

# **Guideline for the Identification of Ceramic and Glass Substances in Electronic Components**

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It should also be noted that this guideline can be revised without previous notice in case of amendment of legislation herein referenced, or when important relevant items having a different context of what is stated here are announced.

# **Guideline for the Identification of Ceramic and Glass Substances in Electronic Components**

## **Preface**

In the United Nations Conference on Environment and Development (a.k.a. “Earth Summit”) held in Rio de Janeiro, Brazil in 1992, Agenda 21 which can be considered a worldwide environmental action plan was adopted. It requested “information provision concerning the toxicity and risk of chemical substances” and “the strengthening of efforts towards the management of chemical substances” in each country of the world.

In 2006, in the International Conference on Chemicals Management (ICCM) which took place in Dubai, SAICM (Strategic Approach to International Chemicals Management) which includes a sound action plan for achieving the requests of Agenda 21 was adopted.

In order to respond to these international agreements, each country and region is promoting the establishment of legal framework concerning the management of chemical substances.

The registration and notification of chemical substances manufactured or imported into the EU fulfilling certain conditions as well as the communication of information on SVHC (Substances of Very High Concern) which appear in the Candidate List and are contained in products are obligations according to the REACH Regulation (Regulation (EC) No. 1907/2006) which took force in June, 2007 in the EU.

As described above, a structure for communicating information on chemical substances contained in products throughout the whole supply chain has become necessary for the industry, from the chemical manufactures on the upstream side, through the component and material manufacturers in the middle stream, and further down to the equipment manufacturers in the downstream side, and moreover also to the consumers when needed, in order to cope with the changes in the methods and principles of international chemical substance management, which aim at preventing harm to human health and protecting the environment involved in the supply chain.

For example, in the Japanese industry, JAMP (Joint Article Management Promotion consortium) was organized in September, 2006, with the objective of facilitating communication and disclosure of information concerning chemical substances, and provides various proposals and actions concerning communication of information.

JAMP communicates information concerning chemical substances contained in electronic components through the AIS (Article Information Sheet), however the unification of a method for the identification and naming of ceramic and glass (hereinafter ceramic/glass), which are main constituents of electronic components, as substances is a difficult matter due to their structure and

characteristics, and their handling varies according to legislation from different countries and commercial practices.

Based on this situation, this guideline concerning an identification method on ceramic/glass as constituent materials of electronic components has been developed and it is expected to contribute to the realization and facilitation of communication and disclosure of information thereof.

## 1. Objective

The objective of this guideline is to show the principles and concrete examples concerning a method for the identification of ceramic/glass as constituent materials of electronic components in order to aid in the communication of information thereof.

## 2. Scope

The scope of this guideline is the substance identification for the communication of information on ceramic/glass as constituent materials of electronic components.

## 3. Definitions of Terms

Agenda 21	An action plan for the achievement of sustainable development in the 21 <sup>st</sup> Century and which was adopted in the Earth Summit (United Nations Conference on Environment and Development) held in 1992 in Rio de Janeiro, Brazil.
Article	An object which during production is given a special shape, surface or design which determines its function to a greater degree than its chemical composition.
Chemical Substances Control Law (CSCL)	The Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances (or the “Chemical Substances Control Law”). Japanese law which regulates the manufacture, import and use of toxic chemical substances.
Solid Solution	A homogeneous solid-state solution obtained when two or more types of elements (metal or non-metal) dissolve into each other.
Mixture	A substance obtained when two or more types of pure substances are mixed together.
Chemical Substance	A single element or a compound, existing in nature or obtained by a manufacturing process.
Supply Chain	Generally speaking, a connection from supplier to consumer, involving a series of working activities from development, purchasing, manufacturing, distribution up to sales. In this guideline, it is meant to extend up to the manufacturing of the final product, involving raw material manufacturers, component manufacturers and equipment manufacturers.
Identifier	Information used for identifying a substance. That can be, for example, IUPAC nomenclature, chemical composition, structural formula, CAS No., etc.
Structural Formula	Method used for expressing the molecular structure of a substance by indicating the bonds between functional groups, radicals, etc.
Preparation	Two or more types of chemical substances which have been intentionally mixed.
Risk	“Risk of a chemical substance”. Risk = Danger, Toxicity x Exposure
AIS	Article Information Sheet. A format for inputting information proposed by JAMP in

	order to disclose and communicate information concerning chemical substances contained in articles.
CAS No.	CAS Number, CAS Registry Number. Numbers assigned for chemical substances by the CAS (Chemical Abstracts Service), a division of the American Chemical Society.
IMDS	International Material Data System. System for collecting information on materials composing automobiles and substances contained therein.
JAMP	Joint Article Management Promotion consortium
MSDSplus	A format proposed by JAMP for substances and preparations for inputting information complementary to (M)SDS, in order to communicate information concerning chemical substances necessary for preparing the AIS.
REACH Regulation	EU Legislation ((EC)No1907/2006 (Registration, Evaluation, Authorisation (and Restriction) of Chemicals)
SAICM	Strategic Approach to International Chemicals Management. International agreement aiming at “ensuring that by the year 2020, chemical substances are produced and used in ways that minimize significant adverse impacts on the environment and human health” and which establishes provisions on “risk reduction based on scientific risk evaluation, information collection and provision, promotion of capacity-building and technical cooperation”.
SVHC	Substances of Very High Concern. Substances which have the characteristics of seriously affecting human health or the environment, and which appear in Annex XIV (List of Substances Subject to Authorisation) of the REACH Regulation and in the Candidate List of Substances of Very High Concern for Authorisation.
TSCA	Toxic Substances Control Act. Basic legislation established by the United States EPA (Environmental Protection Agency) concerning evaluation, notification, registration, etc. of chemical substances.
UVCB	Substances of Unknown or Variable composition Complex reaction products or Biological materials)

#### 4. Problems concerning Ceramic/Glass in Legislation and how to deal with them

Ceramic/glass used as constituent materials of electronic components have a complex chemical composition formed from various metal oxides (or nitrites, carbides, etc.). In addition to that, they also show completely different chemical characteristics from simple mixtures of metal oxides, etc.

As it can be seen from this background, it is very difficult to define (identify) ceramic/glass by means of their chemical composition.

Under these circumstances, it is necessary to communicate required information concerning ceramic/glass in order to conform with relevant legislation having different contents one from the other .

For example, the TSCA regulation of the United States EPA considers “ceramic”, “inorganic glass”, “frits”, etc. as legal mixtures as it is difficult to identify their composition, and so they appear in the TSCA inventory as UVCB substances.

Regarding that, in Japan’s CSCL regulation, ceramic/glass are recognized as solid solutions homogeneously mixed and are thus treated as mixtures, even though, from a chemical viewpoint, they are compounds which are different from the other existing chemical substances. However, as the existing substances are actually transformed into other substances through chemical reactions at the time they become ceramic/glass, we consider it to be desirable from a general viewpoint (on the grounds of toxicity risk assessment and chemical accuracy) to communicate information considering ceramic/glass to be UVCB substances.

However, with the eighth update of the SVHC Candidate List of the REACH Regulation (19 December, 2012), when lead oxides and some lead containing complex oxides were designated as candidate substances for authorization, a further problem arose.

It became necessary to establish an identification method, based on the REACH Regulation, enabling the communication of information concerning the inclusion of corresponding SVHC compounds in ceramic/glass.

Moreover, as information for making a judgment on the applicability of RoHS and ELV Directive exemptions on products as well as the correct communication of information on concentration of restricted substances (substance groups) of the referred directives is also important, an identification method for supplementing the information deficiency and considering the viewpoint that ceramic/glass are UVCB substances has become necessary. This guideline was developed as a reference material to aid the distribution and use of information as well as to facilitate the communication of information, when taking into consideration all the problems mentioned above.

## **5. General Remarks about an Identification Method for Ceramic/Glass**

From the above described, it can be clearly understood that establishing an identification method for ceramic/glass substances that satisfies both legislation from each country and commercial practices is a very difficult task to achieve.

In practice, the information provider prepares and communicates information organized in an appropriate form having consideration on the information recipient, product application, etc. Therefore, in this guideline, in addition to guiding principles concerning recommended basic matters for the identification of ceramic/glass substances, recommended identification rules for

ceramic, recommended identification rules for glass, identification items and explanations as well as examples of assumed formats for communication of information are presented.

## 6. A Recommended Identification Method for Ceramic/Glass

### 6-1. Recommended Basic Matters for the Identification of Ceramic/Glass Substances

#### 1) Communication of Legal Information

- RoHS/ELV... When substances (substance groups) restricted by the RoHS Directive, the ELV Directive, etc. such as lead or cadmium are included in ceramic/glass, information contributing to the interpretation on the conformance status to the regulations such as “lead in ceramic”, “exempted application”, etc. should be mentioned.
- REACH (SVHC)... When ceramic/glass constituting electronic components are themselves SVHCs of the REACH Regulation, they should be identified in accordance with the legal instructions. Please refer to the position papers indicated under 5) to 7) of “**8. References**” for interpretation of legal instructions.

#### 2) Conformance to Customer Requirements

- Declarable substances (substance groups) should be clearly identified.
- Concentrations should be identified not as range values, but as specific values.
- When requested, substances constituting the concerned material should be identified in order to cover the composition up to 100%.

#### 3) Consistency in the Balance between Chemical Accuracy and Risk Avoidance

- In case the identification may be misleading, explanations and supplemental descriptions should be added as necessary.
- Constituents other than the declarable substances should be identified as “Ceramic without declarable substances” or “Glass without declarable substances”.

### 6-2. Recommended Identification Rules for Ceramic

- 1) In case ceramic has been specified as subject to legal provisions (p.e. SVHC of the REACH Regulation, etc.), information based on the respective legal provisions (and its annex documents) in order to identify that substance and its concentration should be provided.

Example: Lead titanium zirconium oxide  $[(Pb_xZr_yTi_z)O_3]$  CAS:12626-81-2 85wt%

- 2) Declarable substances (substance groups) specified by legislation (RoHS, etc.) or customer requirements should be identified by metal oxide (or nitrite, carbide, etc.) identifiers.
  - The concentration should be calculated and expressed in terms of metal oxide (or nitrite,

carbide) content.

Example: Lead monoxide [PbO] in ceramic CAS:1317-36-8 40wt%

- Explanation or supplemental notes concerning the identifier background of the constituents of ceramic can be mentioned in the “substance name” or “remarks” columns, etc.

3) Declarable substances (substance groups) other than those of 1) and 2) above should be identified as “Ceramic without declarable substances”.

- Their concentration is obtained by subtracting the concentration of the declarable substances (substance groups) from 100%.

### **6-3 Recommended Identification Rules for Glass**

1) Declarable substances (substance groups) specified by legislation (RoHS, etc.) or customer requirements should be identified by metal oxide (or nitrite, carbide, etc.) identifiers.

- The concentration should be calculated and expressed in terms of metal oxide content.

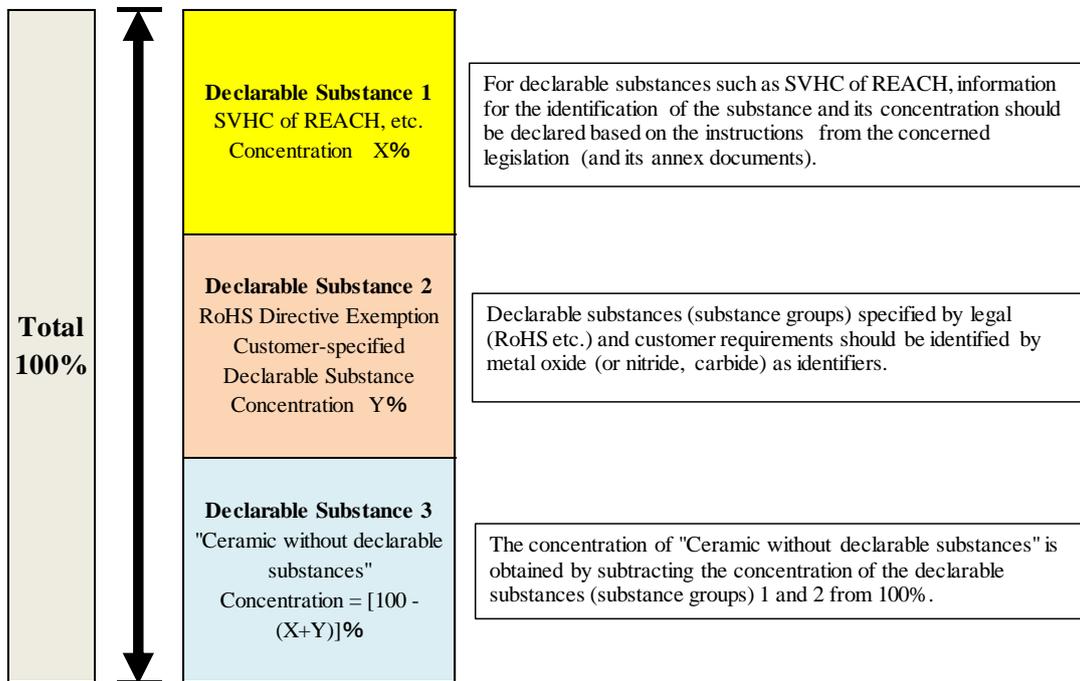
- Explanation or supplemental notes concerning the “identifier” background of the constituents of glass can be mentioned in the “substance name” or “remarks” columns, etc.

Example: Lead monoxide [PbO] in glass CAS:1317-36-8 40wt%

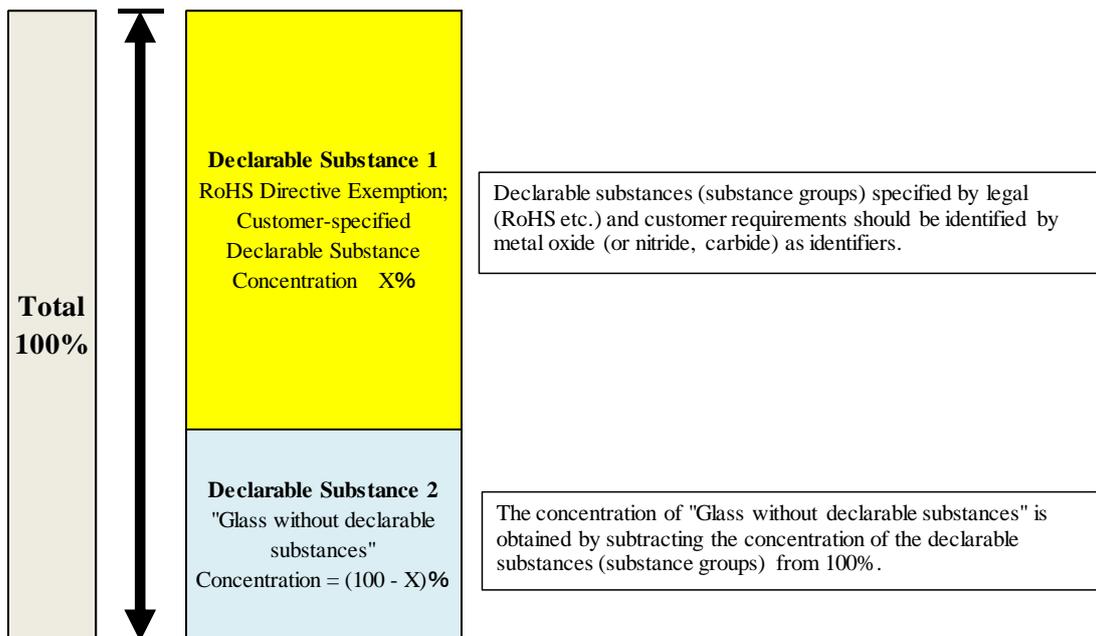
2) Declarable substances (substance groups) other than those of 1) above should be identified as “Glass without declarable substances”.

- Their concentration is obtained by subtracting the concentration of the declarable substances (substance groups) from 100%.

#### 6-4. Concept for the Identification of Ceramic



#### 6-5. Concept for the Identification of Glass



#### 6-6. Recommendation: Introduction of unique code

When utilizing the identification method specified in 6-4 and 6-5 for the tool such as IMDS and JAMP AIS, even though explanation or supplemental notes concerning the “identifier” background of the constituents of glass is mentioned in the “substance name” or “remarks” columns, the tool automatically recognize PbO, Pb3O4 and B2O3 as SVHC of REACH. To resolve this issue, it is recommended to introduce unique code which is specified in attached document.

### 7. Attached Documents

Case Examples.

Unique Code

### 8. References

- 1) Guidance for identification and naming of substances under REACH and CLP  
(ECHA-11-G-10.1-EN)  
Version 1.2, March 2012  
European Chemicals Agency
- 2) JAMP AIS・MSDSplus Practical Guide (Ver.3.1)  
December 24, 2013 Joint Article Management Promotion-consortium (JAMP)
- 3) JAMP AIS Preparation Procedure  
Based on JAMP AIS ver.4.X  
December 24, 2013 Joint Article Management Promotion-consortium (JAMP)
- 4) Guidelines for the Management of Chemical Substances in Products (Ver. 3.0)  
February 20, 2013 Joint Article Management Promotion-consortium (JAMP) (JAMP)
- 5) About the Industry's Position Relating to Diboron Trioxide (B2O3), Newly Listed in the Seventh SVHC under the EU-REACH Regulation (24JEITA-電部企第 098 号)
- 6) View about SVHC in Ceramics concerning the EU-REACH Regulation =Including the Handling of the Lead Oxides and Complex Oxides Containing Lead Added in the 8th Revision of the SVHC Candidate List=  
(24JEITA-電部企第 248 号)
- 7) View about SVHC in Ceramics concerning the EU-REACH Regulation =Including the Handling of the Lead Oxides and Complex Oxides Containing Lead Added in the 8th Revision of the SVHC Candidate List=  
(24JEITA-電部企第 247 号)
- 8) Annex 1 of IMDS001 Recommendation IMDS001a