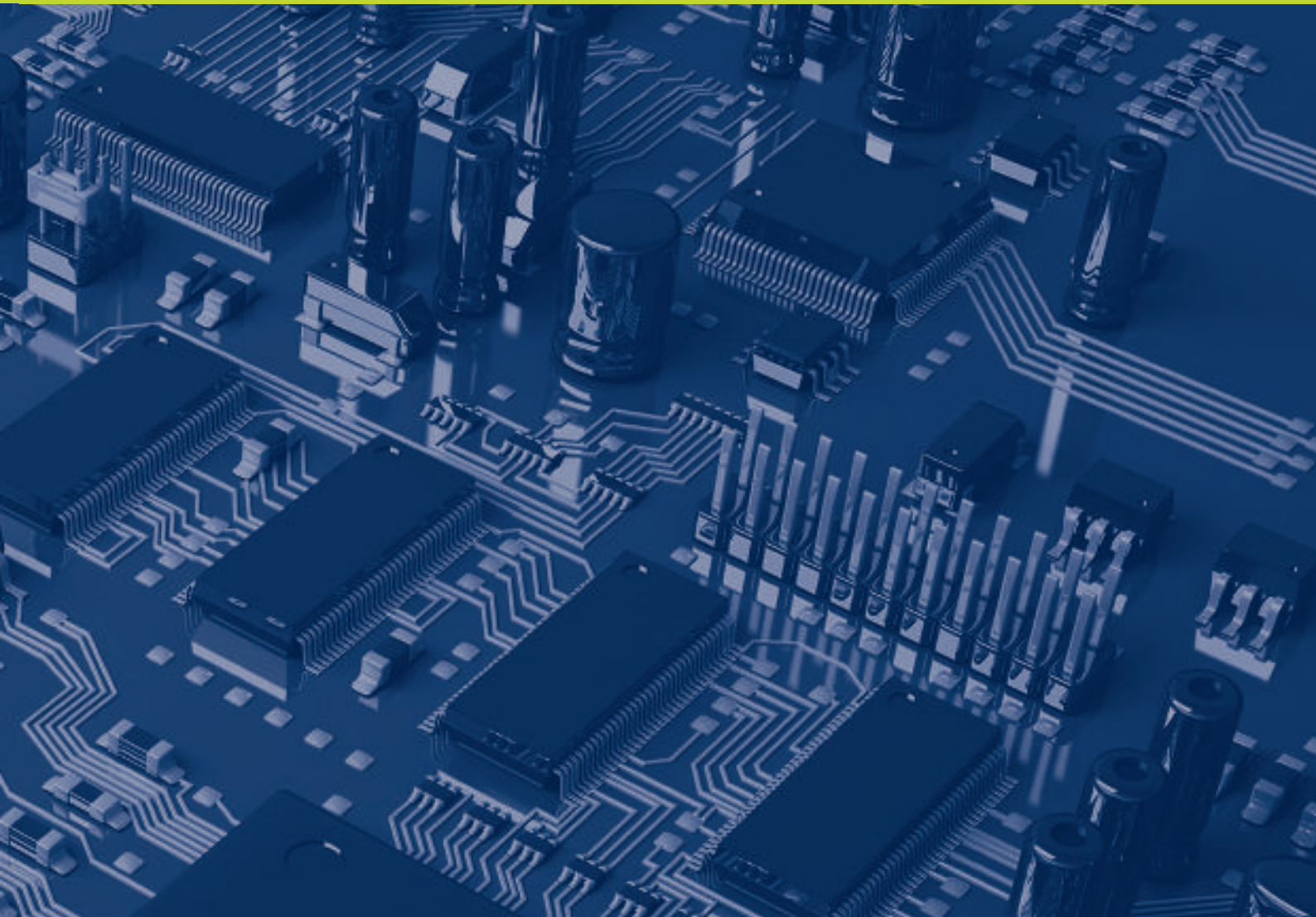


RoHS Guidance

Producer Support Booklet



Introduction

The purpose of this document is to provide support to producers of electrical and electronic equipment in complying with RoHS. The Directive came into force on 1st July 2006, meaning any electrical goods placed on the market after this date should meet its requirements. However, the Enforcement Authority still finds non-compliance across industry – even in businesses that claim to have a good knowledge of RoHS. This can be due to an over-reliance on guarantees from suppliers or a lack of sufficient knowledge to fully understand these declarations, which can be in the form of certificates or test reports.

In writing this booklet, the NMO Enforcement Authority aims to share with producers its experience of assessing the compliance systems that should be in place. By doing this it is hoped the levels of compliance in the UK can be raised and producers can, through the information presented in this document, improve their compliance systems.

It is a producer's corporate responsibility to keep up to date with the Regulations and to make sure they have the appropriate documentation demonstrating compliance before placing the electrical product on the market. Documentation should be held in a technical file before the date the product is made available for the first time, not sought after this time. UK law provides protection to businesses that are seen to have taken all reasonable steps to avoid committing an offence. This is known as a due diligence defence.

This booklet should provide guidance regarding the reading of documentation, advice on control processes to ensure goods are compliant with RoHS and other useful information to avoid leaving businesses open to risk. We aim to work with producers to reach compliance and hope this booklet will raise levels of awareness across industry.

Test Reports

Supplier guarantees often are accompanied by test reports. To be assured of compliance the product is highly likely to have undergone some level of testing at some point along its production process. Holding test reports in a technical file does not guarantee compliance, although test reports do help to provide validation of the levels of compliance claimed and help generate a level of confidence in the compliance programmes of suppliers.

The Enforcement Authority find producers often do not examine reports closely enough and can place an over-reliance on the report provided. Furthermore, there is a lack of knowledge regarding their interpretation. This section of the booklet aims to improve the understanding of how to gain best value from test reports.

Age – How old is the report? All test reports should have a date printed indicating when the report was issued and when the test was conducted. Production processes and components used to make up the final product often change over time, so if the report was written before any alterations to the electrical equipment then it may not give an indication of full compliance. This also relates to the section below on process control. A company with frequently changing compliance or production processes may need to keep their reports more regularly updated.

Figures – Are the numbers on the report below the restricted limit? The Authority is often presented with reports where the numbers demonstrate that the product is non-compliant. This is a clear instance where no checking process is in place and a simple step can prevent the occurrence of larger problems.

Whether the test report shows the data in parts per million or as a percentage, producers should be familiar with the maximum permitted concentration levels of each hazardous substance. All homogenous materials making up the final electrical product should contain less than the restricted limits of each substance shown in the table below.

Restricted Substance	Lead	Mercury	Hexavalent Chromium	PBB	PBDE	Cadmium
Restricted Limit (%)	0.1	0.1	0.1	0.1	0.1	0.01
Restricted Limit (ppm)	1,000	1,000	1,000	1,000	1,000	100

Good practice suggests any result that shows a homogeneous material to contain above its restricted limit of a banned substance should be accompanied by a note explaining the non-compliance or listing its relevant exemption.

Relevance – How relevant is the report to the product? As mentioned above, production systems can change, leading to alterations being made to electrical equipment. If the test report outlines a series of components that are no longer part of the final product and have now been either modified or taken from different suppliers, then there is no longer documentation supporting that these parts are compliant. Outdated reports can also show components that are of no relevance to the product on the market, so it is important to check that the information refers specifically to the relevant electrical goods.

The Enforcement Authority is occasionally presented with test reports of no relevance to the product in question. The components that have been tested and listed on the report clearly bear no relation to those making up the product, showing a lack of understanding from the business and a lack of care in ensuring compliance.

Method – How is the report conducted and presented? The method used for testing is usually shown on the front page of the report and there should be some level of understanding by the producer of the testing processes, including how they are being conducted. There can be different methods of testing for each hazardous substance and these should be listed on the report. It is important for producers to ask the question of suppliers to understand the ways in which compliance is being reached. A test report should list the levels of the hazardous substances in each component, either detected in parts per million, expressed as a percentage, or both. If the presentation of the report is not clear then an explanation should be sought from suppliers to avoid confusion and possible non-compliance. Other factors such as whether the test house is familiar and the report is signed by a trusted source should also be taken into consideration.

Steps	Substances	Polymers	Metals	Electronic (PWBs/components)
Mechanical sample preparation (see Clause 5)		Direct measurement Grinding		Grinding
Chemical sample preparation		Microwave digestion Acid digestion	Microwave digestion Acid digestion	Microwave digestion Acid digestion Solvent extraction
Analytical technique definition (including typical margins of error)	PBB/ PBDE	GC-MS (see Annex A)	NA	GC-MS (see Annex A)
	Cr(VI)	Alkaline digestion/ colorimetric method (see Annex C)	Spot-test procedure/ boiling water extraction procedure (see Annex B)	Alkaline digestion/ colorimetric method (see Annex C)
	Hg	CV - AAS, CV - AFS, ICP - OES, ICP - MS (see Clause 7)		
	Pb/Cd	ICP-OES, ICP-MS, AAS (see Clause 8)	ICP-OES, ICP-MS, AAS (see Clause 9)	ICP-OES, ICP-MS, AAS (see Clause 10)

Homogenising – What exactly has been tested? A definition of the term ‘homogeneous’ can be found later in this booklet and the components tested and shown in the report should reflect this definition. The results of the testing should be specific to each component and not show general areas of the product to be compliant. It is the producer’s responsibility to recognise that the report demonstrates the testing of homogeneous materials in order to represent satisfactory compliance information.

Process Control – How are manufacturing processes controlled? This relates to the age of the test report. Manufacturing processes, as mentioned, can change over time. Usually this is due to choices made by the company but changes can occur, deliberately or inadvertently, under the control of the supplier too. For example, solder baths used have the potential to become contaminated if there is no process control in place to ensure clean processes. Joints can also be re-soldered in the factory using leaded solder, making the whole product non-compliant.

Factories based overseas may be harder to influence and monitor processes so UK producers need to maintain a high level of trust with these manufacturers in order to avoid potential non-compliance. Producers should have an awareness of the processes used in the manufacture of their products and have an awareness of possible problems. For instance, something as simple as taking a sample from a solder bath at targeted intervals could prevent a whole product being non-compliant.

Language – Is the test report in English? Some test reports from suppliers overseas are written in the language of the country in which the product was manufactured. For instance, a product imported from China and accompanied by a test report written in Chinese may not be understandable to a British producer. Again, simply holding a report in a technical file is not sufficient. There should be a level of competence from the company in understanding the compliance information held, including the ability to interpret any test reports.

Declarations

Many organisations supply declarations of compliance for their components, materials and assemblies. These are a valuable tool because they often make a clear statement of compliance. When declarations are received there are various things to consider.

Content – What is being declared and is it a generic declaration or specifically related to the goods supplied? The Enforcement Authority often sees declarations that are not relevant to RoHS compliance. They may be stating that there was ‘no intentional use’, the parts used in the assembly were screened or that they are limited to lead in solder only. Many declarations are generic and use standard wording that could relate to any company or any product. Specific declarations that clearly offer high levels of confidence have the greatest value.

The Authority also sees many caveats such as ‘made best efforts’ or ‘to the best of senior management’s knowledge’. Best practice is to carefully read any declaration and ensure it is providing the protection expected.

Authority – Most declarations are signed on behalf of the issuing organisation. This is often by an executive officer of the organisation but sometimes the declarations are not signed or the person authorising the declaration is unclear. Good practice is always to ask who is making the declaration and whether they have authority to sign on behalf of the company.

Supporting information – As discussed under ‘Risk’, to accept a declaration at face value, consideration should be given to the relationship between organisation and supplier, taking reputation into account. Where there may be concern over the validity of a declaration, there is value in requesting access to any documentation supporting that declaration.

Risk

A due diligence defence relies on the producer taking all reasonable steps to ensure compliance. As part of any compliance regime there is a responsibility for the organisation to assess and target those areas of bringing the product to market where there may be the greatest likelihood of failure. It is the producer’s responsibility to take all reasonable steps to minimise the risk of non-compliant product being placed on the market.

The following section discusses some of the risks and controls that should be associated with a compliance system. However, it must be recognised that this is a general support document and the following information is not exhaustive. Ultimately it is the responsibility of the producer to assess and control both internal and external risks.



Suppliers – Producers should look to establish a level of trust with their suppliers. Some will readily produce documentation showing compliance of the materials they supply, but others may have lesser levels of awareness and can not produce the necessary information. In extreme cases, forged documents stating compliance are given. The information in this booklet stating what to look for in a declaration should support producers in their examinations of these declarations.

After using a certain supplier over a sustained period of time, trust and the knowledge of the processes of manufacture may increase so that a written declaration stating RoHS compliance is deemed sufficient to be relied upon. It is ultimately the producer's decision to assess the risk of the documentation they are provided with. There is no statutory obligation for suppliers of raw materials, components or sub assemblies to hold information regarding RoHS compliance, but market forces may drive suppliers to hold such documentation to support their customers.

Second Party Audits – Where there may be less confidence in a supplier, second party audits can be a more cost effective alternative to carrying out independent testing. An inspection of the manufacturing processes and the systems in place to ensure compliance can not only aid understanding from both supplier and producer, but can also build a level of trust

As mentioned in 'Test Reports', there should be sufficient processes in place to show all reasonable measures have been taken to ensure RoHS compliance. Producers should have a level of awareness regarding manufacturing and look to examine the checks that are in place along the supply line for best practice.

Second party audits of manufacturing can take place to examine the stringency of suppliers in providing compliant material. Potentially this can provide a better idea of the processes in place and improve the level of trust between producer and supplier. Some producers have little contact with suppliers, but building a rapport with them can be beneficial to both organisations. Producers should look to gain understanding with suppliers and develop trust on which to base systems of compliance.

Corrective Action – If non-compliance is found prior to the product being placed on the market, immediate action should be taken to rectify the problem. Again, awareness from both producers and suppliers is vital so that any non-compliant component can be identified and modified before the product is made available on the community market. Regular checks of compliance systems and of new parts contribute to reducing this risk.



Internal Control

Whilst suppliers need to maintain control of their manufacturing processes, producers ultimately have responsibility for ensuring compliance and therefore need to use all resources available to them. This section explores some of the measures it may be useful for producers to take.

There should be an officer within the organisation who manages compliance issues – in many businesses this can fall into the department of Quality Assurance or Production Control. The producer should be aware of who is responsible for ensuring this and make sure that the compliance information is being assessed and not simply gathered and stored. This responsible party should be competent in understanding what the company holds to show its product is RoHS compliant. This person or persons should have authority to act, should it be found that compliance systems are failing. Direct contact with the company's senior management would be considered good practice, as problems can be addressed swiftly and smoothly.

If manufacturing takes place within the UK it can be easier to control compliance. Inspections can be carried out without long distance travel and there is no language barrier to cause complications. Compliance information should be understandable and suppliers can be questioned with less difficulty, incurring fewer problems for the organisation.

Homogeneous Materials

The Enforcement Authority receives a range of enquiries covering the term 'homogeneous material'. When assessing documentation and test reports the Authority is also presented with a range of approaches are taken to the interpretation by test houses.

The Directive states in Article 4:

Member States shall ensure that, from 1st July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

This effectively generates an absolute ban. However, 2005/618 EEC amends the directive and states:

For the purposes of Article 5(1)a), a maximum concentration value of 0.1 % by weight in homogeneous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and of 0.01 % by weight in homogeneous materials for cadmium shall be tolerated.

Therefore, although there is an absolute ban, maximum concentration values have been set for homogeneous materials.

The Commission FAQ helps by defining homogeneous materials by setting two criteria that must be met for a material to be homogeneous.

Homogeneous material means a material that cannot be mechanically disjointed into different materials.

Definitions:

The term 'homogeneous' means "of uniform composition throughout". Examples of 'homogeneous materials' are individual types of: plastics, ceramics, glass, metals, alloys, paper, board, resins and coatings.

The term 'mechanically disjointed' means that the materials can, in principle, be separated by mechanical actions such as: unscrewing, cutting, crushing, grinding and abrasive processes.

Therefore for the purposes of compliance with the Directive, the maximum concentration values of 0.01% by weight for cadmium and 0.1% by weight for the other restricted substances applies to homogeneous materials within the equipment and an absolute ban of the restricted substances applies to non-homogeneous materials within the equipment.

This is important when assessing test reports where whole components may have been ground up (or homogenized) due to sample size. In such cases, levels of the restricted substances identified at concentrations below the maximum concentration values may not demonstrate compliance.

Within the UK, a pragmatic view is taken of what constitutes a homogenous material. Particularly when associated with hexavalent chromium finishes. Typically these passivate layers have a depth of between 0.1µm and 0.7µm with potential variances in concentration of the hexavalent chromium throughout the layer. However, for the purposes of the Directive the Authority takes the view that the chromate layer should be considered a separate homogeneous material from the base plating and therefore the 0.1% by weight maximum concentration value applies.

Exemptions

There are various exemptions to RoHS for products and parts. Categories 8 and 9 (Medical Devices and Monitoring and Control Equipment) are currently out of scope, but may be brought within scope around 2014. This is ultimately a decision made by the European Commission, but the RoHS Website is kept regularly updated with information so any change will be published.

A full list of exemptions for the use of some hazardous substances in certain instances is also provided on the RoHS website. It is presented so that the allowances can be viewed either by substance or the full list. The exemptions are occasionally altered, with new additions or deletions being made. The list on the RoHS website is kept up-to-date for reference regarding these exemptions.

Areas of Non-Compliance

The Regulations specify that each homogenous material must not contain any of the restricted substances, but there are certain parts of electrical products that are more likely to be non-compliant than others. Every component must comply for the whole product to be deemed compliant, but below are some of the areas in which problems are more commonly detected;

- i) **Solder** – RoHS has sometimes been referred to as the ‘lead in solder Directive’ and lead-free solder should be used to ensure a product is compliant. However, this term should not distract from the fact that there are six substances covered by the Directive and all parts of the product are covered – not just solder. Contaminations in the production process can also cause traces of lead to be found at over the maximum concentration limit and, as mentioned above, it is advisable to keep a regular check on production to ensure compliance.
- ii) **Coloured Plastics** – Pigments used to colour various parts of electrical equipment can contain hazardous substances. These are usually found at a level of between 0.1-2%, but this level signifies non-compliance and gives a good indication of why test reports need to be checked thoroughly.
- iii) **Hexavalent Chromium** – This commonly has an oily-gold/green appearance and is used as an anti-corrosive coating on metals. It is the most easily recognisable of the substances and is considered a homogenous material when used, meaning its detection results in the product’s failure.
- iv) **Cadmium in Zinc** – Cadmium naturally exists with zinc, so if the zinc is not properly refined in the manufacturing process non-compliance can occur.

Further Relevant Information

There is a vast amount of information available on the RoHS website. The following sections are easily accessible:

- i) **About RoHS** – There is plenty of information about the legislation, both in detail and in short summary formats.
- ii) **Decision Tree** – This allows a company to examine whether their product needs to be compliant. It gives a list of the Categories of electrical product covered by RoHS and the responsibilities of producers.
- iii) **Due Diligence** – Information is provided on the concept of due diligence and what levels of precaution need to be taken in order to have a defence in the event of a non-compliance being found.
- iv) **Exemptions** – There are a number of instances in which RoHS does not need to apply. A full list of material exemptions is given on the RoHS website.
- v) **Links** – A wide range of links to documents that are potentially helpful in understanding the Directive are also available. These include a link to the Government Guidance Notes which are targeted toward UK business.
- vi) **Trakker** – The RoHS Trakker allows questions to be asked directly to the UK RoHS Enforcement Team. Any questions producers have can be answered using this service.

Other useful information relating to RoHS include documents such as the Government Guidance Notes, the Official Journal and the Blue Guide. The Government Guidance Notes are constructed to aid producers in understanding RoHS and their obligations. It has no legal authority, but is written with the intent to be informative. For a full statement of the legal requirements, producers should refer to the Regulations themselves.

The WEEE Directive can be useful to categorise electrical product, in some cases to determine whether it falls within the scope of RoHS. A list of product that falls into each Category is provided, making this decision easier in most cases. Occasionally there is electrical product which appears ambiguous in terms of the Category it belongs in – in these cases it may be sensible to seek advice from the Enforcement Authority via their Enquiries Trakker.

The Blue Guide explains how New Approach Directives such as RoHS should be implemented. Section Two is particularly useful in further understanding the scope of RoHS.

RoHS Regulations:

<http://www.rohs.gov.uk/Docs/Links/RoHS%20Regulations%202008.pdf>

RoHS Guidance Notes:

<http://www.rohs.gov.uk/Docs/Links/RoHS%20Regs%20Guidance%20-%201%20July%202008.pdf>

WEEE Directive:

<http://www.rohs.gov.uk/Docs/Links/WEEE%20directive.pdf>

Blue Guide:

http://ec.europa.eu/enterprise/newapproach/legislation/guide/document/1999_1282_en.pdf

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