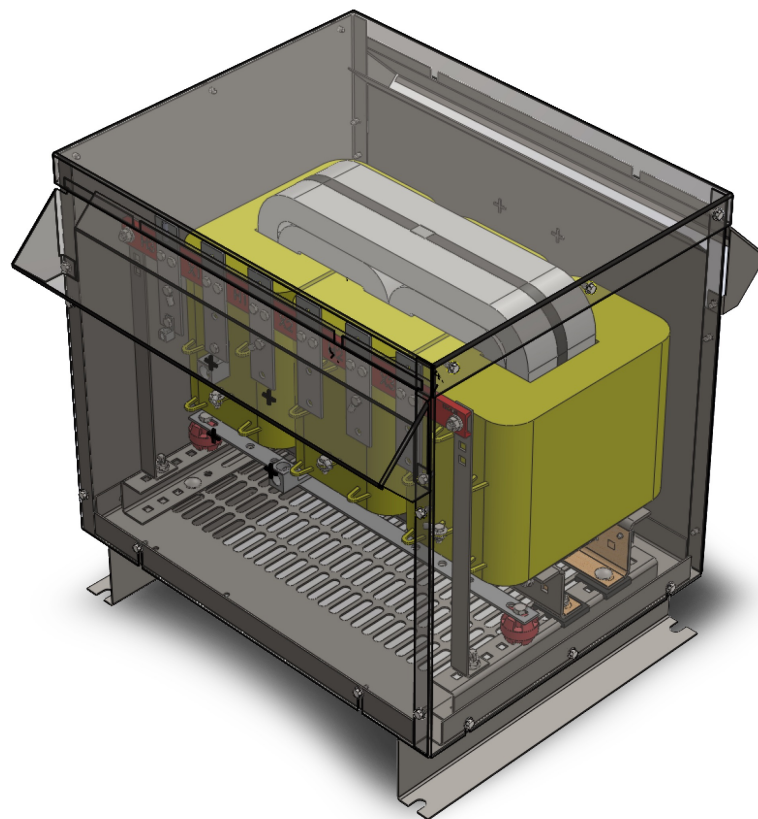


Welcome to DOE 2016



DOE 2016



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What is DOE 2016?

- Department of Energy change to the minimum efficiency requirements for transformers
 - Replacing TP-1 (established in 2007)
- Beginning January 1, 2016
 - Transformers manufactured after this date must meet the new efficiency standards

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Why DOE 2016?

Significant Savings Over the Life of the Transformer

- **Energy Savings**
 - 3.63 quadrillion BTUs
- **Cost Savings**
 - \$12.9 billion in total cost to consumers
- **Greenhouse Gas Reduction**
 - 264.7 million tons of CO₂ emissions
 - Equivalent to the annual emissions of 51.75 million automobiles

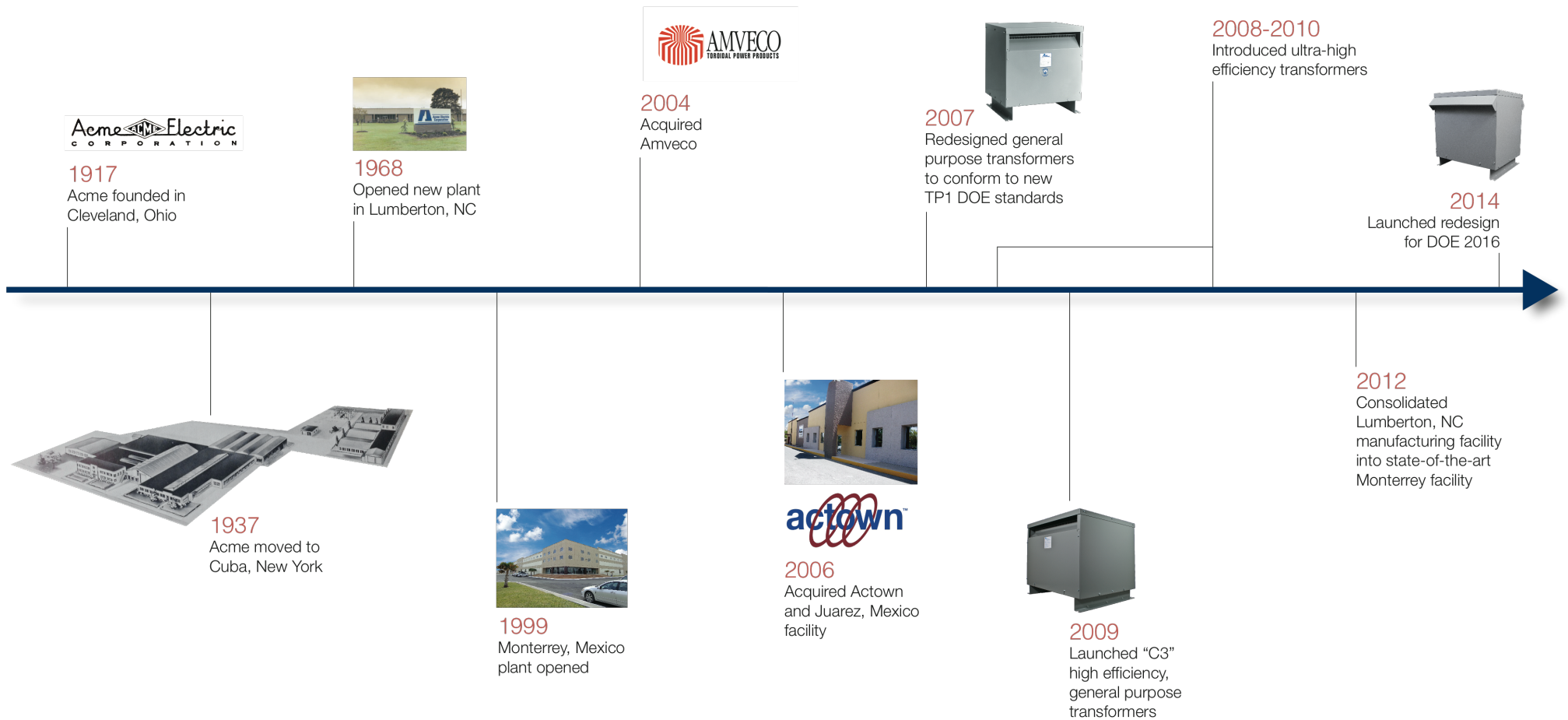
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Acme Timeline



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Acme Solutions

- TP-1 Energy Efficient Transformers
 - Launched in 2007
- C3 Powerwise High Efficiency Transformers
 - Launched in 2009
- C5 Ultra High Efficiency Transformers
 - Launched in 2011 (custom design)
- **DOE 2016 High Efficiency Transformers**
 - **Launched 2014**

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DOE 2016 Product Exemptions

- DOE 2016 covers single and three phase ventilated units 15 kva and larger.
- Acme's single phase general purpose products in 15 and 25 kva are epoxy encapsulated which makes them exempt from DOE 2016. Even though they are exempt they have efficiencies in the 96% to 98% range.
- Single phase catalog numbers did not change since the DOE 2016 efficiency levels stayed the same as the TP1 levels
- Three phase general purpose products in 15 kva are also epoxy encapsulated and therefore are exempt from DOE 2016. These units have efficiencies in the 96% to 97% range.
- This explains why the Catalog numbers for these products did not change.
- K-rated transformers are required to meet the DOE 2016 standard when tested at a K-factor of 1. (no harmonics)

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DOE 2016 Efficiency Basics

- Transformer efficiency equals: (Output power / Input power) times 100
- DOE 2016 efficiency is calculated at 35% of rated kva load.
- Total losses in a transformer are the sum of the No Load (core) losses and the I^2R (conductor) losses.
- A typical 75 kva DOE 2016 unit would have 154 watts no load loss and 2314 watts I^2R loss for total losses of 2468 watts at 100%
- At 35% load the I^2R losses would be only 284 watts ($0.35^2 \times 2314$).
- The total losses would now be $154 + 284 = 438$ watts. As you can see the no load losses have become over 35% of the total losses.
- As a result of this it is necessary to address the no load losses in a transformer design to successfully meet the DOE 2016 efficiency requirement.
- Efficiency of this 75 kva transformer at 35% load would meet 98.6% per DOE 2016.

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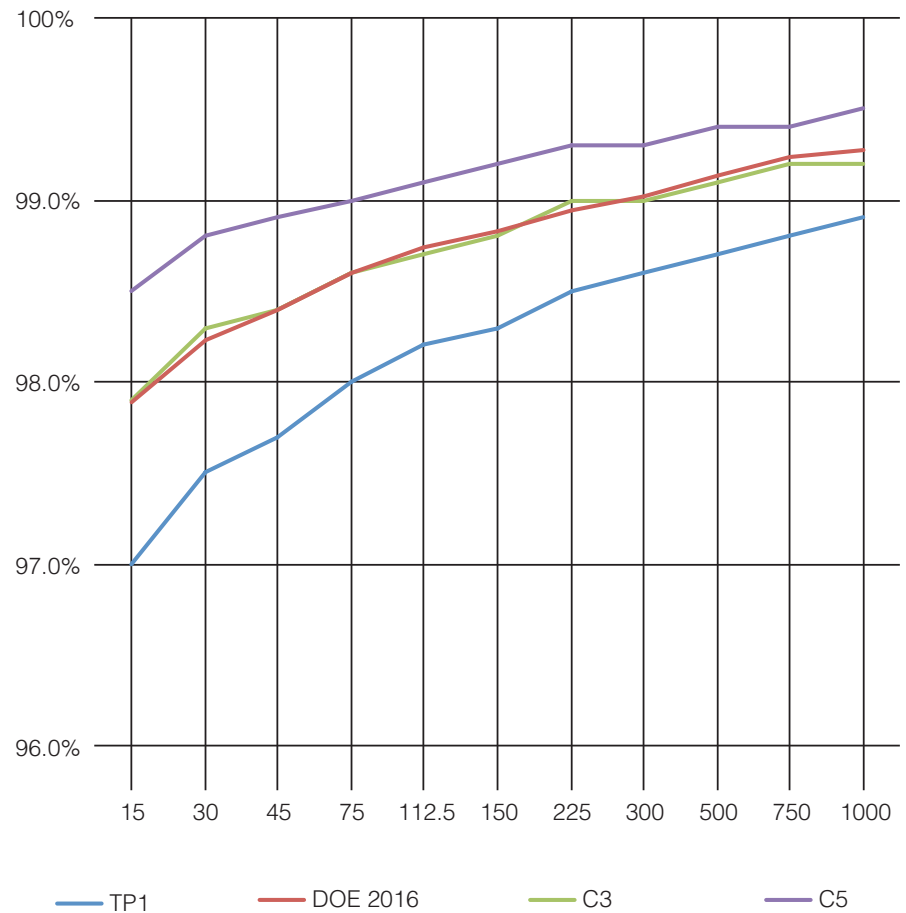
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Efficiency Comparison Chart

In 2007 the department of energy mandated that certain transformers needed to meet TP1 as a minimum efficiency. At that time they also laid out multiple levels of efficiencies known as Candidate Standard Level (CSL). In 2009, Acme launched a line of transformers that met CSL-3 requirements. Effective January 1, 2016 certain transformers will now be required to meet the new, more stringent DOE 2016 standards. See chart for efficiency information.

Three Phase Efficiency				
KVA	TP1	DOE 2016	C3	C5
15	97.0%	97.89%	97.90%	98.50%
30	97.5%	98.23%	98.30%	98.80%
45	97.7%	98.40%	98.40%	98.90%
75	98.0%	98.60%	98.60%	99.00%
112.5	98.2%	98.74%	98.70%	99.10%
150	98.3%	98.83%	98.80%	99.20%
225	98.5%	98.94%	99.00%	99.30%
300	98.6%	99.02%	99.00%	99.30%
500	98.7%	99.14%	99.10%	99.40%
750	98.8%	99.23%	99.20%	99.40%
1000	98.9%	99.28%	99.20%	99.50%



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Features & Benefits

Meets DOE 2016 Requirements—
lower operating cost

Removable Weather Shields – *shipped for use in 3R applications*

Suitable for Wall or Trapeze mounting with Wall Brackets— *suitable for various applications*

Terminal Lugs Included up to 112.5kVA – *labor savings*

Noise & Vibration Isolating Pads – *assures quiet operation*

Aluminum Windings – *increased insulation life, cooler operation, lower losses*

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Features continued

- Single phase DOE 2016 units do not ship with weather shields installed. They must be ordered separately for outdoor 3R applications.
- Single phase DOE 2016 units do not ship with lugs attached to the bus bars. They must be ordered separately.

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Return On Investment

- ROI Calculators available for New Construction and Retrofits
 - \$ Savings per Year
 - \$ Savings Over the Life of the Transformer (30 year estimate)
 - Environmental Benefits (Greenhouse Gas Reduction Estimates)
- Average Payback <18 months
 - Customizable to Specific Projects



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Launch Schedule

- December 2014
 - Launched 15kVA – 112.5kVA
- April 2015
 - Launched 150kVA – 1000kVA
- November 2015
 - Launch Remaining sku's



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Questions or Comments

**Tech Service contact number:
800-334-5214 option 1**



COMMERCIAL CONSTRUCTION

