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Comparison of RoHS Legislations Around the World

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Introduction

The phenomena of the globalization of RoHS has caught many countries and businesses unawares. The EU passed the RoHS Directive in 2002 but it was not until 2004 that most companies took notice. The notable exceptions to this were the big Multi-National Corporates who assisted in shaping the legislation and ensured that they were compliant well before any legislative mandate. Initially it was thought that RoHS would be confined to the EU, however the Chinese soon took the initiative and produced a copy-cat legislation. This meant that RoHS compliant product was needed for 2 of the worlds biggest markets.

At this point RoHS spawned a new environmental driver for other markets. Countries that did not implement some restriction based on RoHS ran the risk of becoming a dumping ground for non RoHS compliant products. As more and more countries adopt RoHS this driver grows in strength.

The introduction of RoHS also created some strong economic drivers. Economically a country without RoHS legislation faced far greater risks. Innovative companies that seeded their business in the domestic market would face a barrier to growth when looking at the export market. Non compliant imported products would drop in price as the global market for non compliant

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products shrunk putting further pressure on locally produced products. And last but not least, loss of export sales due to lack of knowledge of RoHS amongst the exporters which is more prevalent amongst SMEs.

Environmental Drivers	Economic Drivers
• Environmental impact of the substances banned during life and disposal • Becoming a dumping ground for non compliant product	• Barrier to export growth • Cheap imported product • Loss of export sales due to lack of knowledge amongst exporters. (Prevalent amongst SMEs)

Executive Summary

There are some aspects of RoHS which are not harmonized well at a global level such as scope, but the fundamentals such as the banned substances, the limits applied and how they are applied are harmonized. Whether to start with a straight ban or to take a phased approach appears to be very much a country by country decision.

Parameter	EU	China	California	Japan	Korea	Comment
Scope	10 Product categories, exclusions	11 product categories	1 Product Category	7 product categories	10 Products	Non Harmonised
The Restricted substances	Lead Cadmium Mercury Hexavalent-Chromium PBB PBDE	Lead Cadmium Mercury Hexavalent-Chromium PBB PBDE	Lead Cadmium Mercury Hexavalent-Chromium (PBB) (PBDE)	Lead Cadmium Mercury Hexavalent-Chromium PBB PBDE	Lead Cadmium Mercury Hexavalent-Harmonized Chromium PBB PBDE	Harmonised
Restriction or Disclosure	Restriction	Disclosure only	Restriction	Disclosure only	Disclosure only	Non Harmonised
Maximum Concentration Values	0.1% for all except Cadmium at 0.01%	0.1% for all except Cadmium at 0.01%	0.1% for all except Cadmium at 0.01%	0.1% for all except Cadmium at 0.01%	0.1% for all except Cadmium at 0.01%	Harmonized
Level at which restriction is applied	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Homogeneous	Harmonized but with some minor differences
Exemptions	Allowed	Expected to Follow EU	Follows EU	Follows EU	Expected to follow EU	Harmonized

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Comparison of RoHS Legislations around the world

So far there have been no two RoHS legislations that have been identical. The major implementations to date have been the EU, China, Japan and California and Korea. There are numerous aspects of RoHS that can be legislated differently, leading to non-harmonization. These include:

1. Scope
2. The Restricted Substances
3. Restriction or disclosure only.
4. Maximum Concentration Values (allowable limits)
5. The level at which the restriction is applied (Component or Homogeneous material
6. Exemptions

No doubt there are many more but these are the main ones which we will look at further.

Scope:

The EU RoHS provided a list of 10 categories listed in the WEEE Directive plus a number of exclusions, listed in both the WEEE Directive and the RoHS Directive. This was a comprehensive approach but led to a number of “grey areas” that have caused much confusion and uncertainty for industry.

China have produced a 35 page, detailed list of products split into 11 broad categories. They have described the list as fully comprehensive, however at the end of each category is the catch-all “other”. The notable exclusion from the China scope is the major category of Whiteware or White Goods such as Washing Machines, Clothes Dryers Refrigerators etc. The motivation for this is still unclear. They have included medical devices, which are out of scope of EU RoHS until 2012, and as a result have created a very difficult situation for many medical device manufacturers.

Japan have 7 categories that do not directly relate to either the EU or China categories, although the equipment would all be covered by the EU categories in some manner.

Korea have 10 products but intend to implement the EU's scope in the long term. They are beginning with only 10 items: TVs, refrigerators, air conditioners,

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laundry machines, personal computers, audio devices, cellular phones, printers, copy machines, fax machines.

California RoHS is restricted to covered electronic devices with a LCD, CRT or Plasma screen of greater than 4 inches measured diagonally. However they are proposing adopting EU ROHS in its entirety in 2010.

So as we can see, the scope of RoHS is not being implemented in a consistent manner globally.

Restricted Substances

The EU Restricted Lead, Cadmium, Mercury, Hexavalent Chromium, Polybrominated Biphenyl's (PBB) and Polybrominated Diphenyl Ethers (PBDE). All other countries have followed suit except California who have pre-existing legislation (AB302) which, without getting into technical detail, effectively performs the same function. The net effect is that banned substances are consistent across all implementations.

Restriction or Disclosure only.

The EU and California physically restrict the substances in the products. China, Japan and Korea are Disclosure only. "Disclosure only" means that companies still have to collect all the material composition data on their components, but instead of designing out non compliant components they have to declare, usually in the users manual where any of the restricted substances are. This is generally being used as a soft introduction for industry, with China certainly intending to physically restrict the substances in the future.

So, there is a pretty even split between the two approaches with the EU and California enacting physical restrictions and China, Japan and Korea enacting disclosure only.

Maximum Concentration Values (Allowable limits).

The EU set a limit of 0.1% for all substances except Cadmium which is set at 0.01%. This has been universally adopted, but with a couple of improvements. The major use of Hexavalent Chromium is in corrosion protection passivation (chromating) on metal. The way the limits are applied in the EU (weight/weight) make it impossible to accurately measure the amount of Hexavalent Chromium. China RoHS bans all intentionally added Hexavalent Chromium in Metal treatment which very nicely gets around the issue and meets the original aim of the ban which was to prohibit the Chromate treatment.

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The other issue was with small parts which again are nigh on impossible to test. China RoHS, once again improved on the EU RoHS by introducing a category for components smaller than 4mm3. Components of this size and smaller, under certain conditions will be considered one Homogeneous Material (See next section) and will be tested as a whole. Subsequent to this the EU RoHS Enforcement Authorities Informal Network announced similar measures, no doubt for very pragmatic reasons.

So, apart from the issue of Hexavalent Chromium in chromate conversion coatings, the Maximum Concentration Values are consistent across all legislations.

The level at which the restriction is applied (Component or Homogeneous material)

The EU took the original stance of applying the prohibitions at the Homogeneous Level. The EU also went to great pains to define “homogeneous material” which, in simple terms, is any material that cannot be mechanically disjointed in to sub-materials by unscrewing, cutting, grinding or abrasive actions. The rest of the world has followed this verbatim. The Chinese translation to English comes back with the same phraseology and examples. The original EU definition has now been tempered by the limitations of testing technology as outlined in the previous section with the emergence of the Chinese category of components of 4mm3 or less under certain conditions.

Exemptions:

This is more difficult to assess as only the EU and California so far have enacted an actual restriction of the substances. Under SB20, California is adopting the EU exemptions. Reportedly they will set up infrastructure to fast track exemptions locally, to combat the lengthy process that the EU exemptions need to follow. China is also expected to follow suit. They previously had a category of materials called EIP-D which was the list of EU Exemptions. This has been withdrawn but is expected to be re-introduced when they go ahead with phase 2,which involves the actual restriction on the substances rather than disclosure. Interestingly China will continue to require disclosure of any substance above the limit irrespective of whether it is in an exempt application or not.

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In conclusion, there are some aspects of RoHS which are not harmonized well at a global level such as scope, but the fundamentals such as the banned substances, the limits applied and how they are applied are harmonized. Whether to start with a straight ban or to take a phased approach appears to be very much a country by country decision.