

TECHNICAL REPORT



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

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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**

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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.

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

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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.

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 electrotechnical industry,
- availability of material declaration data that is not dependent on an organization's size or purchase volume,

- 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.

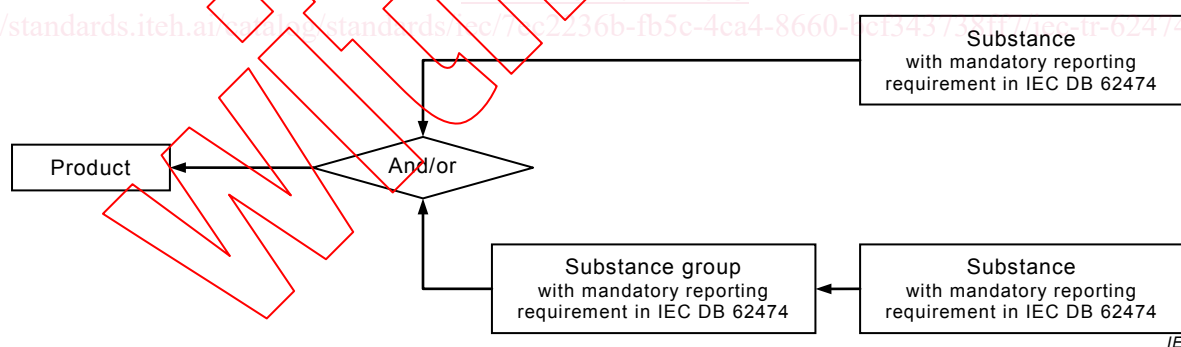
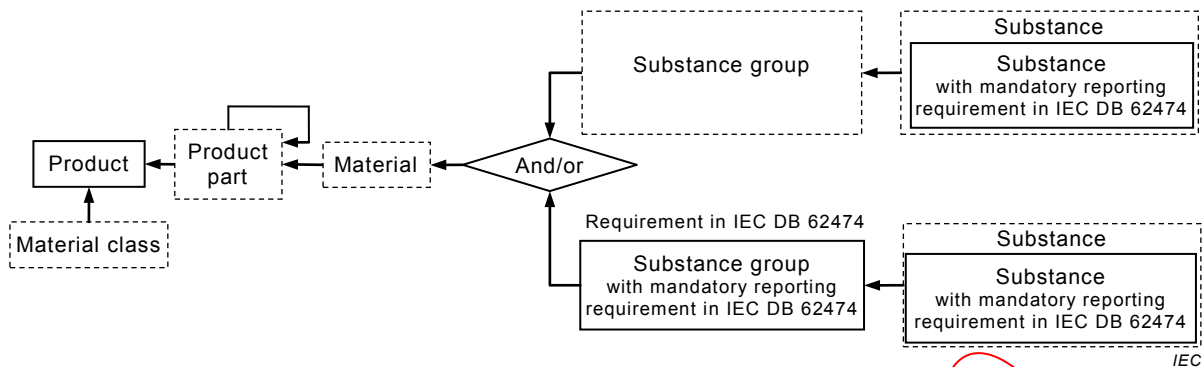


Figure 1 – Conceptual diagram for base requirements



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.

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 $\text{Mass percent} = X \text{ ppm} / 10\,000$.

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

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 homogeneous 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