TABLE OF CONTENT

1 OBJECTIVES / PURPOSE

Nexperia products and its packaging must not contain hazardous substances at levels above our established threshold which can be liberated under normal operating and/or handling conditions during its useful period and at its end-of-life treatment. Nexperia should ensure that it does not put anything on the market that contains hazardous substances above allowed levels as specified by law or other regulations.

2 SCOPE

This document is applicable to all materials, parts, (semi-)finished goods, subassemblies and packaging materials delivered and used for Nexperia products (ICs, Discretes and Modules) which are either intended to be put on the market or intended to be used by the business for evaluation purposes.

3 RESPONSIBILITIES AND RISKS

3.1 Roles and Responsibilities

Role	RASCI*	Activities
Suppliers and subcontractors	R/A	Are responsible to check compliance to this procedure and provide adequate information regarding their products
Purchasing and subcontracting managers	R	Are responsible to verify compliance to this procedure
Business group managers	R	Are responsible to register the documents and information derived from these into Enovia
ECO-Products group	S/C/I	Can be consulted for expertise, supportive activities regarding compliance requirements and needs to be informed in case of non-compliance issues

* R: responsible; A: accountable; S: supportive; C: consulted; I: informed;

3.2 Risks

Non-compliance with regulations in Nexperia's products poses a significant risk to the company, both financially and in terms of reputation. The immediate financial risks are covered by our standard Terms & Conditions of Sales, but a failure to adhere to regulations could result in negative publicity and loss of business. The consequences of non-compliance, such as shipment blockages, fines, facility closures, and potential legal action, can have severe consequences and must be avoided.

4 FLOWCHART

n/a

5 PROCEDURE

Nexperia's requirements on hazardous substances in products and packaging are based on various national and international legislations as well as individual customer requirements. The MasterList can be found as an Excel document in the appendix to this procedure and contains examples of substances belonging to restricted groups (e.g. metal carbonyls). These examples belong to groups mentioning "including, but not limited to" in the MasterList. In other examples, only specified substances are covered (e.g. polychlorinated phosphate esters; "includes only" in MasterList). All TLVs shall apply at the homogeneous material level.

5.1 Prohibited Substances

The intentional use of these substances and/or substances belonging to substance groups mentioned is prohibited. Nexperia does not allow the intentional use of prohibited substances under the conditions as set by our objectives and scope in any application. Nexperia accepts impurities of these substances in naturally occurring amounts and/or amounts generated via synthesis which cannot be avoided and where removal is not feasible.

Table A: *List of prohibited substances and substance groups together with their TLVs. TLVs apply to all applications. Footnotes are given below.*

Substance/Substance Group	TLV ppm (mg/kg)
Aldehydes	0.09
	0.05 in HWPW[a)]
Asbestos (all types)	10
UV-320, CAS No. 3846-71-7	50
Cadmium and its compounds (Cd)	5[b)]
Chlorinated hydrocarbons (CHCs), aliphatic, < C_{10}	900
Chlorinated paraffins (CPs), ≥ C_{10}	100
Dimethylfumarate (DMF)	0.1
Endangered species of flora and fauna, specified group	Not used
Ethyl/methyl glycols and their acetates	1
Expanded polystyrene (EPS)	Not used
Fluorotelomers	50
Greenhouse gases, specified group – including, but not limited to: - Hydrogenated fluorocarbons (HFCs) - Perfluorocompounds (PFCs), specified group	1
Halogenated benzenes (excl. hexachlorobenzene)	50
Halogenated dioxins and furans – including, but not limited to: - Polybrominated dibenzodioxins (PBDDs) - Polybrominated dibenzofurans (PBDFs) - Polychlorinated dibenzodioxins (PCDDs) - Polychlorinated dibenzofurans (PCDFs)	0.005
Halogenated diphenylmethanes, benzyltoluenes, and diarylalkanes	10
Hexabromocyclododecane (HBCDD) and all major diastereomers	1000
Hexachlorobenzene (HCB)	0.02

Substance/Substance Group	TLV ppm (mg/kg)
Hexavalent chromium compounds (Cr^{6+})	100[b)]
Mercury and its compounds (Hg)	2[b)]
Metal carbonyls	1000
Nitro compounds	1000
Nitrosamines	1000
Nonylphenols (NPs) & nonylphenol ethoxylates (NPEs)	50
Ozone-Depleting Substances (ODS), specified group – including, but not limited to: - Chlorofluorocarbons (CFCs) - Halons - Hydrogenated bromofluorocarbons (HBFCs) - Hydrogenated chlorofluorocarbons (HCFCs)	1
Pentachlorophenol (PCP) and its salts and esters	5
Perchlorates	0.006
Sum of per- and polyfluoroalkyl substances (PFAS) and their derivatives – including perfluorocarboxylic acids (PFCAs) and perfluorosulfonic acids (PFSAs) like perfluorooctanesulfonic acid (PFOS) with the following exceptions:	50
- sum of perfluorohexanoic acid (PFHxA) and its salts	0.025
- sum of perfluorohexanesulfonic acid (PFHxS) and its salts	0.025
- sum of perfluorooctanoic acid (PFOA) and its salts	0.025
- sum of PFHxA precursor compounds[d)]	1
- sum of PFHxS precursor compounds[d)]	1
- sum of PFOA precursor compounds[d)]	1
- sum of C_9–C_{14} PFCAs and their salts	0.025
- sum of C_9–C_{14} PFCAs, precursor compounds[d)]	0.26
Persistent, bioaccumulative, and toxic substances (PBTs) and very persistent and very bioaccumulative substances (vPvBs) – including, but not limited to: - Persistent organic pollutants (POPs), specified group - Cationic surfactants, specified group	1000[c)]
Pesticides, herbicides, insecticides	1000[c)]
Phthalates, specified group	100[e)]
Polybrominated biphenyls (PBBs)	10
Polybrominated diphenyl ethers (PBDEs)	10
Polychlorinated biphenyls (PCBs)	5
Polychlorinated diphenyl ethers (PCDEs)	5
Polychlorinated naphthalenes (PCNs)	5
Polychlorinated phosphate esters, specified group	1000
Polychlorinated terphenyls (PCTs)	5
Polycyclic aromatic compounds (PACs) – including, but not limited to: - Polycyclic aromatic hydrocarbons (PAHs) - Thioxanthenes	1
Radioactive substances	Background radiation[f)]
Residual monomers	5

Substance/Substance Group	TLV ppm (mg/kg)
Selenium and its compounds (Se)	100
Toxic glycol ethers, excluding ethyl/methyl glycols and their acetates	1000
Triclosan	10
TSCA Section 6(h)-covered substances	Not used

5.2 Restricted Substances

The intentional use of these substances is restricted. Nexperia allows their intentional use only for specific applications under the conditions as set by our objectives and scope. Nexperia accepts impurities of substances in naturally occurring amounts and/or amounts generated via synthesis which cannot be avoided and where removal is not feasible.

5.2.1 General

Table B1: *List of restricted substances and substance groups together with their restricted applications and TLVs. Footnotes are given below.*

Substance/Substance Group	Applications	TLV ppm (mg/kg)
Arsenic and its compounds (As)	All, except semiconductor chips	25 10 in packaging
Azo compounds	Direct and prolonged skin contact	30
Beryllium and its compounds (Be)	All, except ceramic headers and as dopant in gold wires	1000
Substances that are carcinogenic, mutagenic, or toxic for reproduction (CMR), cat. 1 A and 1 B according to REACH	All, except carbon black as pigment in mould compounds and packaging materials, NiO in passive components and InP in photo diodes	1000[c)]
Lead and its compounds (Pb)	All, except for applications exempted by RoHS and ELV	100 in metals[b)] 20 in non-metals[b)]
Mineral and ceramic fibres (excl. asbestos)	All, except in glass-reinforced plastics (GRPs) in printing wiring boards and as crystalline silica in mould compounds	10
Mineral Oil Aromatic Hydrocarbons (MOAH)	Inks	10000
Mineral Oil Saturated Hydrocarbons (MOSH)	Inks	10000
Natural rubber (latex)	Direct and prolonged skin contact	100
Organotin compounds	All, except methyltin mercaptide in plugs of PVC tubes for semiconductor packaging	5
Phenols excl. PCPs, NPs, NPEs, and UV-320	Direct and prolonged skin contact and laminates of printing wiring boards	50[g)]

Substance/Substance Group	Applications	TLV ppm (mg/kg)
Phthalates, excl. specified group	All, except in glues for die attach and glass reinforced plastics (GRPs) in printing wiring boards, in passive components and wafer backside laminates	100
Polyvinylchloride (PVC) and PVC blends	All, except PVC tubes/rails for semiconductor packaging	5
Substances that may cause skin sensitization – including, but not limited to: - Cobalt and its compounds (Co) - Nickel and its compounds (Ni)	Direct and prolonged skin contact and laminates of printing wiring boards	1000[c)h)]
Tri-(2,3-dibromopropyl)phosphate (TRIS)	Direct and prolonged skin contact and laminates of printing wiring boards	10
Tris(1-aziridinyl)phosphine oxide (TEPA)	Direct and prolonged skin contact and laminates of printing wiring boards	10

5.2.2 Halogen/Antimony-Free Products Only

The requirements from Table B2 must be met for all materials to be incorporated in Nexperia parts that are designated to meet Nexperia's Halogen-Free definition as per XPR-0213.

Table B2: *List of restricted substances/substance groups for products designated to meet Nexperia's Halogen-Free definition. Footnotes are given below.*

Substance/Substance Group	Applications	TLV ppm (mg/kg)
Antimony oxides	If the final product is to meet Nexperia's Halogen-Free definition	900
Sum of chlorine and bromine content	If the final product is to meet Nexperia's Halogen-Free definition	900

Footnotes to the tables:

a) HWPW: Hard Wood Plywood

b) Sum of cadmium, mercury, chromium(VI) and lead shall not exceed the limit of 100 ppm (0.01 %) in packaging material.

c) Certain hazardous substances are regulated individually or under a specific substance group and may have a TLV below 1000 ppm (0.1 %).

d) Precursor compounds include substances/polymers that can release the substance in scope.

e) Specified group of phthalates: DEHP, BBP, DBP, DIBP, DIDP, DINP, DMP, DNHP, and DNOP.

f) Nexperia defines background radiation as 0.2 µSv/h and/or 50 Bq/g maximum at 10 cm distance.

g) Including for phenol in laminates of printing wiring boards: Phenol monomer <50 mg/l using test method ISO6439 and smell emission <200 odor unit/m^2/day using test method NEN-EN 13725:2003.

h) For nickel in surface preparations of products intended to come into direct and prolonged contact with the skin: Nickel ion release <0.5 µg/cm^2/week using test method EN1811:2011.

i) In glass diodes ≤1500 ppm (0.15 %)

5.3 Declarable Substances

The MasterList attached to this document provides guidance on the declarability of certain substances. Generally, the declaration is mandatory for all intentionally added and unintentionally present substances exceeding 100 ppm (0.01 %) of the homogeneous material. In cases where lower TLVs for prohibited/restricted/declarable substances exist, the lowest applicable TLV shall considered to be the declaration threshold. Nexperia is aware that minor deviations in chemical composition between lots may occur. Therefore, the concentrations of declared substances represent typical fixed values where ranges are not accepted.

The use of wildcards such as "Misc., not to declare" is strongly discouraged, since in this case a continuous alignment with Nexperia's changing requirements on declarable substances in step with legal and customer requirements is necessary. In any case, the concentration of wildcard substances must not exceed 10 % of each homogeneous material.

5.4 Non-Conformance

Nexperia requires suppliers to address any non-conformance towards the requirements mentioned herein. The Nexperia Sourcing Manager and ECO-Products (eco-products@nexperia.com) must be informed immediately when a non- conformance is either suspected or confirmed. The existence of any non-conformity shall be verified via appropriate verification methods. After root cause analysis and recognition of the extent of the non-conformity, a corrective action plan must be shared with Nexperia. After the non-conformance has been remedied, suitable evidence is required to confirm that the non-conformance has been successfully eliminated.

6 RECORDS

Compliance to this procedure should be checked with help of the full material declaration process (XPR-0318), with the relevant forms being XTE-0008 for materials and XTE-0055 for products, respectively. In addition, compliance should be verified by Certificates of Analysis (CoAs) as evidence with respect to Nexperia's test requirements (XPR-0009), with XPR-0282 being the respective process description. Documents submitted by suppliers should be attached to the material level in Enovia for traceability purposes.

7 DOCUMENT INFORMATION

7.1 References

Item	Description
XTE-0008	Nexperia Material Declaration Form
XTE-0055	Nexperia Product Declaration Form
XPR-0213	RHF-2006 Classification for Semiconductor Products
XPR-0282	Obtaining Valid Certificates of Analysis (CoAs)
XPR-0318	Full Material Declaration Process
ELV	Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles
PPW	European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste
REACH	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
RoHS	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
TSCA	Toxic Substances Control Act of 1976

7.2 Terms, Acronyms and Definitions

Acronym / Term	Definition
RoHS	Restriction on Hazardous Substances
RHF	RoHS and Halogen/Antimony-Free
n.d.	Not detectable
TLV	Threshold Limit Value

7.2.1 Homogeneous Material

A material of uniform composition throughout or a material, consisting of a combination of materials that cannot be disjointed or separated into varied materials by mechanical actions such as unscrewing, cutting, crushing, grinding, and abrasive processes.

7.2.2 Not Detectable

Nexperia considers amounts of substances below the natural occurrence levels and/or below the detection limit of currently accepted quantitative analytical methods as “not detectable (n.d.)”, “not present”, “not contained” or “0 ppm”.

7.3 History of Changes

Date	Description of change	Changed by (name)
2017-02-06	Transfer from NX3-00119 to Nexperia	Rainer Paschold
2018-04-18	Update of terms and tables	Annette Bunk
2019-12-04	Review and re-validation, correction of typos. Changed owning organization from Quality to EHS.	Annette Bunk
2022-04-22	*Interim revision: changed document owner from Marc Bollmann to Timo Stein*	*NMS Admin*
2022-10-11	• Periodic review • Definitions for prohibited, restricted, declarable substances were moved from chapter 7 to chapter 5 • "Azo compounds (azocolourants and azodyes)" moved from prohibited to restricted • "Persistent, Bioaccumalative and Inherently Toxic Substances (PBiTs)" renamed to PBTs and moved from restricted to prohibited • Typographic fixes • Removed footnote f) about benzene impurities • Info on Tab. C1 and C2 removed as it applies to XTE-0008/XTE-0055 • Rework of chapter 7.1 and 7.2 • Removed Master List attachment as it is distributed along with XTE-0008/XTE-0055	Annette Bunk
2023-02-07	Reworked: (3.2) Risks Updated: - (5.1) Prohibited Substances: PFAS limits adapted to new requirements; polychlorinated phosphate esters added; TSCA 6(h) substances added; specified group column "Applications" removed - (5.2) Restricted Substances: Addition of MOAH/MOSH Added: - (5.4) Non-Conformance; - (8) MasterList as an Excel appendix	Annette Bunk
2023-06-15	• MasterList: (a) Added requirements on declarable substances according to EU Critical raw materials (CRMs) 2023 draft. (b) SVHC-235 update. • (5.1) Specified PFAS requirements, added PFHxA • (5.2.1) Application for "natural rubber (latex)" was changed from "All, except in photo diodes" to "direct and prolonged skin contact". Application for Arsenic was changed from "All, except ICs (as dopant or GaAs-based dies)" to "All, except semiconductor chips".	Annette Bunk

	• (5.2.2) Specified Cl+Br requirement for Halogen-Free; removed footnote j; • (5.3) Rework. Explicit reference to the declarability of substances according to MasterList and wildcard substances.	

7.4 Document Release

Function	Name	Organisation and Role
Approver	Timo Stein	Manager ECO-Products Group (A)
Author	Annette Bunk	Officer Chemical Content, ECO-Products
Co-Author	-	
Reviewer	-	

8 APPENDIX

Nexperia_MasterList.xlsx