1.0 Purpose
The Molex Chemical Substances Specification (MCSS) documents the Molex controls for known or potentially hazardous substances. This specification specifies what product environmental documentations Molex will make available to customers.

2.0 Overview

Applicability to Products: This specification applies to the following product categories:

a) Molex products that are designed, manufactured, sold, or distributed by Molex
b) Molex products whose design and production are outsourced to third parties
c) Third parties’ products whose design and production are outsourced to Molex, except when third parties specify the parts and materials such as customer-specified parts. As this specification applies to products, any chemical or manufacturing process that has the potential to remain in or on the product is in scope to ensure the product remains in conformance with this specification. Any other chemical or manufacturing process that does not have the potential to remain in or on the product is not in scope.

Applicability to Packaging: This specification applies to packaging materials used for delivery to customers and protection of parts; e.g., trays, reels, sticks, bags, cushions, staples, sheets, wraps, tapes, labels, corrugated cardboard, wooden frames, vinyl ties, and inks or paints for printing on packaging. Packaging is evaluated against different legal, industry, and customer requirements than products.

3.0 Revision History
This document supersedes all previous revisions.

<table>
<thead>
<tr>
<th>Document Reviewed:</th>
<th>December 6th, 2017</th>
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<tbody>
<tr>
<td>Document Revised:</td>
<td>December 6th, 2017</td>
</tr>
<tr>
<td>Revision Details:</td>
<td>D→E, new format, updates to content</td>
</tr>
</tbody>
</table>
4.0 Summary of Information Available to Customers

Customers may request for any or all the following product compliance information from Molex. However, Molex also maintains and make available of many relevant policy statements on the Molex website, utilizing the Molex Multiple Part Entry Tool (5.14.13). Therefore, Molex encourages customers to download as many compliance documents as needed and available from the Molex website.

4.1 Certification of Compliance to EU DIRECTIVE 2011/65/EU (RoHS)
This document certifies that the product provided by Molex complies with the requirements of EU Directive 2011/65/EU, including all applicable amendments in effect at the time of certification. Available on Molex Multiple Part Entry Tool (5.14.13).

4.2 Low-Halogen Declaration
This document certifies that the items provided by Molex comply with the low-halogen (also known as halogen-free) substance restrictions in MCSS Prohibited and Declarable Substances (5.14.12), or as specified by the customer, for each homogeneous material. Available on Molex Multiple Part Entry Tool (5.14.13).

4.3 EU REACH Substances of Very High Concern (SVHC)
This document communicates the content of any SVHC above the REACH SVHC threshold per product, as per Article 33 (1) of Regulation (EC) No 1907/2006 (REACH). Available on Molex Multiple Part Entry Tool (5.14.13).

4.4 Molex Product Compliance Declaration (PCD)
This is a standard Molex declaration that comprehensively includes the following information:
1. General contact information
2. General product information
3. Product composition
4. Legal / industry compliance information and status
5. Process information (for lead-free soldering, where applicable)

4.5 International Material Data System (IMDS)
Product environmental information submitted to automotive customers via the IMDS system.

4.6 China RoHS Labeling
Labeling information in accordance with SJ/T 11364-2006 Marking Requirements for Control of Pollution Caused by Electronic Information Products.

4.7 IPC 1752A Class C & IPC 1752A Class D

4.8 Customer-Specific Declaration Formats
As requested by customers and justified by business conditions, Molex shall supply product environmental information in customer-specific formats.

4.9 Substance Test Reports
As requested and justified by business conditions, Molex shall provide substance test reports to support full material declaration and declaration of non-use information.
5.0 Reference

5.1 Product Contents Definition
5.2 Product Compliance Requirements
5.3 Supplier Requirements
5.4 Full Material Declaration
5.5 Declaration of Non-Use
5.6 Substance Testing
5.7 XRF Screening
5.8 Packaging Compliance Requirements
5.9 Document Change Management
5.10 Exceptions
5.11 Molex Specified Parts
5.12 Customer Specified Parts
5.13 Definitions
5.14 Resources
5.1 Product Contents Definition

PRODUCTS – Assembly level parts that are sold to external or internal customers. Sub-Assemblies and components may be products themselves, or they may be used in higher-level assemblies that are products.

SUB-ASSEMBLIES – Sub-Assemblies are assembled units that are combined with other components or sub-assemblies to create finished products. Sub-Assemblies are combinations of components. This level does not exist for all products.

COMPONENTS – A component is a part of a sub-assembly or product that is fabricated from Material(s) or purchased from suppliers that fabricate them from materials. Components may also result from the combination of other components, materials, substances and/or compounds. (Ex: Plated, lubricated terminals).

MATERIALS (RAW MATERIALS) – Materials are the items of which something is composed or can be made (see also homogeneous materials below). Components may actually consist of several materials. A material may also be a coating that is applied during the construction of the product. For example, in terminals plated with both a nickel and a Tin layer, the base metal (copper alloy) and each plating layer is considered a homogeneous material and therefore shall be considered separately. As another example, a cable is constructed of wire, insulation, jacketing and may be marked with ink. Each of these materials is considered a homogeneous material.

SUBSTANCES / SUBSTANCE GROUPS – Substances are physical materials made up of one or more chemical compounds or elements. Substances have a discrete physical existence with uniform properties. A collection of substances that are chemically similar is a substance group, for example lead compounds.
5.2 Product Compliance Requirements

No prohibited substance listed in MCSS Prohibited and Declarable Substances (5.14.12) is contained (intentionally-added or as an impurity) in the item provided by Molex. No detectable level of banned substances is contained.

Additional substance restrictions may apply. These additional substance restrictions are shown in MCSS Prohibited and Declarable Substances (5.14.12). For example, PVC is targeted for gradual phase-out. Products sold as low-halogen (also known as halogen-free) meet the low-halogen requirements listed in MCSS Prohibited and Declarable Substances (5.14.12).

5.3 Supplier Requirements

Product environmental requirements are included as part of our Global Supplier Policy and Manual. Upon request, all Molex suppliers shall be required to provide environmental information for the products, sub-assemblies, components, materials, and substances they supply to Molex. Environmental information includes, but is not limited to, full material declaration, declaration of non-use, and substance testing. In certain cases, based on business conditions, Molex shall contract third-party labs to obtain substance testing.

Molex terms and conditions require suppliers to provide advanced notice of any changes that would affect the environmental information they previously supplied. Annually, Molex suppliers of raw materials shall be required to confirm that previously submitted environmental information has not changed.

5.4 Full Material Declaration

A standard Full Material Declaration is provided to:

- Satisfy all legal requirements and most customer requirements for product environmental information.
- Provide clear direction to internal product development and procurement functions.
- Facilitate the development of global systems for storing, maintaining, and accessing product environmental information.
- Provide consistent, global requirements for suppliers.
- Report on substance names and/or CAS numbers.
- Report on nominal OR minimum and maximum substance concentration levels in each homogeneous material.

Molex maintains substance information on all intentionally-added substances, except that up to 5% of the intentionally-added substances may be classified as proprietary substances. Proprietary substances shall not contain prohibited or declarable substances above the MCVs/thresholds in MCSS Prohibited and Declarable Substances (5.14.12).

5.5 Declaration of Non-Use

Molex shall collect, store, and maintain substance information on the substances listed in MCSS Prohibited and Declarable Substances (5.14.12). This information shall be used to create declarations of non-use per the requirements in MCSS Prohibited and Declarable Substances (5.14.12) or other customer documents. Molex shall confirm that no homogeneous materials contain prohibited substances at a level that exceeds the MCVs in 5.14.12. Also, Molex shall declare the level of declarable substances contained at the homogeneous material level for cases where the threshold is exceeded.

5.6 Substance Testing
Substance testing is used to verify that products comply with legal, industry, and customer requirements. Molex and its suppliers perform substance testing per accepted industry practices (for example, IEC 62321), and testing is performed for each homogeneous material within the product. Annual testing is not performed; instead, suppliers are required to submit annual re-certification that the composition is unchanged, the manufacturing process is unchanged, and the test results are still expected to be representative. Substance testing is conducted using one of the approved methods in the following table:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Polymer Materials</th>
<th>Metallic Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBB/PBDE</td>
<td>GC-MS, HPLC</td>
<td>n/a</td>
</tr>
<tr>
<td>Cr(VI)</td>
<td>UV/VIS</td>
<td></td>
</tr>
<tr>
<td>Hg</td>
<td>CV-AA, CV-AFS, DMA, ICP</td>
<td></td>
</tr>
<tr>
<td>Pb/Cd/Cr</td>
<td>ICP, AAS</td>
<td>n/a</td>
</tr>
<tr>
<td>Halogen</td>
<td>IC</td>
<td>n/a</td>
</tr>
<tr>
<td>Antimony</td>
<td>ICP, AAS</td>
<td></td>
</tr>
<tr>
<td>Beryllium</td>
<td>ICP, AAS</td>
<td></td>
</tr>
<tr>
<td>Phthalates</td>
<td>GC-MS</td>
<td>n/a</td>
</tr>
</tbody>
</table>

AAS: Atomic Absorption Spectrometer  
CV-AA: Cold-Vapor – Atomic Absorption  
CV-AFS: Cold-Vapor – Atomic Fluorescence Spectrometer  
DMA: Direct Mercury Analysis  
GC-MS: Gas Chromatograph - Mass Spectrometer  
HPLC: High-Performance Liquid Chromatograph  
IC: Ion Chromatograph  
ICP: Inductively Coupled Plasma  
UV/VIS: Ultraviolet / Visible Spectrometer

5.7 XRF Screening

Molex performs X-ray fluorescence screening of certain prohibited substances to assess conformance to these requirements and to further ensure compliance to legal and customer requirements.

5.8 Packaging Compliance Requirements

Molex packaging shall comply with the requirements established in EU Directive 1994/62/EC, and REACH Regulation 1907/2006, as amended by commission decisions released prior to the latest revision of this document. Pallets and other wood packaging used to transport Molex products to customers shall meet the requirements of the International Standard for Phytosanitary Measures No. 15 with modifications to Annex 1 (2006).

Packaging does not contain prohibited substances above the MCVs listed in 5.14.12.
5.9 Document Change Management

Molex shall review this document at least annually and make whatever changes are necessary to continue to control substances that are regulated, projected to be regulated, or have the potential to be regulated for the protection of human health and the environment. This includes all legal, industry, and customer requirements that are relevant to Molex products.

5.10 Exceptions

Exceptions to this specification shall be approved by the Molex EHS.

5.11 Molex-Specified Parts

Component suppliers do not need to supply FMD for any parts (products, sub-assemblies, components, or materials) for which Molex specifies the materials and design; e.g., a molded part for which Molex specified the resin to be used. In this case, Molex may obtain environmental information directly from the material supplier(s), and the component supplier may be required to provide documentation as well (for example, declaration of non-use). Molex may require component suppliers to confirm that the parts, as supplied, are manufactured using the Molex-specified material(s).

5.12 Customer-Specified Parts

When customers require the use of components or materials from specific suppliers, and that the customer has requested Molex to manage EHS data, Molex shall request environmental information from those suppliers as necessary to satisfy the legal, industry, and customer requirements for environmental information for the products involved.

When customers require the use of components or materials from specific suppliers, and that the customer has clearly communicated to Molex that EHS data for the customer-specified part is NOT required, then EHS data is not required. Since such components or materials are out of scope of MCSS requirements, it cannot be allowed to be applied to general market products (custom product only, sold to a single customer). On that note, if the customer does not clearly waive the requirement with written communications, Molex must continue to manage EHS data, meaning collecting it from its supplier(s).

In the event a customer-specified supplier refuses to provide EHS information, Molex shall notify the customer and reserve the right to change to another supplier.
5.13 Definitions

5.13.1 Banned Substances
Banned substances are prohibited substances where the maximum concentration value is 0 ppm. No detectable level of a banned substance is permitted in a homogeneous material.

5.13.2 Full Material Declaration (FMD)
A Full Material Declaration (FMD) is similar to a bill of materials, but it contains the specific chemical substances that are intentionally used in the composition of the product or component. The FMD details the list of substances at the level of each homogeneous material. The FMD does not include process chemicals unless the chemicals become an integral part of the final product. An example of a process chemical is a lubricant used during the process of the material or part and the chemical does not remain on the material or part when the product is shipped. Alternatively, the FMD includes a surface coating applied during processing that is not removed before product shipment (for example, an environmental barrier). If a solvent evaporates, then the solvent is not included in the FMD, but the remaining substances are declared (for example, hardened glue after the solvent evaporates). The FMD is used in conjunction with the declaration of non-use (see below) to determine if products comply with legal, industry, or customer environmental requirements.

5.13.3 Chemical Abstract Service (CAS) Number
A number assigned by the American Chemical Society to identify a specific substance or compound.

5.13.4 Contained In
'Contained in' refers to a situation in which a substance is added to, blended with, fills up, or adheres to products, sub-assemblies, components, or materials. This definition applies to substances that remain in or on the final product, regardless if the substance is intentionally added or an impurity.

5.13.5 Customer-Specified Parts
When customers require the use of components or materials from specific suppliers, Molex shall request environmental information from those suppliers as necessary to satisfy the legal, industry, and customer requirements for environmental information for the products involved. In the event a customer-specified supplier refuses to provide such information, Molex shall notify the customer and reserve the right to change to another supplier.

5.13.6 Declarable Substances
For substances that are not currently prohibited substances, there may still be a legal, industry, or customer or industry requirement to report the weight percent or PPM level when it is above a threshold due to the potential for inclusion in future restrictions. These substances are classified as declarable substances, and are either included in legal requirements (for example, the REACH legislation), or may be included in future restrictions as prohibited substances. Declarable substances shall be reported to Molex when present above thresholds found in this specification.

5.13.7 Declaration of Non-Use (DoNU)
A Declaration of Non-Use (DoNU) supplements a full material declaration to help determine compliance to legal, industry, and customer product environmental requirements. A DoNU considers substances that may be present unintentionally as contaminants or trace substances in the product or component. The DoNU evaluates each homogeneous material against a list of prohibited and declarable substances (5.14.12). The DoNU certifies or confirms that none of the homogeneous materials in the product or component contains any prohibited substance above their respective maximum concentration value and reports any declarable substance above their respective reporting threshold.
5.13.8 Exemptions
Exemptions are specific situations where a deviation is allowed from the requirements that would otherwise apply. Exemptions can apply at any level, but they are generally grouped into material exemptions, product exemptions, and application exemptions (end-use exemptions). Molex does not specify exemptions for applications since Molex does not control the end-use of its products. In certain cases, Molex may identify products as exempt to specific regulations based on the application of the product, provided the end-use applications are limited and known, or if the customer has confirmed the end-use application in writing.

5.13.9 Homogeneous Materials
Homogeneous materials are materials that are of uniform composition throughout and that cannot be mechanically disjointed into different materials. Homogeneous materials are raw materials used to fabricate a product, or materials that are applied to a raw material or a product during fabrication. For example, in terminals plated with both a nickel and a Tin layer, the base metal (copper alloy) and each plating layer is considered a homogeneous material and therefore shall be considered separately. As another example, a cable is constructed of wire, insulation, jacketing and may be marked with ink. Each of these materials is considered a homogeneous material.

5.13.10 Impurities/Trace Substances
Impurities or trace substances are substances in a material that are not intentionally added. Impurities/trace substances are substances that exist in natural materials or substances generated in the process of producing a material. These substances are generally not included in the full material declaration, but shall be addressed in the declaration of non-use.

5.13.11 Intentionally-Added Substances (Ingredients)
Intentionally-added substances are substances that are deliberately used in the formulation or fabrication of a product, sub-assembly, component, or material to provide specific characteristics, appearance, or quality. Intentionally-added substances may be prohibited substances, declarable substances, or substances that are neither prohibited nor declarable. Intentionally-added substances may also be referred to as the ingredients of the product. These are the substances that are included in the full material declaration.

5.13.12 Maximum Concentration Value (MCV)
For prohibited substances, the upper limit on the amount of the substance that can be included in the homogeneous material is called the maximum concentration value or MCV. The MCV can be expressed in terms of weight percent or PPM. Maximum concentration values for prohibited substances apply regardless of whether the prohibited substance is intentionally-added or an impurity/trace substance and the MCV shall apply to the amount of the substance contained in each homogeneous material.

5.13.13 Prohibited Substances
Substances for which specific maximum limits (maximum concentration values) are set for their weight percentage or PPM level content in materials. Prohibited substances are determined by legal, industry, or customer requirements. See definition for banned substances also.

The controls on prohibited substances apply to both intentionally-added substances and impurities/trace substances. Prohibited substances are not contained in products or packaging above MCVs found in this specification.

5.13.14 Proprietary Substances
Proprietary substances are substances that are considered confidential because they supply some unique, competitive performance, cost, or quality advantages. Prohibited and declarable substances shall not be proprietary substances.
5.13.15 Threshold
The threshold is the level above which the presence of a substance or material in a product shall be declared (declarable substances) based on the requirements of this specification. Thresholds apply regardless of whether the specific substance is an intentionally-added substance or an impurity/trace substance.

5.13.16 Halogen
Halogen refers to substances fluorine, chlorine, bromine, iodine, or astatine, and each of its compounds. For example, chlorine and its compounds are considered halogens. The term “Halogen Free Low Halogen” (HFLH) is a Molex compliance requirement. Compliant against HFLH means that the product is either free of all halogen substances or is within the acceptable limit of the customer requirements, whereas Not Compliant would mean the opposite. These substances are targeted for gradual phase out. For a more extensive list of these phase-out substances, refer to MCSS Prohibited and Declarable Substances (5.14.12).
5.14 Resources

Please note that only links maintained by Molex EHS will be listed here. For all other references, please research based on the listed identifications.

5.14.1 EU Directive 2011/65/EU (RoHS)


5.14.3 EU Regulation 1907/2006 (REACH)


5.14.5 EU Directive 97/129/EC (Packaging Identification)

5.14.6 SJ/T 11364-2006 Marking Requirements for Control of Pollution Caused by Electronic Information Products (China RoHS Labeling)


5.14.8 International Material Data System (IMDS)

5.14.9 Global Automotive Declarable Substance List (GADSL)

5.14.10 IEC 62474 – Material Declaration for Products of And for The Electrotechnical Industry

5.14.11 IEC 62321 Electrotechnical Products - Determination of Levels of Six Regulated Substances (Lead, Mercury, Cadmium, Hexavalent Chromium, Polybrominated Biphenyls, Polybrominated Diphenyl Ethers)

See http://www.molex.com/suppliers/images/CASNumberList_Search1.xlsx

5.14.13 Molex Multiple Part Entry Tool
See http://www.molex.com/molex/electrical_model/rohsCoC.jsp

5.14.14 Molex Multiple Part Industry Compliance Documents
See http://www.molex.com/molex/electrical_model/MultiPartComplianceDocuments.action