

RoHS and WEEE – The Essentials

Introduction – What are RoHS and WEEE All About?

The full names of these important EU Directives are:

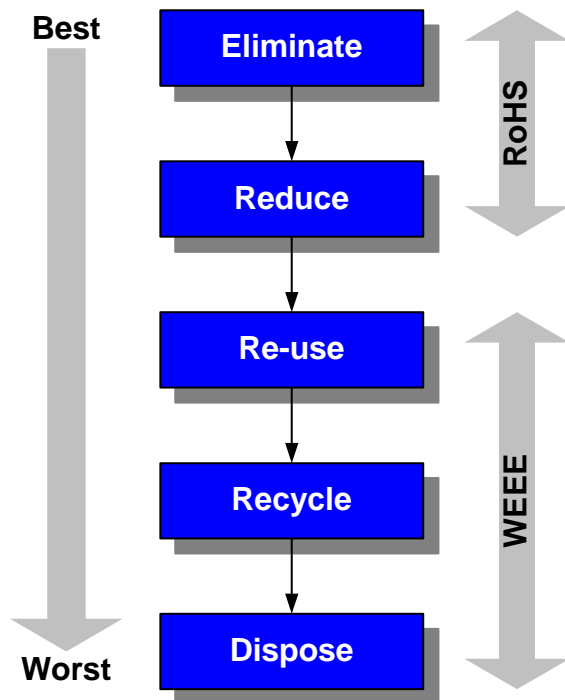
RoHS: Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the **R**estriction of the use of certain **H**azardous **S**ubstances in electrical and electronic equipment – This Directive restricts the use of hazardous substances (lead, mercury, cadmium, hexavalent chromium, PBB and PBDE) in electrical and electronic equipment at the design and manufacturing stage. The RoHS Directive means that products containing restricted substances will have to be redesigned or withdrawn by July 2006.

and

WEEE: Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on **W**aste **E**lectrical and **E**lectronic **E**quipment – This Directive covers the treatment and recycling of WEEE. It is designed to encourage the reuse and recycling of WEEE and to reduce the amount of WEEE being discarded. The WEEE Directive will require producers to pay for at least the collection of their products at end-of-life from central points, and meet targets for re-use, recycling and recovery.

Waste electrical and electronic equipment is the fastest growing municipal waste source in Europe. The two Directives initially started out as a single combined Directive aimed at reducing the environmental impact of WEEE. It was then realized that there was a need to address both the start and the finish of the product life cycle to adequately deal with the concern.

This is best illustrated using the waste hierarchy shown at right.



The Waste Hierarchy



Reducing the environmental impact of a product begins at the design and manufacture stage where eliminating or reducing the use of hazardous substances is most effective – if hazardous substances are removed at source and are not present, then there is no need to specially treat the waste. RoHS deals with the elimination and reduction aspects of the waste hierarchy.

If hazardous substances have been used, then it is best to reuse or recycle the waste to reduce the environmental impact. Only when these have been fully carried out is it acceptable to properly dispose of the waste. WEEE deals with the reuse, recycling and disposal aspects of the waste hierarchy.

Much of the effort and publicity surrounding RoHS and WEEE to date has concentrated on the heavy metals present in circuitry and the issues facing the electronics industry, but if the product is not exempt, then the Directives cover all the materials in WEEE including any plastic materials. Some of the substances included in the RoHS list were, or are, used extensively in plastics (e.g. lead-based stabilizers were once the predominant method of stabilization in PVC, cadmium based colorants have been extensively used in producing red pigments for many types of plastics, and PBB and PBDE are used as flame-retardants). Plastics producers cannot ignore RoHS and WEEE and think that these will go away, particularly since the high volumes of plastics used in many WEEE products means that the plastics must also be recycled to comply with the Directive.

Definitions and Scope

RoHS and WEEE share many common definitions and these are important in deciding if the Directives cover suppliers and products. The relevant definitions are:

1. 'Electrical and electronic equipment' means equipment which is dependent on electric currents or electromagnetic fields in order to work properly, equipment for the generation, transfer and measurement of such currents and fields and equipment designed for use with a voltage rating not exceeding 1000 volts for alternating current and 1500 volts for direct current.
2. 'Producer' means any person who, regardless of the selling technique used:
 - (i) Manufactures and sells own brand electrical and electronic equipment.
 - (ii) Resells equipment produced by other suppliers under his own brand.
 - (iii) Imports or exports electrical and electronic equipment into a Member State.



3. 'Distributor' means any person who provides electrical or electronic equipment on a commercial basis to the party who is going to use it.

4. The product areas covered by RoHS and WEEE are largely the same and are listed in the table below:

Product Category	RoHS	WEEE
Large household appliances	YES	YES
Small household appliances	YES	YES
IT and telecommunications equipment	YES	YES
Consumer equipment	YES	YES
Lighting equipment	YES	YES
Electrical and electronic tools (except for large-scale stationary industrial tools)	YES	YES
Toys, leisure and sports equipment	YES	YES
Medical devices (with the exception of all implanted and infected products)	NO	YES
Monitoring and control instruments	NO	YES
Automatic dispensers	YES	YES
Electric light bulbs	YES	NO
Luminaires in households	YES	NO

This list should be considered as provisional only, see section 'The exemptions' (below). For further details of example products included in each product category see Annex II of the WEEE Directive.

RoHS in Detail

The affected substances

To comply with RoHS, beginning in July 2006 manufacturers will need to demonstrate that their products do not contain more than the maximum permitted levels of:

1. Lead (Pb)
2. Mercury (Hg)
3. Cadmium (Cd)
4. Hexavalent Chromium (Cr VI)



5. Polybrominated Biphenyls (PBB)
6. Polybrominated Diphenyl Ethers (PBDE)

The maximum permitted levels are proposed to be 0.01% by weight for cadmium in any individual homogeneous material and 0.1% for the other substances. Initially there was some debate as to what a 'homogeneous material' was and whether this referred to a component or assembly. This has now been clarified and a 'homogeneous material' is now known to be a single substance such as a plastic, e.g. the plastic used in the insulation of a wire is considered to be a single substance. The assembly of 'wire + insulation' is not considered to be a single substance but a component. A component may contain several different materials that must all be considered separately.

The Exemptions

There are some significant product and application exemptions listed in the RoHS Directive, but these mainly relate to the use of materials in non-plastic applications and are not considered in this Newsletter. A full list of the current exemptions is given in the Annex to the RoHS Directive.

Further product and application exemptions have been applied for, e.g. for light bulbs, and are currently being considered by the EU. It is unlikely that all the exemptions applied for will be granted, but most of them do not affect the application of plastics in WEEE.

Where are the Affected Substances Likely to be Used in Plastics?

In most cases the affected materials have already been phased out for plastics processing due to rising environmental pressures. Examples of previous uses are:

Lead – Lead based stabilizers have been used in PVC for a variety of uses in the past but this has largely been superseded by the use of other stabilizer systems, e.g. Ba/Ca/Sn systems.

Cadmium – Cadmium has been used as a red colorant in many plastics in the past but has been replaced by alternative colorant systems.

Hexavalent Chromium – This is used in metallizing of plastics and is being phased out rapidly by alternative processes that are less environmentally damaging.

PBB and PBDE – These have been used as flame retardants in a range of plastics but substitution with other flame retardants has already largely taken place.



Despite the progress, users of plastics in products that are covered by the RoHS or WEEE Directives are still advised to seek confirmation from plastics raw materials suppliers that the affected substances are either not used or are used in less than the maximum permitted levels.

Proving Compliance and Policing

Proving compliance is likely to require a producer to 'self-declare' compliance. This will be supported in the medium to longer term by the development of non-mandatory standards for compliance testing and non-mandatory standards on supply chain reporting formats. It is also proposed that there will be a network of information exchanges between Member state enforcement bodies to support this system and to preserve the harmonized approach across Europe necessary for the Single Market basis of the Directives.

There is no current detailed guidance (May 2005) on how producers can comply with the RoHS Directive, and most importantly there is no universal procedure for producers to establish compliance due to the range of products affected. The current likely approach is one of 'self-declaration'. Electrical and electronic equipment placed on the market will be presumed to comply with the RoHS Directive.

The simplest approach for producers involves two steps:

1. Obtain an assurance from all suppliers that no banned substances are present (except where they are exempt from the requirements) and keep a permanent record of this assurance to show that 'reasonable' steps have been taken to comply with the Directive.
2. Carry out a limited analysis of products to verify the supplier's declarations or to provide assurance where the supplier's declarations are either unavailable or unreliable. Where there may be a high probability of the product or component containing one of the banned substances (e.g. PVC products or red/orange colored plastics) then analysis may be carried out more frequently.

Manufacturer Concerns

If the supply chain is full, then producers must also consider the product in the supply chain and how to adequately identify this to discriminate between existing non-compliant products and new compliant products if the supply chain will not be completely flushed before the required implementation date. There will be an obvious need for traceability and product identification to discriminate between compliant and non-compliant products. Producers need to start immediately to identify compliant products to begin flushing the supply chain.



WEEE in detail

The WEEE Directive covers the design and production of electrical and electronic equipment to aid the recycling of redundant electrical equipment, and passes the responsibility for recycling back to the producer. It will probably involve the introduction of a recycling levy as part of the price of new equipment.

The Member State Requirements

The requirements on the Member states are as follows:

1. Member states must set up systems that encourage the separate collection of WEEE and systems that allow the free of charge return of WEEE.
2. Member states must achieve a WEEE collection rate of at least 4 kilograms per inhabitant per year (on average) of WEEE from private households.
3. Member states must ensure that all WEEE collected from private households is transported to authorized treatment facilities.
4. Member states must ensure that producers set up systems to provide for recovery, re-use and recycling of WEEE according to defined targets that are a proportion of the WEEE collected from private households.
5. Member states must report WEEE targets on a regular basis.

There is no mandatory requirement for individual householders to separate WEEE at source but Member states should encourage behavior leading to recovery, re-use and recycling.

Retailers must ensure that WEEE is taken back (on a one to one basis) when a new, equivalent product is sold but Member states can allow retailers to make other arrangements, provided that they are free of charge to the consumer.

The Producer Requirements

The requirements on EEE producers are as follows:

1. From August 2005, producers who wish to market electrical and electronic equipment in any EU Member State will have to guarantee that the future costs for the collection of WEEE from central collection points and later treatment and recycling costs will be met,

even if the company ceases to trade. This can be achieved by a variety of methods such as:

- Joining a scheme for financing WEEE
- By taking out 'recycling insurance'
- Opening a bank account where the money deposited is only released to pay for managing WEEE.

Insurance companies and similar organizations are currently developing appropriate schemes and setting prices for insurance premiums.

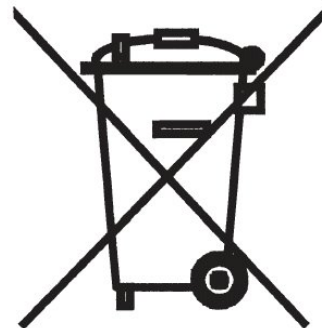
2. Producers selling to commercial customers must provide systems for the collection, treatment and recycling of old products (on the sale of new products) and commercial sales must have appropriate contractual arrangements for WEEE recovery and recycling.

3. New products introduced onto the market must be clearly marked with the producer's name and the WEEE symbol (shown at right) to indicate that it must not be disposed of in municipal waste collection.

4. Producers will be required to provide information on components and materials used in their products to allow treatment facilities etc. to disassemble, re-use and recycle them.

5. Producers will be required to provide information to treatment facilities to identify specific components and materials in the equipment that must be removed, including:

- Capacitors containing polychlorinated biphenyls.
- Components containing mercury (e.g. switches, backlighting lamps);
- Batteries.
- Printed circuit boards (PCBs) in mobile phones and those greater than 10 cm²
- Brominated flame retardants.
- Cathode ray tubes (fluorescent coating must be removed).
- Gas discharge lamps (mercury must be removed).



The WEEE Symbol



- Liquid crystal displays.

6. Producers will have a shared responsibility for financing the collection and treatment of waste from products put on the market before August 2005 (historical waste). The producer's part of this cost is to be calculated according to their market share at the time that the equipment becomes waste, but the exact method of financing historical waste has yet to be fully defined.

The World-Wide Story

RoHS and WEEE are major EU Directives and will affect anybody who supplies products directly to any of the EU Member states or who supplies materials or components that will eventually end up in the EU. Despite this, they should not be thought of as simply a 'European issue'. Legislation similar to WEEE and RoHS is currently being enacted or strongly considered around the world, e.g. China, Japan, Malaysia, Thailand and California.

The EU Legislation

The full EU legislation for the WEEE (including the latest amendment) and RoHS Directives are available from:

WEEE Directive:

http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_037/l_03720030213en00240038.pdf

Amendment to WEEE Directive:

http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_345/l_34520031231en01060107.pdf

RoHS Directive:

http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_037/l_03720030213en00190023.pdf

As with all EU legislation, the EU firstly passes the WEEE and RoHS directives and the Member states of the EU must then put in place national legislation to implement the Directives. The legal deadline for enacting National legislation was 13 August 2004, and as of May 2005 16 Member states had put the relevant legislation in place. These were: Austria, Belgium, Cyprus, the Czech Republic, Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Luxembourg, the Netherlands, Portugal, Slovakia, Slovenia and Spain. The remaining 9 Member states are expected to enact legislation in the near future, but several major EU countries will miss the legal deadline, e.g. the UK and Germany are not scheduled to introduce National legislation until at least January 2006.



The delays, with respect to the enactment of National legislation, relates only to the obligation of producers to take back redundant equipment. In all Member states the obligation to mark equipment for recycling is still scheduled to come into effect on August 13.

The Fluorocarbons

Fortunately, the fluorocarbon plastics do not generally use any of the substances covered by RoHS and the provision of 'Certificates of Compliance' regarding most of the products produced by Zeus will present no concerns. Despite the fact that RoHS and WEEE are European mandates, Zeus is an environmentally responsible global supplier and will offer a complete range of fully compliant extrusions well in advance of the deadline. Customers can purchase and use with confidence any of our extrusions in the natural, unpigmented state, as these products do not contain any of the banned heavy metals.



Summary

Regardless of the timetables and difficulties, the WEEE and RoHS Directives will be introduced into the EU in the very near future and similar legislation will be introduced elsewhere in the medium term. This means that all producers and exporters of products covered by the Directives must be aware of the requirements and to take action to ensure that their products can continue to be offered for sale in the EU and other countries with similar legislation.

Collaboration at this early stage will help us meet your requirements as they evolve. The challenge lies in developing pigmented extrusions in the broad range of colors our customers have grown accustomed to purchasing. Zeus is committed to supporting your business and our technical teams have succeeded in converting many of our most popular extrusions to organic pigments. We encourage you to contact your Zeus technical sales representative at your earliest convenience if you plan to convert to heavy metal-free extrusions so that we may discuss options and establish timing. You also may check our web site for more information and updates at <http://www.zeusinc.com>.

How Zeus Can Help

With a technical inside and outside sales force backed up with engineering and polymer experts, Zeus is prepared to assist in material selection and can provide product samples for evaluation. A dedicated R&D department staffed with PHD Polymer chemists and backed with the support of a



world-class analytical lab allows Zeus an unparalleled position in polymer development and customization.

Since 1966 Zeus has been built upon the core technology of precision extrusion of high temperature plastics. Today, with a broad portfolio of engineered resins and secondary operations, Zeus can provide turnkey solutions for development and high-volume supply requirements.

RoHS FAQ

Download our RoHS FAQ here:

<http://www.zeusinc.com/technicalservices/technicalbulletins/technicalinformation/rohsandweeeinformation.aspx>

Contact Us

Visit <http://www.zeusinc.com> for more information about our products and capabilities, or give us a call at (toll-free) 1-866-272-4118