

Key differences between EU RoHS and China RoHS

(As of August 7, 2006)

In this article the key differences between the EU (European Union) RoHS (restriction of the use of certain hazardous substances in electrical and electronic equipment) and the China Management Methods for Control of Pollution Caused by Electronic Information Products or simply (un-officially) called China RoHS will be presented. Emphasis is placed on the implementation methods of these two regulations.

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Introduction

In the past few months, there have been many articles written on the China RoHS. Most of them, however, have been not only misstated but misleading. Of those that were correctly reported, few presented a complete picture of the China RoHS. In this study, the key differences between these two regulations will be critically reviewed. The principles, objectives, implementation methods, and backbones of China RoHS will also be briefly discussed. Furthermore, some important standards, such as marking and maximum concentration values (MCV), and the criteria for selecting the China RoHS product catalogue will be examined.

EU RoHS

The EU RoHS directive^{1,2} has been implemented since July 1, 2006. It bans lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr6+), PBBs (polybrominated biphenyls), and PBDEs (polybrominated diphenyl ethers). This means that starting from that date, all EEE (electrical and electronic equipment), except those with exemptions^{1,3,4,5}, cannot be put on the EU market if they contain those six banned materials. A list of products that are covered by the EU RoHS is shown in the ANNEX of Ref. 6:

1. Large Household Appliances
2. Small Household Appliances
3. IT and Telecommunications Equipment
4. Consumer Equipment
5. Lighting Equipment
6. Electrical and Electronic Tools (with the exception of large-scale stationary industrial tools)
7. Toys, Leisure and Sports Equipment
10. Automatic Dispensers

One of the key implementation methods of the EU RoHS is by exemptions^{1,3,4,5}. EU RoHS relies on the 25-member (one from each EU country) TAC (Technical Adaptation Committee) to provide technical changes and exemptions as well as the interpretation of the



Figure 1. Relationships between China RoHS, standard, and product catalogue^{17,18}

regulation. As of today, 20 exemptions of the EU RoHS have been published in the Official Journal of EU. Eight exemptions have been voted 'yes' by the TAC and are waiting for the signature of the EU Commissioner. Forty exemptions are still outstanding, which the TAC members and their consultants are working very hard on now. For an update of the EU RoHS exemptions, please read Ref. 7.

The EU RoHS enforcement guidance document⁸ was published in May 2006. Basically, it is a 'self declaration by manufactures' process and welcome by the electronics industry!

China RoHS

China RoHS⁹ was promulgated on February 28, 2006 by seven different organizations, namely Ministry of Information Industry (MII), National Development and Reform Commission (NDRC), Ministry of Commerce, Administration of Customs, Administration of Industry and Commerce, Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), and State Environmental Protection Administration (SEPA). There are four chapters with 27 articles in the China RoHS, and it bans the same six materials banned by the EU RoHS. The implementation date of the China RoHS is March 1, 2007¹⁰. The reasons and objectives for promulgating the China RoHS are published

in Ref. 11. The most important of them is to protect our environments and make sure of the sustainable development of information industry.

Implementation Methods of China RoHS

As mentioned earlier, the implementations of the EU RoHS' product catalogue⁶ employ the method of exemptions. The EU Commissioner is constantly reviewing the existing exemptions and granting new exemptions. On the contrary, the implementations of China RoHS require the formulation of 'standard' and 'product catalogue'. This product catalogue will be issued in batches and gradually expanded. The first batch will be empty (at most with those six banned materials) on March 1, 2007!

China RoHS uses a two-step method¹² to deal with the banned materials. The first step is starting from March 1, 2007 when all the electronic information products (EIP)¹³ put into the China market and all the EIP produced in China have to be marked according to the "Marking for control of pollution caused by electronic information products" standard¹⁴ (which will be discussed later). It should be noted that EIP include just about every electronic product, even printed circuit boards, components, and materials! The good news is that at this stage even with the maximum concentrate values (MCV) of the banned substances in all the homogenous materials of your products exceed the "Requirements for concentration limits for certain hazardous substances in electronic information products" standard¹⁵ (which will be discussed later) you still can put your products into the China market and produce your products in China.

The second step is serious! If your product is listed in the China RoHS product catalogue then before you can even put your product in the China market, the MCV of the banned substances in all the homogenous materials of your products must meet the required standard¹⁵ and then must pass the China Compulsory Certification (CCC)¹⁶, which will be discussed later.

China RoHS Principles

The principles in formulating the China RoHS are¹⁷: (1) following the World Trade Organization (WTO) rules; (2) in close connected with international committees; and (3) cohered with China' national situation. The relationships between the China RoHS, standards, and product catalogue are shown in *Figure 1*¹⁸. It can be

Table 1. Unit Classification of EIP¹⁵.

Unit Classification	Definition of Unit
EIP-A	Each homogeneous material in a EIP
EIP-B	Each metal coating layer in a EIP
EIP-C	Very small components or materials in a EIP which cannot be disassembled further ($\leq 4\text{mm}^3$)

Table 2. Requirements for concentration limits for certain hazardous substances¹⁵.

Unit Classification	Limit Requirements (For quantity, the unit is wt%)
EIP-A	The contents of lead, mercury, hexavalent chromium, PBB, and PBDB (except DecaBDE) in this Unit shall not exceed 0.1wt% and the contents of cadmium shall not exceed 0.01wt%
EIP-B	Lead, mercury, cadmium, and hexavalent chromium in this Unit shall not be added intentionally.
EIP-C	The contents of lead, mercury, hexavalent chromium, PBB, and PBDB (except DecaBDE) in this Unit shall not exceed 0.1wt% and the contents of cadmium shall not exceed 0.01wt%

seen that standards and product catalogue are the backbones of the China RoHS. Also, the formulation of the product catalogue needs the support of standards¹⁹.

China RoHS Standards

Similar to the TC (Technical Committee) working group of IEC (International Electrochemical Commission), China RoHS formed its standard working group in October 2004. Today there are 91 P-Members (with the right to vote) and ¹¹ O-Members (with no right to vote)²⁰. Their functions are to help the MII (who is the author of the China RoHS) to discuss, draft, review and vote on the standards.

There are eight standards to accompany the China RoHS²¹:

- Marking for control of pollution caused by electronic information products Standard¹⁴;
- Requirements for concentration limits for certain hazardous substances in electronic information products Standard¹⁵;
- Testing methods for regulated substances in electronic information products²²;
- Lead-free Solder-Chemical Compositions and Forms standard²³;
- Test Method for Lead-Free Solders Standard²⁴;
- Flux of Lead-Free Solders Standard;
- Solder Powders Standard; and
- Solder Pastes Standard.

In the requirements for concentration limits for certain hazardous substances in electronic information products standard¹⁵, it can be seen that the MCV of those six banned materials are very close to those in the EU RoHS. The only difference is shown

in *Table 1* and *Table 2* of the standard¹⁵ which are shown in the followings.

It can be seen from *Tables 1 and 2* that, in addition to the EU RoHS2, which only defines the MCV in homogenous materials, China RoHS defines two more classes of material units (EIP-B and EIP-C) for very thin layer of coatings and very small components and materials which cannot be disassembled further in a EIP.

All importers (from outside China) and producers (in China) should use the symbol shown in either *Figure 2* or *Figure 3* in¹⁴ for marking their EIP. The proportion for the lines of these symbols is shown in *Figures 2 and 3* (the net-grid = 100 x 100). For both symbols, their size cannot be smaller than 5mm x 5mm. The color for the symbol shown in *Figure 2* is green, which means these EIP don't contain hazardous substances. The color for the symbol shown in *Figure 3* is red (or orange), which indicates these EIP contain hazardous substances and the following tasks must be completed.

First of all, the number '10' in the symbol of *Figure 3* is only for demonstration purpose and its unit is 'year'. For real cases this number represents the actual environment-friendly use period¹⁴ of the product. The font of the number should be 'Impact'. In addition to the marking, a product manual is required for the environment-friendly use period of this product used in normal conditions. The ratio of the height of this number (H) to the diameter of the inner circle (D_i) and to the diameter of the outer circle is (D_o) is 5:8:12¹⁴.

Also, in this product manual the importers and producers should clearly state the name and concentrations of



Figure 2. Symbol for marking of (Green) EIP which don't contain any banned hazardous substances¹⁴.

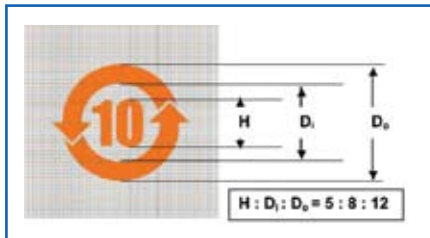


Figure 3. Symbol for marking of EIP which contains at least one of the banned hazardous substances¹⁴.

the banned hazardous substances in their products. Table 3¹⁴ shows the reporting format that should be used. For example, let's consider a PQFP (plastic quad flat pack) component in an EIP. Assuming that the molding compound and die attached are halogen-free and the lead-frame of this PQFP is electroplated with Sn-10wt%Pb. Thus in Table 3, the Unit Name is PQFP, there should be an 'X' under the Pb column, and an 'O' under all the other five columns. The definitions of 'X' and 'O' are shown in the footnotes of Table 3.

China RoHS Product Catalogue

First of all, the listing of EIP¹³ is not the China RoHS product catalogue. Many people don't know this and some of the special-interest groups, e.g., testing houses, intentionally misunderstand this and tell their customers that the listing of EIP is the product catalogue. However, the China RoHS product catalogue will be a subset of the EIP as schematically shown in Figure 4^{17, 18, 19}.

How to select products (either finished products or components or materials) from the listing of EIP and put them into the China RoHS product catalogue is a million dollar question! MII, AQSIQ, and other departments of China are working very hard on this topic right now. According to the conversations with and presentations of Mr. Huang Jian Zhong of MII (the author of China RoHS), most likely the China RoHS product catalogue will be recommended by the experts in the

Table 3. Product Manual: name and MCV of those six banned hazardous substances¹⁴.

Unit Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr ⁶⁺)	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PQFP	X	O	O	O	O	O

O: Means the hazardous substances in all the homogeneous materials are below the concentration limits defined in Ref. 15.
 X: Means the hazardous substances in at least one of the homogeneous materials of the unit exceed the concentration limits defined in Ref. 15.

industry and government. The selection criteria for the product catalogue will be based on the feasibility of economics and maturity of technologies to make the products, as well as most of the electronic enterprises can use the replaceable (substitute) products as shown in Figure 4.

Secondly, it should be noted that all the products in the product catalogue are 'Green' products that meet the requirements for concentration limits for all the banned hazardous substances¹⁵ and pass the CCC. Unfortunately, the CCC for the China RoHS is not established by the Chinese Government yet. MII and the Certification and Accreditation Administration of China (CNCA) of AQSIQ are working very hard on this area right now!

Summary and recommendations

Key differences between the EU RoHS and the China RoHS have been presented in this study. The principles, objectives, implementation methods, and backbones of China RoHS have also been briefly discussed. Furthermore, some important standards such as marking and MCV, and the criterions for selecting the China RoHS product catalogue have been examined. Some important results and recommendations are summarized in the followings.

(1) One of the major implementation methods of EU RoHS is through

exemptions. On the other hand, the implementation method of China RoHS is through a set of standards and product catalogue. China RoHS will not grant exemptions.

- (2) Unlike EU RoHS, China RoHS use a two-step method to deal with the banned substances. In the first step, all the EIP have to be marked with a symbol according to the standard¹⁴. If a product contains any of the banned substances, then a product manual is also required to give: (a) the environment-friendly use period of this product used in normal conditions, and (b) a detailed table listing which part(s) of the product containing what kind of banned substance(s). In the second step, if your product is listed in the product catalogue, before you can even put your product in the China market, the MCV of the banned substances in all the homogenous materials of your products must meet the required standard¹⁵ and must pass the CCC.
- (3) Since the first step of the China RoHS is starting from March 1, 2007, it is recommended that all the EIP importers and producers prepare to mark their products and accompany them with a product manual (in Chinese) if their products contain any of the banned substances.
- (4) Even though the China RoHS product catalogue is not out yet, a reasonable assumption is that the products that have to be compliant with the EU RoHS will most likely be included in the China RoHS product catalogue.
- (5) China RoHS is very dynamic. It is recommended to go to the websites of MII, AQSIQ, CNCA, etc. more often to get the latest information.

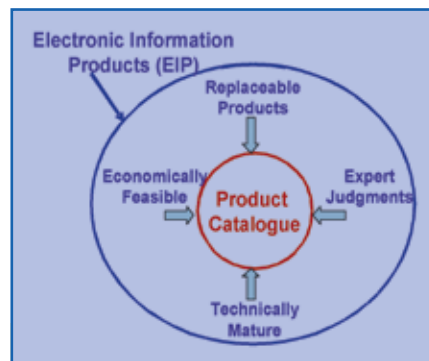


Figure 4. Symbol for marking of EIP which contains at least one of the banned hazardous substances¹⁴.

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