Declaration Process Overview

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Version 1

This document is released for purpose of supporting the development of materials and substances declaration in the Aerospace and Defence industry, and its supply chain.

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1.0 Introduction

Aerospace and Defence (AD) companies and their suppliers have an increasing need to obtain information about materials and substances contained within industry hardware products due to the increasing number of international substance regulatory requirements. The International Aerospace Environmental Group (IAEG®) has developed tools and information to support the exchange of material and substance data between members of the AD industry supply chain. This document was created by IAEG to support the identification of materials and substances within products consistent with the data elements contained in IPC-1754, *Materials and Substances Declaration for Aerospace and Defense and Other Industries.*

2.0 Scope

This document is offered for suppliers' consideration when providing information on materials and substances contained within the products that they supply to customers in the AD industry supply chain. Currently, process substances are not within the scope of this document, they will be addressed in future documentation.

3.0 IAEG Terms of Use

4.0 Definitions / Acronyms

AD – Aerospace & Defense

Article – An object, which during production is given a special shape, surface, or design which determines its function to a greater degree than does its chemical composition. An Article is any object that is not defined as a substance or mixture of substances.

BOM – Bill of materials or may also be referred to as a parts list

CAS Number – Chemical Abstracts Service (CAS) registry number is a unique identifier assigned to every chemical substance including organic and inorganic compounds, minerals, isotopes and alloys

Declarable Substance List (DSL) – A list of substances and/or group(s) of substances against which require declaration.

Declaration – Reporting of product-related substance data in standardized format, using specific data elements and rules. Declaration may either be based on a customer request, in a "request/reply mode" declaration, or be developed by the supplier in anticipation of customer requests in a "distribute mode" declaration.

Distribute mode – The supplier identifies which products are the subject of the declaration.

EC Number – European Community number is a unique seven-digit identifier assigned by the European Commission to substances for regulatory purposes within the European Economic Area.

IAEG Substance ID – A unique substance identifier assigned by IAEG.

Material – Matter that is made up of one or more substances.

Product – Any substance, material, sub-part, part, sub-assembly, or assembly up to a finished manufacturer's assembly that is the subject of a declaration.

Request/Reply mode – The requester determines which products are the subject of the declaration.

Requester – The company or other entity requesting a declaration from the supplier; the requester is the default recipient of the supplier's response.

Safety Data Sheet (SDS) – A regulatory document that includes information about hazardous constituents and properties of a chemical product, including regulatory information, hazards and instructions for handling, management, disposal and transport and also first-aid, fire-fighting and exposure control measures.

Subproduct – An entry applied to a Product object for the purpose of defining a portion of that product per the supplier's bill of materials, engineering documentation, or other logical structure (i.e. sub-assembly).

Substance – Chemical elements and their compounds.

Supplier – The company or other entity responsible for providing the finished goods and/or services required to produce a product supplied to a customer.

5.0 Declaration Process

The method used to report material and substance data is known as a "materials and substances declaration" and is referred to as a "declaration" throughout this document. The process of developing declaration information is managed through individual AD company's internal processes, as well as its relationships with its suppliers, and is subject to the requirements of those business-to-business relationships and contractual agreements. **Figure 1** is a high-level representation of the typical process a supplier could follow upon receiving a declaration request.

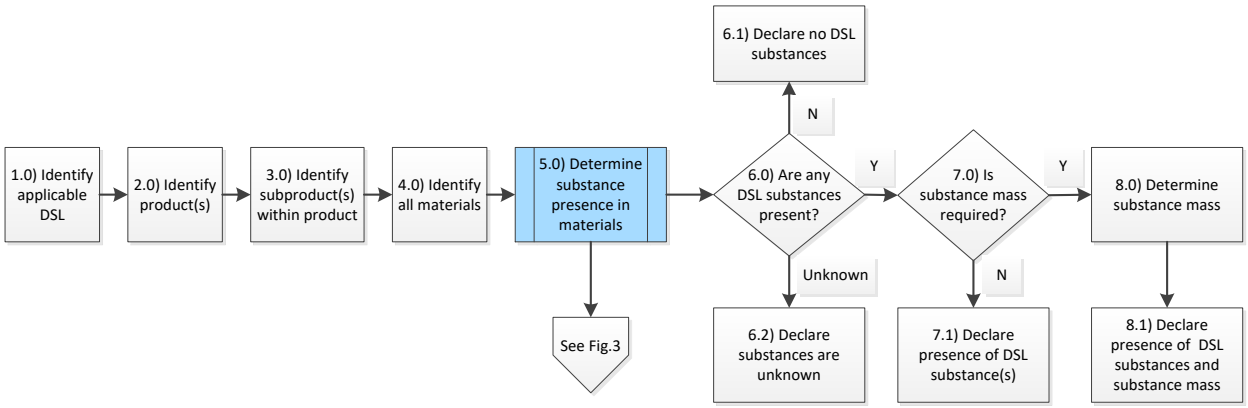


Figure 1: General Declaration Process Flow Diagram

1. <u>Identify applicable DSL</u>: Determine the substances that are to be reported in the declaration. Typically the requester provides the DSL or the supplier determines the DSL when there is no requester. Additional substances known to be present in the product but not listed on the DSL may be provided in a declaration in anticipation of requests from multiple requesters, or to minimize additional supplier declaration requests when new

substances are added to the DSL. For the AD industry, the default DSL is the Aerospace and Defence Declarable Substances List (AD-DSL).

2. Identify product(s): Identify the product(s) that require(s) a declaration. A supplier may provide a declaration without a request and identify the products on the declaration.

3. Identify subproducts within product: Determine if the product(s) is composed of subproducts, if any, from the relevant Bill of Materials (BOM), engineering documentation, or other logical product structure. A subproduct may have additional levels of subproducts. This information could be obtained internally or by requesting a declaration(s) from the supply chain. **Figure 2** is a graphical representation of a product and with multiple subproducts.

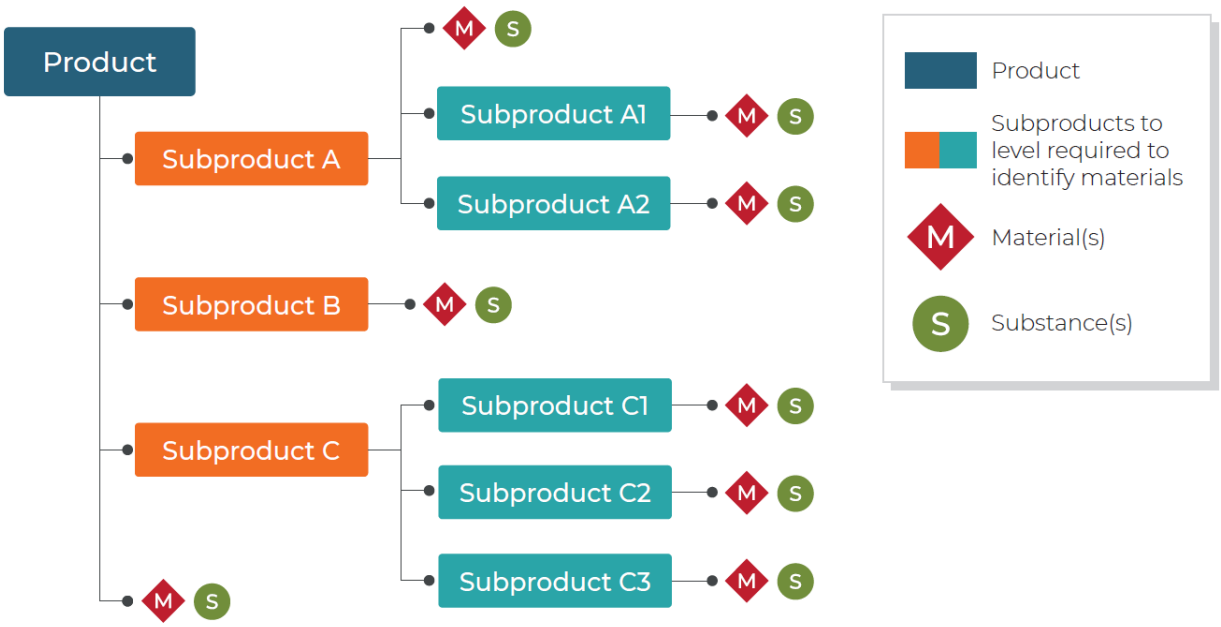


Figure 2: Graphical Representation of a Product with Multiple Subproducts

4. Identify all materials: Identify the unique materials (e.g. plastic, metal, ceramic, coatings, adhesives, etc.) in the various products and subproducts.

5. Determine substance content of materials: Identify the substance composition of each material. **Figure 3** displays the detailed steps for determining substances in materials.

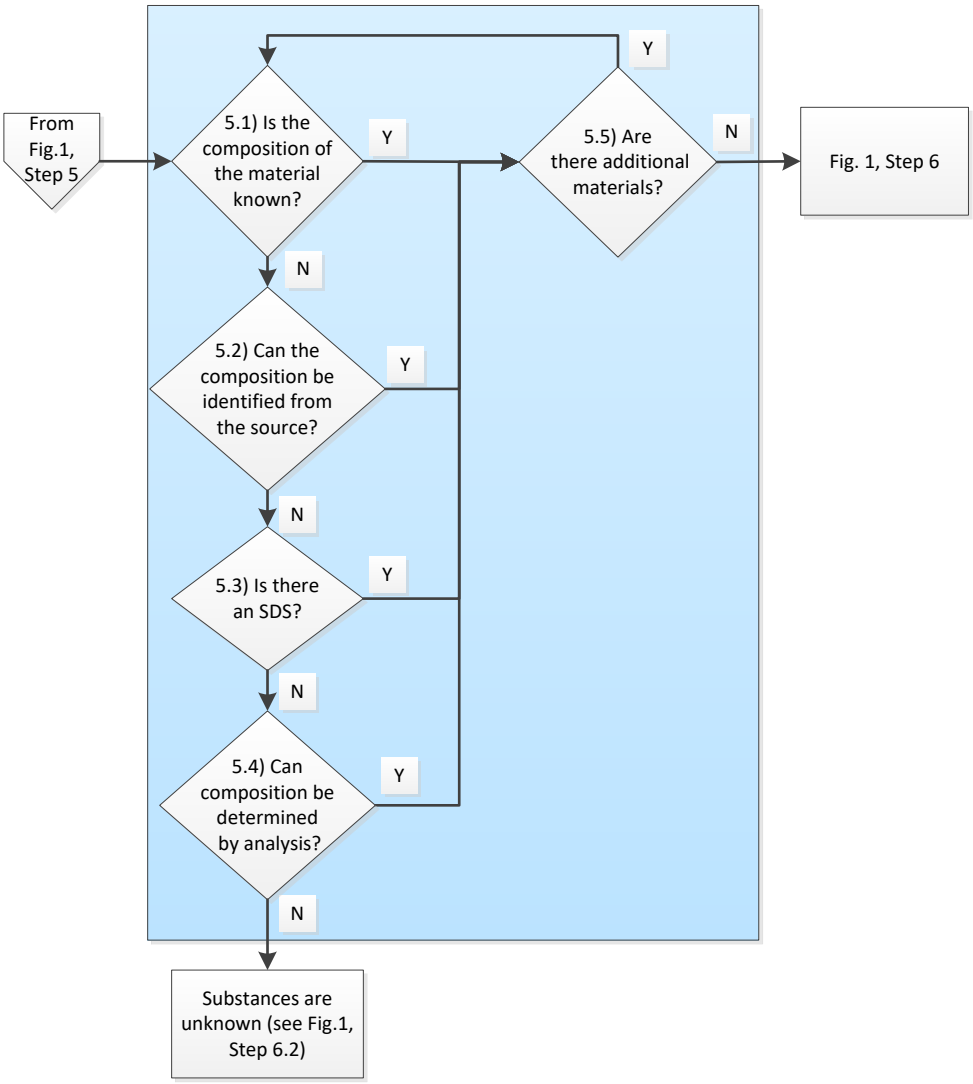


Figure 3: Identify Substances in Materials

5.1. Is the composition of the material known? Determine if the individual substances that compose the material can be identified from reviewing internal company resources (e.g. material database, specifications, test data, etc.) or leveraging materials subject matter experts.

5.2. Can the composition be identified from the source? Determine if the individual substances that compose the material can be identified from appropriate sources such as:
- Formulator: The manufacturer of the material
- Specification: Government, industry, supplier, etc.
- Literature: Supplier or industry information / data

5.3. Is there an SDS? Determine if an SDS is present for the material. If so, review the SDS and identify substances comprising the material. Caution should be used when referencing an SDS to determine the presence of substances in the product. For example, the SDS may not indicate:
- All substances contained in the material (e.g., some may be proprietary and are exempted from disclosure requirements)
- The substances formed from chemical reactions during processing (this is usually the case)
- Substances that are lost or consumed during production, such as those that are volatile or reactive

5.4. Can the composition be determined by analysis? Determine if the individual substances can be identified by engineering analysis or available chemical analysis (e.g. testing).

5.5. Are there additional materials? Return to Step a) in order to review the next material.

6. Are any DSL substances present? After identifying the materials and constituent substances, determine if any substances on the DSL were found.

6.1. Declare no DSL substances: No DSL substances were found during the product/material analysis. Document this information using the appropriate format.

6.2. Declare substances are unknown: If all options to determine the substances in a material have been exhausted, then the substance for that material is considered "unknown". If only a portion of the substances in the material is known, declare those known substances. It is anticipated that declaring an "unknown" substance may trigger a follow up from the requester to the supplier.

7. Is substance mass required? Determine if specific substance quantity/mass data is required. Unless otherwise required by the requester, the substance mass may be reported as a minimum, maximum, minimum to maximum range, or nominal value in relative (e.g. percent) or absolute (e.g. grams) unit of measures consistent with IPC-1754.

7.1. Declare presence of DSL substance: Provide the response to the requester using the agreed upon format on the presence of the DSL substances.

8. Determine substance mass: Perform necessary calculations to determine the mass of the substance. Detailed information planned for future development.
   8.1. Declare presence of DSL substances and substance mass: Provide the substance and associated mass information to the requester using the agreed upon format on the presence of the DSL substances.

6.0 Assumptions & Tips for Substance Identification

A. SDS requirements and content vary by country or region, depending on governing regulations. (e.g. EU safety data sheets are likely to contain more information on hazardous substances)
B. Corrosion resistant steel alloys contain elemental chromium. Elemental chromium is a different substance than hexavalent chromium compounds (i.e. metal alloys may contain elemental chromium, but do not contain regulated hexavalent chromium/compounds).
C. Metal plated finishes such as cadmium plating, chromium plating, and nickel plating contain only the plated metal, not the chemical constituents of the plating bath. Plated finishes may have an underplating layer or supplemental surface treatment which should also be reviewed for DSL substances (e.g., cadmium plating with a supplementary chromate coating).
D. Anodized aluminum (e.g., MIL-A-8625) is composed of an aluminum oxide film, and chemicals used during the chemical processing do not remain on the metal surface after chemical processing is completed. For example, after chromic acid anodizing, there is no hexavalent chromium trioxide (CrO_3) remaining on the aluminum oxide anodized surface. Anodized aluminum is often sealed and the anodize seal may contain AD-DSL substances such as hexavalent chromium compounds (e.g., those meeting MIL-A-8625 Types I and IB requirements).
E. MIL-DTL-5541 conversion coating (also called “chem film”, Alodine, or Iridite) can be either Type I or Type II. Type I conversion coating leaves residual hexavalent chromium compounds on the conversion coated surface; Type II conversion coating does not contain hexavalent chromium, and thus does not leave any residual hexavalent chromium. If the type is not specified, then MIL-DTL-5541F states to apply Type I conversion coating. Check with your source documentation to identify the materials used, if no type is specified.
F. Aluminum parts typically have a conversion coating or anodize surface treatment unless they are adhesively bonded. If an aluminum part is painted, then it typically has a surface treatment under the paint.
G. Solder commonly contains lead in significant composition percentages for AD applications.
H. Substances in etchants, deoxidizers, and pickling chemical processes do not remain on the metal surface after chemical processing is completed.

I. Substances used during the passivation of corrosion resistant steels per ASTM A967 or SAE AMS2700 do not remain on the metal surface after chemical processing is completed.
J. Secondary passivation processes (e.g., post treatment, sealing, conversion coating, surface treatment) typically leave substances on the product surface as delivered.
K. Multi-part materials composed of a base and activator (e.g., curing agent, catalyst, etc.) typically have a chemical reaction such that the substances on the product as delivered are usually different than the substances present in the unmixed base and/or activator. It is assumed that no residual reactants remain. The manufacturer may have information on the composition of the cured (reacted) material.
L. Solvents present during chemical processing normally will evaporate and not be present on the product as delivered (e.g. carrier paint solvents evaporate, but the paint pigment/solids remains on the product).
M. Solvents used for cleaning processes should not remain on the product as delivered.

7.0 Examples of the Identification of Substances in Materials

The following examples are provided for illustrative purposes only and are not intended to reflect the design of any specific vendor product.

<u>Example 1: Cadmium plated nut</u>

Step 1: Identify product:

- Product number: 123765
- Product description: nut

Step 2: Identify applicable DSL: The AD-DSL is the DSL being used.

Step 3: Identify all subproducts: None, in this case

Step 4: Identify the materials: Base material the nut is made of is low carbon steel grade 2H per the ASTM A194 specification. The nut is plated with cadmium per AMS-QQ-P-416, Type II, Class 2.

Step 5: Identify the substances: The following substances are present in the product as sold:.

- ASTM A194 steel alloy 2H grade; contains carbon, phosphorus, sulfur, silicon, and iron.
- AMS-QQ-P-416, Type II (with supplementary chromate treatment), Class 2 (0.0003 inch minimum plating thickness); contains the cadmium plated layer and supplemental surface treatment of hexavalent chromium compounds.

Step 6: Determine the presence of DSL substances in the product: Compare the substances identified in Step 5 to the substances on the AD-DSL, to identify any substances that may be subject to declaration. The following substances are indicated as requiring declaration:

CAS Number	EC Number	IAEG ID	Substance Name
7440-43-9	231-152-8	IAEG000028	Cadmium (Cd)
18540-29-9*		IAEG000439	Chromium (VI)

* This CAS is for the hexavalent chromium ion, and may be used when the exact hexavalent chromium compound is unknown.

Step 7 & 8: Detailed information on substance mass is planned for future development.

<u>Example 2: Primed cover</u>

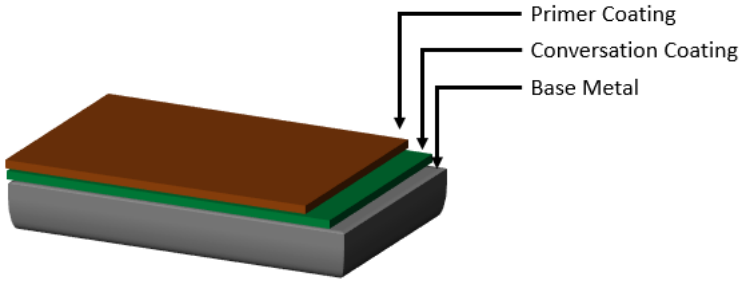
Step 1: Identify product:

- Product number: 123AA456987
- Product description: cover

Step 2: Identify applicable DSL: The AD-DSL is the DSL being used.

Step 3: Identify all subproducts: None

Step 4: Identify the materials: The plate base material is A357 aluminum alloy which is surface treated with MIL-DTL-5541 Type I, Class 1A conversion coating and coated with MIL-PRF-23377, Type I (standard pigments), Class C2 (strontium chromate based corrosion inhibitors) primer.



Step 5: Identify the substances: The following substances are present as the finished product, as supplied (Note: all solvents in the primer are assumed to have evaporated and are no longer present):

- A357 aluminum contains aluminum, silicon, beryllium, iron, copper, magnesium, titanium, zinc, and manganese
- MIL-DTL-5541, Type 1 conversion coating contains hexavalent chromium compounds
- MIL-PRF-23377, Type I, Class C2 primer contains strontium chromate and an epoxy polymer that is not listed on the DSL

Step 6: Determine the presence of DSL substances in the product: Compare the substances identified in Step 5 to the substances on the AD-DSL, to identify any substances that may be subject to declaration. The following substances are indicated as requiring declaration:

CAS Number	EC Number	IAEG ID	Substance Name
7440-41-7	231-150-7	IAEG000021	Beryllium (Be)
18540-29-9*		IAEG000439	Chromium (VI)
7789-06-2	232-142-6	IAEG000370	Strontium chromate

* This CAS is for the hexavalent chromium ion and may be used when the exact hexavalent chromium compound is unknown.

Step 7 & 8: Detailed information on substance mass is planned for future development.