

Whitepaper

Understanding EU RoHS Exemptions





Summary

The EU Restriction of Hazardous Substances (RoHS) Directive was created to avoid risks to human health and the environment when disposing of electronics.

Because the 10 substances in scope of RoHS are integrated into many electronic products, immediately reducing or eliminating them was not possible. Exemptions were created to provide a transition period for electronics manufacturers to identify and qualify these substances in their products, and then source alternatives.

History

On January 27, 2003, the European Parliament and the Council of the European Union passed Directive 2002/95/EC,¹ also known as RoHS, which imposed restrictions on six substances at the homogeneous level applicable to a broad range of electrical and electronic equipment (EEE). An additional four substances were restricted on July 22, 2019, under Directive (EU) 2015/863.² The 10 substances in scope of RoHS are:

- ▶ Lead (Pb), (≤ 0.1 percent)
- ▶ Mercury (Hg), (≤ 0.1 percent)
- ▶ Cadmium (Cd), (≤ 0.01 percent)
- ▶ Hexavalent chromium (chromium VI, Cr+6), (≤ 0.1 percent)
- ▶ Polybrominated biphenyls (PBB), (≤ 0.1 percent)
- ▶ Polybrominated diphenyl ethers (PBDE), (≤ 0.1 percent)
- ▶ Bis(2-ethylhexyl) phthalate (DEHP), (≤ 0.1 percent)
- ▶ Benzyl butyl phthalate (BBP), (≤ 0.1 percent)
- ▶ Dibutyl phthalate (DBP), (≤ 0.1 percent)
- ▶ Diisobutyl phthalate (DIBP), (≤ 0.1 percent)

As part of its RoHS implementation, the European Commission created 36 exemptions that defined specific permitted uses for these substances to give industry time to phase them out. Each exemption was assigned an expiry date after which these specific use cases for restricted substances would no longer be permitted.

On July 21, 2011, the original RoHS Directive 2002/95/EC was replaced with a new version, RoHS Directive 2011/65/EC,³ also known as RoHS 2 or RoHS Recast. The recast included an expanded and clarified list of exemptions. This list has been increased over time and currently includes over 100 exemptions.

1 European Union Parliament and Council. (2002). *Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment*. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32002L0095>

2 Official Journal of the European Union. (2015, March 31). *Commission Delegated Directive (EU) 2015/863*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015L0863&from=EN>

3 European Union Parliament and Council. (2011). *Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment Text with EEA relevance*. <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=celex%3A32011L0065>



EU RoHS Categories

CATEGORY 1	Large household appliances such as refrigerators, washers, stoves, and air conditioners
CATEGORY 2	Small household appliances such as vacuum cleaners, hair dryers, coffee makers, and irons
CATEGORY 3	Computing and communications equipment such as computers, printers, copiers, and phones
CATEGORY 4	Consumer electronics such as TVs, DVD players, stereos, and video cameras
CATEGORY 5	Lighting such as lamps, lighting fixtures, and light bulbs
CATEGORY 6	Power tools such as drills, saws, nail guns, sprayers, lathes, trimmers, and blowers
CATEGORY 7	Toys and sports equipment such as video games, electric trains, and treadmills
CATEGORY 8	Medical devices and equipment, such as in-vitro diagnostic devices
CATEGORY 9	Control and monitoring equipment, such as thermostats, smoke detectors, and fire alarms
CATEGORY 10	Automatic dispensers such as vending machines and ATM machines
CATEGORY 11	All other electrical and electronic equipment, including two-wheeled electric vehicles, select electrical cables, and vaporizers



What Is an Exemption?

An exemption temporarily allows a restricted substance to be used in certain applications when a suitable alternative is not yet available. There are two different lists of exemptions under the RoHS Directive. The first is Annex III, impacting categories 1 through 11. The second list is Annex IV, impacting categories 8 and 9, medical devices, and monitoring and control equipment.

Exemptions are substance- and application-based for a set period of time. For example, exemption 7b includes lead in solders for servers, storage and storage array systems, and network infrastructure equipment for switching, signaling, transmission, and network management for telecommunications. These are specific applications for a specific substance within an in-scope category that were allowed until July 22, 2016.

Working With Exemptions: Examples

Exemption 7b

Exemption 7b is a source of confusion for suppliers and manufacturers alike. As an example, server manufacturers fall under Exemption 7b for the use of lead within their products. However, Exemption 7b only applies when lead is used in a server or telecommunications product. This means a resistor with lead could be considered exempt when used in a server, but it cannot be used in a product such as a laptop.

Some suppliers would include Exemption 7b in their RoHS declaration and their products would appear in the system as “compliant with exemption.” However, the product was not compliant for any use other than in servers or telecommunications. Other suppliers did not claim the exemption at all, which confused some manufacturers.

To get around this confusion, some companies decided to specifically break out Exemption 7b from the rest of the exemptions. This allowed engineers to find piece parts that were compliant for their non-server application, and only claim Exemption 7b when used in a server. Today, the exemptions for categories 1 to 10 have expired. However, in vitro devices in Category 8 have an extended exemption until July 2023, and Category 11 and industrial monitoring and control instruments in Category 9 have extended exemptions until July 2024.

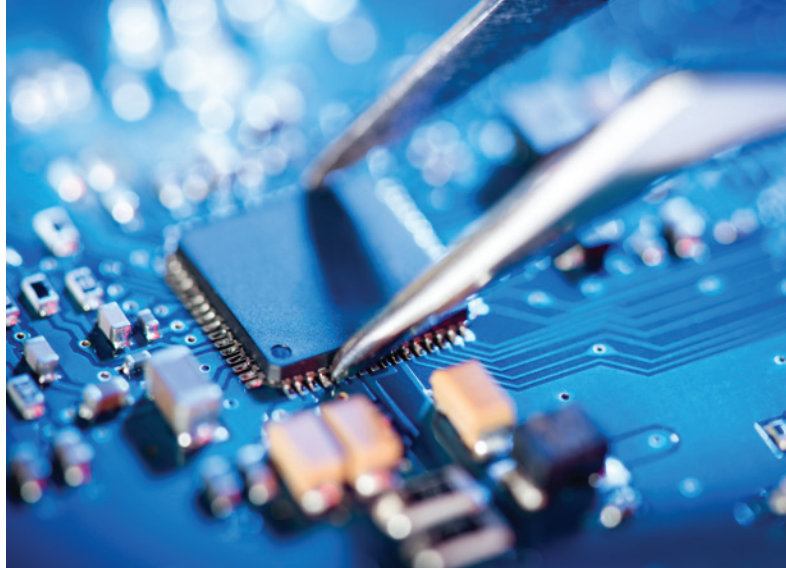
Exemptions 15 & 15(a)

Flip chip package assembly is the direct electrical connection of flipped (face-down) electronic components onto substrates, circuit boards, or carriers, by means of conductive bumps on the chip bond pads. The bumps that connect the chip to the traces on the circuit/wiring board were originally made from an alloy of tin and lead (Sn63Pb37). Each alloy has its own melting point and, therefore, requires a specific temperature profile — including duration at specific temperatures — in the component assembly reflow process.

The RoHS Directive states that “lead in solders [can be used] to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages.” This means that in order to be RoHS compliant for products using the leaded solder, manufacturers of Category 8, 9, and 11 products can still use Exemption 15 in their RoHS declaration.

However, all other categories of manufacturer must use Exemption 15(a). This exemption can be applied to the following products:

- ▶ A semiconductor technology node of 90 nanometers or larger
- ▶ A single die of 300 square millimeters or larger in any semiconductor technology node
- ▶ Stacked die packages with die of 300 square millimeters or larger, or silicon interposers of 300 millimeters or larger



Exemption 29

This exemption allowed for the use of lead in crystal glass, such as the kind used in crystal chandeliers and lamps. It expired in July 2021, but provided extensions until July 2023 for in vitro devices in Category 8 and until July 2024 for Category 11 and industrial monitoring and control equipment in Category 9.

Lead is used in glass to provide improved luminosity and increase the amount of time available to work with the heated glass. The extra time allows for more elaborate and elegant chandeliers or lamps. That extra time is lost when replacement substances are used in place of lead.

Many lead crystal manufacturers expect the industry to be severely impacted by the loss of lead in their products, with some even going out of business as a result.



Products Out of Scope

An exemption is different from a product being out of scope. Out-of-scope products are of a specific type or category that are allowed to be shipped into the EU without any limits on the amount of the restricted substances they contain.

Some products are out of scope for a specific period of time. For example, Category 9 products were out of scope until July 22, 2017.

Products may also be out of scope based on their application. Electrical products that are going into space, for example, will be out of scope for the foreseeable future. These items are typically excluded because they are used in a place that is difficult to access or are unlikely to be thrown into a landfill. A professional is often required to remove or replace EEE attached to these types of products, and safely dispose of the parts.

In general, all products that contain an electrical component needed to perform a function are covered under RoHS 2. All EEE, except those explicitly excluded, were brought into scope of the RoHS Directive as of July 23, 2019.

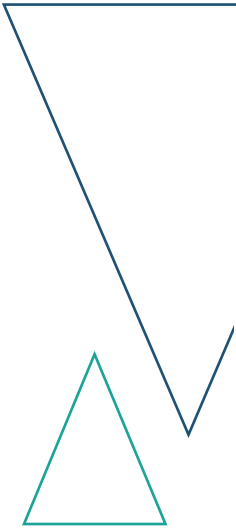
The specific products or applications that are out of scope of RoHS 2 are named in Article 2(4), and are not expected to be implemented within a specific timeframe. They are as follows:

- ▶ Equipment necessary for the protection of the essential interests of the security of member states, including arms, munitions and war material intended for specifically military purposes
- ▶ Equipment designed to be sent into space
- ▶ Equipment that is specifically designed, and is to be installed, as part of another type of equipment that is excluded or does not fall within the scope of the directive, which can fulfill its function only if it is part of that equipment, and which can be replaced only by the same specifically designed equipment
- ▶ Large-scale stationary industrial tools
- ▶ Large-scale fixed installations
- ▶ Means of transport for persons or goods, excluding electric two-wheel vehicles that are not type-approved
- ▶ Non-road mobile machinery made available exclusively for professional use
- ▶ Active implantable medical devices
- ▶ Photovoltaic panels intended to be used in a system that is designed, assembled, and installed by professionals for permanent use at a defined location to produce energy from solar light for public, commercial, industrial, and residential applications
- ▶ Equipment specifically designed solely for the purposes of research and development only made available on a business-to-business basis
- ▶ Pipe organs



In practice, this could mean a lead-containing resistor attached to a circuit board in a robot on an automobile assembly line would be out of scope because the robot itself is out of scope (large-scale stationary industrial tools). However, that same resistor attached to a circuit board contained in a laptop would be required to use Exemption 7(c)-I to remain compliant, or reduce the lead content to a level below 0.1 percent to be compliant without the exemption. This exemption states, “Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound.”

Understanding how a product is being used is key to determining whether or not it is out of scope or requires the use of an exemption to be compliant. As a result, though some suppliers may have a general understanding of exemptions, they may not be able to specify which exemptions their parts are in scope of, or whether they are compliant.



Exemption Expirations & Extensions

All exemptions have an expiration date. During the time an exemption is valid, industry experts are required to research and test replacements for the exempted substance(s).

If a suitable alternative cannot be found during the valid period, manufacturers can request an extension or clarification of the exemption. If approved, the extension will receive a new expiration date to allow more time to identify suitable replacements.

If rejected by the European Parliament, the exemption will expire at least 12 months and not more than 18 months after the decision. At this time, all products using the exemption become non-compliant. If an exemption expires while still under review, the European Parliament typically extends the exemption to allow time for the request to be reviewed and legislation to be updated.



Requesting a Change to New or Existing Exemptions

After reviewing the existing exemptions, companies or industries may discover that none of these exemptions apply to the use of a restricted substance. In such cases, the companies have the option of requesting a modification of an existing exemption or requesting a new exemption.

Companies can also request the extension of an exemption that is soon to expire or even request that an exemption be removed. An exemption application can be submitted by a manufacturer, authorized representative of the manufacturer, or any economic operator within the supply chain. Requests for new exemptions are generally submitted for applications related to EEE newly coming into scope, new applications with an aspect of innovation, and applications that have either already expired or been rejected previously.

Regardless of the change, the requests will require the following:

1. Use the checklist below to understand what information and data needs to be compiled before handing in a request
2. Fill out the application form
3. Send the application form along with further documentation to the European Commission by e-mail or post

Documentation Checklist

Research and provide documentation such as:

- ▶ Test results on the suitability of substitutes and any other technical or scientific documentation supporting the request, ideally verified by a third party
- ▶ Documentation such as a lifecycle assessment (LCA) according to the principles and framework for LCA (ISO 14040), the requirements and guidelines for LCA (ISO 14040), product carbon footprint and/or cost benefit analysis, verified by a third party
- ▶ Roadmap to substitution, including action and timelines for developing alternatives
- ▶ Documentation relevant to the EU Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) Regulation, such as registration or application for authorization
- ▶ Documentation from suppliers on the availability or unavailability of substitutes
- ▶ Socioeconomic data in as much detail as possible, with third-party certification if possible
- ▶ Information on end-of-life phases, including waste preparation, treatment, and recycling
- ▶ Where relevant, indication of proprietary information



After the request is received, the following steps will apply:

- ▶ First check of request
 - ▷ First set of clarification questions sent to applicant
- ▶ Stakeholder consultation
 - ▷ Open between 8–12 weeks.
- ▶ Public information and questionnaires prepared for online consultation
 - ▷ Evaluation of request
- ▶ Further rounds of clarification questions, until information allows a conclusion to be reached; or non-conclusive if project time does not suffice
 - ▷ In some cases, general and targeted stakeholder meetings or teleconferences may be used to clarify open issues.
- ▶ Documentation or report of evaluation and recommendation
 - ▷ Final decision delivered

It is likely that new exemptions will be added to the Annexes, or the end dates for existing exemptions will be pushed back, if the following criteria from Article 5 of the RoHS Directive 2011/65/EU are met:

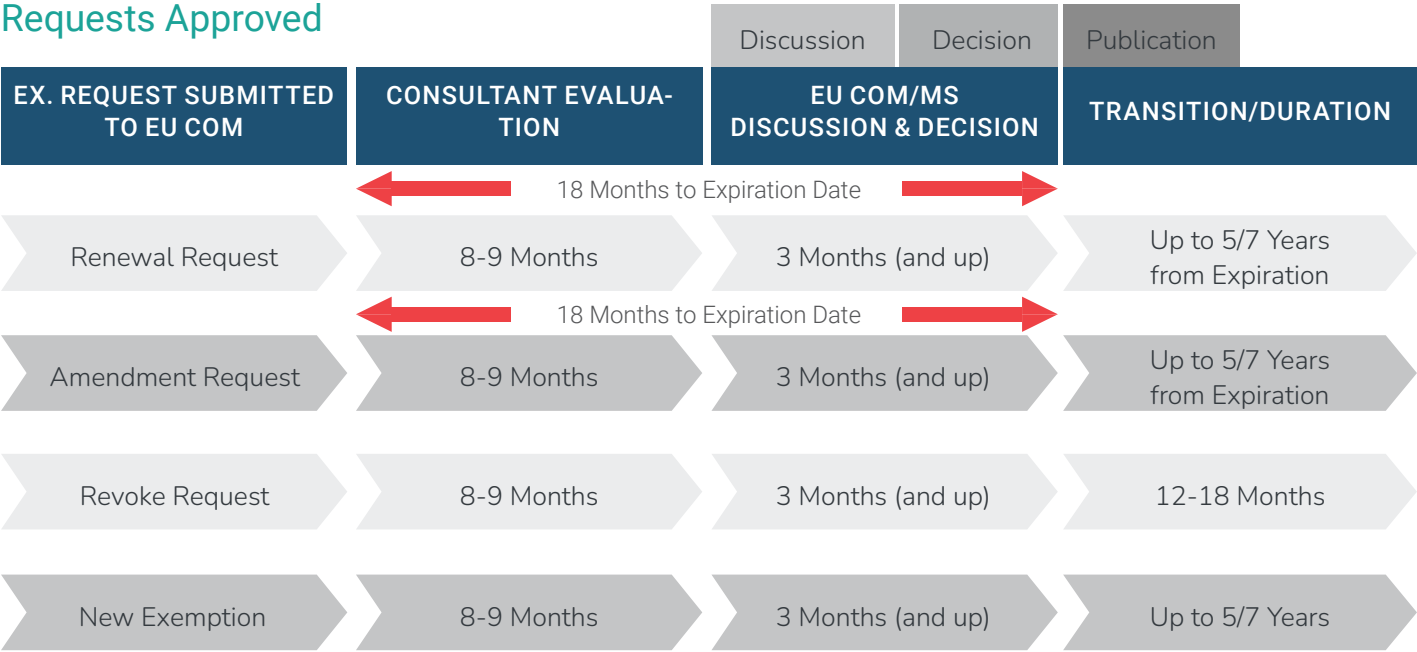
- ▶ It is not scientifically or technically possible to eliminate or substitute materials or substances listed in Annex II via changes to design, materials, or components
- ▶ The reliability of substitutes is not ensured
- ▶ The total negative environmental, health, and consumer safety impacts caused by substitution are likely to outweigh the total environmental, health, and consumer safety benefits thereof

If approved, official legislation will be created and voted upon by the European Parliament. It may take up to 1.5 years for a request to be evaluated, approved, or rejected. However, even if a request is approved, applicants should continue to pursue alternative substances for their product application. Also note, any type of evaluation of an existing exemption can result in its revocation.



Timelines

Requests Approved



Requests Denied



Conclusion

As the RoHS Directive expands to include more substances and a broader scope, it forces industry to innovate and find alternative substances. Exemptions give companies time to develop these alternatives while staying active in the market.

Going forward, regulation will continue as new information is uncovered on substances and their impact on humans and the environment. To keep up, companies need to continuously map and monitor suppliers, products, parts, practices, and regulations. Supply chain sustainability management solutions such as Assent help companies look deeper than their suppliers and into their products and substances within parts, to ensure they are compliant with RoHS and other regulations.

For more information about how Assent can help you manage RoHS and other types of product compliance data, contact us at info@assent.com.



About the Author

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Valerie Kuntz spent over 19 years at Intel, starting in materials before moving to IT as a System Analyst, Project Manager and finally Program Manager in charge of IT Environmental Compliance. She has a key understanding in RoHS and REACH implementation processes at large companies, as well as EPR and conflict minerals processes.





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