Nexans

RoHS and WEEE Overview and Recommendations

February 2012

Issue 3

DATA COMMUNICATIONS COMPETENCE CENTER

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Executive Summary

The increasing global awareness of the impact of products and manufacturing processes on the environment has prompted efforts to control and minimize this impact. In 2006, the European Union implemented a set of requirements for the production of specific families of products and materials with the intent of reducing and eventually eliminating negative environmental impact. These requirements, generally known as RoHS and WEEE, have been referenced or adopted by many nations as they move toward increased environmental responsibility. This White Paper will discuss the present status of RoHS as well as the new RoHS 2 directive which was adopted by the European Parliament in 2010 and will probably be implemented by member states in 2013. In addition, this White Paper will discuss the voluntary phase out of the manufacture and sale of DBDE, one of the substances regulated by RoHS, in the US.

Introduction to RoHS and WEEE

The Restriction of the use of Hazardous Substances (RoHS) is a legal standard issued by the European Economic Union in 2003 (Directive 2002/95/EC). The directive bans the sale of new electronic equipment into Europe if it contains more than trace amounts of six substances defined as hazardous. This ban came into force throughout Europe on July 1, 2006.

The Waste Electrical and Electronic Equipment initiative (WEEE) sets recovery, reuse and recycling targets for each of ten categories and took effect on December 31, 2006 (Directive 2002/96/EC). Information Technology and Telecommunications Equipment comprises one of these ten categories within WEEE and specifically addresses the markets for data and telecom cabling products. However, the primary material content concerns for cabling products are addressed under RoHS, so RoHS will be the focus of this article.

Although RoHS is a European Union Directive that currently applies only to Europe, global efforts to reduce usage of hazardous substances have accelerated. Since the goal of RoHS is to restrict the use of these substances in equipment that will eventually accumulate in local landfills or local dumpsites resulting in environmental contamination concerns, it is gaining wider attention throughout the world.

For instance, in the United States, several states have enacted legislation that requires equipment manufacturers to comply with RoHS requirements. Many states are also considering bans or restrictions on materials and products regulated by RoHS. Requirements for verification of product or material compliance to RoHS standards have become more common in the United States.

New amendments to RoHS were approved on November 24, 2010 by the European Parliament for implementation by member states of the European Union. Implementation of this revision, now referred to as RoHS 2, can begin as early as October 2012 within the European Union. However, many believe member states will not begin enacting RoHS 2 until 2013.

No changes were made to the list of restricted substances in Annex II and their permissible concentration levels between the original version of RoHS and RoHS 2. However, RoHS 2 states that additions to the restricted substances list must be considered prior to July 22, 2014. Those involved in the commenting process for RoHS 2 believe that future additions to the restricted substances list will be harmonized with REACH, making compliance with both directives easier.

Globally, Japan has had a program to reduce lead contamination for years. China has adopted RoHS and Korea has enacted a voluntary RoHS compliance program. Although adoption of a program of the magnitude of RoHS may not be global, most nations conduct, or will conduct trade with partners that have adopted such a program. As such, it is incumbent upon commercial or national entities to review their product portfolios in light of RoHS (and similar) program requirements.

What Materials are Restricted?

RoHS restricted substances, listed in Annex II with their Maximum Concentration Values (MCV), are:

Cadmium (Cd)	0.01%
Mercury (Hg)	0.1%
Lead (Pb)	0.1%
Polybrominated biphenyls (PBBs)	0.1%
Polybrominated diphenyl ethers (PBDE's)	0.1%
Hexavalent Chromium (Cr6+)	0.1%

These MCV limits apply to each “homogeneous material,” defined by the European Commission as a material that cannot be mechanically disjointed or separated into different materials. Understanding this distinction is important. For example, the total concentration of PDBE by weight in a 100-strand cable may only be 0.02%. Since the limit is 0.1%, this cable initially appears to be RoHS compliant. However, the PDBE concentration in the separatable flame retardant jacket of that cable may be 0.4%, well above the 0.1% limit specified by RoHS. Therefore, this cable would not be considered RoHS compliant under the directive.

The “homogeneous materials” in a data cable are located within all the elements of the cable, including (but not limited to) cable sheaths, strength yarns, armor layers, water blocking powders/yarns/tapes/gels, strands or optical fibers. This distinction regarding “homogeneous

material" is crucial to the manufacturer or vendor as they may be required to prove "due diligence" in ensuring that their efforts towards RoHS compliance include knowledge of the compliance of all materials used in the final product.

For example, cadmium, a RoHS restricted substance, was commonly used in pigments and colorants for plastics in the wire and cable industry. Mercury is used in batteries, electrical switches, computer equipment relays and in some thermometers. Hexavalent Chromium has been used in pigments, dyes, inks, chrome plating and as a wood preservative.

Lead was the predominant thermal stabilizer for PVC in wire and cable applications before the implementation of RoHS. However, the availability of cost effective alternatives to lead stabilizers as well as regulatory efforts such as RoHS have greatly diminished its use in PVC. PBBs were commonly used as flame retardants, but manufacturers ceased utilizing them in the United States in 1976 and globally in 2000. PDBEs are commonly used as flame retardants in a variety of plastics and were granted a RoHS exemption by Commission Decision 2005/717/EC in the original version of RoHS. However, a legal challenge by the European Parliament resulted in the elimination of this exemption as of July 1, 2008.

These examples of restricted materials do not comprise an exhaustive list. The vendor should not assume the absence of these prohibited materials, and if they are present, the vendor needs to determine the concentration. All Nexans LAN cable products manufactured in the US beginning in July 2006 are not only compliant with the original RoHS Directive, they are also compliant with the new RoHS 2 Directive as well. RoHS has granted exemptions for specific applications or product groups and additional exemptions have been identified for consideration during the next review of the RoHS directive. The status of exemption requests that have been accepted for review has not been defined, but reliance upon eventual adoption is not recommended.

Loss of the Decabromodiphenyl Ether Exemption

In 2005, the European Commission exempted from RoHS the use of decabromodiphenyl ether (DBDE) flame retardants in plastics. This exemption was driven by the public safety benefits of flame resistant plastics along with the lack of scientific data showing these materials constituted a health risk when incorporated into plastics. The European Parliament challenged this exemption in court claiming that the European Commission did not follow the correct exemption procedure as stated in Article 5.1b of the RoHS Directive. The European Court of Justice agreed and ruled that the DBDE exemption would end on July 1, 2008.

It should be emphasized that the loss of the DBDE exemption was not due to the discovery of scientific evidence indicating that these materials pose a threat to human health. Instead, the loss of the exemption was due to a procedural technicality related to the exemption process.

Alternatives exist for DBDE flame retardants in plastics and Nexans uses these alternatives in all LAN cable applications requiring brominated flame retardants.

Phase Out of Decabromodiphenyl Ether (DBDE) in the US

As noted above, the elimination of the decabromodiphenyl ether (DBDE) exemption in RoHS occurred in 2008. In 2009, the US EPA began discussions with the two major manufacturers of DBDE in the US as well as the main US importer of this flame retardant. A voluntary agreement was reached in which the manufacture, importation, and sale of this flame retardant by these parties will cease on December 31, 2012. All Nexans LAN cable products were compliant with RoHS when the DBDE exemption was eliminated in July of 2008 and therefore will not be affected by the phase out of DBDE in the US.

What do I Need Tested and How is it Tested?

If you are a material manufacturer, you must establish the compliance of your product against these declared substances. If you use materials in the manufacture of your products, you may attempt to get certification of compliance from the material vendor. This certificate should detail the content percentage (or declare the absence) of RoHS proscribed materials. (This answers my earlier question, but I think this needs to be briefly referenced above.)

The American Society of Testing and Materials (ASTM) International has created Committee F40 on *declarable substances* in materials to help industries develop standards and test methods to be used in verifying compliance. Until such developments yield results, most labs are using current tests to establish concentrations of these substances in homogeneous materials.

How Can I Identify a RoHS Compliant Product?

There is no current requirement, globally or in the United States, for the implementation of a RoHS compliance application mark, nor have third party auditing procedures by independent bodies been specified. At present, vendors are required to self–declare compliance to RoHS for products entering Europe. For those who want to verify the RoHS compliance of products they purchase, many labs offer RoHS related testing services and handheld testers are available which can inspect parts for their RoHS elemental content.

The main problem with RoHS compliance testing occurs when bromine is detected in a plastic. When this occurs, additional testing must be carried out to determined it any of the

brominated material present is a decabromodiphenyl ether (DBDE). All laboratories offering RoHS services and all of the RoHS handheld testers can easily identify the presence of bromine. However, few of the labs offering RoHS testing services and none of the handheld testers can determine if the bromine in question is a DBDE. The testing to conclusively identify a brominated flame retardant as a DBDE at times requires specialized equipment and can be very expensive.

Unfortunately, some people incorrectly believe that if they find bromine in a plastic article, the article is not RoHS compliant. The reality is that most of the brominated flame retardants sold in this country for use in plastics are based on RoHS compliant substances. None of the brominated flame reatardants used by Nexans are based on DBDE's.

Conclusion

Although RoHS and RoHS 2 are European Directives, Nexans believes that the global nature of the world's economy requires RoHS compliance for all Nexans LAN cable products. The original RoHS Directive was implemented in 2006 and the implementation of RoHS 2 in Europe should begin in 2013. The only major change affecting the LAN cable industry involving RoHS 2 versus the original RoHS directive is that additions to the regulated substances list in Annex II are to be proposed by July 2014 for adoption at a later date. It is the opinion of Nexans that any future additions to the RoHS 2 restricted substances list in Annex II will be coordinated with the REACH SVHC Candidate List. Nexans will monitor upcoming changes to RoHS 2, but fully expects Nexans LAN cable products to remain compliant in the future.

Data Communications Competence Center

Nexans' Data Communications Competence Center, located at the Berk-Tek Headquarters in New Holland, Pennsylvania, focuses on advanced product design, applications and materials development for networking and data communication cabling solutions. The Advanced Design and Applications team uses state-of-the-art, proprietary testing and modeling tools to translate emerging network requirements into new cabling solutions. The Advanced Materials Development and Advanced Manufacturing Processes teams utilize sophisticated analytical capabilities that facilitate the design of superior materials and processes. The Standardization and Technology group analyzes leading edge and emerging technologies and coordinates data communication standardization efforts to continuously refine Nexans' Technology Roadmap. An international team of experts in the fields of cable, connectors, materials, networking, standards, communications and testing supports the competence center. The competence center laboratories are a part of an extensive global R&D network.