A Review of the Impact of European Union Directives on S&C Products

Texas Instruments Incorporated
Sensors & Controls

Introduction

Section 1: Summary of the EU Regulatory System, the EU Material Content Directives, and Implications to Industry

Section 2: Impact of EU Material Content Directives on S&C Products

Section 3: Communicating Status of S&C Products to Customers

Section 4: What should we be doing now?

Section 3: Communications

Entire supply chains are currently engaged in collecting data on the conformance of their suppliers.

The Automotive Industry, because the ELV passed two years prior to the RoHS, has been actively addressing material content issues for the past two years.

Other industries in which TI participates are only now beginning this process.

Since November 1, 2003, TIA has received over 100 questionnaires regarding CPB and RFID RoHS conformance.

Section 3: Reporting

Because the obligation to demonstrate conformance rests with the OEMs, they have developed a variety of mechanisms for obtaining conformance data of their supply chains.

As a supplier, TI is obligated to utilize whatever mechanism provided by our customers:

- Simple and Complex Certification Statements
- EIA/EICTA/JGPSSI Tool
- International Material Data System

Section 3: Reporting

Since there is no single format being used across industry, each product line must be prepared to respond in any one of the formats or, in some cases, all of them.

Regardless of format, the first step is collecting data about the product:

- Material Content Breakdown
- Transpose Material Content Data into format required of questionnaire.
- Apply appropriate level of disclaimer to protect TI as product understanding changes.
Section 3: Reporting

- Example of the simplest of the reporting formats: "Request for Certification"

Complex certifications are similar but require greater detail and other data elements.

Section 3: Reporting

- The Electronics Industry Association (EIA) and equivalents in Japan & Europe have developed a standard material content reporting tool.

Electronics Industry Reporting

- EIA released a Materials Declaration Guide in March 2001
- Contains 3 material lists:
  - "Banned" materials (RoHS & country specific)
  - "Restricted" materials
  - "Materials of interest"

- Process chemicals not covered
- Background levels not covered
- Materials used in rare and uncommon applications not covered

- Variations of the EIA tool are beginning to appear, especially from Asian based multinationals.
- The tool compares products against the most strict of the world’s material content restrictions.
- The objective of the EIA tool is to create a single certification statement regarding the material content of an electronic or electrical device.

Level A Materials

Comprises those materials and/or substances that are knowingly present or intentionally added within the materials that comprise the product and which are subject to current or enacted legislation that either.

a) Prohibits the use and/or marketing
b) Restricts the use and/or marketing
c) Requires reporting or other regulatory effects
### Level A List

<table>
<thead>
<tr>
<th>Material/Substance</th>
<th>Threshold Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestos</td>
<td>Intentionally added</td>
</tr>
<tr>
<td>Azo colorants</td>
<td>1) Intentionally added</td>
</tr>
<tr>
<td>Cadmium/Cadmium Compounds</td>
<td>75 ppm or Intentionally added</td>
</tr>
<tr>
<td>Hexavalent Chromium/Hexavalent Chromium</td>
<td>1000 ppm or Intentionally added</td>
</tr>
<tr>
<td>Lead/Lead Compounds</td>
<td>1000 ppm or Intentionally added</td>
</tr>
<tr>
<td>Mercury/Mercury Compounds</td>
<td>1000 ppm or Intentionally added</td>
</tr>
<tr>
<td>Ozone Depleting Substances (CFCs, HCFCs, HBFCs, carbon tetrachloride, etc.)</td>
<td>Class I: Intentionally added, Class II: HCFCs: 1000 ppm</td>
</tr>
<tr>
<td>Polybrominated Biphenyls (PBBs)</td>
<td>1000 ppm or Intentionally added</td>
</tr>
<tr>
<td>Polybrominated Diphenylethers (PBDEs)</td>
<td>1000 ppm or Intentionally added</td>
</tr>
<tr>
<td>Polychlorinated Biphenyls (PCBs)</td>
<td>Intentionally added</td>
</tr>
<tr>
<td>Polychlorinated Naphthalenes (more than 3 chlorine atoms)</td>
<td>Intentionally added</td>
</tr>
<tr>
<td>Radioactive Substances</td>
<td>Intentionally added</td>
</tr>
<tr>
<td>Shortchain Chlorinated Paraffins</td>
<td>Intentionally added</td>
</tr>
<tr>
<td>Tributyl Tin (TBT) and Triphenyl Tin (TPT)</td>
<td>Intentionally added</td>
</tr>
<tr>
<td>Tributyl Tin Oxide (TBTO)</td>
<td>Intentionally added</td>
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</tbody>
</table>

### Level B Materials

Comprises those materials and/or substances which are knowingly present or intentionally added in electrical and electronic equipment and which are deemed reportable for the purposes of proactively managing the supply chain in a sustainable manner, and which meet one of the following criteria:

- a) Precious materials and/or substances that provide economic value at end-of-life to recyclers.
- b) Materials and/or substances that are of significant environmental or health and safety interest.
- c) Materials and/or substances that would trigger hazardous waste regulatory requirements.
- d) Materials and/or substances that could have a negative impact on end-of-life management.

<table>
<thead>
<tr>
<th>Material/Substance</th>
<th>Threshold Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony/Antimony Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Arsenic/Arsenic Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Beryllium/Beryllium Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Bismuth/Bismuth Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Brominated Flame Retardants (other than PBBs or PBDEs)</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Copper/Copper Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Gold/Gold Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Magnesium</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Nickel/Nickel Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Palladium/Palladium Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Phthalates</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Selenium/Selenium Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Silver/Silver Compounds</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Vinyl Chloride Polymer (PVC)</td>
<td>1000 ppm</td>
</tr>
</tbody>
</table>

### Reporting in the Automotive Industry

#### End of Life Vehicles Directive
- Objective is the prevention of waste from vehicles and also the reuse, recycle, & recovery of end-of-life vehicles and components, thus improving environmental performance for all economic operators involved.
- Automobile producers to provide appropriate information to treatment facilities, concerning dismantling, and re-use.
- Requirements of the End-of-Life Vehicle Directive:
  - Ban on the use of hazardous substances (lead, mercury, cadmium, hexavalent chromium) with exemptions.
  - Total limit @ 2.0 grams/vehicle of Cr+6 for corrosion protection purpose only; 0.0 gram for any other application in June 2003.
- Requirements for the reuse and recovery at vehicle end-of-life.
  - Achieve re-use and recyclability of at least 85% average vehicle weight by 2005 with greater percentages for 2015.
  - Improve recycled content.
  - End-of-Life disposition information.
In 2000, the automotive manufacturers were faced with the challenge of how to meet the requirements of the End-of-Life Vehicle directive.

- Certify that their products do not contain prohibited hazardous substances.
- Demonstrate the percent of recycled content built into their products.
- Demonstrate the percent of their products that can be reused or recycled at end-of-life.
- Provide appropriate information to treatment facilities concerning the dismantling, re-use and recycling of their products.

Development of the Automotive Manufacturer strategy:
- Starting in 1996, the Association of Automotive Manufacturers established a procedure for the collection of material content data (Material Data Sheets).
- Concurrently, investigation began on automated systems for providing obtaining material content data:
  - Individual queries of each and every supplier regarding the material content of their products.
  - Product Material Content Web (or equivalent) to be queried, as necessary.
  - Product Material Content Web provided by the customer with data inputs required of the supplier.
- In 1998, the Automotive Manufacturers developed an electronic system, the International Material Data System (IMDS at http://www.mdsystem.com).

Why IMDS?
- Several automakers have attributed the IMDS format on the ELV requirements for the automakers to supply information on recycled content, end-of-life recyclability and specific chemical-specific (Cr+6 weight) data.

From DaimlerChrysler Corp. Characteristics Standard, CS-9003

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<tr>
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<tbody>
<tr>
<td>New</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>Carwyn Models</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
<td>50%</td>
</tr>
</tbody>
</table>

(1) All values are by weight and include 5% for energy recovery. Values after 2003 for new models have a 10% energy recovery value included. For both new and carwyn models after 2013 a 10% energy value applies.
SUPPLIER COMPLIANCE

- Accountability
  - PPAP
  - Scorecard – Deduct 5 Points from Supplier Delivery Rating
  - Terms and Conditions

Reporting in the Automotive Industry
IMDS: One Certification Procedure for the Industry

2000 2002 2004

Supplier Responsibilities in IMDS.
- It is the position of the automotive manufacturers that suppliers are responsible for both entering their data into IMDS and rolling data entry requirements to their suppliers.
- Tier One suppliers to cascade information to their suppliers.
  - Suppliers Register into IMDS.
  - Report the material content of their products directly into IMDS.
  - Tier One suppliers retrieve the information from IMDS and report to the Automotive Manufacturers.
- Penalties for Suppliers who fail to input data.
- Preference for Suppliers with products without restricted materials.

Reporting in the Automotive Industry

- From 1996 to 2000, Automobile Manufacturers required submission of material content data via hardcopy Material Data Sheets.
- In September 2000, automakers who developed IMDS issue statement to CEOs of Tier One suppliers of impending requirements.
- Suppliers input data on four materials of concern (Cr6+, Hg, Pb, Cd), European platforms first, then other geographies.
- Suppliers input data on 100% of material content, certify labeling of polymeric parts, and % of recycled content.
- Most companies (Ford, GM, Visteon, etc.) have made demonstration of IMDS entry a requirement to any PPAP document approval.

Reporting in the Automotive Industry

Example of “Ford-specific” IMDS Requirements
- Each Automaker has established their own schedule for entering material content information into IMDS.
- Each Automaker has defined the criteria of an acceptable IMDS entry.
- Example of “Ford-specific” IMDS Requirements
  - Must use IMDS as method of making material content declarations.
  - All substances listed in the Restricted Substance Management Standard (WS-M99P9999-A1) must be reported.
  - Ford does NOT require 100% basic substance disclosure – materials not covered by the standard can be reported as “miscellaneous.”
  - A “Flat Bill of Materials” is acceptable for electronic components - materials still need to be disclosed, but transistors, resistors, etc. can be grouped together.
Example of “GM-specific” IMDS Requirements
- Must use IMDS as method of making material content declarations.
- All substances listed in the Restricted Substance Standard (GMW3059) must be reported.
- GM requires the following statement in the “Remarks” if any “joker” is used:

“The material doesn’t have any restricted or reportable substances according to GMW3059 and VDA 232-101 guidelines.”

GETTING STARTED ON IMDS
- Initial registration and obtaining an Account.
  - Texas Instruments NA (Attleboro, MA) 2883
  - Texas Instruments Europe (Almelo) 4394
  - Texas Instruments Germany (Freising) 2169
  - Texas Instruments Asia (Japan) 14299
- System originally limited access by region. Upgrades allow one account for each company (simplify data sharing)
- Establish Account Manager
  - Logon and Passwords
  - System Permissions
  - Data Sheet Management
  - Organizational Unit Assignment and Management

Automakers have established very specific rules regarding the format of IMDS entries.
IMDS Entry Structure:
- Component (red square)
- Sub-component (yellow circle)
- Material (green double circles)
- Element/Substance (blue triangle)
- Not following the acceptable IMDS Entry Structure will result in “Rejection.”
- Each company has slight variations to what they allow.

Material Content Data Elements
- IMDS Format:
  - TI part number
  - Supplier Number provided by Customer
  - Customer part number
  - Material Account Information
    - Total part weight
    - Detailed Material Account
    - Recyclability Characteristics
  - Supplier Information
    - Additional Information required of Customer
    - Use of the Material in the Part (Ford)
    - Customer IMDS number/identifier