PD IEC/TR 62474-1:2015

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Material declaration for products of and for the electrotechnical industry

Part 1: Guidance for the implementation of IEC 62474

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee GEL/111, Electrotechnical environment committee.

A list of organizations represented on this committee can be obtained on request to its secretary.

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TECHNICAL REPORT

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Material declaration for products of and for the electrotechnical industry – Part 1: Guidance for the implementation of IEC 62474

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MATERIAL DECLARATION FOR PRODUCTS OF AND FOR THE ELECTROTECHNICAL INDUSTRY –

Part 1: Guidance for the implementation of IEC 62474

FOREWORD

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IEC TR 62474-1, which is a Technical Report, has been prepared by IEC technical committee 111: Environmental standardization for electrical and electronic products and systems.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
111/359/DTR	111/369/RVC

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

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This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62474 series, published under the general title *Material declaration for products of and for the electrotechnical industry*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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MATERIAL DECLARATION FOR PRODUCTS OF AND FOR THE ELECTROTECHNICAL INDUSTRY –

Part 1: Guidance for the implementation of IEC 62474

1 Scope

This part of IEC 62474, which is a Technical Report, is a guidance document to help organizations that create tools for material data exchange and organizations that submit and receive material declarations to properly implement IEC 62474.

IEC 62474 specifies the procedure, content, and form relating to material declarations for products of companies operating in and supplying the electrotechnical industry.

This Technical Report:

- illustrates the flexibility and functionality of IEC 62474 using examples,
- supports organizations that create software to exchange substance and material data,
- supports users that submit and receive material declarations, and
- is designed to support consistent implementation of IEC 62474.

Clause 3 summarizes industry needs for material information and business benefits related to IEC 62474.

Clause 4 provides case studies that describe the functionality of IEC 62474.

Clause 5 provides detailed representations and XML files for the material declaration case studies included in Clause 4.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62474:2012, *Material declaration for products of and for the electrotechnical industry*

3 Industry needs and business benefits

3.1 Industry needs

Today, there are ever increasing legal regulations in many countries from around the world and supply chain requirements that may restrict the use of substances in products, require reporting and/or require notifications of substance uses.

To determine restricted substance compliance status, electrotechnical product manufacturers need information about restricted substances contained in supplied products that become part of the manufacturer's products.

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Electrotechnical product manufacturers also need data about materials used in products as one of the inputs in an environmentally conscious design process to improve environmental performance of products throughout their product life cycle.

Also, to make material declaration data readily available, the supply chain (including organizations providing products into the electrotechnical industry) needs a standardized method to exchange the data.

3.2 Business benefits

IEC 62474 was developed to standardize the multiple existing approaches into a single global approach for the electrotechnical industry.

Material declarations according to IEC 62474 provide all data needed to make a restricted substance compliance assessment. These material declarations according to IEC 62474 can be used to obtain the data needed to be included in the technical documentation file required to place products on the market in different regions. Examples are:

- The EU Restriction of Hazardous Substances (RoHS) Directive
- The China Administrative Measures on the Control Pollution Caused by Electronic Information Products (known as “China RoHS”).

IEC 62474 specifies the use of a dedicated database that lists substances and substance groups that require declaration. This provides certainty to suppliers regarding what data they need to provide, regardless of the customer. The IEC database also includes material classes that may be used as an input to environmentally conscious design, and a developers table and schema that specifies data exchange requirements. The IEC 62474 database is maintained and regularly updated by global experts to meet changing legislation and broad customer requirements. The database can be found at: http://std.iec.ch/iec62474.

Implementing IEC 62474 improves data quality and reduces cost, because it offers a standardized method to support material declaration data throughout the supply chain.

The data required about products, product parts and materials can be extensive, and the electrotechnical industry benefits from a standardized way to exchange this data as well as provides a defined list of declarable substances through the IEC 62474 database. This reduces the risk of data entry errors as well as unnecessary reporting of substances that do not apply to electrical and electronic products.

The standard is flexible, identifying base requirements, but also allowing all levels of additional reporting under defined rules, so that the data is properly exchanged through the supply chain. The data exchange format specification allows the supply chain to use a single format to exchange their data rather than replying to each customer’s custom format. The capability to send and receive data in the IEC 62474 format allows suppliers to provide data and customers to request data. How the data is stored remains independent of how it is exchanged.

IEC standards are recognized by the World Trade Organization (WTO), which means that IEC 62474 can be referenced as the global standard for material declarations applicable to the electrotechnical industry.

Broad implementation by electrotechnical industry organizations will result in:

- material declaration data being available as a condition to sell to the eletrotechnical industry,
- availability of material declaration data that is not dependent on an organization’s size or purchase volume,

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- improvement of data quality, reduction of compliance costs and elimination of inefficiencies, and
- faster assessments of products/materials under review.

4 Material declaration approach and flexibility of IEC 62474

4.1 Material declaration approach

4.1.1 General

Subclause 4.1.1 builds on the content given in IEC 62474:2012, 4.1 (for example, by including the conceptual diagrams for base requirements and additional requirements), and addresses the following topics:

- base requirements;
- additional requirements;
- conditional requirements.

IEC 62474:2012, Clause 4 is organized in the order of the conceptual diagrams (see Figure 1 and Figure 2 below from IEC 62474) for ease of understanding. Mandatory information is shown with solid boxes and arrows. These represent the products, substance groups or substances with a mandatory reporting requirement in the IEC 62474 database.

Product parts, material classes, materials, and substance groups or substances without a mandatory reporting requirement in the IEC 62474 database are optional and represented with dotted boxes and arrows. Substance groups and substances not listed in the IEC 62474 database are also optional for declaring. Further mandatory reporting requirements apply without being displayed in the diagrams (e.g. mass or mass percent). When there is a substance group with a mandatory reporting requirement, one can declare only the substance group if there are no underlying declarable substances with a mandatory reporting requirement at or above the reportable threshold as specified in the IEC 62474 database.

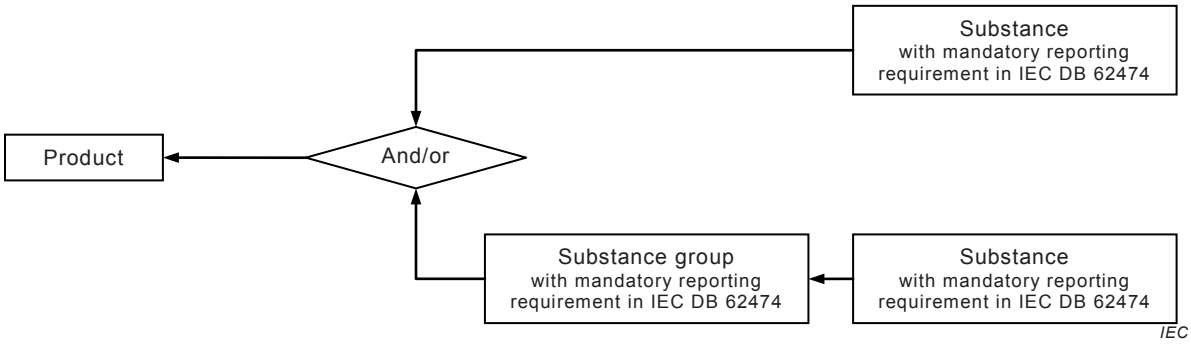

Figure 1 – Conceptual diagram for base requirements

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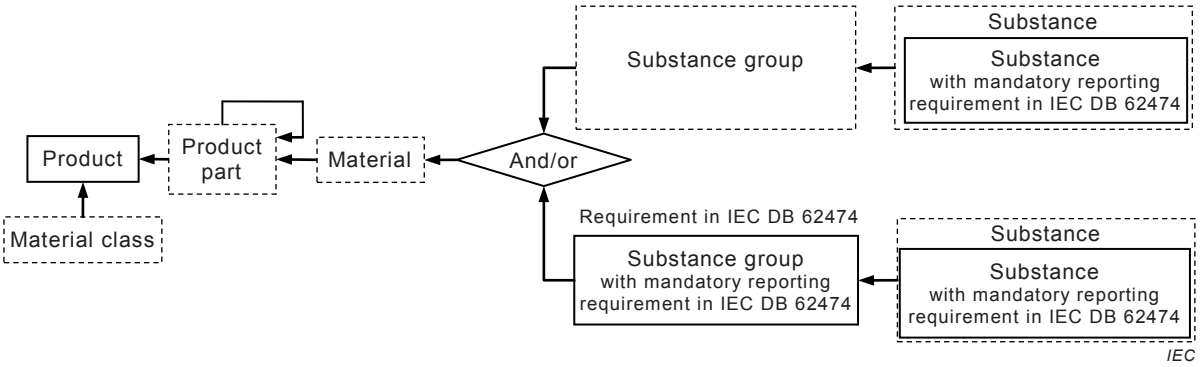

Note The arrow around the product part indicates that any product part could be broken down into further product parts and thus it indicates that the product assembly is not just limited to two levels (product – product part) as displayed in this conceptual diagram.

Figure 2 – Conceptual diagram for additional requirements

A user may only state that it is in conformance with IEC 62474 if it has:

- included all declarable substances and substance groups with a mandatory reporting requirement that are present in the product at or above the reporting threshold as per the IEC 62474 database, and
- followed the IEC 62474 XML data exchange (schema and developers table).

If a user is reporting more than the base data requirements, then conformance to IEC 62474 also includes:

- meeting all of the "additional requirements" associated with any optional information that is reported, and
- meeting all the detailed data requirements specified in the IEC 62474 XML schema and developers table.

IEC 62474 specifies that only substances that remain in the product may be declared in the material declaration file. IEC 62474 also requires that manufacturing chemicals that react, form other chemicals or otherwise do not remain in the product are not to be included. For example, for a resin and a hardener that are used to form epoxy in a product, the final epoxy substance should be declared if it is a declarable substance or as a voluntary declaration. The individual resin and hardener chemical could be declared only if a residual amount of these chemicals remained in the product.

The recursive nature of product parts (shown in Figure 2 above with the arrow back to product parts), allows the users flexibility to report multiple levels within a product's "Bill of Materials" (BOM) such that users are not just limited to only one part level under the product. For example, one can declare a personal computer (product) with a mother board (product part 1) with a coin cell battery (product part of product part 1). This flexibility enables all users within the electronic industry supply chain to be able to effectively utilize the IEC 62474 XML schema.

4.1.2 Guidance on use of conditional fields in the developers table

The IEC 62474 developers table includes a column (Obligation column) that indicates whether a specific data field (element or attribute) is mandatory or optional. Some data fields are listed as conditional. These fields are mandatory under certain material declaration conditions, optional under other conditions. A conditional obligation may also cause an element or attribute to become not applicable under certain conditions and therefore it may not be used in that particular instance.

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For example, the “identifier” attribute within the ProductID class is listed with a conditional obligation. If the ProductID is used to identify the product at the top of the material declaration hierarchy, then the identifier information is mandatory and must be provided by the user in the material declaration. However, if the ProductID is used in declaring a product part that is lower in the declaration hierarchy, this identifier information is optional.

There are a few other data elements and attributes that are also listed with a conditional obligation. The Mass, MassPercent, and MatMassPercent elements have particularly complex conditional provisions that must be carefully reviewed to ensure correct implementation.

4.1.3 Guidance on use of mass and mass percent fields

IEC 62474 specifies that a declaration is required to report either mass or mass percent, but not both. This is important for data quality purposes as only one data field is variable and the second data field is a calculated value.

If both the mass percent and the mass are declared, but due to errors the calculation does not correspond to the reported mass, then the receiver of the material declaration will not know which number is the correct one to use.

A general rule of thumb is to report using mass percent when reporting product families (e.g. ICs, resistors, capacitors, etc) which contain multiple products in one declaration, but to use mass when reporting assemblies or finished goods when a single product is declared. Reporting concentrations (mass percent) for product families provides sufficient data for the receiver of the declaration to correctly calculate the mass of each product in the family in their IT software system tools, while streamlining the number of material declarations to be exchanged between the two companies.

4.1.4 Calculating mass percent

In the material declaration, either mass or mass percent for the substance, substance group, material or product part can be used.

Many laboratories report concentrations in ppm. One ppm means 1 part in 1 000 000 like parts, such as grams to gram basis. ppm is converted to mass percent for such cases by the formula Mass percent = X ppm / 10 000.

See Table 1 for conversion from ppm to mass percent.

Table 1 – Conversion table from ppm to mass percent

Percent (%)	ppm = (mg/kg)
0,000 1 %	1
0,001 %	10
0,01 %	100
0,1 %	1 000
1,0 %	10 000
10,0 %	100 000
100,0 %	1 000 000

With one justified exception, mass percent is always referring to the next higher level in the product hierarchy that is declared. This means that mass percent will refer to the material, product part or product. The exception is that if a substance is assigned to a substance group in the declaration (see IEC 62474:2012, 4.2.3 a), 4.3.4 a) and 4.3.5 a)), the mass percent refers to material (if declared), product part (if declared) or to the product. The mass percent of a substance is never calculated based on the mass of the substance group. Declaring a

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substance as a mass percent of the substance group can cause errors and therefore it is not allowed in IEC 62474. This is stated in the relevant requirements included in IEC 62474:2012, 4.2.3 c), 4.3.4 c) and 4.3.5 c).

This deviation from the generic rule ensures that the recipient of a material declaration is able to interpret the data correctly under any combination of base and optional reporting. This is necessary to cope with situations where a declarable substance group has a reporting requirement that is based on materials (e.g. homogeneous material). The situation is further complicated when only a part of the compound (e.g. the lead in lead/lead compounds) is to be declared. As some substances within the substance group may be unknown, the information on percentage of the declared substances within the substance group cannot be unambiguously correlated to the mandatory material mass percent declaration, and as a consequence a further transfer of this information would not be of use.

As a consequence, the declaration of mass percent of a substance within a substance group is not allowed in IEC 62474. To secure that the voluntarily provided declaration of a substance is useful for any follow-up declarations, its mass or mass percent of the material (if declared), product part (if declared) or product is needed.

To convert from mass to mass percent, one divides the mass of the substance or substance group by the mass of the product, product part or material and then converts to percent.

Mass percent = mass of substance/mass of product, part or material × 100 percent.

The only time the MatMassPercent data field is used in the XML file is when the IEC 62474 database has a mandatory reporting threshold at the material level. For all other instances, either the Mass or the MassPercent data field should be used in the XML file.

4.1.5 Interpretation of reporting threshold for declarable substances and declarable substance groups

For most of the declarable substance and declarable substance group entries in the IEC 62474 database, the reporting threshold is based on the mass percent of the product. This is represented by a reporting threshold that is listed as "0,1 mass percent". The reference to the mass of the product that is declared is implied in this threshold. However, there are declarable substances and declarable substance groups that have a reporting threshold with a different calculation basis. The EU RoHS declarable substance groups are examples that use the mass of the homogeneous material as the basis for calculation. If the reporting threshold refers to something other than the product (such as a material or a product part like a battery), this is indicated in the IEC 62474 database.

4.1.6 Guidance on declaring a substance that belongs to two different substance groups

A material declaration that conforms to IEC 62474 requires that a declared substance with a mandatory reporting requirement must be assigned to its respective declarable substance group with a mandatory reporting requirement, if the declarable substance group is declared. The requirement “such substances shall be assigned to the substance group”is specified in IEC 62474:2012, 4.2.3 a) and 4.3.4 a).

In most material declarations this is straightforward. However, since the establishment of IEC 62474, several corner cases have emerged with a declarable substance fitting into two declarable substance groups. For example, the REACH SVHC substance “Lead sulfochromate yellow” creates such a situation. The declarable substance groups “Lead/Lead Compounds” and “Chromium (VI) Compounds” are both relevant. "Lead/Lead Compounds” and “Chromium (VI) Compounds” need to be declared if they are present at or above the reporting threshold for each homogenous material. However, it is not possible in an XML file (by the design of the XML schema) to assign the same occurrence of “Lead sulfochromate yellow” to both substance groups simultaneously even if the Lead sulfochromate yellow triggered the

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declaration of both declarable substance groups. Reporting this occurrence under both Lead/Lead Compounds" and "Chromium (VI) Compounds" would incorrectly double the total amount of Lead sulfochromate yellow and should be avoided, too.

Several possibilities arise for assigning the substance group in such situations. In the case of Lead sulfochromate yellow, the responder (supplier filling out the material declaration) needs to select one of the respective declarable substance groups and assign the substance to it. Regardless of which declarable substance group is selected, the responder still needs to state the presence of the other declarable substance group if it exceeds the threshold.

4.2 Flexibility of IEC 62474

4.2.1 Overview of material declaration features

Beyond the minimum declaration requirements specified in IEC 62474:2012, 4.2, base data requirements and detailed data requirements as per the IEC 62474 XML schema, users have significant flexibility in providing additional information that is useful in material declaration exchanges up and down the supply chain.

4.2.2 Flexibility of declaring substances and substance groups at different levels within the declaration

Users have flexibility as to how substances and substance groups are declared within the hierarchy of the material declaration created in the XML file. For example, a user may voluntarily declare the material for some substances; whereas other substances (such as EU REACH SVHCs) may be represented as reporting directly into the product. This flexibility is illustrated in Example 6 (see 5.7). If there are any restrictions on how a declarable substance or declarable substance group is to be reported; this information will be provided in the reporting threshold on the IEC 62474 database.

4.2.3 Declarable substances in a material declaration

4.2.3.1 General

The declarable substances and declarable substance groups in IEC 62474 are central to the declaration. If they are present in the product, and meet or exceed the reporting threshold for that particular application, it is required that these substances and substance groups are identified in the material declaration if they have a mandatory reporting requirement. Otherwise the declaration does not fulfil the requirements of IEC 62474. There are two specific situations that are sometimes overlooked and deserve additional discussion in this guidance document. These are trade secrets and substances with a CAS number that contains other substances, which are discussed below.

4.2.3.2 Trade secret

Suppliers might have special alloys or compounds that are central for the function and where the supplier does not want to disclose the exact composition.

For materials that are considered as a "trade secret", IEC 62474 specifies that any declarable substances or substance groups contained in such a material need to be declared if they have a mandatory reporting requirement and are present in the product at or above the reporting threshold for its associated reportable application.

4.2.3.3 Substances with a CAS-number that contains other substances

Some mixtures and materials have been assigned CAS numbers. Examples include:

- Steel with CAS number 12597-69-2
- Brass with CAS number 12597-71-6

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Each of these mixtures and materials may or may not include a substance (e.g. lead) that is a declarable substance or declarable substance group. Declaring only “Steel” does not give information if lead is a part of the alloy or not. Declarable substances and declarable substance groups clearly need to be disclosed.

Many declarable substances are compounds which must be reported as listed in the IEC 62474 list of declarable substances. It is not permissible to report the separate elements that make up the compound. For example, diboron trioxide (CAS number 1303-86-2) consists of Boron and Oxygen, with CAS-numbers 7440-42-8 and 7782-44-7. In this example, the declaration of these elemental CAS-numbers will hide the existence of the declarable substance and does not meet the reporting requirement of IEC 62474 because it does not properly represent the substances actually contained in the product.

4.2.3.4 Description of UVCB substance which constitutes ceramic/glass

Ceramic/glass used as constituent materials of electronic components has a complex chemical composition when formed from various metal oxides (or nitrites, carbides, etc.). In addition, they also show completely different chemical characteristics compared to simple mixtures of metal oxides, etc. It is subsequently very difficult to describe precisely the exact chemical composition of the glass or ceramic due to its complex and variable nature. IEC 62474 can support different methodologies for reporting UVCBs (Unknown or Variable composition, Complex reaction products or Biological materials).

The U.S. Toxic Substances Control Act (TSCA) 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 substances of UVCB. On the other hand, the EU REACH Regulation in Point 11 of Annex V exempts ceramic frits and glass from specified regulations (Title II Registration of substances, Title V Downstream users and Title VI Evaluation) unless they meet the criteria to be classified as dangerous according to Regulation (EC) 1272/2008 and provided that they do not contain constituents meeting the criteria to be considered dangerous in accordance with Regulation (EC) 1272/2008 present in concentrations at or above the specified concentration limits. This concept is chemically accurate because ceramic or glass is a simple UVCB where constituent substances are dissolved and homogenized during the manufacturing process. For example, diboron trioxide (B2O3) is a common substance used in the production of borosilicate glass. Diboron trioxide is designated as a REACH SVHC. However, during the glass formation process the diboron trioxide is transformed to a different boron substance. This transformation renders the boron in the glass to be non-hazardous and thus no longer qualifies it as an SVHC. Technically, it is not possible to assign a unique chemical formula to the boron containing substance due to its complex and variable nature.

For glass or ceramics that are considered dangerous, as defined by Regulation (EC) 1272/2008, declaring the hazardous substance (such as Pb in glass) is problematic since it is not possible to precisely identify the Pb containing substance. Various industry groups have devised their own declaration protocols for addressing this issue. Presently, there is no single method that is without limitations. It is not the intent of this guidance document to prescribe a particular methodology. Rather, examples of reporting methodologies for substances in glass and ceramic are contained in Annex A. It is at the discretion of the user to determine which, if any, of the methodologies best fit their own reporting requirements. For the purposes of the detailed examples shown in Clause 5, this Technical Report shows constituents using a modified International Material Data System (IMDS) method. This method describes substances as a more general substance instead of selecting a specific chemical substance to represent the actual substance present or to describe constituents used in the manufacturing process that no longer exist in the product.

4.2.4 Additional guidance on declaration of material classes

Material declarations are not only used to determine regulatory status, but as an input for environmentally conscious design, where it helps to inventory product-related environmental aspects and give information to determine which of these aspects is significant to a specific product.

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Material classes represent categories of materials, so that an electrotechnical equipment manufacturer may determine the materials contained in their products, and use these as one of the inputs to life cycle assessments. It allows:

- an inventory of materials contained in the product that can be assessed for significance;
- determination of which materials are dominant in the product that may be used for material efficiency goals; and
- analysis of energy used to obtain and manufacture the materials, as an input that may be used for energy efficiency goals.

Material classes are not related to hazards or regulations, and do not represent any kind of recommendation related to hazards or regulations.

4.2.5 Absence declaration

In addition to conforming to IEC 62474 requirements to provide information about any substances and substance groups that are present in the product at or above threshold levels, the user can also provide an absence declaration stating that the IEC 62474 declarable substances and substance groups are not present, at or above threshold for the reportable application in the product, or that additional substances and/or substance groups are not present at or above a user defined threshold and reportable application.

An absence declaration should not be interpreted as a “free of…” statement, as it is used in ISO 14021. In the context of IEC 62474, the absence declaration only means that the concentration of the substance is not higher than the specified reporting threshold.

The absence declaration (which is sometimes also referred to as a negative declaration) can provide confidence to downstream manufacturers and/or enforcement authorities that the supplier has assessed the product for these substances and is reporting that they are not present at or above the reporting threshold.

To indicate an absence declaration, the responder would set the "aboveThresholdLevel" flag for the substance or substance group in the XML file as false. IEC 62474:2012, 4.3.6 b) also specifies that an absence declaration must include information about the absence criteria (such as reporting threshold and reportable application). The reportable application and reporting threshold should be taken from the IEC 62474 declarable substance list where available. If a substance being reported is not contained within the IEC 62474 database, then it is suggested the 0,1 mass percent threshold at the product level be used as a baseline, as it is suggested as the default threshold level for declarable substances listed based on criteria 3 in IEC 62474.

An absence declaration is not allowed for a declarable substance that is contained at or above the reporting threshold, even if an exemption is applicable.

4.2.6 Material names

If one or more materials are declared in the material declaration, a name for the material is mandatory and a UniqueID of the materials is optional. This material name is the name of the material within the product. Material name may describe the material and/or describe the use or location of the materials in the part. The UniqueID field in material can be used to identify a declared material based on specifications defined in a standard (e.g., ISO 1043, Parts 1 through 4 for plastics).

When declaring a material in the declaration, it is necessary to specify the material class that the material is part of using the "materialClassID" field. This is mandated in IEC 62474:2012, 4.3.3 d).

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4.2.7 Use of the query list features

Query lists are used to provide additional information about the product. Query lists can be used in a response mode to request information from the supplier or in a distribute mode for the supplier to provide key information to their customers. For example, a query list can be used to provide information on whether or not the product contains a battery, uses RoHS exemptions, or conforms to an industry standard such as IEC61249-2-21 for low halogen concentrations in a printed circuit board laminate.

The query list XML contain two parts: 1) a statement with a true/false response and 2) the identity which is a code that identifies the list or group of queries (see Table 2).

Table 2 – Use of query list

Query List	Statement	Response
ABC CompanyList-001	This product contains a battery	TRUE
	This product meets IEC 61249-2-21 low halogen definition for PCB laminate	FALSE

This is shown in XML format below:

<QueryList identity="**ABC CompanyList-001**">
<Query response="**True**" statement="**This product contains a battery**" />
<Query response="**False**" statement=" **This product meets IEC 61249-2-21 low halogen definition for PCB laminate**" />
</QueryList>

NOTE **Bold text** shows the supplier added information and the regular text is the XML code.

4.2.8 Declaring exemptions

This guidance document recommends that material declarations include any regulatory exemptions that are applicable to the use of declarable substances and declarable substance groups. Once declared, IEC 62474:2012, 4.3.4 f) requires that information about exemptions must be carried through the supply chain. Users should check the reportable application to assess whether an exemption is applicable or not to a given application.

IEC 62474 is very flexible in allowing users to specify exemptions from one or a multiple of exemption lists. For example, a material declaration may specify both an EU RoHS exemption and simultaneously an EU ELV exemption for a given use of lead. Exemptions may be specified for a substance, a substance group or at the level of the entire product. In most cases, exemptions will be associated with the substance or substance group. The IEC 62474 XML schema does not currently allow exemptions to be associated with product parts or materials.

Examples of declaring such exemptions are provided in Clause 5. Within the material declaration file, each exemptions entry has data fields for "UniqueID" (provides information about the exemption list used) and "Exemption" which identifies the specific exemption that is applicable. The UniqueID field will include the authority -- use the exact text string provided by the authority (e.g. IPC or JAMP) -- and the specific exemption list that is used (e.g. “EL2011/534/EU” for IPC and “EU_RoHS_1.02” for JAMP). The "Exemption" field will include the identity of the exemption (e.g. “1(a)” for IPC 1752A and “0201” for JAMP) and the text based description of the exemption.

Users should use exemptions from a recognized and maintained list that is readily available and commonly accepted throughout the electrotechnical industry and supply chain. This is necessary to allow computer processing of the exemptions in the material declaration XML file. Examples of such maintained lists include the IPC 1752A standard and the JAMP material

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declaration system. Please see the examples below of the IPC 1752A and JAMP exemption lists.

Example 1: IPC 1752A

The IPC material declaration system contains lists of EU RoHS exemptions and EU ELV exemptions. The IPC exemptions lists are revised whenever the EU Commission publishes an official amendment. When using an IPC exemption list in a material declaration, the user will set the UniqueID.authority to 'IPC'. The UniqueID is set to the version of the IPC exemption list and is taken from the EU official document:

UniqueID.Authority = IPC

UniqueID = EL2010/571/EU

Within the EU RoHS exemption list, 2 fields are identified.

1) The identity of the exemption
2) Description of the exemption

An example of the fields used within the IPC EL2010/571/EU list is shown in Table 3.

Table 3 – IPC 1752A exemption specification example

Identity	Description
1 (a)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes less than 30 W: 5 mg
1 (b)	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):For general lighting purposes greater than or equal to 30 W and less than 50 W: 5 mg

<Exemption identity="1(a)" description="Mercury in single capped (compact) fluorescent lamps not exceeding (per burner): For general lighting purposes less than 30 W: 3,5 mg"/>

<Exemption identity="1(b)" description="Mercury in single capped (compact) fluorescent lamps not exceeding (per burner): For general lighting purposes greater than or equal to 30 W and less than 50 W: 3,5 mg"/>

Example 2: JAMP

The JAMP material declaration system has an "Application List" that clarifies the effective date and expiration date of both RoHS exempted use and ELV exempted use. JAMP adds a unique code to each exempted use and updates its "Application List" on a regular basis.

The exemption list released by JAMP is organized by legislation (e.g. EU RoHS Directive, EU ELV Directive). The contents of the exemption are specified in this list. This enables specifying the exemptions without having to describe the contents, thereby reducing the volume of information communicated in XML.

An example of the JAMP application list for the EU RoHS exemption list is shown in Table 4 below. Besides IEC 62474 fields, JAMP has fields for an exemption, application code and expiry date. The JAMP term “Identity” maps to the IEC 62474 XML attribute “”Identity” and the JAMP term “Description” on the JAMP Application List maps to the IEC 62474 XML attribute “Description”.

– UniqueID.Authority＝JAMP
– UniqueID＝EU_RoHS_Ver._1.02

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Table 4 – JAMP application list for RoHS exemption list example

"Description" on the JAMP Application List	Identity	Exemption
EU_RoHS_0201	0201	Mercury in single capped (compact) fluorescent lamps for general lighting purposes <30 W:not exceeding (per burner) 5 mg

An example of the JAMP application list for the EU ELV exemption list is shown in Table 5 below.

– UniqueID.Authority=JAMP

– UniqueID=EU_ELV_Ver._1.02

Table 5 – JAMP exemption specification example

"Description" on the JAMP Application List	Identity	Exemption
EU_ELV_0058	0058	Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 percent by weight or more lead)

In XML, these examples are shown as:

RoHS:
```
- <Exemptions>
  <Exemption description=" EU_RoHS_0201" identity="0201" />
 <UniqueID.authority="JAMP" identity=" EU_RoHS_Ver.1.02" />
  </Exemptions>
```

ELV:
```
- <Exemptions>
  <Exemption description=" EU_ELV_0058" identity="0058" />
 <UniqueID.authority="JAMP" identity=" EU_ELV_Ver.1.02" />
  </Exemptions>
```

All of these fields should be copied word-for-word from the maintained exemption list that is used. Detailed XML examples of exemptions are provided in Clause 5.

4.2.9 Using the reportingThreshold, aboveThresholdLevel and the reportableApplication fields

The Substance and SubstanceGroup classes include a class reference to the Threshold element. The data in this element provides the downstream recipient of the material declaration with important information about whether the substance is present in the product at or above, or below, a reporting threshold that is specified in the IEC 62474 declarable substance list. The Threshold element includes three individual attributes for the reporting threshold, the reportable application, and true/false information about whether the substance or substance group in present at or above the reporting threshold. For declarable substances and declarable substance groups the reporting threshold and reportable application fields should be copied directly from the IEC 62474 declarable substance list – copy/paste of the text directly from the IEC 62474 declarable substance list is important so that the information can be checked and processed by computer software tools without manual intervention. It is not sufficient for a supplier to provide just the above threshold value given that multiple reporting thresholds may be applicable to a substance group or substance. The reporting threshold needs to be provided and it may be helpful also to provide the reportable application.

The declaration of the Threshold element in Substance and SubstanceGroup is optional; however, it is strongly recommended that this information is included in the declaration. The multiplicity of 0:* for this element, means that multiple reporting thresholds may be provided by the supplier. This may be useful in circumstances where multiple reporting

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threshold/reportable application combinations are applicable. The supplier can provide information on which of these are at or above threshold and which are below threshold.

For most of the declarable substance and declarable substance group entries in the IEC 62474 database, the reporting threshold is based on the mass percent of the product. This is represented by a reporting threshold that is listed as “0,1 mass%”. The reference to the mass of the product that is declared is implied in this threshold. However, there are other many declarable substances and declarable substance groups that have a reporting threshold that has a different calculation basis. The EU RoHS declarable substance groups are examples that use the mass of the homogeneous material as the basis for calculation.

4.2.10 How to declare a product that does not have a fixed mass

To make a declaration for a product that does not have a fixed mass one shall specify the unitType (for example, cm, m, cm^2, m^2, cm^3, l, m^3, etc) and provide the mass of 1 unitType of the product. For example, the mass of 1 m of copper wire, the mass of 1 m^2 of steel sheet, the mass of 1 litre of paint. For discrete parts (e.g. resistors, capacitors, screws, housings), one should set the unitType to 'each'.

5 Material declaration examples

5.1 General

Clause 5 illustrates several examples of material declaration. For presentation purposes, these declarations are separated into i) business information (mandatory and optional information), ii) product part/material/substance group/substance declaration (mandatory and optional information) and iii) a declaration of the material classes (entirely optional). XML editor programs are commercially available that can show XML files in a more readable format.

This guidance document provides examples of IEC 62474 material declarations. For a complete list of information required for material declaration according to IEC 62474, see IEC 62474:2012, Clauses 4 and 6 and the developers table and XML schema in the IEC 62474 database. The examples provided in this guidance document are based on substance list version D7.00 and XML schema version X5.00, which are the most current versions of the IEC 62474 database at the time of this Technical Report’s publication.

Footnotes in the Tables shown in Clause 5 are repeating requirements from IEC 62474 and do not introduce any new requirements.

5.2 Example 1 – An electronic component

5.2.1 General

An electronic component weighing 0,12 grams consists of six materials. Two of these materials contain ‘Lead/Lead Compounds’ at or above the reporting threshold level. The termination glass contains 9,3 percent material mass percent of lead which is exempt from the RoHS substance restrictions under exemption 7(c)-I of Annex III of the RoHS2 Directive (as amended by Decision 2011/534/EU) and is exempt from the ELV substance restrictions under exemption 10(a) of Commission Directive 2011/37/EU. The termination metal solder contains 97,0 percent material mass percent of lead which is exempt from the RoHS substance restrictions under exemption 7(a) of Annex III of the RoHS2 Directive (as amended by Decision 2011/534/EU) and is exempt from the ELV substance restrictions under exemption 8(e) of Commission Directive 2011/37/EU.

<u>Base data requirements example:</u>

Subclause 5.2.2 and Tables 6, 7 and 8 illustrate the material declaration based on the “base data requirements” given in IEC 62474:2012, 4.2. The declarable substance group “Lead/Lead Compounds” shall be declared separately for each homogenous material that contains

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“Lead/Lead Compounds” at or above the reporting threshold level, but the base requirements do not require declaration of the materials themselves; thus two declarations of “Lead/Lead Compounds” are shown. Figure 3 provides the XML file for this material declaration based on “base data requirements”.

Additional requirements example:

Subclause 5.2.3 illustrates a material declaration with optional additional data fields to provide information on material and exemption information for RoHS, and optional declaration of brominated flame retardants (other than PBBs, PBDEs, or HBCDD). Material information can be reported as mass or mass percent, but cannot use both. This example reports material information as mass percent.

Subclause 5.2.4 illustrates a material declaration reporting optional information that goes beyond the base requirements. This declaration is based on “additional requirements” given in IEC 62474:2012, 4.3 and provides information on materials, substance groups and substances for 100 percent of the product composition. IEC 62474:2012, 4.3.2 d) recommends that material classes declared represent at least 95 percent of the product. In this example, the information is more precise and 100 percent of the product composition is declared (see Table 9). Material and substance information can be reported as mass or mass percent, but cannot use both. This example reports material and substance information as mass percent.

Information in this example is provided as mass percent except those substance groups where IEC 62474:2012, 4.2.3 c) requires declaration of material mass percent. For the two occurrences of lead present in different materials, the information on applicable exemptions is provided (see Tables 9 and 11).

Figure 4 provides the XML file for this material declaration based on “additional requirements”.

Confidentiality Example:

Subclause 5.2.4 illustrates a material declaration reporting where the supplier chooses not to disclose the presence of Manganese Oxide (Mn3O4) in the active part ceramic on the grounds of confidentiality.

The three examples demonstrate the functionality of the following subclauses of IEC 62474:2012:

- Subclause 4.2.1 related to product, and product identification and mass;
- Subclause 4.2.3 related to assigning declarable substances and declarable substance groups to a product part, declarable substance and declarable substance group naming as per the IEC 62474 database, and reporting as mass percent of the product part or product;
- Subclause 4.2.3 related to declaring substance groups separately for each occurrence that exceeds a threshold;
- Subclause 4.2.4 related to reporting business information and use of SI units;
- Subclause 4.3.2 related to reporting material classes as named by the IEC 62474 and assigned to the product, accounting for 95 percent as mass percent of the product;
- Subclause 4.3.3 related to optional reporting of materials as mass percent of a material class or product part;
- Subclause 4.3.4 f) for reporting of exemptions.

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5.2.2 Material declaration reporting "base data requirements"

Table 6 – Base data requirements – Business information

BusinessInfo	Business information is provided as specified in IEC 62474:2012
Authoriser name	John Doe
Authoriser title	Quality Assurance Manager
Authoriser phone	301-555-2345
Authoriser email	John.doe@supco.com
Contact name	Fred Smith
Contact title	Quality Assurance Assistant
Contact phone	301-555-2345
Contact email	Fred.smith@supco.com
SupplyCompany name	Supco
SupplyCompany UniqueID authority	DUNS
SupplyCompany UniqueID identity	987654321

Table 7 – Base data requirements – Product information

ProductID	Product information is provided as specified in IEC 62474:2012
ProductID.identifier	ABC4523
ProductID name	Electronic component
ProductID effectiveDate	2012-11-23
ProductID.Mass	0,12 (g)
unitType	Each

The example given in Table 8 and Figure 3 shows reporting each instance of lead and lead compounds within a reportable application contained in materials. The materials themselves are not declared under the IEC 62474 base requirements.

Table 8 – Base data requirements – Substance group/substance information

Substance group[a]				Substance[a]			
Name	Mass[b] (g)	Mass[b] (percent)	Material mass[b] (percent)	Name	Mass (g)	Mass[b] (percent)	Material mass[b] (percent)
Lead/Lead Compounds[c]			9,30				
Lead/Lead Compounds[c]			97				

[a] Substance groups or substances with mandatory reporting requirements shall be reported.

[b] See IEC 62474:2012, 4.2.3 c) for details on reporting requirements.

[c] The declarable substance group 'Lead/Lead Compounds' shall be declared separately for each homogenous material that contains lead or lead compounds at or above the reporting threshold level; thus two declarations of 'Lead/Lead Compounds' are shown, (see IEC 62474:2012, 4.2.3 d)).

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