Complying with International Product Safety & EMC Standards: The Challenge & The Opportunity

Compliance certification can be cost-effective and expedient if design engineers have correct and timely information.

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INTRODUCTION

U.S. manufacturers who export to other countries often find the process of complying with various product safety and EMC standards to be confusing, costly, and time-consuming. However, if equipped with the right information at the right time, engineers can design products that accommodate these variations relatively easily, making compliance certification more cost-effective and timely.

This article summarizes the main differences between the standards in many of the countries of interest to U.S. manufacturers. These countries include Canada, Japan, European Community (EC) countries,[1] and Certification Body (CB) Scheme countries[2] (Table 1). The article discusses differences for the following types of equipment.

- information technology
- medical
- laboratory
- test and measurement

It then recommends several steps design engineers can take to prepare for efficient testing and approval of these products.

BASIC INTERNATIONAL DIFFERENCES

Before discussing the ways in which standards differ, it is important to understand some basic differences between countries that affect product design, even though the standards themselves are practically identical.

First, variations in electrical supplies — 100 volts in Japan, 120 volts in the U.S., 220/240 in Europe, and so on — require products to be designed accordingly. Second, national electrical codes, which determine how wiring is installed in buildings, vary from country to country. Also, products must accommodate the circuit-protection practices in each country in which they are sold. Finally, each country requires that components in a product's

[1] The twelve EC countries are Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and the United Kingdom. Most other European countries have standards nearly identical to the EC's, including the six European Free Trade Agreement (EFTA) countries — Austria, Finland, Iceland, Norway, Sweden, and Switzerland — and Czechoslovakia, Hungary and Poland, which are seeking associate status with EFTA.

[2] The CB Scheme applies only to product safety certification. The 29 CB Scheme countries outside the US are Australia, Austria, Belgium, Canada, China, Czechoslovakia, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, the Netherlands, Norway, Poland, Republic of Korea, Russia, Singapore, Spain, Sweden, Switzerland, Yugoslavia, and the United Kingdom. While the US is a CB Scheme member, so far it has adopted only the standard for information technology equipment; it is considering, but has not yet adopted, the other CB Scheme standards.

primary circuitry be individually tested and approved as "recognized components" for that country. This approval process requires separate tests by agencies around the world. A product marketed in the U.S., for example, must use components approved by a Nationally Recognized Testing Laboratory. For European marketing, component tests must be conducted by an acceptable European agency. In Canada, the CSA must approve components. The absence of any necessary component recognition can delay or prevent product safety certification, so this requirement should be anticipated early in product design.

	INFORMATION TECHNOLOGY EQUIPMENT	MEDICAL EQUIPMENT	LABORATORY EQUIPMENT	TEST & MEASUREMENT EQUIPMENT
SAFETY				
U.S.	UL 1950	UL 544	UL 1262	UL 1244
Canada	CSA 950	CSA 601	CSA 151	CSA 231
Japan	IEC 950	JIS T1001-T1004	IEC 1010	IEC 1010
EC	IEC 950	IEC 601	IEC 1010	IEC 1010
CB Scheme	IEC 950	IEC 601	IEC 1010	IEC 1010
EMISSIONS				
U.S.	FCC Part 15	--	--	--
Canada	CRC c. 1374	--	--	--
Japan	VCCI	--	--	--
EC	EN 55022	EN 55011	EN 55011	EN 55011 or 55014
IMMUNITY				
U.S.	--			
Canada	--			
Japan	--			
EC	EN 50082-1			

TABLE 1. *International Standards.*

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PRODUCT SAFETY STANDARDS

INFORMATION TECHNOLOGY EQUIPMENT

The safety standards for information technology equipment — UL 1950, CSA 950, and IEC 950 — are nearly identical (hence the "950" in each standard number). Products that meet any one of these standards should meet the others as well.

MEDICAL EQUIPMENT

Safety standards for medical equipment are in transition. In the near future, both the U.S. and Japan are expected to replace their current standards (UL 544 and JIS T1001 through T1004[3]) with "601" versions that will be similar to the IEC 601 standard which the EC and CB Scheme countries have adopted. However, even then some significant differences will remain between these "601" standards. Examples are differences in the requirements for electrical installations and differences in the way medical products are classified according to potential risk to patients.

LABORATORY, TEST, AND MEASUREMENT EQUIPMENT

For laboratory, test, and measurement equipment, the safety standards — UL 1262, CSA 151, and IEC 1010 for lab equipment, and UL 1244, CSA 231, and IEC 1010 for test and measurement equipment — are far from harmonized. Even the simplest requirements can differ: the allowable size of openings in an enclosure, the enclosure strengths, the leakage current, the electrical insulations, etc.

EMISSIONS

INFORMATION TECHNOLOGY EQUIPMENT

The U.S. and Canadian emissions standards for information technology equipment — FCC Part 15 and CRC c.1374 — are practically identical. The Japanese and EC emissions standards (VCCI[4] and EN 55022) are also similar. However, the acceptable limits defined in the U.S./Canadian standards are consistently more relaxed than those defined in Japanese/EC standards for both Class B and Class A equipment (called "Level 2" and "Level 1," respectively, in Japan) and for both radiated and line-conducted emissions. Products that comply with either the Japanese or the EC emissions standard will comply with U.S. and Canadian standards as well.

MEDICAL, LABORATORY, TEST, AND MEASUREMENT EQUIPMENT

Products in the medical, laboratory, test, and measurement categories are exempt from emissions requirements in the U.S.,[5] in Canada,[6] and in Japan. However, all such equipment sold in the EC must meet minimum susceptibility requirements in accordance with EN 55011 (for digital devices) and/or EN 55014 (for devices with electric motors).[7] Therefore, all potentially international products should be designed with the EC emissions standards in mind.

IMMUNITY

Immunity standards apply only in the EC, where EN 50082-1[8] covers all products. All items intended for potential international marketing and sale should be designed to comply with this standard.

SUMMARY AND RECOMMENDATIONS

Complying with the various product safety and EMC standards around the world is easier than it may seem — if the appropriate research is done. Manufacturers can expedite product testing and certification, thus ensuring minimal delays in introducing products to international markets, by following these recommendations:

- Ensure the product accommodates all appropriate electrical supplies: 100 volts in

[3] JIS refers to Japanese Industrial Standards.
[4] VCCI refers to the Voluntary Control Council for Interference by data processing equipment and electronic office machines.
[5] If the equipment qualifies as a computer peripheral, it must comply with FCC Part 15.
[6] If the equipment qualifies as a computer peripheral, it must comply with CRC c.1374. Canada also has an emissions standard specifically for equipment that qualifies as a transmitter: TRC 51.
[7] EN 55011 and EN 55014 are product-specific emissions standards under the EC's EMC Directive, 89/336/EEC.
[8] EN 50082-1 is the generic immunity standard under the EC's EMC Directive, 89/336/EEC.

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EMC REGULATIONS

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Japan, 120 volts in the U.S., 220/240 in Europe, and so on.

- Take into account the variations in national electrical codes, wiring, and circuit-protection practices.
- Ensure that each component purchased to go into a product's primary circuitry is already approved as a "recognized component" for each country where the product will be marketed. Look for appropriate recognition marks, or ask the component manufacturer for documentation verifying all approvals. Otherwise, component testing will add time and cost to the certification of the final product.
- Since power supplies must be certified independently, use all power supplies that have already been tested against all the same standards that will apply to the product itself.
- Contract with a test laboratory or consultant experienced in product development. Once the expert identifies the relevant international differences, courses of action can be suggested that will prevent expensive and time-consuming design modifications later.

NOTE: This article is based on current standards, which are subject to change. Also, changes in U.S. or other countries' trade policies or political climates could have implications for product marketability.

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