

**Note:**

The following technical article was current at the time it was published. However, due to changing technologies and standards updates, some of the information contained in this article may no longer be accurate or up to date.

RoHS and Siemon's Commitment

RoHS stands for Restriction on the use of Hazardous Substances. It is the European Directive 2002/95/EC that published in the Official Journal of the European Union in February of 2003. The legislation was updated in 2011 under European Directive 2011/65/EU. The RoHS directive provides preventive measures on a legal basis to restrict the use of certain hazardous substances in various types of new electronic and electrical equipment.

Siemon has a long-standing reputation for its environmental consciousness. Over the years, it has won numerous awards including the William O. Jeffrey III IRMCO Environmental Improvement Award, a CBIA Environmental Success Award, induction into the EPA's New England Star Track Program, State of CT DEP Green Circle awards, and ISO 14001:2004 certification.

Siemon has achieved full compliance with the RoHS Directive. Our compliance strategy includes:

- Comprehensive systems that control inbound and outbound finished good and subcomponent material for all Siemon operations and stocking locations
- Identification and qualification of RoHS compliant materials for all of our products.
- Compliant product markings applied to packaging.

The execution of this strategy means that Siemon meets EU directive 2011/65/EU. Specifically:

- All Siemon products shipped to EU Member States from our factories are fully RoHS compliant
- All Siemon products shipped in packaging marked with the  designation are RoHS compliant
- Some Siemon products are not electrical equipment. These items are not in the scope of RoHS and are not legally allowed to carry the CE logo. Packaging for these products will be marked with a leaf  or an arrow , representing that these products do not contain any hazardous substances, as identified in the RoHS or REACH directives.

Specific compliancy requests can be directed to any regional Siemon sales office. For a list of regional contact information, please visit our worldwide offices page.

RoHS Overview

The components used to build current electrical and electronic equipment may contain various hazardous substances and materials. The extraction of these hazardous raw materials and their eventual disposal can damage human health from occupational and disposal exposure as well as to pollute the environment.

As result of these concerns, the RoHS directive was created to protect human & animal health, reduce the occupational risk to recycling personnel, reduce the need for special handling and treatment, and place fewer toxins into landfills and the environment.

In addition, the RoHS directive is also closely linked with the Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU). Electrical and electronic waste (e-waste) is one of the fastest growing waste streams. To solve this e-waste problem, the WEEE directive was created to set collection, recycling and recovery targets for electrical products. The role of RoHS is to reduce harmful substances at the source, and it leads on to a further saving in recycling costs.

RoHS is part of a growing wave of environmental regulations or "green" initiatives. It has been the most complex and expensive undertaking our industry has experienced and has had a direct and significant impact on the entire electronics industry at every level, from the retail store, to manufacturers, distributors, integrators, supply chain and OEMs as well as marketing and R&D etc. Manufacturing companies around the globe are finding that the RoHS compliance is costly and poses significant technical challenges. However, in order to ensure that their products can be freely specified and used throughout the world, compliance is essential.

Understanding the RoHS Directive and associated Guidance Notes is the first step.

Restricted Substances

RoHS is often referred to as the "lead-free" directive, but removing lead alone will not achieve RoHS compliance. Currently, the RoHS directive identifies the following six restricted substances:

- Lead (Pb). Ex. solder alloys, PCB coating, etc.
- Mercury (Hg). Ex. fluorescent lamps and switches
- Cadmium (Cd). Ex. switches, paint, etc
- Hexavalent Chromium (Cr-VI). Ex. metal plating
- Polybrominated Biphenyls (PBB). Ex. flame retardants
- Polybrominated Diphenyl Ethers (PBDE). Ex. flame retardants

These restricted substances are known to be harmful to humans and animal health as well as the environment. Those restrictions are in addition to numerous existing regulations, including Regulation (EC) No 1907/2006 (REACH).

Lead is the first and the foremost substance detailed in the RoHS directive. It is a core component of the solder that has traditionally gone into the manufacture of printed circuit boards (PCBs). The removal of lead from the PCB production process represents a challenge for the manufacturer. However, it is a trend that electronics industry is moving towards Lead (Pb)-free or green manufacturing.

In order to achieve RoHS compliance, manufacturers have to find some alternatives for the restricted materials. However, the RoHS/WEEE directives do not call for a total 100% elimination of these substances. RoHS has specified the maximum concentration values (MCV's) for each material.

Effective July 1st, 2006, producers of new electrical and electronic equipment must demonstrate that their products do not contain more than the maximum permitted levels shown in below table:

Restricted Materials	Maximum Concentration Value (MCV)
Lead (Pb)	0.1% by weight
Mercury (Hg)	0.1% by weight
Cadmium (Cd)	0.01% by weight
Hexavalent Chromium (Cr-VI)	0.1% by weight
Polybrominated Biphenyls (PBB)	0.1% by weight
Polybrominated Diphenyl Ethers (PBDE)	0.1% by weight

The MCVs are 0.1% by weight (1000 ppm) in "homogeneous materials" for lead, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenylethers, and 0.01% by weight (100ppm) for cadmium.

According to the commission, "homogeneous" material is defined as a material that cannot be mechanically disjointed into different materials. The term homogeneous is understood as "of uniform composition throughout". Examples include plastics, glass, and metals.

Remember, RoHS compliance is based on each homogeneous material and not components or devices.

Scope - Covered Product Categories

According to Directive 2002-95-EC (RoHS), the definition of "electrical and electronic equipment" (EEE) is equipment which depends on electric currents or electromagnetic fields in order to work properly as well as equipment for the generation, transfer and measurement of such currents and fields falling under the categories set out in Annex I of the directive and designed for use with a voltage rating not exceeding 1000 volts for alternating current and 1500 volts for direct current.

The scope of RoHS or impacted electrical and electronic equipment category is given in Annex I of the directive :

- Category 1: Large Household Appliances (Ex. fridges, washing machines, electric ovens)
- Category 2: Small Household Appliances (Ex. vacuum cleaners, toasters, irons, clocks, scales)
- Category 3: IT and Telecommunications Equipment (Ex. computers, photocopiers, telephones)
- Category 4: Consumer Equipment (Ex. televisions, video recorders, hi-fi equipment)
- Category 5: Lighting Equipment (Ex. fluorescent lamps, discharge lamps)
- Category 6: Electrical and Electronic Tools (Ex. drills, sewing machines, lawnmowers)
- Category 7: Toys, Leisure and Sports Equipment (Ex. video games and consoles, train sets)
- Category 8: Medical Devices
- Category 9: Monitoring and control instruments including industrial monitoring and control instruments
- Category 10: Automatic Dispensers (Ex. drinks machines)
- Category 11: Other EEE not covered by any of the categories above.

In vitro diagnostic medical devices and monitoring and control equipment (category 9) are not currently required to be RoHS compliant. They are required to be compliant by July 22, 2016 and July 22, 2017 respectively.

Exemptions

RoHS directive provides EXEMPTIONS from the restrictions and Scope of Coverage:

- Large-scale stationary industrial tools
- Large-scale fixed installations
- The Annex of the RoHS Directive provides a list of exemptions for certain applications of lead, mercury, cadmium and hexavalent chromium where no current alternative exists.
- There is also an exemption for spare parts used for the repair of equipment put on the market before 1 July 2006. The Regulations do not apply to the re-use of equipment placed on the market before 1 July 2006.
- Military, space, automotive, and implantable medical device EEE are exempt from RoHS Directive, but may be subject to future restrictions.
- Lead in solders for network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunication.

Note: Exemptions to the maximum allowed concentrations of restricted materials exist in cases of technology does not yet allow for substitutions, or when alternatives may have a worse impact on human health and the environment.

A lack of long-term reliability data for lead-free interfaces, the long life of the equipment, and the high costs of product failures drove the exemption for network infrastructure equipment. There has been a great deal of research on lead free solder and this exemption will likely expire July 2016. Siemon products being manufactured in all of

our global locations are 100% lead solder free and therefore do not use the RoHS exemption for network infrastructure equipment.

The list of exemptions is continually changing. Exemptions may be found in RoHS amendment and the RoHS Directive Annex. Information on further pending exemptions may be found at the UK DTI website.

Typically, the exemptions will be reviewed no less than every 5 years.

Who is affected?

The RoHS directive places the responsibility of compliance on the "producer" of the equipment. According to RoHS, the "producer" is defined as any person who, irrespective of the selling technique used, including by means of distance communication according to Directive 97/7/EC of the European Parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts:

- (i) manufactures and sells electrical and electronic equipment under his own brand;
- (ii) resells under his own brand equipment produced by other suppliers, a reseller not being regarded as the 'producer' if the brand of the producer appears on the equipment, as provided for in sub point (i); or
- (iii) imports or exports electrical and electronic equipment on a professional basis into a Member State.

Producers will be responsible for self-declaring if products comply with the RoHS directives or obtain material declarations or certificates from their suppliers. Producers must be able to demonstrate compliance by submitting technical or other information to the enforcing authority on request. They must retain such documentation for four years after the EEE is placed on the market.

Each European Union member state will adopt its own enforcement and implementation policies using the directive as a guide. Failure to comply with the requirements of RoHS Regulations will result in heavy fines, or the removal of manufacturers products from the market place in some EU member states. Member states are obliged to engage in market surveillance according to regulation (EC) No 765/2008.

Although RoHS is a European Union (EU) Directive, manufacturers of EEE outside Europe must also abide by this legislation if their produces are ultimately imported into a EU member state.

The RoHS Directive is a reality. Even if the manufacturer doesn't face regulation directly, its customers probably will, and they will push the requirements down to the manufacturer. Failure to comply will be a competitive disadvantage that can result in customer and market share loss.

Global Impact

The RoHS Directive is not only a single EC market directive; it's leading a worldwide shift to environmental regulation. Since it was introduced in 2003, the RoHS Directive has been a de facto global environmental standard for the world's electronics industry.

In addition to RoHS Directive for Europe, many other countries are making progress toward introduction of their own versions.

In the US, California's Electronics Waste Recycling act of 2003 (SB 20, Chapter 526) used the RoHS Directive as its guide and entered into force on January 1, 2007. Besides California, at least six others states, including New York, Minnesota, and New Jersey have adopted RoHS requirements.

China's Ministry of Information Industry, near the time of the 2006 RoHS deadline, has released the "China RoHS" -The Administration on the Control of Pollution Caused by Electronic Information Products.

Japanese companies have created a non-governmental group (i.e., Japan Green Procurement Survey Standardization Initiative-JPSSI) to standardize Japanese Green Procurement that is also considered to contain more stringent mandates than the RoHS directive. Further, many Japanese manufacturers are changing to lead-free technology as a result of recycling laws. 'Sony Green' is becoming an Industry Understanding.

Thailand has created a high-level governmental committee specifically to monitor the RoHS and WEEE Directives and develop a plan of action. Canada, Taiwan, Korea, and Australia are all in the initial stages of their own versions of the RoHS or WEEE directive, and many other countries can be expected to follow suit soon thereafter.

International companies that are seeking to expand globally must work to ensure that their manufactured products are RoHS or/and WEEE compliance.

International Environmental Compliance Standardization

IEC TC 111 - Environmental standardization for electrical and electronic products and systems, The International Electrotechnical Commission (IEC) created technical committee TC111 in 2004 to address a gap in emerging environmental legislation of Electronic Equipment. The scope of TC 111 is standardization of environmental aspects concerns:

- To prepare the necessary guidelines, basic and horizontal standards, including technical reports, in the environmental area, in close cooperation with product committees of IEC, which remain autonomous in dealing with the environmental aspects relevant to their products;
- To liaise with product committees in the elaboration of environmental requirements of product standards in order to foster common technical approaches and solutions for similar problems and thus assure consistency in IEC standards;
- To liaise with ACEA and ISO/TC 207;
- To monitor closely the corresponding regional standardization activities worldwide in order to become a focal point for discussions concerning standardization;
- EMC and EMF aspects are excluded from the scope of TC111.

For more information on published standards and pending projects under development by this committee, go to www.iec.ch/tc111 .

Reference and Resources:

- European Commission:
http://europa.eu.int/comm/environment/waste/weee_index.htm
- The Department of Trade and Industry (DTI) in the UK has played a major part in the original proposal, development and implementation of RoHS and WEEE. The DTI site also includes an up to date guide to the transposition of the WEEE and RoHS Directives for each EU Member State.
<http://www.dti.gov.uk/sustainability/>
- National Weights & Measure Laboratory (NWML)
<http://www.rohs.gov.uk/>
- The US Commercial Service provides some useful information
<http://www.buyusa.gov/europeanunion/weee.html>
- A California Integrated Waste Management Board site with some useful information
www.ciwmb.ca.gov/Electronics
- This link provides more guidance documents and includes a self-assessment/decision tree to see if the product falls under the scope of the RoHS Directive.
<http://www.pb-free.info/survey/index.htm>
- This US association provides information about upcoming events dealing with WEEE/RoHS in the US.
<http://www.aeanet.org/events/>

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