

Understanding Transformer Standards At Home and Abroad

There is a lot of confusion about how UL applies its standards to equipment and components. Most designers know that they need components that "meet UL," but they may not understand what this really means. Products that meet UL requirements can be either "listed" or "recognized." Listing generally applies to an end product such as an instrument or a piece of electronic equipment, or occasionally to a component used for a specific application. Transformers are generally not UL listed; doing so would restrict the use of that transformer to a very narrow purpose.

UL recognition is much more flexible. UL component recognition makes it easier for equipment containing recognized components to go through the UL listing process. By designing recognized components into equipment that is to be submitted for UL listing, considerable paperwork and testing can be avoided.

What are the UL standards that users of transformers should be interested in? The significant UL standards for users of transformers include:

- UL506 Specialty Transformers -- covers the requirements for particular construction methods, dielectric strengths and a maximum operating temperature rise for power transformers rated 10.0 KVA or less.
- UL544 Medical and Dental Equipment -- covers equipment in which transformers may be used. Requirements for transformers recognized to UL544 include a limit on leakage current, some means of internal thermal or current fusing, or a manufacturer-specified external current fuse, and either double insulation or an electrostatic shield between primary and secondary.
- UL1411 Transformers and Motors for Use in Audio, Radio and Television Type Appliances -- like UL544, this is an equipment standard to which a transformer can be recognized. Requirements for transformers recognized to UL 1411 are very similar to UL506. The major difference is a requirement for the use of UL94VO listed material (flame retardant) for terminal anchoring points and the abnormal performance testing required per end product specifications.
- UL1585 Class 2 and Class 3 Transformers -- covers current-limited devices designed to protect against the consequences of an overload. They can be either inherently or non-inherently current-limited. Inherently current limited transformers are constructed so that during a long-term overload, or short-circuit, they will not produce a fire. Non-inherent current-limited transformers contain either a current or a thermal fuse to protect them from overload, or a specified fuse installed by the equipment manufacturer.

CSA Certification

CSA serves the same function in Canada as UL does in the United States. Each product certified by CSA goes through a process involving a company's application, then testing by CSA, evaluation of test results, reporting of those results to the company, certification itself and periodic follow up, involving visits to the company's facilities by CSA inspectors. The CSA standard for transformers is C22.2, No. 66, and covers air-cooled, dry-type power frequency transformers (and reactors) of 1,000 KVA or less, with a primary voltage of 750 V or less.

International Standards: The IEC

Although the initials UL, CSA and VDE are quite familiar, there are others that equipment manufacturers selling in the international marketplace must know about. The first and most important of these is IEC, for International Electrotechnical Commission. The IEC has generated some new standards for the safety of "information technology equipment, including business equipment."

One important IEC document is IEC 950, which consolidates the requirements of the former IEC 380

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(Safety of Electrically Energized Office Machines) and the former IEC 435 (Safety of Data Processing Equipment).

IEC 950 is embodied in several other national and regional standards, including UL1950 (U.S.), EN 60950 (European Community), VDE 0805, Part 100 (Germany), BS 16204 (U.K.) and CSA C22.2 950 (Canada).

The European Community version, EN 60950, is intended to cover the entire community with some national deviations that take into account special marking requirements, local climatic differences and pre-existing national standards.

For example, for equipment sold in Norway or Sweden, sections of the NEMKO (Norwegian) and SEMKO (Swedish) standards referring to safety isolation between, and grounding of, telephone and power connections to the same piece of equipment, are more stringent than the requirements in EN 60950. However, a Danish national standard allows non-grounding power plugs for certain type of appliances, a less stringent requirement than is found in the applicable section of EN 60950.

While the unification of international standards for office automation and data processing equipment seems to be fairly straightforward, the same cannot be said of standards for medical equipment. In this category, multiple standards abound -- UL544 (U.S.), VDE 0750 (Germany), CSA 22.2 No. 125 (Canada) and IEC 601 (Continental Europe and elsewhere) -- and they differ from each other in many respects.

Designers and manufacturers should be aware of the particular standard their finished product will be required to meet and make certain that they specify transformers and other components accordingly.

In the U.S., some cities have their own requirements. For example, the city of Los Angeles, because it is in an earthquake zone, has set certain standards, including requirements for tamper-proof thermal protection and nonflammable materials.