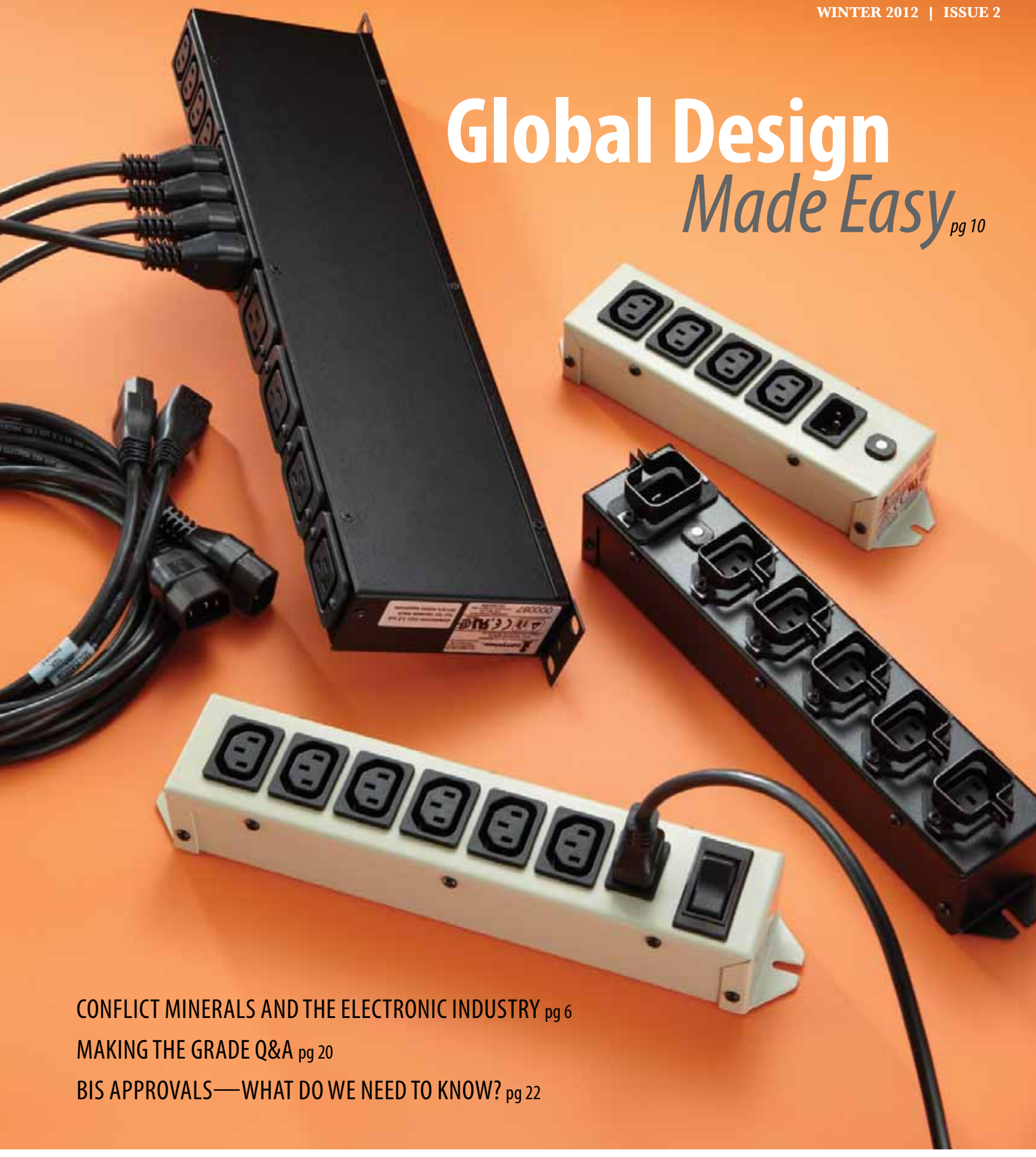
INTER POWER SOURCE

WINTER 2012 | ISSUE 2

Global Design *Made Easy* pg 10



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Interpower Corporation makes it easy! Interpower Accessory Power Strips simplify power system distribution inside electrical systems that are sold worldwide. All of the Interpower Accessory Power Strips are approved by the appropriate North American and international approval agencies. Accessory Power Strips can be used when your equipment does not have sufficient panel space for an accessory power module. They are enclosed in an 18 gauge steel case and are intended for use with professional-quality commercial equipment. All stock Accessory Power Strips include a resettable CBE (Circuit Breaker for Equipment).

We offer International cord sets that allow connection between the Accessory Power Strip and all major power mains in the world. Interpower also carries Jumper cord sets to connect equipment to the Accessory Power Strip eliminating the need for country-specific plugs and outlets. Interpower Corporation carries many lengths of power cords and cord sets, and we offer just a 1-week manufacturing lead time on nonstock cords.

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- 1-week manufacturing lead time
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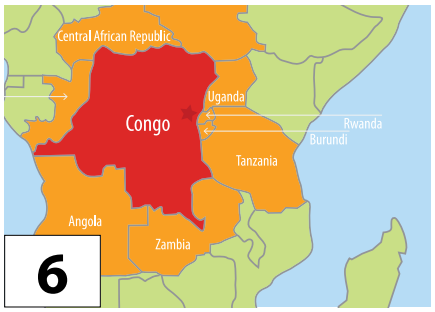
INTERPOWERSOURCE

WINTER 2012 | ISSUE 2

COVER STORY

FEATURES

DEPARTMENTS



ON THE COVER
The cover shows our Accessory Power Strip which simplifies the process of designing for export. This issue contains information on how to utilize the APS when designing for global markets with long term cost savings. To inquire about this product, contact Customer Service: sales@interpower.com

EMPLOYEE FOCUS

Rob Taylor

Photo by Hannah Pothoven

Rob Taylor, Vice President of New Product Development, Quality Assurance and IT (Information Technology), provides leadership for the technical areas of the company. Rob's Product Development team directs the design, development, initial production and ultimately the announcement of new products. The Quality Assurance and Product Compliance Team facilitates continual quality system improvements and product safety compliance and certification. The IT Department supports the Company's computer needs.

Rob is actively involved on international standards writing committees such as IEC 60320, UL 60320 and UL 817 / CSA Spec 21 (in "English," connectors, plugs and cords). On a local level, Rob is active in city and regional housing improvement efforts, the Rotary Club of Oskaloosa, and Leadership Iowa.

Rob's best memories at Interpower involve the establishing of new product lines, especially new product design. Of particular interest is the teaching and training of staff on the technical aspects of our products, especially as it relates to product specific testing in the Ames and Lamoni test laboratories.

Before joining Interpower Corporation in 1993, Rob earned his BS Degree in Industrial Technology from Iowa State University, with emphasis in electronics. Prior to Interpower Corporation, Rob worked as a Purchasing Quality Engineer in a spice production and packaging facility.

Putting the Pieces Together

By Hannah Pothoven

At Interpower Corporation, we strive to delight our customers through teamwork. A wonderful example of this was the way the team pulled together to process an order that was received on October 21, 2011. The customer needed the order as soon as possible, and requested a dock date of no later than November 15.

An item on the order was on backorder until November 17, which would mean a dock date of November 23. This caused a dilemma, as our customer needed to build and ship the equipment in time to be on dock in Korea on December 2. If they were late, there were penalties incurred through the purchase agreement with their end customer.

Interpower's Customer Service Department worked with the customer to attempt to resolve the delay by expediting the backordered parts. The Interpower Customer Service Representative contacted the Purchasing Department to see if it was possible for the order to be expedited. Our Purchasing Department contacted the supplier, and at the time there was no way to pull it in. However, Purchasing did not give up and continued to watch this item. They were able to get the parts expedited to arrive on November 1, which allowed them to ship overnight to our customer and arrive on November 2!

Photo by Hannah Pothoven

Through the teamwork of the Customer Service Representatives and the Purchasing Department, we were able to delight this customer; by working together, we were able to "work some magic." According to an email from the customer, they were "happy campers" due to the service they received.

Thank you to our Interpower team and to our customers who work together to put the pieces together.

INTERPOWER SOURCE

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Power systems components are not only regulated by safety agencies in industrialized countries but increasingly by other agencies with responsibility for the environmental impact of materials present in components and even the materials and chemicals used in manufacturing the components, regardless of whether they are present in the final product. Recently, the Dodd-Frank Act added regulations concerning four so-called conflict minerals that are mined in the Democratic Republic of the Congo and used in large quantities in the manufacture of electronic equipment. Collectively, these regulations create new and challenging issues for equipment manufacturers.

In an article on the RoHS Directive, we address recent changes to the Directive that add covered product groups and additional substances to the "prioritization list" for possible future control. This article also addresses the implications for equipment manufacturers.

Conflict minerals and the impact on equipment manufacturers is the focus of another article.

The second in the series of articles on designing for global markets addresses the use of an accessory power system to simplify power mains connections in equipment and systems consisting of two or more separately powered sub-systems. Our handy "Guide to International Cords" makes it easy to identify the proper cord for each market.

We present an article on the plugs used in Denmark, Argentina, Australia, and China. The last three plugs are so similar that they are difficult to distinguish from one another.

Our article on hospital-grade requirements defines and addresses the implications of hospital-grade plugs.

Finally, we offer an introduction to the BIS (Bureau of Indian Standards). The Indian market for electrical equipment is very large and is growing rapidly and knowledge of BIS will be increasingly important for equipment designers going forward.

We hope you find the information contained in these articles useful as you design and build electrical equipment that will be sold globally.

Best regards,

Bob Wersen, President

The RoHS Directive

By Joe Caligiuri

The RoHS Directive (Restriction of Certain Hazardous Substances) has been renewed and updated by the European Union. The new directive (2011/65/EU) was implemented on July 21, 2011 and must be ratified into national law by all the member states by January 2, 2013.

The RoHS Directive limits the use of six hazardous substances (cadmium, lead, mercury, hexavalent chromium and Brominated flame retardants PBB and PBDE) in products. The RoHS Directive applies to the majority of electrical equipment. The key elements of the new directive are as follows:

- A gradual extension of the rules to all electrical and electronic equipment (EEE), cables and spare parts, with a view to full compliance by 2019;

- A review of the list of banned substances by July 2014, and periodically thereafter;

- Clearer and more transparent rules for granting exemptions from the substance ban;

- Improved coherence with the REACH Regulation on the Registration, Evaluation, Authorization and Restriction of Chemicals;

- Clarification of important definitions; and

- CE marking denoting compliance with European norms reserved for electronic products that also respect RoHS requirements.

New product groups

The renewed RoHS directive is implemented:

- from July 22, 2014 for medical devices and monitoring and control instruments entering the market
- from July 22, 2016 for medical devices used for in vitro diagnostics entering the market
- from July 22, 2017 for industrial control and monitoring equipment and
- from July 22, 2019 for all other electrical products

Additional substances on the prioritization list

Although the renewal of the RoHS directive does not add limited substances, four substances will be included in the prioritization list - HBCDD, DEHP, BBP and DBP. These substances might be added to the list of limited substances in the future.

Actions to be taken by manufacturers and importers as a result of the new RoHS directive

The major change of the RoHS directive is that compliance with the RoHS directive is verified with CE marking. As CE marking requires that requirements of other valid directives must be fulfilled, the manufacturer and importer must ensure the conformity of these directives (e.g. Low Voltage and EMC Directives).

In order to CE mark their products in accordance with the RoHS directive, the manufacturer or the authorized representative must complete the technical file and update the Declaration of Conformity. The technical file must include at the least material and component suppliers' verifications regarding the quantity of the substances – the use of which are limited by the RoHS directive. On request, analysis results must be provided in order to verify the product's conformity with the RoHS directive.

Where can I get more information?

To read more about the RoHS Directive go to http://ec.europa.eu/environment/waste/rohs_eee/index_en.htm. If you have any questions, please let us know by emailing info@interpower.com.

Info**POWER** ***Briefs***

By Hannah Pothoven

Interpower Corporation's weekly blog, InfoPower, has been up for a year now! We are excited to be able to use this venue to share information on designing for worldwide markets. As mentioned in our Fall issue of InterPower Source, we are covering the 21 plug patterns used around the world, also known as Power Mains Monday. Since October we have covered the power mains of Italy, Japan, North America, and Switzerland.

The InfoPower blog is also covering quality topics such as testing requirements. To date we have covered the Cord Flex Test, Abrupt Pull Test, Crimp Pull Test, Crimp Cross Section Station, Temperature Rise Test Equipment, and Cord Anchorage Pull Test. You can view these blogs, along with video links for the tests on our website www.interpower.com.

We have also posted information on topics such as resource information on designing for various countries, environmental and product information, and industry terms to help you when designing your equipment for export.

Check out our YouTube channel! Scan this QR code with your smart phone to go directly to the site.

You can view our blog at www.interpower.com/ic/infopower-2. For topics not addressed in our blog, please email us at infopower@interpower.com. For urgent needs, please call our Customer Service Department at (800) 662-2290 or email sales@interpower.com. Technical support is free and available from 7 a.m. to 7 p.m. Central Standard Time.

Letters to the Publisher

InterPower Source welcomes comments from our readers. Letters can be typewritten or e-mailed, and must include the author's full name, address, and telephone number. Address your submission to:

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e-mail: info@interpower.com

The editors reserve the right to edit letters for clarity, style, and length. We regret that unpublished letters cannot be acknowledged or returned.

Conflict Minerals

and the Electronic Industry

By Kari DeBruin

The conflict in the Eastern Democratic Republic of Congo (DRC) is considered the deadliest conflict the world has faced since World War II. How is it, then, that so many of us have not heard of the war and terror taking place there? And, more importantly, how are we personally and corporately contributing to the devastation and carnage of an entire region, without even knowing it? The answer is shockingly simple: by using materials or minerals in the products we design and consume that originate in the Eastern Congo. These minerals, known as conflict minerals, are used in a variety of electronic products and are being mined in regions in which armed militias (often affiliated with rebel groups) have taken control and threaten, abuse, and kill anyone that does not support their cause.

The United Nations estimates that over 5 million people have died as a result of this conflict. There are many militias battling for control of the mines throughout the region. Because most of the mines are located far from populated areas, they are often left vulnerable and "up for grabs" by warring armies. The surrounding towns and villages are then used as a 'base camp' for the armed men. While occupying the town and mines, these men terrorize the community in order to strike fear and loyalty in the people. They steal food, supplies, and anything else they may need or want. Violence and murder is common. Most often, however, their weapon of choice is rape. Women and girls are used as tools to intimidate and punish anyone that does not show support of the occupying militia.

By occupying these towns and stationing themselves near the mines, these militia groups are able to illegally tax, extort and coerce civilians to work. As one can imagine, the mining conditions are very poor, the hours are very long and the physical demands are excruciating. The armed groups are making millions of dollars by taking these minerals and trading them for weapons. The lucrative mineral trade fuels these armed groups to continue to war over control of the lands. The most profitable minerals are referred to as the 3T's and Gold. The 3T minerals are tin, tantalum, and tungsten which are extracted from Cassiterite, Wolframite, and Coltan.

Cassiterite is the metal ore that is most commonly used to produce tin, which is used in alloys, tin plating, and solders

for joining pipes and electronic circuits. Tin is also used in biocides, fungicides, and in polyvinyl chloride (PVC) and in manufacturing high performance paint.

Wolframite is the metal ore that is used to produce tungsten, which is used for metal wires, electrodes, and contacts in lighting, electronic, electrical, heating, and welding applications. It is a dense metal that is often found in golf club heads, dart tips and fishing weights. A significant amount of tungsten is used as tungsten carbide, which possesses hardness and wear-resistance properties, often used in metalworking tools. In some cases, it is used as a substitute for lead. Small amounts are used in electronic devices, particularly in the vibration functions of cell phone and other devices.

Coltan (also known as Columbite-tantalite) is the metal ore from which tantalum is extracted. It is used in electronic products, including mobile telephones, computers, GPS devices, videogame consoles, and digital cameras, airbags, and as an alloy for making carbide tools and jet engine components. It is also used in the production of capacitors, particularly for applications requiring high performance, a small compact format and high reliability, such as in pacemakers and hearing aids.

As a whole, the consumer electronics industry is the largest user of some of these minerals.

Gold is used for making jewelry and, due to its superior electric conductivity and corrosion resistance, is also used in electronic, communications, and aerospace equipment. It is commonly used to coat the wiring in cell phones and laptops.

Conflict Minerals

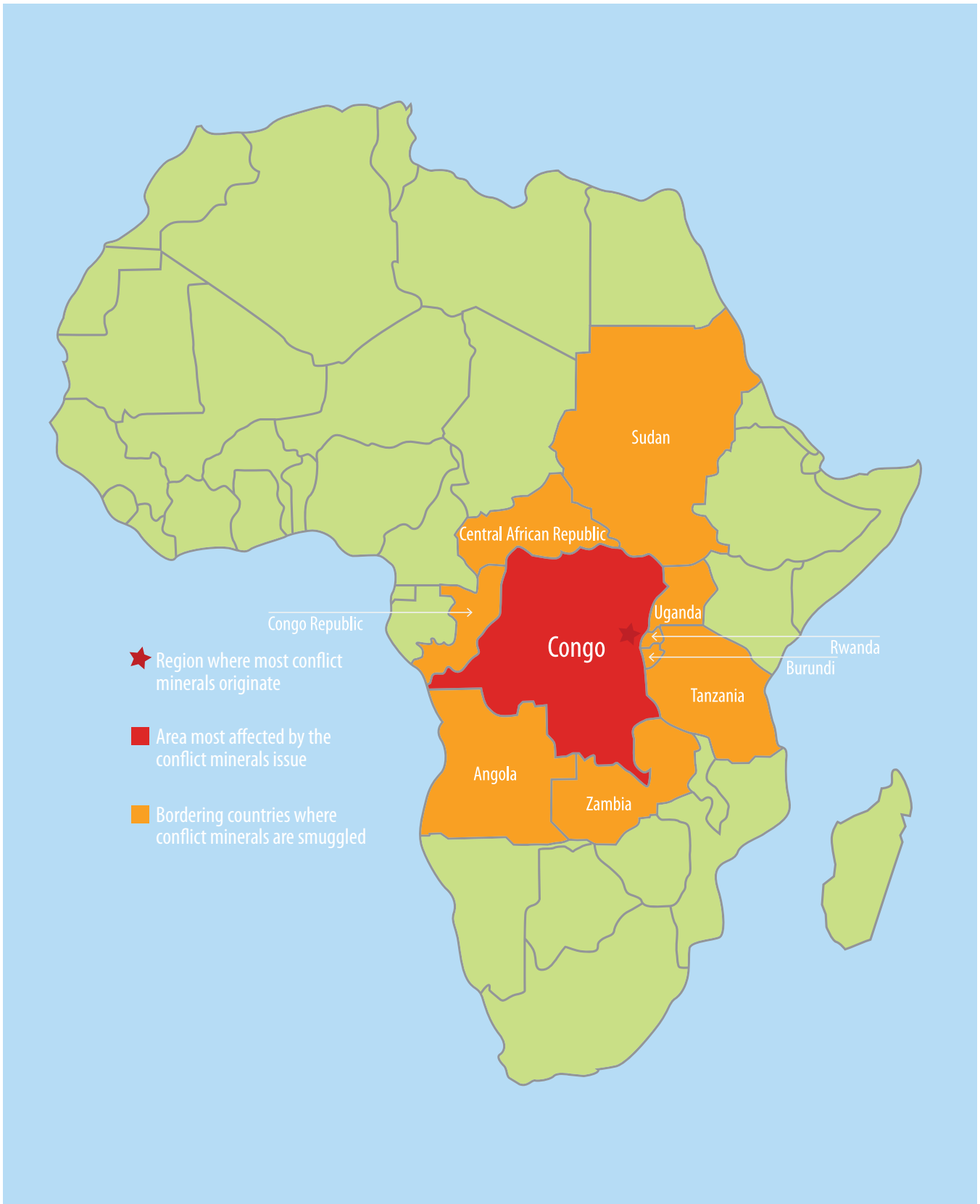
Tin (Cassiterite)

Tantalum (Wolframite)

photo courtesy of Shutterstone.com

Tungsten (Coltan)

Gold


Sudan
Central African Republic
Congo Republic
Congo
Uganda
Rwanda
Burundi
Tanzania
Angola
Zambia
Region where most conflict minerals originate
Area most affected by the conflict minerals issue
Bordering countries where conflict minerals are smuggled

The Three T's and Gold are mined and then stolen, taxed, and smuggled along routes and border points run by the militia. The minerals are taken into neighboring countries such as Uganda, Burundi, and Rwanda. Once there, they are sold and shipped to refining companies in the Eastern Asian countries of Thailand, China, Malaysia and India. During the refining process, they are mixed with other minerals from around the world, making it difficult to trace their origin. The minerals are then processed and utilized in products and components that are produced and shipped all over the world.

As a whole, the consumer electronics industry is the largest user of some of these minerals. In an effort to interrupt the support of these militias, the UN recommends due diligence in the international supply chain. Domestically, the United States is also now subject to The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act), which was signed into law on July 21, 2010. This law primarily focuses on reform through financial regulations. It attempts to replicate the success in the apparel, forestry and diamond sectors. Through public pressure and open disclosure, the intent of the Act is to try to curb the violence by revealing the companies that use the minerals from this region and bordering countries, due to the smuggling routes. The bordering countries are Angola, Burundi, Central African Republic, Congo Republic (separate from DRC), Rwanda, Sudan, Tanzania, Uganda and Zambia. Under the law, the Federal Government is requiring that all SEC regulated companies and ALL of their suppliers disclose sourcing information to assure that there are NO conflict materials contained in or used in production. In order to comply with this demand for information, companies must assure that its supply chain is not using conflict materials in products it purchases or in processes used to make products it purchases from their suppliers.

Annually, companies will need to:

1. Determine where conflict minerals are being used in products or processes at both in-house manufacturing or at contract manufacturers.

Two questions that should be asked of suppliers are:

   1) Are any of the following minerals necessary to the functionality or production of your company's products that it manufactures or contracts to manufacture?

   2) Do conflict minerals (the 3T's and Gold) necessary to the functionality or production of your company's products originate from the DRC or an adjoining country?

2. Conduct supply chain due diligence, 3rd party verification, and in some cases private sector audits on the sources of these metals – all the way down to mine of origin.

3. Report the findings of the due diligence on the company's annual SEC filing and website.

If a company finds that the minerals they are using in their products originated from the DRC or bordering countries (listed earlier) it is required to state as such in its annual report. Also, if a company is unable to determine the origins of the minerals, they are required to state this as well. In both cases, the companies are to report this information publicly by placing it on their company's website and by providing the SEC with the internet address where these reports are located. If, however, it is found that no minerals originated from the DRC or bordering countries, the report made to the SEC must state as such and provide a clear description of the tracing of origin.

Although there have been obvious steps taken to try to thwart the efforts of these militias through the laws that have been enacted, there has been much criticism concerning these laws. A common argument is that although these place pressure on the manufacturers – or receivers of the minerals – not much is being done to address the root cause of the conflict itself; leaving the Congolese government as the sole responsible party for offering companies a location for mining the minerals they need while still being able to trace the minerals, practice due diligence and transparency. In many cases, this has caused legitimate mining to halt – hurting the local Congolese economy and according to some reports, reducing export of legal minerals to 90%.

However, there are organizations, activists and various industry and trade associations that are getting involved to help monitor, trace and fight against the illegal taxing, extorting and smuggling of these minerals as well as trying to restore and rebuild the communities these militias have terrorized and destroyed.

Sources:

- *Globalwitness.org. Global Witness, n.d. Web. 11 Nov. 2011. <http://www.globalwitness.org/campaigns/conflict/conflict-minerals>*
- *Enoughproject.org. Enough, n.d. Web. 13 Nov. 2011. <http://www.enoughproject.org/conflict-minerals>*
- *Abranches, Sergio. Conflict Minerals and Corporate Responsibility. Ecopolity.com. Ecopolity, 29 March 2010. Web. 13 Nov. 2011. <http://www.ecopolity.com/2010/03/29/conflict-minerals-and-corporate-responsibility/>*

Global Design

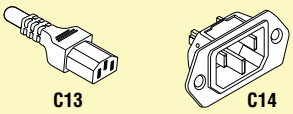
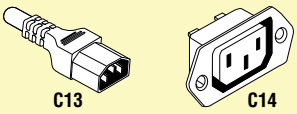
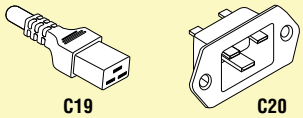
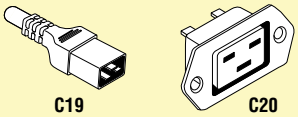
Made Easy

By Kari DeBruin

The key to success for any company trying to compete in the global market place is to trade its products and services with precision and ease. Markets for electrical and electronic equipment are truly global and, because of this, more competitive than ever before. In order to be successful now, it is essential to offer products that are easily adapted to the needs of global markets, without requiring reconfiguration by the user. This is especially important with regard to power cords, circuit protection and electromagnetic compatibility requirements.

Electrical plugs and sockets vary by country in size, shape, and type of connectors. Each country determines the type or types which are used and these are set by national standards legislation. With 21 different standard plug patterns used around the world, the problem of needing to have country specific plugs and cords can be quite daunting and expensive. In addition, many manufacturers do not have the desire or the space to warehouse or inventory all of the different cords for each different country to which their product will be exported.

Guide to IEC 60320-1 and IEC 60320-2-2 Class 1 Accessory Power Components and Terminology

IEC 60320-1 Connectors* Inlets	IEC 60320-2-2 Plug Connectors** Outlets
10A International/15A North American	10A International/15A North American
 C13 C14	 C13 C14
16A International/20A North American	16A International/20A North American
 C19 C20	 C19 C20

* Connectors are female cable mount devices.
** Plug connectors are male cable mount devices.

Because of this, there is a real need for manufacturers worldwide to have a product that offers an easier way to design for global markets with long term cost savings. There is a great desire to be able to manufacture a product without having to worry about which plug it needs for export, if the plug is available or inventoried somewhere in the warehouse.

As a product designer, you can now simplify the process of designing for export in the global market. How? By using an Accessory Power System. Using Accessory Power Systems will make it easy to build for markets all over the world because it is no longer necessary to carry several country-specific plugs and outlets. As mentioned earlier, if/when you were sending a product that required several power supply connections to different countries, you would need a country specific cord for every connection. Now, however, with an Accessory Power System, you can use one strip, jumper cords, and only ONE country specific cord. This makes it easier to build equipment that can be sold throughout the world.

There are three main reasons to use the Accessory Power System.

1. The IEC 60320 2-2 component family makes it possible to control power to accessories through the main appliance.

2. The IEC 60320 2-2 component system is generally accepted for use throughout the world.

3. The use of country-specific plugs and outlets are not needed for accessory power connections. For example,

it is no longer necessary to use North American plugs and outlets on peripheral equipment destined for sale in the U.S. and Canada, or British plugs and outlets on equipment destined for sale in the United Kingdom. However, the mains connection to the primary piece of equipment or the Accessory Power Strip does have to use a country specific plug.

The basic components of an accessory power distribution system are an outlet or outlets (Accessory Power Module or Strip), a power cord with a plug-connector, or a cord set with a molded plug-connector on one end and a connector on the other.

The most commonly used Sccessory Power System is rated for use at 10A internationally and 15A in North America.

However, a second system is provided in the IEC standards with current ratings of 16A internationally and 20A in North America. See chart on page 12 for the outline drawings with the proper IEC references.

Utilizing an Accessory Power Strip in your design and manufacturing process, will not only simplify things but can also directly affect sales by opening up opportunities for you to ship to new countries. In addition, you will save time and money by eliminating differences when shipping to different countries. Lastly, although you will have to purchase more jumper cord sets, you will purchase less country specific cord sets – allowing you to spread your costs over more volume.

Interpower Corporation has spent the last several years designing and perfecting our own Accessory Power System product that meets the needs of the global designer. If you are interested in learning more about Interpower Corporation's Accessory Power Strips, please see our complete product line, at http://www.interpower.com/ic/accessorypower or scan this QR code with your smart phone to go directly to the link.

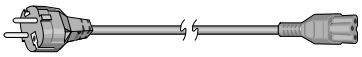
Also, please visit our Whitepaper on Accessory Power Strips, located at http://www.interpower.com/ic/apswhitepaper

Guide to International Cor

For more specifications on these and more cords with different lengths and cable options, please visit our web site at www.interpower.

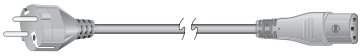
The Class I grounded plug used in Germany, Austria, the Netherlands, Sweden, Norway, Finland, Russia, and more. (Not shown: angled Continental European cords)

86232180 2.5A, IEC 60320 C5 connector

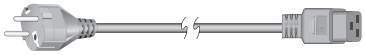


86230020 10A, 50/10mm strip

86230110 10A, IEC 60320 C13 connector (mold 052)



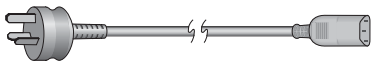
86235000 16A, IEC 60320 C19 connector (mold 011)



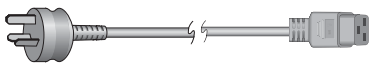
The Class I used in China.

86517050 10A, 50/5mm strip

86517040 10A, IEC 60320 C13 connector



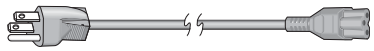
86517080 16A, IEC 60320 C19 connector



The Class I used in Japan.

86532140 3A, IEC 60320 C7 connector

86557110 3A, IEC 60320 C5 connector



86589000 7A, IEC 60320 C13 connector

86589070 12A IEC 60320 C13 angled connector

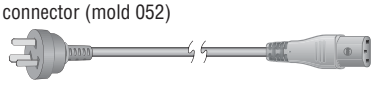
86589030 12A IEC 60320 C13 connector

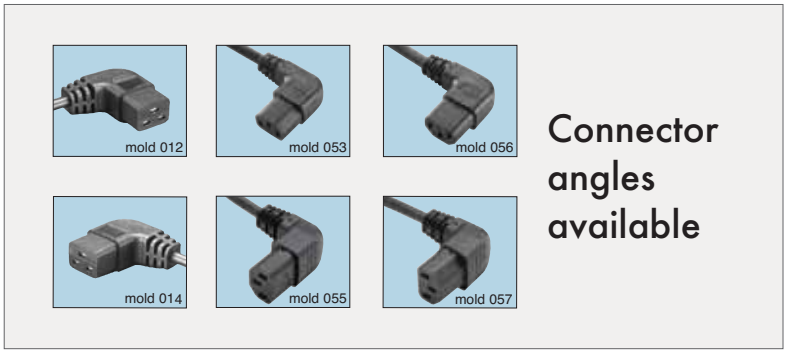
86589010 15A,IEC 60320 C13 connector

The standard plug for Argentina.

86270000 10A, 50/10mm strip

86270010 10A, IEC 60320 C13 connector (mold 052)

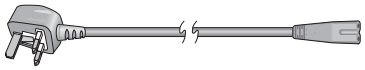




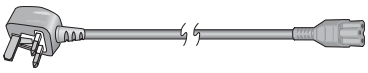
Connector angles available

The official plug standard in the United Kingdom since 1962.

86552100 2.5A, IEC 60320 C7 connector, BS 1362 3A fuse.



86245030 2.5A, IEC 60320 C5 connector, BS 1362 5A fuse.



86240340 3A, 50/10mm strip, BS 1362 3A fuse.

86240350 5A, 50/10mm strip, BS 1362 5A fuse.

86240140 10A, 50/10mm strip, BS 1362 10A fuse.

86240240 13A, 50/10mm strip, BS 1362 13A fuse.

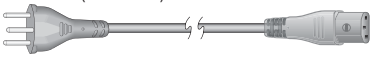
86240150 10A, IEC 60320 C13 connector (mold 052), BS 1362 10A fuse.

Swiss standard plug pattern.

86285330 2.5A, IEC 60320 C5 connector

86285000 10A, 50/10mm strip

86285010 10A, IEC 60320 C13 connector (mold 052)

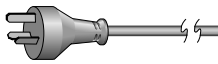


Used in Australia, New and Papua New Guine

Department of Fa

86532110 2.5A, IEC 60320

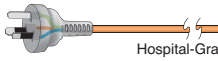
86211250 2.5A, IEC 60320



86210020 10A, 50/10mm st

86210030 10A, IEC 60320 C connector (mold 052)

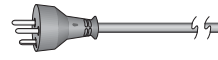
86210150 10A, IEC 60320 C connector (mold 052)



86210140 10A, IEC 60320 C connector (mold 052)

Class I Danish plug. D Schuko for Denmark be be properly grounded.

86280930 2.5A, IEC 60320



86280000 10A, 50/10mm st

86280010 10A, IEC 60320 C connector (mold 052)

86280710 10A, IEC 60320 C

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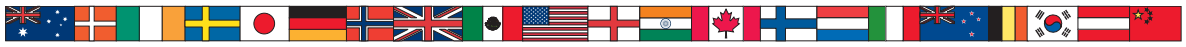

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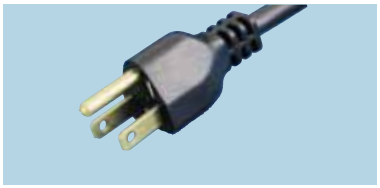
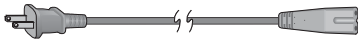


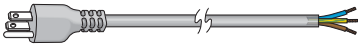
Used in Canada, USA, Mexico, Japan, parts of Korea, Taiwan, Central America, Colombia, Venezuela, Ecuador, and the west coast of South America. Not shown: 5-15 angle plugs; 5-20, 6-15, and 6-20 plugs; and hospital-grade cords.

86532120 NEMA 1-15, 3A, IEC 60320 C7 connector



86220365 NEMA 5-15, 2.5/7A, IEC 60320 C5 connector

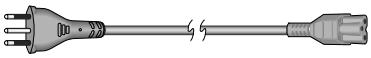
70413000244 NEMA 5-15, 10A, 50/10mm strip



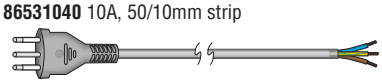
70401020244 NEMA 5-15, 10A, IEC 60320 C13 connector (mold 052)

The Italian system is used in Itay, Libya, Ethiopia, and Chile and is also used in parts of Northern Africa.

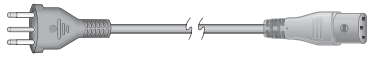
86260390 2.5A, IEC 60320 C5 connector



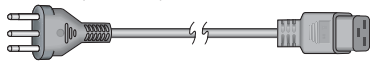
86531040 10A, 50/10mm strip



86394000 10A, IEC 60320 C13 connector (mold 052)

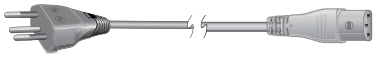


86260060 16A, IEC 60320 C19 connector (mold 011)



The Brazil plug is specified in Brazilian standard NBR 14136:2002.

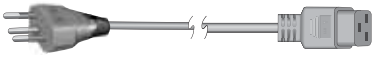
86286110 10A, IEC 60320 C13 connector



86518050 10A, 50/10mm strip

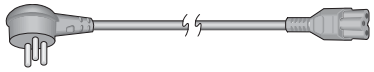
86286500 16A, 50/10mm strip

86286510 16A, IEC 60320 C19 connector (mold 011)

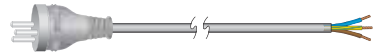


Israel's standard plug pattern.

86275250 2.5A, IEC 60320 C5 connector

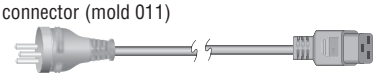


86275000 10A, 50/10mm strip



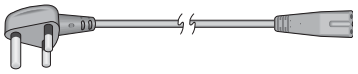
86275010 10A, IEC 60320 C13 connector (mold 052)

86275060 16A, IEC 60320 C19 connector (mold 011)

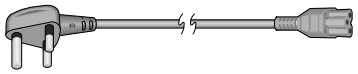


The Class I used in India and South Africa

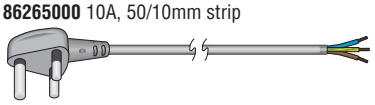
86532130 2.5A, IEC 60320 C7 connector



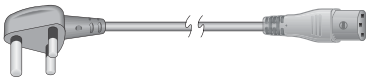
86265350 2.5A, IEC 60320 C5 connector



86265000 10A, 50/10mm strip



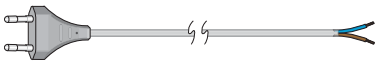
86265010 10A, IEC 60320 C13 connector (mold 052)



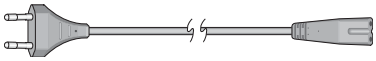
86265070 16A, IEC 60320 C19 connector (mould 011)

Class II, ungrounded Europlug. Used in Europe and western Asia. Also used in the Middle East, most of Africa, South America, and many developing nations.

86532032 2.5A, 31/7mm strip



86532100 2.5A, IEC 60320 C7 connector



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21 Plug Patterns... *and Counting*

Our second in a series of articles covering the 21 worldwide plug patterns

By Kari DeBruin

We are pleased to be continuing the series of articles devoted to describing the 21 standard plug patterns that are currently used throughout the world. In our last edition, we covered the plugs from the Continental European "Schuko," Euro, UK, India/South Africa and Israel. In this edition, we will be focusing on the plugs of Denmark, Argentina, Australia and China.

We will begin by taking a look at the plug from Denmark.

The standard Danish plug is described in DEMKO publication Afsnit 107-2-D1 and is unique to Denmark.

The Danish plug has a pin pattern similar to the standard Schuko CEE 7/7 plug, but grounding is achieved by use of a short ground pin. Although the standard Schuko CEE 7/7 plug fits the Danish socket, it will not be grounded, which may result in serious safety hazards and liability exposure for the manufacturer. For this reason, it is important to use a Danish plug on equipment being exported to Denmark. In addition, the cord sets have a maximum output rating of 16A/250VAC. All cord sets carry the appropriate approvals.

A variation of this plug and socket standard has been developed for use in computer circuits that are especially sensitive to power line spikes and surges. This data plug has pins that are flat and not round with a rating up to 16A/250V.

The Danish hospital-grade plug and socket are recommended for use in medical applications and specifications are being added to the standard SB 107-2-D1, which was published at the end of 2003. The socket is designed to prevent "normal equipment" from being connected and disrupting the mains circuit in specific medical settings. The medical plug has a round line pin and a flat neutral pin with a rating of up to 16A/250V.

Next, we will be discussing the plugs of Argentina, Australia and China. These plugs resemble each other; they have similar pin patterns, however, they have slight body variations, wiring alterations, and different pin sizes.

Now, let's discuss the plug from Argentina.

The standard plug for Argentina is

defined by IRAM 2073. IRAM is the standards agency for Argentina. The Argentine plug, which is used in Class I applications in Argentina, is similar in appearance to the Australian plug. However, this plug differs greatly from the Australian plug—the pins are 1mm longer, the body dimensions change slightly and most importantly, the wiring differs. The positions of the line and neutral contact pins are reversed. For this reason, great care must be taken when manufacturing equipment for export to Australia and Argentina, as well as specifying the correct power cord or cord set for use with equipment. The Argentine plug also resembles the Chinese plug pattern, however, there is a slight variation in body dimension.

The Argentine plug is a 3-wire, grounded plug, rated at 10A/250VAC. The cord set is terminated with an IEC 60320 connector rated at 10A. Argentina does not have a designated medical-grade standard.

We will now take a look at the plug from Australia.

Australia's plug and socket system is described in SAA document AS/NZS 3112. The Australian standard is also used in New Zealand, Fiji, and Papua New Guinea. The Australian plug mates with the Peoples Republic of China's (Mainland China) socket – although there are some slight differences. While the pin pattern is the same as the Chinese and Argentine cords, they are not able to be used in these countries. As mentioned, the Chinese and Argentina pins are 1mm

longer. They also do not carry the correct approval markings. In addition, the Australian cords have the line and neutral wired opposite from the Argentine cords.

Standard plug and socket rating is 10A, but 15A and 20A models are also available. In the 15A, the ground pin is larger; in the 20A all three pins are larger. This prevents a 20 amp plug from being plugged into a 10 amp socket, since the pin size is not the same. The Class II cord set is rated at 2.5 amps. The line and neutral pins are partially insulated to protect against accidental shock while plugging and unplugging the plug. The cord sets can be terminated with a variety of IEC 60320 connectors and have a maximum output rating of 10A/250VAC.

Australia has several state electrical testing agencies; the others accept a component approved at one of the other agencies. The Australian agencies also accept component approvals, the New Zealand electrical testing agency (the Ministry of Economic Development), and vice versa.

Australian medical equipment used in Australia must meet AS/NZS 3200 series. There are no special requirements for cord sets, only preferences. All Australian cord sets must use a plug approved to AS/NZS 3112 and a connector approved to IEC 60320-1, or the equivalent Australian standard. Cord sets for use in Australian medical applications are preferred by some hospitals to have a clear, transparent plug and connector, and orange, flexible cable. These plugs and connectors must carry an Australian approval.

Lastly, let's discuss the plug from China.

The plug and socket pattern for use in China is specified in publications GB 2099-1 and GB 1002-1. The Chinese plug is a 3-wire, grounded plug rated at 10A/250VAC used in Class I applications in China.

As noted earlier, the plug is nearly identical to the Australian plug pattern

except that the contact pins of the Chinese plug are 1mm longer and the plug body dimensions vary slightly. The cord sets can be terminated with a variety of IEC 60320 connectors and have a maximum output rating of 10A.

China requires that plugs, connector couplers, and cable used in the construction of the Chinese cord sets be tested and approved by the China Commission for Conformity Certification of Electrical Equipment (CCEE) and must bear the CCC mark. China does not have a medical grade standard.

For more information on plug patterns, please see our whitepaper, "National Power Mains." A link is available on our home page at www.interpower.com. You can also download our "Guide to International Cords" simply by clicking on our "Product Design Library" tab. For your convenience we have also included a copy of the guide in this edition of InterPower Source. Be sure to check out our next article on plug patterns in the next edition of InterPower Source. We will be discussing the plugs of Japan, Brazil, Italy and Switzerland.

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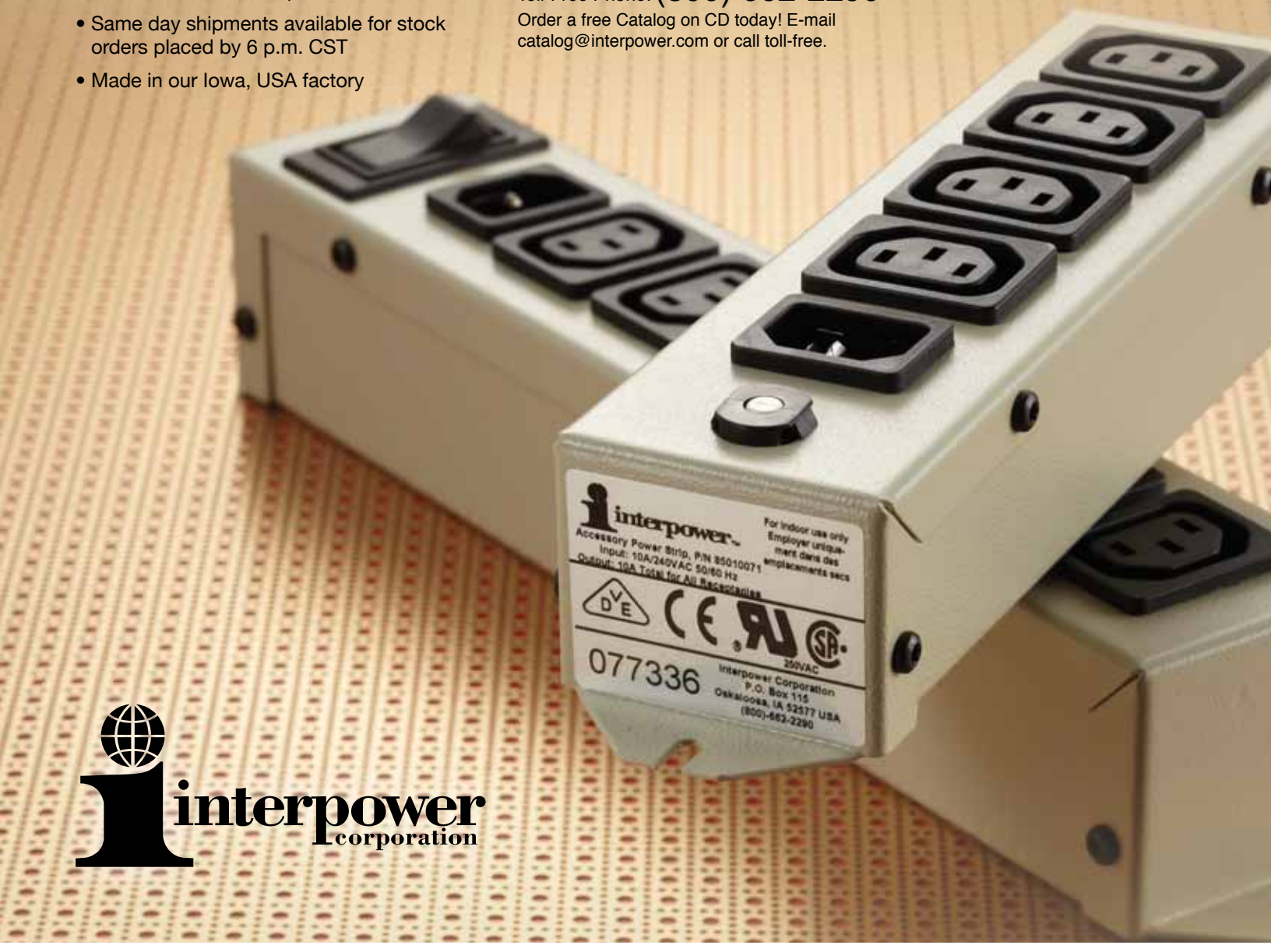

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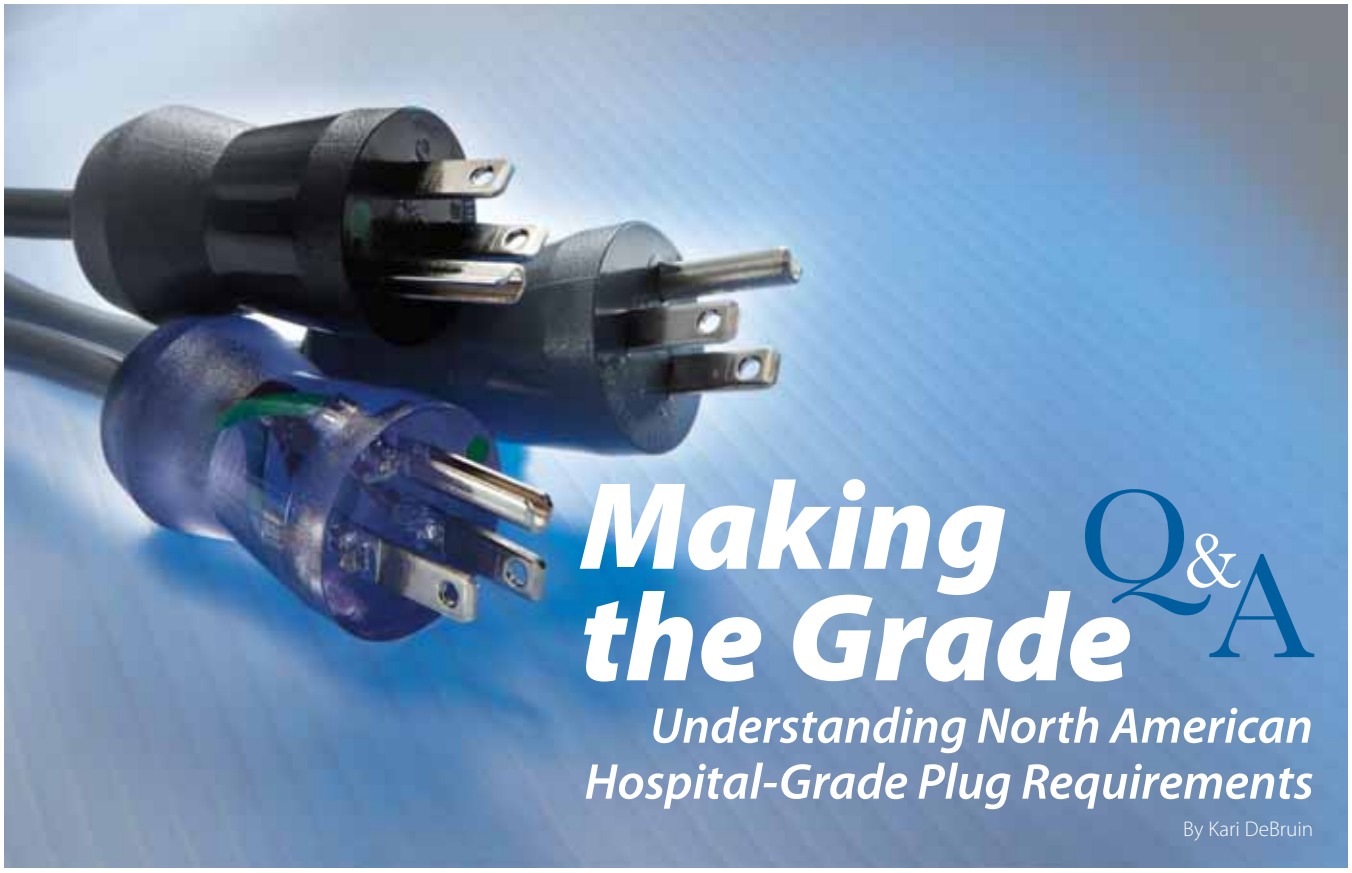


Making the Grade Q&A

Understanding North American Hospital-Grade Plug Requirements

By Kari DeBruin

When designing, using, or ordering products for use in a hospital/ medical setting, some electrical plugs and/or sockets may need to meet a different set of requirements to ensure safety to the user and to the patient. The following Q&A is designed to address the purpose and differences of using Hospital-Grade electrical plugs and sockets.

Q What is Hospital-Grade?

When discussing plugs and sockets, 'Hospital-Grade' is a description of those that have met special UL and CSA requirements. Hospital-grade plugs, connectors, and receptacles are identified by the markings of the phrase 'Hospital-Grade' and have a green dot. One or both of these markings can be on the face of the plug or other external surfaces of the plug. Receptacles must have these markers visible after installation. The presence of these two identifiers signifies that they have been designed and tested for grounding reliability, assembly integrity, terminal strength, impact resistance and durability.

Q When is Hospital-Grade Necessary?

Medical equipment used in hospital settings where patients could be connected to equipment, are required to meet medical equipment standards UL 60601-1 (refers to patient-care equipment and patient vicinity) and CAN/CSA C22.2 No. 60601, which require the use of a cord set using a medical grade plug as described in power supply cord standards UL 817 and CAN/CSA C22.2 No.21; and attachment plug standards UL 498 and CAN/CSA C22.2 No. 42.

Currently only the NEMA 5-15, 5-20, 6-15 and 6-20 straight-blade devices may be marked 'Hospital Grade' per Supplement SD of UL 498. The requirements basically center on the need for a more robust plug and a more reliable ground connection.

The hospital-grade receptacle is required in areas of a hospital where reliable medical equipment function is critical. Typically, the electrical contractor will determine the type of receptacle used. In some cases, the electrical contractor will specify the use of hospital grade receptacles throughout an entire facility, including administrative and public areas.

Q Do we need Hospital-Grade certifications when purchasing electrical plugs and sockets?

Possibly. It depends on which approval agency that is being used, the type of equipment, and where it will be used. UL, CSA, and ETL, can test the equipment to a medical standard and then issue the

certificate. In North America there is UL 60601-1 Medical Electrical Equipment, Part 1 Gen Requirements.

Why does someone need certification?

National standards and electrical codes require certification. In order to get a medical device approved, the components standards must be met first. For more information, you can refer to the NEC's website at www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70.

Where do I get certification?

In the United States and Canada you can go to the UL and CSA websites at: www.ul.com and www.csa-international.org.

What other countries have Hospital-Grade or Medical Requirements for their plugs and sockets?

At this time, Australia, Canada and Japan have hospital grade requirements.

Australian medical equipment must meet AS/NZS 3200 series. There are no special requirements for cord sets or plugs, only preferences dictated by individual medical facilities. All Australian cord sets must use a plug approved to AS/NZS 3112 and a connector approved to IEC 60320-1, or the equivalent Australian standard. Many hospitals prefer that the cord sets have a clear, transparent plug and connector, and orange, flexible cable. These plugs and connectors must carry an Australian approval.

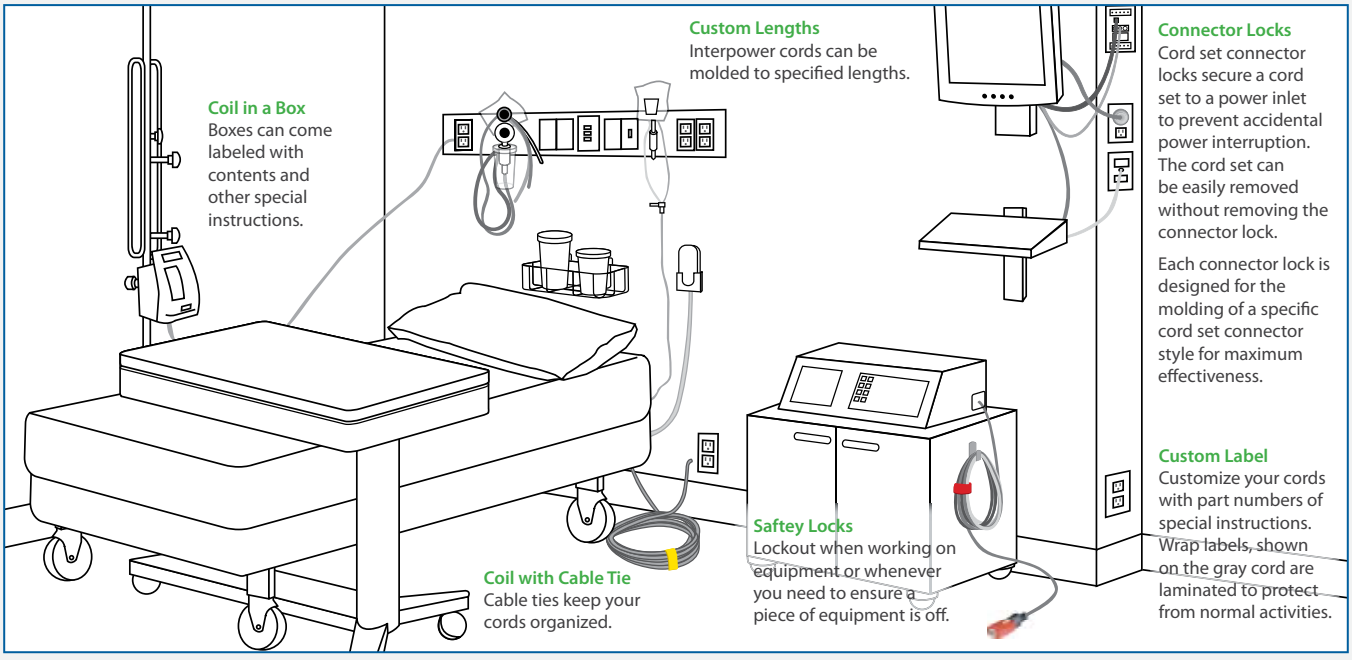
Canadian requirements are that the hospital-grade power cords and cord sets meet CSA standard C22.2 No 21-95. Section 4.10.2.5 of this standard states, "Hospital-Grade attached plugs and cord connectors shall only be molded on type SJO, SJT, SVO, SVT, or other jacketed type cord of at least equal serviceability. The bonding of the conductor of power supply cords and cord sets longer than 3 meters shall not be smaller than No. 16 AWG." Any 3×18 AWG molded hospital-grade cord over 3 meters in length will only carry UL approval and will NOT carry CSA approval. This applies to all cord set manufacturers.

There are alternative solutions that will allow you to maintain CSA approval on your products. These solutions include having cord sets shorter than 3 Meters (if 18 AWG is required), different cable sizes (16 AWG instead of 18 AWG).

In Japan, the medical-grade standard is JIS T1021, however, the hospitals make the final decision of whether or not they want to use a medical-grade plug.

The other international medical markets, including European markets, typically must meet EN/IEC 60601-1. At this time, there are no special performance or construction requirements for cord sets used in these applications. Cord sets typically will be Class I (with ground), PVC molded and black in color.

Similar to having different plug patterns, international markets do not have one standard for medical equipment. When designing, using, or ordering electrical components for use in a hospital/medical setting, make sure to verify the standards and regulations that need to be followed.



Above is an example of a typical hospital room illustrating the benefits of utilizing Interpower products.

[BIS APPROVALS]

What do you Need to Know?

By Kari DeBruin

What is BIS?

The Bureau of Indian Standards is the organization that once operated as the Indian Standards Institution (ISI), which was established under the Resolution of the Department of Industries and Supplies No. 1 Std.(4)/45, in 1946. The ISI was registered under the Societies Registration Act, of 1860.

In 1986, the Bureau of Indian Standards (BIS) was established by the Bureau of Indian Standards Act and operates as the National Standards Body of India, working under the guidance of the Ministry of Consumer Affairs, Food & Public Distribution, and the Government of India. The Bureau consists of over 20 members assembling from Central and State Governments, science and research organizations, industry and consumer groups.

BIS has 14 division councils whose main function is to create, establish and award approvals of the Indian Standards, aiding the country's industry in upgrading and regulating the quality of their products and services. Laboratories are set up in India to conduct the testing of chemicals, food, mechanical and electrical products. Some outside labs are also used as needed. BIS has published more than 18,000 Indian Standards (IS) and Priced Publications (PP) which are available for sale. Over 300 new standards and amendments are published each year.

Who needs BIS Approvals?

In 1999, BIS began the "Product Certification Scheme" for those wanting to export to India. This scheme allows foreign manufacturers to seek certification from BIS for marking their product(s) with the BIS Standard Mark. To date, BIS has granted more than 30,000 licenses to companies that manufacture products ranging from electronics to agricultural to textiles.

The scheme is voluntary; however, the Government of India has enforced mandatory certification on a variety of products. While BIS continues to grant licenses on application, the actual enforcement of the required certification is done by the notified Indian authorities. A complete listing of items requiring mandatory certification is available at: http://www.bis.org.in/cert/man.pdf.

For products that are listed on the mandatory certification list, the foreign manufacturer may be required to establish a presence in India (by setting up a liaison office) with the approval of the Reserve Bank of India which will meet all liabilities with respect to the BIS Act, Rules and Regulations for purpose of the BIS license. If BIS determines that a liaison office is not required, a legally appointed Authorized Representative located in India may be responsible for overseeing compliance.

How do I get BIS Approval?

Each product and/or Indian Standard requires a separate application. The location at which the product is manufactured is granted the BIS license. Once the product is tested and conforms to the relevant Indian Standards, the BIS Standard Mark can be applied. To obtain a BIS license, an application must be submitted to BIS along with an application fee. Applicants need to be mindful that the application process may take time and therefore should plan accordingly. Applications are available at: http://www.bis.org.in/forms/pcfrm.htm

Licenses are granted if:

- the BIS Officers find that their preliminary inspection and testing of the samples are satisfactory
- the applicant has the necessary manufacturing & testing facilities per relevant Indian Standards
- the applicant has permanently employed testing personnel
- the applicant complies with the requirements mandated in Scheme of Testing & Inspection (STI)
- the applicant pays the BIS Marking Fee

Once a license is granted, the applicant must pay annual marking and license fees. Then, the licensee is required to pay quarterly fees based on the amount of products marked according to the prescribed marking fee rates.

Licenses are valid for one year. License renewals are for periods of one to two years as long as there appears to be a satisfactory operation of the license by the license holder. This is determined through periodic inspections, and acceptable factory and independent testing of samples drawn from the factory and the market.

At this time, according to India Standard IS1293 plugs, sockets, and cord sets are not included on the mandatory certification list and therefore, do not have to carry the BIS Standard Mark.

Sources:
Procedure for Grant of License. 2011. Bureau of Indian Standards. 16 Nov. 2011 <http://www.bis.org.in>

Brief of Certification procedure for Foreign Manufacturers. 2011. Bureau of Indian Standards. 15 Nov. 2011 <http://www.bis.org.in/cert/fm.htm>.

BIS Sales Portal. 2011. Bureau of Indian Standards. 16 Nov. 2011 <http://www.standardsbis.in/Gemini/home/Home.action>

Upcoming Trade Shows

Each year Interpower Corporation attends shows throughout the United States and Europe. Not only does it give us the opportunity to display and highlight our products, but it also gives us a chance to visit with you. Stop by and see us at one of the following shows.

February 14–16	**MD&M West** at the Anaheim Convention Center in Anaheim, CA; Booth # 3408
February 22	**Quality Test and Measurement Virtual Show**
March 7	**Medical Equipment Design Virtual Show** *www.globalspec.com/events/upcomingevents*
March 14–16	**MD&M TX** at the Fort Worth Convention Center in Fort Worth, TX; Booth # 310 *www.globalspec.com/events/upcomingevents*

A Family Tradition Continues

One of the Oldest Single Family Representative Firms in the Country.

By Judy Nunnikhoven

Interpower Corporation enjoys a good working relationship with their Manufacturers Sales Representatives, which allows them to delight their customers. Customers can order and work with Interpower's knowledgeable Customer Service Department directly, or with their local sales representative. Interpower's sales representatives are very knowledgeable in their products and will be glad to visit with you directly for assisting in a design application, placing a sample or sales order, or expediting existing orders. A complete list of all of Interpower's Manufacturers Sales Representatives can be found on page 26.

Interpower's Sales Representative in the New England area, since 2002, is Ray Perron & Company, which represents several companies with synergistic lines of electronic and electro-mechanical components, power supplies and sub systems. Their mission is "To provide our customers, Principals and distribution partners with exceptional sales and service in the New England region; to provide our employees with exceptional support and opportunities to succeed; to support a variety of philanthropic causes to the best of our ability."

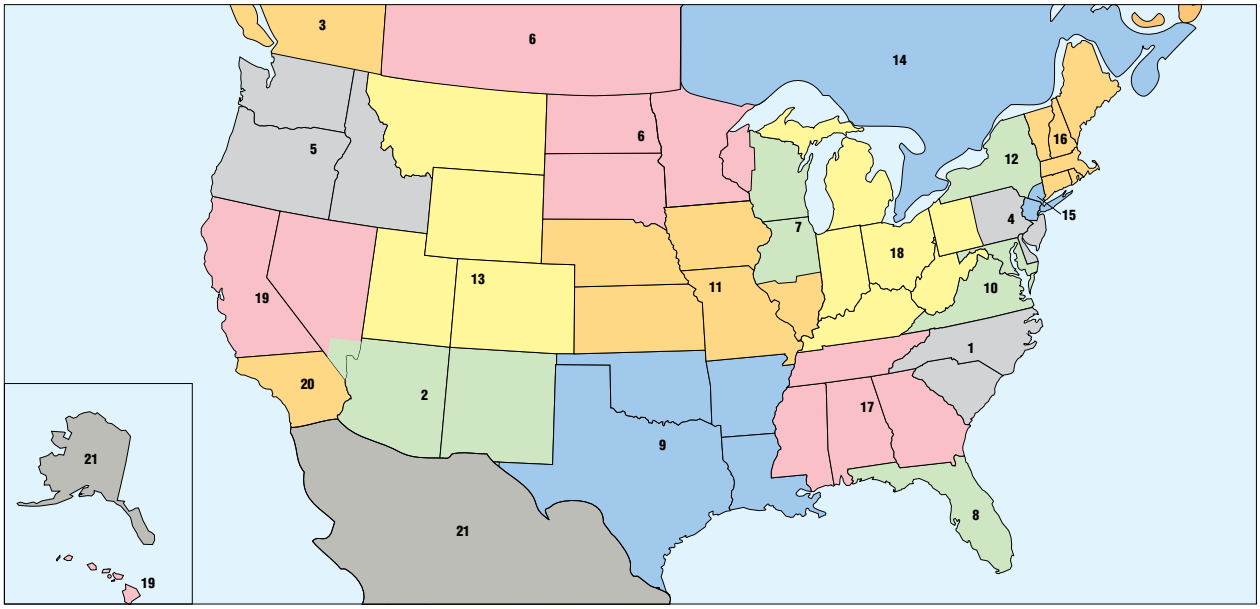
Ray Perron & Company has been carrying out their mission since 1936 and is one of the oldest single family rep firms in the United States. Ray Perron began with 3 phone lines in his basement and watched his company expand during the changes World War II brought to the New England electronics market. The company saw large growth again during the expansion of the telecommunications age. Ray's son Dean joined the firm in 1963. The current owner, Ray's grandson Steve, joined the firm in 1991.

Steve recalls an instance a few years ago when he was able to help a customer in a panic. This customer was following up on what they believed to be a late order. The customer asked Steve and his staff to see if they could expedite the PO so they could meet their "end of quarter" shipments. After much searching of both Ray Perron & Company and Interpower's systems, they realized that they had never received the PO. The customer rechecked their system and realized the order had never been sent. Ray Perron & Company and Interpower Corporation worked together and were able to ship the customer their parts the same day, at no additional cost, so they could meet their goals.

Ray Perron & Company has had many interesting requests throughout the years. One of their more interesting requests was for an Interpower cord set that was needed for a piece of surgical equipment used by the U.S. military in Afghanistan.

Ray Perron & Company has 5 employees that would be happy to assist you with your needs. Ray Perron & Company is located in Needham, MA and they cover Massachusetts, New Hampshire, Connecticut, Maine, Vermont and Rhode Island. Their phone number is 781.449.6162 and their fax number is 781.444.1074. You can also reach them by email at tkelley@rpc.inc or visit them on the web at www.rpc.inc.

Looking for an Interpower Corporation Sales Representative?



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InterPOWER *Pointz*

By Ralph Bright

There are two types of filters: a standard Electromagnetic interference and Radio Frequency interference filter, known as the EMI/RFI filter and the medical-grade EMI/RFI filter. Filters may be shielded or unshielded determining how much noise radiates out of or into the equipment. This article will explain the role of filters and the types of EMI/RFI filtering for your equipment.

What is the purpose of a filter?

Filters play an important part in equipment design, especially in high frequency and medical equipment applications. An RFI/EMI filter is an electrical circuit that is designed to remove electromagnetic and radio frequency interference (noise) from the equipment. This prevents malfunctions due to interference and also prevents the equipment from radiating noise, which might interfere with other equipment.

The typical frequency filtered is 10,000Hz to 30,000,000Hz for noise picked up and conducted through external wires or power cords. 30,000,000Hz to 1GHz is the frequency filtered for noise that is radiating and being picked up through the air. Low-leakage filters are used for medical purposes, as they provide low levels of leakage current to meet patient safety requirements.

What is EMI/RFI interference?

Interference is a phenomenon that is generated in nature and in electrical equipment as a result of switch closures, and by motors, inductors, and various other complex electrical circuits. EMI/RFI is conducted from the point of origin either through the cables or by radiation through air. In either case, it may present performance problems for adjacent equipment. For example, they can affect the electrical circuit because of electromagnetic induction or electromagnetic radiation from external sources. These disturbances can interrupt, degrade and/or limit the performance of the circuit itself.

EMI and RFI are sometimes considered as separate entities, but many companies and organizations tend to combine these terms into one. By definition, EMI and RFI have their own individual frequency ranges, which heavily overlap.

Are there regulations in place to help control these issues?

Many countries have requirements for products to meet Electromagnetic Compatibility (EMC) standards, but it did not start out that way. Here is a brief history:

1933 – The International Electrotechnical Commission (IEC) meets in Paris to deal with the problem of EMI. What came out of these meetings are the building blocks for what we have in place today.

1979 – Legal limits imposed by the FCC in the United States on electromagnetic emissions.

1985 – European Union adopts EMC directives and it is the first time there were legal requirements on emissions on products intended for the "general population."

How are the electromagnetic emissions measured?

There are three forms of measurement: insertion loss, common mode insertion loss and differential mode insertion loss.

Insertion loss is the value (in dB) determined from a ratio of the voltage passed through the equipment without filtering, versus the voltage passed through the equipment with filtering.

Common mode insertion loss is used to express the amount of signal lost on both the line and the neutral conductors (when referenced to ground), due to removal of interference or noise by the filter circuit.

Differential mode insertion loss is used to express the amount of signal lost on either the line or the neutral conductors (when referenced to the other, i.e. between line and neutral), due to removal of interference or noise by the filter circuit. Insertion loss values are typically based on the results of a 50ohm test circuit.

How is medical equipment different?

Medical equipment must meet special requirements as it pertains to fusing and filtering. Patient connected medical equipment can be subjected to low-leakage current requirements. The use of a low-leakage filter in the 5μA range at 250VAC is desirable. In addition, fusing of both line and neutral connectors may be required (i.e. double fusing).

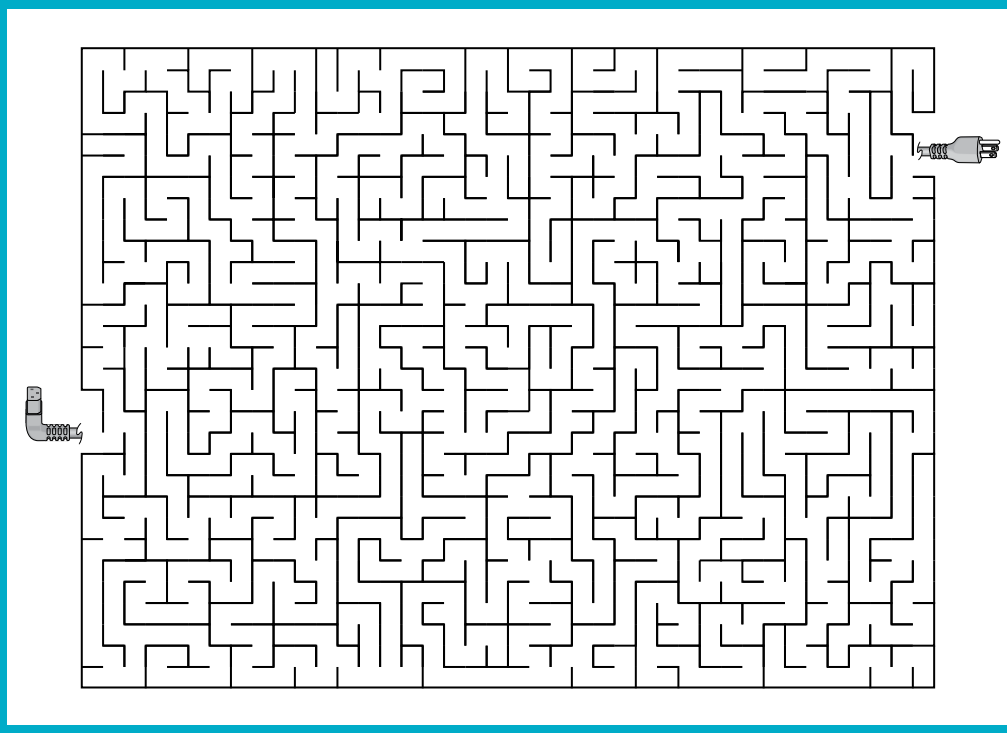
POWERSOURCE *Play*

fun FACTS

1. What does AWG stand for?
2. What does the <HAR> mark on cable mean?
3. How many Underwriters Laboratory (UL) standards are there?
4. How much copper is used in the U.S. annually?
5. What is a CE marking? What does it mean?

You can find the answers to the fun facts at the bottom of this page.

MAZE



For answers to the maze this month, please go to www.interpower.com /ic/answers

1. American Wire Gauge 2. A marking on cable to indicate that it is harmonized cable. Harmonized cable is made in Europe to the HD 21 and HD 22 standards. Cable made elsewhere can be made to these standards, but will not be allowed to display the <HAR> mark (interpower.com) 3. UL has developed more than 1000 standards for safety (UL.com) 4. The amount of copper products consumed in the U.S.A. this past year would make a size 12 AWG wire that could encircle the Earth 2,630 times or make 140 round trips to the Moon. (copper.org) 5. The CE marking is a mandatory conformance mark on many products placed on the market in the European Economic Area (EEA). With the CE marking on a product the manufacturer ensures that the product is in conformity with the essential requirements of the applicable EC directives. The letters "CE" stand for "Conformité Européenne" ("European Conformity"). (Wikipedia.com)

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