



Nokia Substance List

2023

This Nokia Substance List is authorized for use by Nokia suppliers.

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1 Purpose and scope

Nokia recognizes the need to identify and control the materials and substances used in its products and sales packaging. For this purpose, Nokia has compiled the Nokia Substance List. The list specifies the substances Nokia has restricted, targeted for reduction or required to be reported. The basic principle for the Nokia Substance List is that the use of substances in Nokia products shall be safe for humans and the environment. Nokia applies these mandatory requirements worldwide. This list and timetables are subject to change in light of further scientific evidence, legislation or other facts, at the sole discretion of Nokia.

The scope of the restrictions is generally defined (unless specifically restricted for processing in the restriction table) as materials and substances present in the final product. The requirements apply for applications in Nokia products including components, materials (solders, pastes, etc.), parts, assemblies, accessories and packaging materials.

Compliance with this list does not exempt manufacturer/seller/supplier from any legal requirements, and it is the responsibility of manufacturer/seller/supplier to follow the latest legislative developments related to materials and substances. Further, if the manufacturer/seller/supplier has reason to believe that any substance, listed or otherwise, may create risk of harm to persons, the environment or products, the manufacturer/seller/supplier shall alert Nokia to the potential harm.

2 Definitions

Accessory – A non-electronic device that is not essential in itself, but adding to the convenience, or effectiveness of a product.

Article - An object, which during production is given a special shape, surface or design, and which determines its function to a greater degree than does its chemical composition. This definition is aligned with the EU REACH Regulation.

<https://echa.europa.eu/en/regulations/reach/candidate-list-substances-in-articles>

Assembly – A (semi) finished combination of parts.

Battery – or accumulator is any source of electrical energy generated by direct conversion of chemical energy and consisting of one or more non-rechargeable cells or one or more rechargeable cells. This definition is aligned with the EU Battery Directive.

CAS number - Chemical Abstract Service number, which is a unique numerical identifier assigned to the substance. The same substance may have several different names, all having the same CAS number (e.g. acetone is also named 2-propanone, but only one CAS number: 67-64-1).

Conversion between units: ppm (parts per million), ppb (parts per billion) and percent (%) – Conversion instructions:

- To convert percent (%) to ppm multiply by 10 000, e.g. 0.1% = 0.1 * 10 000 = 1000 ppm
- To convert ppm to percent (%), divide by 10 000, e.g. 900 ppm = 900 / 10 000 = 0.09 %
- To convert ppm to ppb multiply by 1000, e.g. 0.025 ppm = 0.025 * 1000 = 25 ppb
- To convert ppb to ppm, divide by 1000, e.g. 100 ppb = 100 / 1000 = 0.1 ppm

Exemptions – Applications where the use of a restricted substance is permitted, such as RoHS exemptions and Nokia Substance List exemptions.

Homogeneous material - A material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes. Examples are individual types of plastics, ceramics, glass, metals, alloys, resins and coatings. For example, a stainless steel screw is a "homogeneous material", but a semiconductor package contains many homogeneous materials, which include plastic molding material, tin-plating on the lead-frame, the lead-frame alloy and bonding wires. This definition is from RoHS.

Impurity - A substance contained in a natural material but which is not completely removed in the refining process (i.e. natural impurities), or which is generated in a reaction process but is not completely removed.

Intentionally introduced - For the purposes of this document: "Intentionally introduced" shall mean "deliberately utilized in the formulation of a material or component where its continued presence is desired in the final product to provide a specific characteristic, appearance or quality". The use of recycled materials as feedstock for the manufacture of new products, where some portion of the recycled materials may contain amounts of regulated substances, is not to be considered as intentionally introduced.

Material - A material is made of one or more substances. Examples of materials are plastics, metals, coatings, alloys, paints and adhesives. For example, copper alloy is a material made up of

several substances, e.g. copper, nickel and zinc. Also, preparations (e.g. solder pastes, fluxes, cleaners and lubricants), compounds (e.g. water and sodium chloride) and elements (e.g. hydrogen, helium, gold) are materials.

Mobile & Wearable - Products that belong to mobile and wearable categories and parts used in such products – Mobile category includes devices such as mobile phones, smart phones and tablets. Wearable category includes devices that are intended to be worn by the user or maintained in close proximity to the user. Both categories also include accessories (such as USB cables, chargers or headsets) intended for use with products that belong to these categories.

Nanomaterial - Definition of nanomaterial in Nokia is based on the European Commission Recommendation on the definition of nanomaterials (2011/696/EU):

‘Nanomaterial’ means a natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50% or more of the particles in the number size distribution, one or more external dimensions is in the size range 1 nm-100 nm. In specific cases and where warranted by concerns for the environment, health, safety or competitiveness, the number size distribution threshold of 50% may be replaced by a threshold between 1 and 50%.

Network & Others – All network products and other products as well as parts used in such products not covered by Mobile & Wearables.

Packaging – Restrictions for materials/substances used in packaging refer to sales (outbound) packaging. Packaging in Nokia refers to packaging including printed user guide and other printed materials and its transport packaging that is used for transportation to end customers.

Parts – Any item that is supplied to and/or designed on behalf of Nokia excluding packaging.

Processing – Any operation used to produce finished products or intermediate materials from raw materials or other resources.

Product - A final manufactured good that is delivered to Nokia customers.

Prolonged skin contact - Prolonged contact with the skin is defined as contact with the skin of potentially more than 10 minutes on three or more occasions within two weeks, or 30 minutes on one or more occasions within two weeks. Definition is taken from the ECHA proposal for minimum contact time for “prolonged contact with the skin” in relation to the Nickel restriction: https://echa.europa.eu/documents/10162/13641/nickel_restriction_prolonged_contact_skin_en.pdf/b6f35357-da40-4a04-8085-fe42f6f543ab

Radioactive substance - Substance whose radioactivity exceeds the natural background value.

REACH - Acronym for the EU Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals.

Reportable - Substances that are to be monitored regarding their use/presence in Nokia products and packaging and any usage/amounts present reported to Nokia.

Restriction / threshold value – Defines the limitation, requirement and/or regulation

Restricted - Substances that are prohibited from use as specified in the restriction / threshold level column in table 1 and/or 2.

For all other uses these substances are considered “To be Avoided”.



RoHS - An acronym for the EU Directive 2011/65/EU on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment.

Substance - A chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition. This definition is from REACH.

To be Avoided - Substances which Nokia tracks and expects suppliers to reduce and phase out from products and packaging as technically and environmentally acceptable alternatives become available. Suppliers are strongly advised to work on a phase-out plan based on potential future regulatory or Nokia implementation dates, as applicable.

3 Requirements for materials and substances

The Substance List defines all materials and substances which are restricted, to be avoided or defined as reportable. If a substance belongs to several material/substance groups, the stricter concentration limit is always applied.

3.1 Substance list

All materials and substances for which a requirement of any type applies are listed in Table 1. or Table 2. Examples of legal and regulatory references are listed for each material / substance group, but this list is not exhaustive. Even though some regulatory references are country specific, Nokia applies these mandatory requirements worldwide.

The letter "R" in any of the columns under Scope indicates that the substance is Restricted for that scope. The letter "A" in any of these columns means that the substance is to be Avoided. See also Figure 1 below.

Material / Substance	Legal/Regulatory Reference	Mobile & Wearables	Network & Others	Batteries	Packaging	Pressing	Restriction / threshold level	References (non-exhaustive list)
REACH: Restricted		R	R	R	R	R	As specified in Annex XVII of REACH	EU REACH Regulation (EC)1907/2006 as amended
REACH: Authorisation		A	A	A	A	R	As specified in Annex XIV of REACH	EU REACH Regulation (EC)1907/2006 as amended
REACH: Candidate for authorisation		A	A	A	A		Reportable ² if > 0.1% by weight of an article	EU REACH Regulation
RoHS: Annex II	2011/65/EU	R	R				Per Annex II - allowing for relevant exemptions from Annex III and Annex IV	EU RoHS Directive 2002/95/EC (including with 2015 amendments)
Eco-design Regulation: Halogenated flame retardants	(EU) 2019/2021	R ³	R ³				Intentional use in the enclosure and stand of electronic displays	EU eco-design requirements for electronic displays
Persistent organic pollutants (POP)	(EU) 2019/1021	R	R	R	R	R	Intentionally introduced, and not exceeding limits set in (EU) 2019/1021	EU Regulation (EU) 2019/1021 on persistent organic pollutants
TSCA: PBT Chemicals under Section 6(h)	Final rules	R	R	R	R	R	As specified in the final rules	Persistent, Bio-accumulative, and Toxic (PBT) Chemicals under TSCA Section 6(h)
Radioactive substances	-	R	R	R	R	R	Intentionally introduced	International Atomic Energy Agency (IAEA) Safety Standards
Ozone depleting substances	(EC)1995	R	R	R	R	R	Intentionally introduced	Montreal Protocol on Substances that Deplete the Ozone Layer
Fluorinated greenhouse gases		R	R	R	R	R	Intentionally introduced	Kyoto Protocol and Paris Agreement
Proprietary substances		R	R	R	R	R	Any application where risk of user exposure requiring a warning is to be expected	California Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65)
Substances that may cause skin sensitization	(EC)1272/2008	R	R				Banned for all applications that may come into prolonged contact with the skin ⁵	Restriction applies to substances classified as Skin Sensitizer under CLP Regulation (CE)1272/2008
EU Battery Directive	2006/66/EC					R ⁴	As specified in Article 4, however, for Cd this applies to any type of battery	EU Battery Directive 2006/66/EC as amended

Scope: Type of part/product determines which column applies

Actual restrictions for "Network & Others" do not go beyond legislation

Regional legislation applies worldwide

R : "Restricted"
 R⁴ : "Restricted" but can be waived by Nokia
 A : "To be Avoided" and implies best efforts only

Further specification of restrictions and exceptions. Uses that are excluded from a restriction are "To be Avoided"

¹ In the columns under Scope "R" means Restricted, "A" means to be Avoided. For further explanation see chapter 2 Definitions.
² For further explanation see chapter 2 Definitions and section 3.3.
³ 'halogenated flame retardant' means a flame retardant that contains any halogen.
⁴ Restricted from use unless explicitly amended or waived in writing by Nokia.
⁵ For reacted materials that are not in themselves sensitizing, this covers possible remains of sensitizing reactant(s).

Figure 1: How to read Table 1 and Table 2

3.2 Chinese version of section 3 / 3.1 (for reference only)

3 材料和物质的要求

本物质清单规定了禁止使用、避免使用或者需要报告等限制类别的所有材料和物质。如果一种物质属于多个材料/物质类别，则按照更严格的类别执行。

3.1 物质清单

表 1 和表 2 列出了任一类别适用的材料和物质。每个类别列出了法律法规参考实例，但本清单并没有穷尽所有的法律法规。尽管一些法规适用于特定国家，但诺基亚在全球强制实施这些法规。

“范围”一列中的字母“R”表示该物质禁止使用。“范围”一列中的字母“A”表示该物质避免使用。参见下面的图一

Material /	Scope ¹	Mobile & Wearables	Network & Others	Batteries	Packaging	Processing	Restriction / threshold level	References (non-exhaustive list)
REACH: Restriction	范围：部件/产品类别确定哪一列适用。	R	R	R	R	R	As specified in Annex XVII of REACH	EU REACH Regulation (EC)1907/2006 as amended
REACH: Authorisation		A	A	A	A	R	As specified in Annex XIV of REACH	EU REACH Regulation (EC)1907/2006 as amended
REACH: Candidate list		A	A	A	A		Reportable ² if > 0.1% by weight of an article	EU REACH Regulation (EC)1907/2006 as amended
RoHS: Annex II	2011/65/EU	R	R				Per Annex II - allowing for relevant exemptions from Annex III and Annex IV	EU RoHS Directive (2002/95/EC) (including with 2015/863/EU)
Eco-design Regulation: Halogenated flame retardants	(EU) 2019/2021	R ³	R ³				Intentional use in the enclosure and stand of electronic displays	EU eco-design requirements for electronic displays
Persistent organic pollutants (POP)	(EU) 2019/1021	R	R	R	R	R	Intentionally introduced, and not exceeding limits set in (EU) 2019/1021	EU Regulation (EU) 2019/1021 on persistent organic pollutants
TSCA: PBT Chemicals under Section 6(h)	Final rules	R	R	R	R	R	As specified in the final rules	Persistent, Bio-accumulative, and Toxic (PBT) Chemicals under TSCA Section 6(h)
Radioactive substances	-	R	R	R	R	R	Intentionally introduced	
Ozone depleting substances	(EC)1005/2002	R	R	R	R	R	Intentionally introduced	
Fluorinated greenhouse gases		R	R	R	R	R	Intentionally introduced	
Pr							Any application where risk of user exposure requiring a warning is to be expected	US California Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65)
Substances that may cause skin sensitization	(EC)1272/2008	R	R				Banned for all applications that may come into prolonged contact with the skin ⁵	Restriction applies to substances classified as Skin Sensitizer under CLP Regulation (CE)1272/2008
EU Battery Directive	2006/66/EC					R ⁴	As specified in Article 4, however, for Cd this applies to any type of battery	EU Battery Directive 2006/66/EC as amended

¹ In the columns under Scope "R" means Restricted, "A" means to be Avoided. For further explanation see chapter 2 Definitions.
² For further explanation see chapter 2 Definitions and section 3.3.
³ 'halogenated flame retardant' means a flame retardant that contains any halogen.
⁴ Restricted from use unless explicitly amended or waived in writing by Nokia.
⁵ For reacted materials that are not in themselves sensitizing, this covers possible remains of sensitizing reactant(s).

图 1：表 1 和表 2 阅读说明

Table 1 Legislative requirements for groups of materials and substances (applicable worldwide)

Material / Substance Group	Listing	Scope ¹					Restriction / threshold level	References (non-exhaustive list)
		Mobile & Wearables	Network & Others	Batteries	Packaging	Processing		
REACH: Restricted substances	Annex XVII	R	R	R	R	R	As specified in Annex XVII of REACH	EU REACH Regulation (EC)1907/2006 as amended
REACH: Authorisation list	Annex XIV	A	A	A	A	R	As specified in Annex XIV of REACH	EU REACH Regulation (EC)1907/2006 as amended
REACH: Candidate list for authorisation	cSVHC	A	A	A	A		Reportable ² if > 0.1% by weight of an article	EU REACH Regulation (EC)1907/2006 as amended
RoHS: Annex II	2011/65/EU	R	R				Per Annex II - allowing for relevant exemptions from Annex III and Annex IV	EU RoHS Directive 2011/65/EU as amended (including with 2015/863/EU)
Eco-design Regulation: Halogenated flame retardants	(EU) 2019/2021	R ³	R ³				Intentional use in the enclosure and stand of electronic displays	EU eco-design requirements for electronic displays
Persistent organic pollutants (POP)	(EU) 2019/1021	R	R	R	R	R	Intentionally introduced, and not exceeding limits set in (EU) 2019/1021	EU Regulation (EU) 2019/1021 on persistent organic pollutants
TSCA: PBT Chemicals under Section 6(h)	Final rules	R	R	R	R	R	As specified in the final rules	Persistent, Bio-accumulative, and Toxic (PBT) Chemicals under TSCA Section 6(h)
Radioactive substances	-	R	R	R	R	R	Intentionally introduced	EU Directive 2013/59/EURATOM
Ozone depleting substances (ODS)	(EC)1005/2009	R	R	R	R	R	Intentionally introduced	Montreal Protocol; (EC)1005/2009 on Ozone Depleting Substances; US Clean Air Act
Fluorinated greenhouse gases	(EC)517/2014	R	R ⁴	R	R		Intentionally introduced	Nokia Policy, EU Regulation (EC)517/2014 on fluorinated greenhouse gases
Proposition 65 listed substances	PROP 65	R	A	A	A		Any application where risk of user exposure requiring a warning is to be expected	US California Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop 65)
Substances that may cause skin sensitization	(EC)1272/2008	R	R				Banned for all applications that may come into prolonged contact with the skin ⁵	Restriction applies to substances classified as Skin Sensitizer under CLP Regulation (CE)1272/2008
EU Battery Directive	2006/66/EC					R ⁴	As specified in Article 4, however, for Cd this applies to any type of battery	EU Battery Directive 2006/66/EC as amended

¹ In the columns under Scope “R” means Restricted, “A” means to be Avoided. For further explanation see chapter 2 Definitions.

² For further explanation see chapter 2 Definitions and section 3.3.

³ ‘halogenated flame retardant’ means a flame retardant that contains any halogen.

⁴ Restricted from use unless explicitly amended or waived in writing by Nokia.

⁵ For reacted materials that are not in themselves sensitizing, this covers possible remains of sensitizing reactant(s).

Table 2 Requirements for individual materials and substances (applicable worldwide)

Material / Substance Group	Listing	Scope ¹					Restriction / threshold level	Reference(s) (non-exhaustive list)	
		Mobile & Wearables	Network & Others	Batteries	Packaging	Processing			
Antimony trioxide	-	R	A	A	A		0.09% of homogeneous material in polymeric materials	Nokia (prop65)	
Beryllium oxide (BeO)	-	R ⁴	R ⁴				Intentionally introduced	Nokia (prop 65, reporting of information to WEEE recyclers)	
Beryllium and compounds (other than BeO)	-	R	R ⁴				0.1% of homogeneous material	Nokia (prop 65, reporting of information to WEEE recyclers)	
Bromine and compounds	-	R ⁶	A				0.09% of homogeneous material	Nokia Policy (Halogen free)	
Chlorine and compounds	-	R ⁷	A				0.09% of homogeneous material	Nokia Policy (Halogen free)	
EU Critical Raw Materials	COM(2020) 474	Reportable						Preparation for future EU CRM Act and Digital Product Passport	
Formaldehyde	-	A	A	A	R		Intentionally introduced	Nokia (Prop 65)	
Lead	-			R			0.004% in non-rechargeable batteries	Nokia Policy	
Nanomaterials	-	Reportable						Various National registers (e.g. Belgium, France, Denmark)	
Nickel	-	R ⁸	R ⁸				Banned for all applications that may come into prolonged contact with the skin	Nokia Policy (Skin Sensitizer)	
Per- and polyfluoroalkyl substances (PFAS)	-	Reportable						Potential REACH restriction	Substances that contain at least one aliphatic -CF2- or -CF3- element (includes PTFE)
Polyethylene (PE) foam	-				R		Only chemically cross-linked PE foam	Nokia Policy (End of Life concerns)	
Polystyrene expanded	-				R ⁴		Intentionally introduced	Nokia Policy (End of Life concerns)	
Polyurethane	-				R ⁴		Intentionally introduced	Nokia Policy (End of Life concerns)	
Polyvinyl chloride (PVC)	-	R	A		R		Intentionally introduced	Nokia Policy (Halogen free)	
Responsible Minerals	-	Reportable							Nokia Responsible Minerals policy

⁶ Bromine used as an activator in solder (excluding solders used in product assembly) and use as pigments in optical applications is exempted.

⁷ Chlorine used as adhesion promotor, colorant as well as process residuals are exempted.

⁸ Nickel used in amorphous metals and ceramics and the use of nickel in stainless steels (excluding stainless steel with sulphur content over 0.03% due to its potential for nickel release) are exempt.

3.3 Reporting of substances

All substances classified as to be Avoided are reportable. Substances classified as Restricted shall not be used for any applications covered by the scope of the restriction, all other uses are “To be Avoided” and are reportable.

It is vital that our suppliers declare compliance with the NSL requirements. In case a full material declaration is not required by Nokia and Nokia has requested the completion of a Confirmation of Compliance template instead, Nokia does not require test reports or certifications.

Reporting of EU REACH Substances of Very High Concern (SVHC):

2015 EU Court of Justice (EUCJ) Judgment in Case C-106/14:

<https://curia.europa.eu/jcms/upload/docs/application/pdf/2015-09/cp150100en.pdf>

The ruling of the EU court of Justice in Case C-106/14 details that the REACH regulation defines the concept of ‘article’ as ‘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’. There is no need to draw a distinction between the situation of articles incorporated as a component of a complex product and that of articles present in an isolated manner. Each of the articles incorporated as a component of a complex product is covered by the relevant duties to notify and provide information when they contain a substance of very high concern in a concentration above 0.1% of their mass.

Nokia requires SVHCs to be reported if present in the lowest level article >0.1% even if this low level article is subsequently integrated in a complex article.

(Chinese for reference only)

2015 年，欧盟法院在裁决 Case C-106/14 时，详细说明 REACH 法规“物品”的概念：“在生产过程中，它被赋予了特定的形状、外观或设计，它比其化学成份有更多的功能。”没必要区分作为复杂产品组成部分的物品和以单独方式呈现的物品的情况。作为复杂产品组成部分的任何物品，当其高关注度物质的浓度超过其质量 0.1% 时，相关方应通告并提供信息。

如果物品中高关注物质(SVHC)的浓度大于 0.1%，即使此物品随后被集成到复杂物品中，也需要向诺基亚报告此高关注度物质信息。

3.4 RoHS exemptions

Exemptions set by the RoHS directive apply to RoHS substances. The actual list of exemptions can be found in the consolidated version of the EU RoHS Directive (see

EUR-Lex website under consolidated legislation:

http://ec.europa.eu/environment/waste/rohs_eee/legis_en.htm

It is the supplier's responsibility to check the validity of the exemption in question.

3.5 REACH and nanomaterials

Suppliers are advised to follow the development of nanomaterials policy such as the review of the EU definition and inclusion in REACH:

<https://echa.europa.eu/regulations/nanomaterials> as well as various mandatory National registers.

3.6 Examples of substances and their CAS numbers

The Nokia Substance List (NSL) restricts substances that are prohibited by a variety of legislative requirements that are applicable to our industry. Table 1 lists several references beyond RoHS and REACH that do have relevance on the electronics industry. We are aware that many of the substances prohibited, for instance, by the EU Persistent organic pollutants Regulation, are not generally used in electronics. However, some substances covered have a relevance for our products. See Table 3 for some examples.

Table 3 Examples of substances covered by various legal instruments

Legal instrument	Example of impacted substance(s)
REACH (Restrictions)	Polycyclic Aromatic Hydrocarbons
RoHS	Pb, Hg, Cd, Cr6+, PBBs, PBDEs, DEHP, BBP, DBP, DIBP
POP	PFOA, PFOS
TSCA (US EPA)	Phenol, Isopropylated Phosphate (PIP) 3:1
Fluorinated greenhouse gases	SF6, 1,1,1,2-tetrafluoroethane
Proposition 65 listed substances	Bisphenol-A, Lead, Diisodecyl Phthalate (DIDP)
Critical Raw Materials	Indium, Niobium, Palladium

Examples of substances and their CAS numbers in each material/substance group can be found in the IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry: <http://std.iec.ch/iec62474>.

Please note that this list is not exhaustive and suppliers need to identify if substances they are using in their products belong to additional restricted material/substance groups.

4 Contact and Updates

4.1 Contact

sustainability.global@nokia.com

4.2 Communication of Updates

Once a new version of the Nokia Substance List is made available on the Nokia.com website all suppliers will be notified.

4.3 Changes since last issue

Section	Change	Comment
3 Table 2	Addition of EU Critical Raw Materials as Reportable	In preparation of future EU CRM Act and Digital Product Passport (not to be included in Confirmation of Compliance request)
3 Table 3	Addition of CRM examples impacted by listing in Table 2	