

NEW ENERGY REGULATIONS TO IMPACT THE COMMERCIAL TRANSFORMER MARKET

The continual and rapid escalation of U.S. energy consumption was a major driving force behind the enactment of the first comprehensive revision of the domestic energy policy in over 14 years.

This article addresses the implications of the new energy policy on the electrical industry, with specific focus on the commercial transformer segment. Distributors and end users will need to understand the impact of this new regulation as they prepare for new construction and building maintenance projects in 2007.

2005 ENERGY POLICY ACT

Signed into law on August 8, 2005, President Bush signed into law the 2005 Energy Policy Act (EPAAct 2005). EPAAct 2005 addresses the conservation and development of newer energy sources through an extensive set of new regulations that stretch from hybrid cars to commercial lighting installations.

Today, the United States leads the world in energy consumption by a large margin using over 3.7 trillion kilo-watt-hours and over 7.3 billion barrels of oil per year. As a gauge, U.S. oil consumption is 233% higher than the number two consumer, China.

That thirst for energy is growing. Unabated, U.S. energy consumption is forecasted to continue climbing by 32% over the next 14 years, which is more than double the increase experienced since 1973. With today's elevated energy prices, EPAAct 2005 seeks to quell this thirst and tap into renewable, domestic sources of energy for the long-term viability and stability of the U.S. economy.

EPACT 2005 MANDATES HIGH-EFFICIENCY TRANSFORMERS

EPAAct 2005 mandates that distribution transformers meet specific efficiency levels starting January 1, 2007. The new levels use NEMA TP-1 rating standards as a reference for establishing a higher-efficiency rating for distribution transformers. The law closely mirrors TP-1 but is not based verbatim on TP-1. The

TP-1 efficiency ratings for Dry-Type distribution transformers are detailed in the chart below.

Production of non-compliant models must be halted by the end of 2006. Unfortunately, the higher-efficiency transformers cost more to build than the non-compliant models.

in the transformer's core, a main component of the transformer. The losses in the core remain the same throughout the transformer's operating range. At 100% load, the amount of comparative loss is negligible. However, at reduced loads, the same amount of energy loss represents a higher percentage of energy being

REFERENCE CONDITION		TEMPERATURE		% OF NAMEPLATE LOAD			
Low Voltage		75°C		35%			
Medium Voltage		75°C		50%			
SINGLE PHASE EFFICIENCY				THREE PHASE EFFICIENCY			
KVA	LOW VOLTAGE	MEDIUM VOLTAGE		KVA	LOW VOLTAGE	MEDIUM VOLTAGE	
		≤50 W/BL	>50 W/BL			≤50 W/BL	>50 W/BL
15	97.7	97.6	97.6	15	97.0	96.8	96.8
25	98.0	97.9	97.9	30	97.5	97.3	97.3
37.5	98.2	98.1	98.1	45	97.7	97.6	97.6
50	98.3	98.2	98.2	75	98.0	97.9	97.9
75	98.5	98.4	98.4	112.5	98.2	98.1	98.1
100	98.6	98.5	98.5	150	98.3	98.2	98.2
167	98.7	98.6	98.7	225	98.5	98.4	98.4
250	98.8	98.9	98.8	300	98.6	98.6	98.5
333	98.9	99.0	98.9	500	98.7	98.8	98.7
500	—	99.1	99.0	750	98.8	98.9	98.8
667	—	99.2	99.0	1000	98.9	99.0	98.9
833	—	99.2	99.1	1500	—	99.1	99.0
				2000	—	99.2	99.0
				2500	—	99.2	99.1

NEMA class 1 efficiency levels for dry-type distribution transformers

Builders and contractors need to be aware of these cost implications and adjust their budgets accordingly. While the noncompliant models are cheaper to buy, they do cost more, in the long term, due to the higher energy costs incurred to run them in addition to the increased pollution levels they cause. The higher cost of the compliant transformers however, is offset by reduced usage costs through lower energy bills by wasting less electricity.

The rationale for the mandate is quite clear. While standard transformers operate at 90% to 95% efficiency while under full load, their efficiency drops at lighter loads. This is due to inefficiencies

wasted. Unfortunately, average transformer loads run between 50% and 34% of the transformer's total capacity.

With the majority of the electricity used in this country being run through transformers at these lower loads, massive amounts of energy are being wasted.

IMPROVED EFFICIENCIES DURING AVERAGE LOADS

Compliant transformers are able to maintain NEMA Class 1 efficiency levels at 35% load. This is accomplished by using higher-grade grain oriented steel in

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Spanish utility

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profitable marketing campaigns because it has allowed us to effectively cross-sell other products and services offered by our company,” said Valentín Vallina, information systems technical manager of Hidroeléctrica del Cantábrico. Hidroeléctrica del Cantábrico offers services associated with the production, transport, transformation and distribution of electrical energy, and possesses businesses related to gas, renewable energy and telecommunications.

Hidrocantábrico was able to rapidly implement StreamServe’s EDP solution into their environment, thus optimizing the production and distribution of business documents, facilitating customer-specific marketing offers, and electronic invoice distribution.

Another advantage of StreamServe Utilities is that it offered data source independence and, therefore, no modification had to be made to the standard SAP – ISU version. In addition, Streamserve’s EDP solution is certified for the receipt of SAP data in compressed RDI format, providing the ability to rapidly design and generate invoices, contracts and any other documents coming from SAP applications for distribution across multiple channels.

“There were several compelling reasons we chose StreamServe,” said Mr. Vallina. “The rapid speed of implementation, the versatility in using new channels such as SMS,

the connectivity of StreamServe Utilities, and the high degree of professionalism demonstrated by the StreamServe team in Spain were all important factors.”

Hidroeléctrica del Cantábrico consolidated electricity and gas consumption into a single invoice, while classifying the invoices by distinct criteria (postal code, invoicing summary, etc.) inserting optical labels and providing total flexibility for design changes.

Another key advantage of the solution was its ability to preserve the intelligence of the life cycle in the commercial documentation of Hidrocantábrico, assuring independence from its printing supplier. This advantage contains an ROI that is much more compelling than might be initially apparent: Another StreamServe customer has indicated that its EDP solution reduced their print production costs by 50 percent because they were no longer locked into a single print vendor.

Equally as important, Hidroeléctrica del Cantábrico improved its corporate image on each printed document and optimized its client relationships by establishing a new marketing channel through the invoice itself.

Now, personalized cross-promotional marketing messages can be dynamically inserted into invoices and other attached documents without a costly investment in personnel and commercial technicians. The company has also achieved significant cost savings on paper and postage, since these campaigns are now inserted into the invoice envelope instead of requiring a separate mailing.

New regulations

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the core rather than the standard non grain oriented. Grain oriented steel’s thinner gauge and purer metallic material quality reduces heat caused from eddy currents by limiting the current’s direction in which it can flow. This narrowing of the magnetic field into a thinner profile also reduces the canceling effect of opposing currents.

The compliant transformers will cost more than their lower-efficiency predecessors due to the higher price tag for grain oriented steel, additional labor and higher raw material costs. Unlike the market for standard Cold Rolled steel, demand for grain oriented steel is at an all-time high. This has been caused by an increased usage in today’s energy-efficient products, such as hybrid cars, and from government regulations, like EPAct 2005. This heightened demand has quickly outpaced the stagnant global supply chain of grain oriented steel, causing unprecedented price hikes.

Beginning October 2005, prices for grain oriented steel have risen nearly 50%. Moreover, grain oriented steel’s smaller thickness requires more individ-

ual pieces to be used in the transformer to achieve the required total stack height. This requires additional labor compared to using the thicker material. In addition, other raw material markets have experienced record price hikes starting last fall. Sola/Hevi-Duty offers transformer windings in either aluminum or copper. Since 2004, aluminum and copper have experienced price growth of 46% and 91%, respectively. Supply and demand has caused much of the escalation. However, investment speculators and opportunists have also lifted metal market prices as they seek portfolio diversification and chase returns that the stock market has not seen in years.

BENEFITING FROM HIGHER ENERGY EFFICIENCIES

Increasing the energy efficiency of a transformer allows the unit to operate at the same level of power with less energy being wasted in the process. This has a large impact on the consumption and distribution of energy because the reduction in energy usage improves the nation’s energy independence, reduces environmental impacts, lessens infrastructure investment, and protects and strengthens the economy.

Decreasing usage through reduced waste by just .03% over the next 20 years cuts the need for new power generation by 60 to 66 million kw. That drop would eliminate the need for construction of 11 new 400-megawatt power plants by 2038. Electrical power generation accounts for 35% of all U.S. emissions of carbon dioxide, 75% of sulfur dioxide and 38% of nitrogen oxides.

With higher-efficiency transformers, the country will see reduced emissions of CO₂, NO_x and Hg of 678.8 Mt, 187.7 kt and 6.48 t over the next thirty years. Curbing energy imports also bolsters the U.S. economy by reducing the current \$65 billion trade deficit and mitigating fuel prices through decreased demand.

EPACT 2005’S TRANSFORMER DEFINITIONS

EPAct 2005 applies to “distribution transformers” which are defined as:

- Has an input voltage of 34.5 kV or less
- Has an output voltage of 600 V or less
- Is rated for operation at a frequency of 60 Hz
- Has a capacity of 10 kVA to 2500 kVA for liquid-immersed units and 15 kVA to 2500 kVA for dry-type units.