

# Regulations on and Management of Chemical Substances in Products

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Regulations on chemical substances are being strengthened yearly in each country, and chemical substances contained in products such as electrical and electronic equipment are subject to regulation. In order to comply with such regulations, communicating information of chemical substances contained in products in the supply chain is necessary. For communicating information, international standards are set for electrical and electronic equipment, and construction of a mechanism for communication of information by industry groups, etc. Furthermore, in order to communicate accurate information, it is essential to manage chemical substances at each stage of design and development, purchasing and manufacturing, etc.

Keywords: Chemical substances management, RoHS Directive, ELV Directive, REACH Regulation

## 1. Introduction

Chemical substances are indispensable for our daily life. However, they can be harmful to both human health and the environment. In order to minimize the negative impact on human health and the environment, countries regulate usage of chemical substances, and the coverage of such regulations has now expanded from the actual chemical substances themselves to substances contained in products. This paper summarizes current trends in the regulation of chemical substances in products and chemical substances management to comply with such regulations.

## 2. Regulations Concerning Chemical Substances in Products

### 2-1 International trends in chemical substance regulations

In 1992, the United Nations Conference on Environment and Development (Earth Summit) was held in Rio de Janeiro, Brazil, with the aim of achieving both global development and environmental protection. The summit produced the *Rio Declaration on Environment and Development and the Agenda 21*, an action plan to implement principles described in the Rio Declaration, and Chapter 19 in the Agenda 21 was dedicated to *Environmentally Sound Management of Toxic Chemicals*.

Later in 2002, the World Summit on Sustainable Development (WSSD) was held in Johannesburg, South Africa, to revise the said Agenda 21 and discuss issues newly arisen. Products from the WSSD were the *Johannesburg Declaration on Sustainable Development and the Plan of Implementation of the World Summit on Sustainable Development*, with the aim of minimizing negative impacts from chemical manufacturing and usage on human health and the environment by 2020.

Further, to clarify the action plan, the International Conference on Chemicals Management 1 (ICCM 1) was held in 2006 and the *Strategic Approach to International Chemicals Management* (SAICM) was adopted. With the backdrop of such developments in chemical management,

related laws and regulations have been actively revised and renewed across the world in recent years.

Specifically with regard to chemical substances in products, ICCM 2 held in 2009, adopted hazardous substances within the life cycle of electrical and electronic products and chemical substances contained in products as emerging issues.

### 2-2 European regulations on chemical substances in products

#### (1) RoHS Directive

In Europe, waste electrical and electronic devices were conventionally discarded by means of landfills and incineration. However, pollution from the hazardous substances, such as lead, contained in devices treated in the landfill or incineration sites became an increasing problem. To control this situation, the RoHS Directive 2002/95/EC Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment was enforced in 2003 to restrict the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. Later, a new legislative framework, RoHS (2011/95/EC), was adopted in 2012 stipulating creation and attachment of technical documents that verify conformance with the directive and displaying CE marking\*<sup>1</sup> on products.

The RoHS Directive specifies maximum limits of specified substances by weight in a homogenous material\*<sup>2</sup> within electrical and electronic devices, as follows: 0.1 wt% (1,000 ppm) for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) (the latter two are brominated flame retardants); and 0.01 wt% (100 ppm) for cadmium.

Usage of the specified chemicals beyond these maximum levels is prohibited. Further, in 2015, the revised directive was published to add the following four phthalates, which are mainly used as plasticizers, to restricted substances: bis (2-Ethylhexyl) phthalate (DEHP); benzyl butyl phthalate (BBP); dibutyl phthalate (DBP); and diisobutyl phthalate (DIBP). The maximum limit of these substances is 0.1 wt% (1,000 ppm) and the directive will come into effect in July 2019.

## (2) ELV Directive

In the same way as the RoHS Directive for electrical and electronic devices, the ELV Directive (Directive 2000/53/EC End-of Life Vehicles) was adopted in 2000 in order to reduce environmental impact from waste vehicles. The ELV Directive specifies maximum limits of 0.1 wt% (1,000 ppm) in homogeneous materials and vehicle components for lead, mercury, and hexavalent chromium, and 0.01 wt% (100 ppm) for cadmium, and prohibits usage beyond these limits.

## (3) REACH Regulation

Following the chemical regulations across the world as described in the above 2.1, the EU adopted REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals; Regulation (EC) 1907/2006) in 2006.

REACH comprises the following regulations:

### <1> Registration

Mandates manufacturers and those importing chemical substances into the EU in quantities above 1 ton per year to register such the substances.

### <2> Authorisation

Mandates manufacturers and those importing the designated chemical substances to obtain authorisation to manufacture or import the substances through application depending on their usage.

### <3> Restriction

Limits or bans the manufacture from placing the designated substances on the market or using it.

### <4> Information exchange

Mandates manufacturers of products that contain more than 0.1 wt% of Substances of Very High Concern (SVHC) to communicate information on the safe use of the products (at least a list of the substances) for downstream uses.

Among the above four items, restriction and information exchange concerning SVHC are regulations that are related to chemical substances in products. Note that any chemicals that are intentionally emitted from products must be registered in advance.

## 2-3 Regulations in Japan on chemical substances in products

### (1) J-Moss

In 2006, the Act on the Promotion of Effective Utilization of Resources and related cabinet and ministerial orders were revised to mandate display of a mark on electrical and electronic devices to indicate that they contain chemical substances that require extra treatment in recycling.

The revised law and orders obligate the display of the containment mark on seven items, including TVs and PCs if they contain the designated substances at a concentration exceeding the specified limits. Details to be displayed in the containment mark are defined in J-Moss: The Marking for Presence of the Specific Chemical Substances for Electrical and Electronic Equipment. The substances and the concentrations designated by the Japanese law and orders are the same as those governed by the RoHS Directive; however, one difference is that the Japanese laws and orders merely demand provision of the substance information through display of the mark, unlike RoHS, which prohibits usage of such substances.

## (2) Act on the Evaluation of Chemical Substances and Regulations of Their Manufacture, etc.

The Act on the Evaluation of Chemical Substances and Regulations of Their Manufacture, etc. was enforced in 1973 following the health hazard caused by polychlorinated biphenyls (PCBs) that occurred in 1968. The Act on the Evaluation of Chemical Substances mandates reporting about chemical substances newly manufactured in—or imported into—Japan in advance, and an evaluation of their hazardous nature. The law also designates highly persistent and/or bio-accumulative chemicals that may cause health hazards when released into the environment as Class I Specified Chemical Substances and prohibits their manufacture and import. The act was revised in 2009 in response to the WSSD resolution and SAICM, and the revised version newly obligated reporting of quantities of the existing chemical substances\*<sup>3</sup> to manufacture or import, as well as safety evaluations of the chemicals by the government. This act therefore contains regulations covering the chemicals themselves, not the products containing such chemicals. However, it includes an article that restricts the import of products that contain Class I Specified Chemical Substances.

## 2-4 Regulations in different countries covering chemical substances in products

China has started hazardous substance management in electrical and electronic devices with the Administrative Measures for Pollution Control from Electronic Information Products enforced in 2006, which was revised as the Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products in 2016. The new law mandates display of a marking, for which the specifications are stipulated in SJ/T11364-2014 Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products, if a product contain any of the six designated chemical substances (the same substances as in the RoHS Directive) at a concentration higher than the standard limits. The law also makes it obligatory to display the names of hazardous substances, their quantities, parts that contain the substances, recycling possibility of such parts, and the impact on human health and the environment in case of misuse. Further, the law prohibits usage of the six substances in the electrical and electronic devices that are in the administration list (although the items in the list have not yet been published as of the end of May 2017).

Although the United States does not have any federal law that controls hazardous substances in electrical and electronic devices, some states, such as California and Maine, have their own state laws. In California, the Electronic Waste Recycling Act enacted in 2003 prohibits sales of 4-inch or larger video display products that contain lead, mercury, hexavalent chromium, and cadmium at a concentration higher than the same standard limits as those specified in the RoHS Directive. Also, Proposition 65, another California law, enacted in 1986, mandates display of a warning on products that contain the substances designated in the Proposition 65 list so that users are informed about their exposure to such substances when using these products.

Other countries, such as Korea, Vietnam, Thailand, India, and Turkey, also have laws similar to the EU RoHS

Directive that control hazardous substances contained in electrical and electronic devices.

### 3. Information Communication in the Supply Chain

To conform with the regulations that control the chemical substances in final products such as electrical and electronic devices and vehicles, it is necessary to know the types of substance and their quantities in the materials and parts contained in the products. This means that the material and parts manufacturers and vendors must understand the substances contained in their products and communicate information about the substances from the upstream to the downstream of the supply chain. If such materials and parts are exported, they become subject to laws and regulations in the importing countries or regions. Therefore, it is still necessary to communicate thorough information on substances along the supply chains inside Japan. Even though a material/part manufacturer or vendor does not export their product by themselves, if there is the possibility that an intermediate or final product may be exported to other countries, the material/part manufacturer or vendor must pass on the information about the contained chemicals to the downstream of the supply chain (Fig. 1). This section describes typical information exchange methods used in a supply chain to ensure smooth communication.

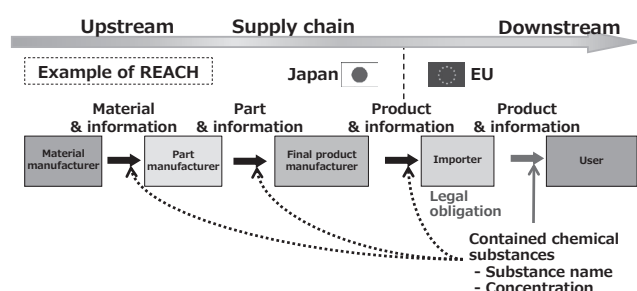


Fig.1. Information Exchange Containing Chemical Substances in Products Within the Supply Chain

To exchange composition data about materials used in electrical and electronic devices, the International Electrotechnical Commission (IEC) specifies an international standard *Material Declaration for Products of and for the Electrotechnical Industry* (IEC 62474), which stipulates the substances to be included in material declarations and specifications on the data format for the exchange of material declaration data.

Inside Japan, the Joint Article Management Promotion-Consortium (JAMP) was established in 2006 as a cross-industry organization in order to build a system to appropriately manage information about the chemical substances contained in products and provide smooth communication of such information throughout the supply chain. JAMP supplies JAMP MSDSplus and JAMP AIS as

communication tools to exchange information on the chemical substances contained in chemical products and processed products. These tools enable the upstream companies in the supply chain to disclose whether their products contain chemical substances designated by JAMP or not, the contained chemical names, and their concentrations, etc. to downstream companies. Also, chemSHERPA, a scheme for chemical information sharing that conforms with IEC62474, was published under the initiative of the Ministry of Economy, Trade and Industry in 2015, and put into full practice in 2016 by JAMP. In addition to information on designated chemical substances, chemSHERPA also specifies the exchange of information on compliance with laws and standards. As chemSHERPA comes into full operation, updating of the chemical list and data creation tools used for JAMP MSDSplus and JAMP AIS will be terminated in January 2018.

The automobile industry across the world uses the International Material Data System (IMDS), which was jointly developed by major car manufacturers as a communication tool, along with the Global Automotive Declarable Substance List (GADSL), which itemizes regulated and prohibited chemicals. The Japanese automobile industry also uses the JAMA/JAPIA Standard Material Datasheet created by Japan Automobile Manufacturers Association, Inc. and the Japan Auto Parts Industries Association.

Other than these in-product chemical information exchange schemes, communication tools include the IPC-1752A standard specified by the Association Connecting Electronics Industries, the industry association for printed circuit board and electronics manufacturers in the US, and the BOMcheck system developed under the initiative of the European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry.

### 4. Management of Chemical Substances in Products

In order to correctly understand and communicate the names and quantities of chemicals in products throughout the supply chain, chemical management must be carried out correctly at each stage of production procedures, including design, development, material and parts procurement, production, and delivery. As a Japanese industrial standard concerning the principle and policy of such communication, JIS Z 7201: The Management of Chemical Substances in Products – Principles and Guidelines was established in 2012. To present more concrete actions to be taken at each stage while conforming with the said standard, JAMP issued the Guidelines for the Management of Chemical Substances in Products (Version 3.0).

To ensure thorough management of chemical substances in products, an appropriate management structure must be built first. As disuse of prohibited substances and display of information on the contained substances are essential, a company with an effective quality assurance system must be able to undertake chemical management efficiently by establishing appropriate systems as a part of its quality assurance system.

It is important for midstream companies to focus on

incoming chemicals and quantities in the procured materials and parts, as well as track changes in chemical composition and concentration during their processing work.

In the procurement stage, companies must provide a list of prohibited or designated substances using their standards, such as green procurement guidelines, to the suppliers in order to have a full picture of the existence of chemicals in the procured materials and parts, the chemical names, quantities, etc.

To streamline chemical communication while preventing confusion from having numerous communication formats, it is desirable to use the standardized communication tools listed in the previous section. Another important point is that the chemical substance management status in suppliers' production procedures should be inspected. This is to prevent any contamination of prohibited substances and to accurately determine the contained substances.

Such inspection should also confirm that the substances are managed even to the level of changes in composition and concentration during production. Such changes in chemical composition or concentration are particularly likely to occur when the chemical substances are initially processed to be made into the first stage of a product. It may not be just a change of shape, and therefore, it is important to pay extra attention in managing chemicals. Processes that are associated with chemical reactions include electrodeposition, and those associated with chemical concentration changes include coating. Also, a supplier that manufactures different products by sharing the same production lines must take particular care to avoid misusing or mixing materials.

## 5. Management of Chemical Substances in Products by the Sumitomo Electric Group

In business divisions of Sumitomo Electric Industries, Ltd. and its group companies (the Sumitomo Electric Group), requirements on chemical substances vary significantly depending on their products and their types. Thus, each organization manages chemicals in an optimum manner to suit their particular situation. The following sections describe the approach shared across the Group.

### 5-1 Management structure

In response to reinforcement of chemical substance management, such as establishment and enactment of the RoHS Directive and the REACH Regulation, the Sumitomo Electric Group began to reinforce its management of the chemical substances contained in products. In 2006, the Green Procurement Promotion Committee and the Pollution Prevention Committee were reorganized into the Chemical Management Task Committee, which is formed by members elected from each business division. The Committee's role is to gather information on enforcement and revision of the in-product chemical-related laws and regulations inside and outside Japan, and also about the trends in in-product chemical communication systems in the supply chain, and share such information across the group companies. The Committee also studies and analyzes the impact from the enforcement and revision of chemical-

related laws and regulations on our business activities, and supports the divisions and group companies in complying with such laws and regulations when they become subject to legal changes.

For example, when the RoHS Directive was revised in 2012, the Committee gathered all the information available concerning the revised contents and each committee member then passed down the information to their workplace. At the same time, the Committee also studied and analyzed the impact of legal revision on each division and company and the members held briefings to explain the revision and changes in the mandatory technical documents to the staff members at their workplace, ensuring thorough understanding and implementation of revised chemical management compliant with the new RoHS Directive.

### 5-2 Guidelines

The Sumitomo Electric Group specifies the *SEI Guidelines for the Management of Chemical Substances in Products*, which conform with the JAMP Guidelines mentioned in Section 4 to provide practical and concrete guidance for departments that manage chemical substances in products. Based on these guidelines, the Group appropriately manages chemical substances in products in each stage of design, development, procurement, production, and delivery.

The Group also published the *SEI Guidelines for Green Quality Purchases* and its attachment, the *SEI Standards for Chemical Substance Management* (Fig. 2), to specify substances that are either prohibited from being used or are required to be communicated across the supply chain, toward the optimum management of chemicals in purchased materials and parts.

In addition to these group-wide guidelines, each business division and group company has their own guidelines, standards, and management methods suitable for their specific cases to cope with variations in the chemical substances and usages as required in each organization.

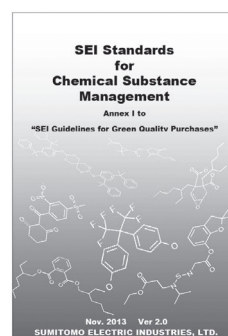


Fig. 2. SEI Standards for Chemical Substance Management

### 5-3 Education

Keeping up with new and revised laws and regulations concerning chemical substances in products is not sufficient to maintain sound management. It is also important to disseminate knowledge about the current laws and

regulations among staff members, in case of changes to the officers responsible for chemical-related tasks or specification alterations in products. To cover a wide variety of situations, the SEI Group provides regular education programs on chemical substance regulations, such as sessions concerning the Act on the Evaluation of Chemical Substances, as a part of our environmental education.

## 6. Conclusion

The RoHS Directive specifies four new chemical substances to be banned in 2019, and more chemicals are expected to be added to this list of prohibited substances. This trend of further restriction on chemical usage in products will continue. In Japan, chemSHERPA will become the main communication tool of the industry to exchange information about chemical substances in products, as updating of the chemical list and data creation tools used for JAMP MSDSplus and JAMP AIS will be terminated in January 2018. The SEI Group will maintain its rigid management of chemical substances in products by keeping up with all such changes in the situation and maintaining compliance with all statutory environmental requirements.

### Technical Terms

- \*1 CE Marking: A mandatory marking for certain products to indicate that the product meets the requirements of the applicable EU standards.
- \*2 Homogenous material: Material that cannot be mechanically divided into two or more materials. For example, plated alloy wire can be mechanically divided into the plating and the alloy, but the alloy itself cannot be mechanically divided into different metals. In this case, alloy wire and plating are regarded as homogenous materials.
- \*3 Existing chemical substances: Chemical substances that have already been manufactured in or imported into a country, where registration of newly used chemicals is legislated, when such legislation is newly introduced or revised. In this paper, it refers to chemical substances that had already been manufactured in or imported into Japan at the time of the enactment of the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture.

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