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1 OBJECTIVES / PURPOSE

Nexperia requires that its products and packaging remain free of hazardous substances—as defined in NDS-00005—above established threshold levels that may be released under normal usage, handling, and end-of-life disposal conditions. Compliance with applicable legal and regulatory requirements mandates that material suppliers, sub-contractors, and foundry partners (collectively “Suppliers”) furnish analytical test reports (ATRs) confirming adherence to our substance concentration specifications. As part of standard industry supply chain practices, suppliers agree that Nexperia may share these ATRs with customers through appropriate channels to provide documented compliance assurance for finished products.

2 SCOPE

This procedure applies to all materials, parts, (semi-)finished goods, subassemblies, and the packaging materials used for finished Nexperia products, all of which will henceforth be referred to as “materials”. The scope of this procedure covers materials intended for either consumer market release or internal business evaluation purposes.

3 RESPONSIBILITIES AND RISKS

3.1 Roles and Responsibilities

Who	What
Customer	Requests ATRs from Nexperia to obtain proof of compliance.
Customer Representative	Nexperia colleague supporting a customer. Often Sales Quality Engineer.
ECO-Products Group	Maintains a repository of ATRs. Reviews ATRs of materials to be qualified. Requests regular updates from Suppliers. Verifies compliance of incoming ATRs. Uses ATRs to answer chemical compliance requests.
Manager ECO-Products	Oversees activities. Can be consulted for expertise and any supportive activity regarding compliance requirements.
Supplier	Arranges tests of supplied materials and submits resulting ATRs to Nexperia in a timely manner. Accountable for any non-compliance.
Sourcing Manager	Supports requests for ATRs with Suppliers where necessary. Involved in any escalation procedure if Supplier is reluctant to comply or does not respond adequately within 14 days after request.
Applicant	Stakeholder requesting an assessment of environmental compliance, for example in the context of initial material qualification or material change, see NDS-00197. Typically Package R&D or Business Group. Subjects incoming ATRs to an initial check on completeness and plausibility per 5.3 (testing requirements) and 5.5 (report requirements). Makes ATRs available to ECO-Products.

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3.2 Rules

Relevant stakeholders must follow the process described herein and shall be informed in case of any non-compliance.

3.3 Risks

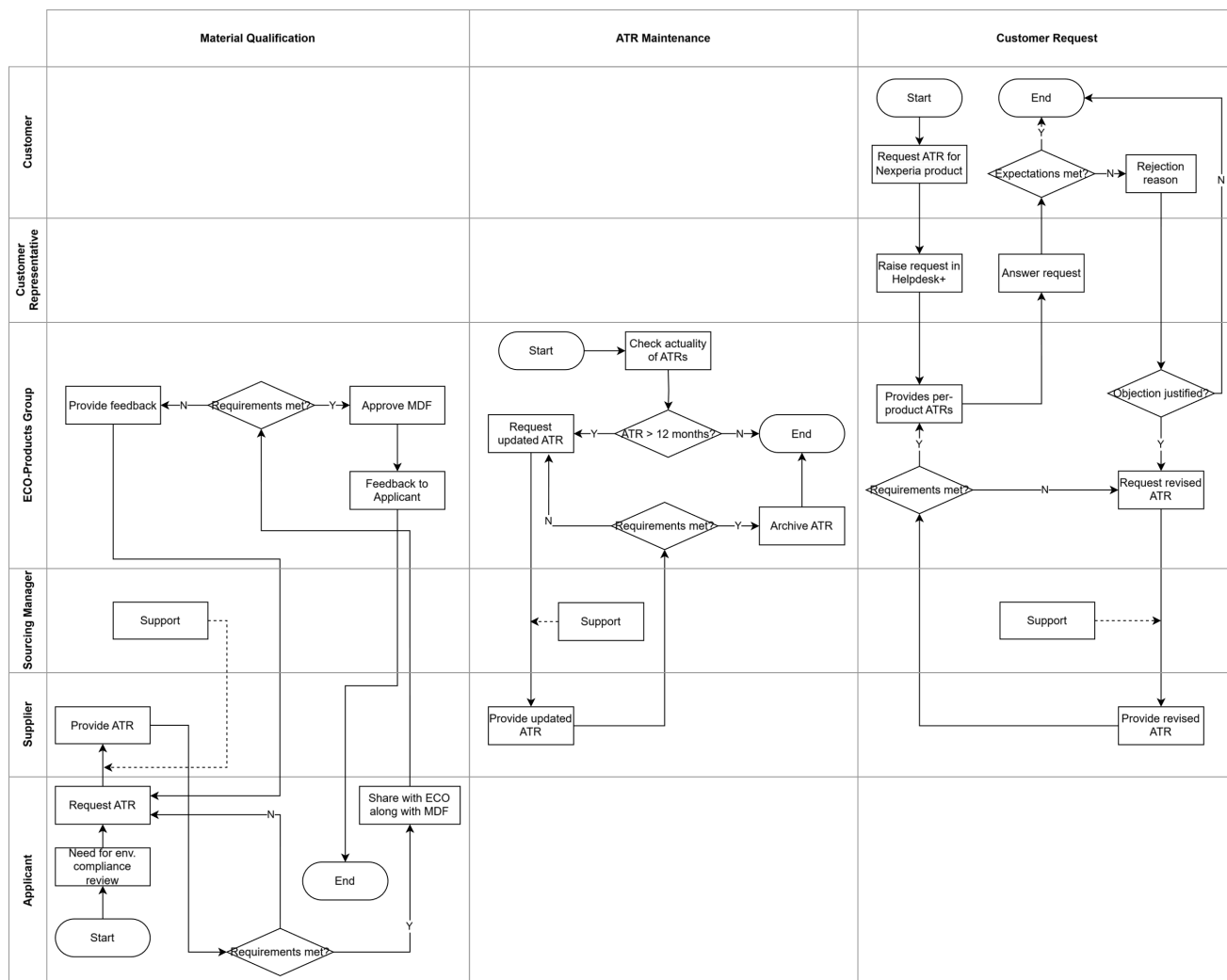
The principal risk addressed by this procedure is placing on the market Nexperia products that contain hazardous substances above legally or contractually permitted thresholds. Consequences of non-compliance include:

- Regulatory — blocked shipments, customs holds, monetary penalties, and, in severe cases, suspension of production at affected facilities under applicable EU and national chemical regulations.
- Commercial — customer claims, qualification suspension, recalls, and the cost of corrective action across the supply chain.
- Reputational — loss of trust with customers, regulators, and the broader market.

Responsibility is shared. Suppliers are accountable for the accuracy and completeness of ATRs and for promptly notifying Nexperia of any change that could affect compliance. Nexperia (ECO-Products and Applicants) is accountable for verifying incoming reports, maintaining the compliance evidence trail, and acting on any non-conformity. Customers depend on this evidence trail when issuing their own declarations to authorities and end-users; gaps propagate downstream.

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4 FLOWCHART



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5 PROCEDURE

5.1 Scope of Analytical Test Reports

Suppliers are required to provide evidence on compliance with the requirements mentioned in sections 5.1.1 and 5.1.2 on the homogeneous material level. For a more detailed guidance on individual test scopes, including material examples, please refer to section 5.1.4.

The test scope, e.g., which tests need to be carried out on which kind of homogeneous material, depends on the nature of the material. Nexperia distinguishes between metals, non-metals (adhesives, substrates, molding compounds, inks, plastics, cellulose-based materials like cardboard and paper, ...), and metalloids (dies, ceramics, ...). For maximum allowable concentrations of individual substances, please refer to NDS-00005.

Additional tests might be required due to specific customer needs. The decision on such requirements is at the discretion of and must be approved by the Manager ECO-Products.

5.1.1 Mandatory per Nexperia

- Directive 2011/65/EU, amended by Directive (EU) 2015/863, commonly referred to as "RoHS 2 amended" (RoHS: Restriction of Hazardous Substances Directive).
- Regulation (EU) 2025/40 ("PPWR"), Article 5(4): the sum of Pb + Cd + Hg + Cr⁶⁺ in packaging and packaging components shall not exceed 100 ppm. The limit is the same as under Directive 94/62/EC, which PPWR repealed on 2026-08-12, so test reports issued against that Directive remain acceptable.
- Nexperia Halogen-Free Definition. Homogeneous materials designated to be incorporated into products meeting the Halogen-Free definition (cf. NDS-00094).¹

5.1.2 Required per Nexperia's Customers

The following additional tests are required only for the homogeneous material types listed against each substance below. Suppliers of other material types do not need to perform these tests.

- As — for glass materials
- PFOS and PFOA — for inks, paints, and coatings, in line with POPs Regulation (EU) 2019/1021 (PFOS Annex I; PFOA added by (EU) 2020/784).
- F³ — for molding/potting compounds, die attach materials, inks, paints, coatings, plastic housings, and substrates
- Be⁴ — for alloys of aluminium, gold, copper, and titanium

5.1.3 Recommended per Nexperia

For all homogeneous materials intended for incorporation into Nexperia products, additional test reports for antimony are recommended, though not mandatory. Please note that Nexperia's Halogen-Free standard includes coverage of antimony oxides. Analytical testing typically determines the total antimony content, which serves as the basis for calculating the theoretical concentration of antimony trioxide (Sb₂O₃).

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5.1.4 Material Test Requirements Matrix

		non-metals								metals					metalloids	
		part of the product							packaging	part of the product						
		Molding/Potting Compound	Die Attach Epoxy/Film	Ink/Paint	Coatings (Passivation Layer, Solder Mask)	Glass	Plastic Housing	Substrate (Pre-preg, Core)	Cellulose (Cardboard, Paper), Plastics, Inks, Labels, ...	Leadframe	Plating	Bonding Wire	Solder	Pad Layer/Under Pad Layer/ Under Bump Metallization	Dies	Ceramics
PPWR	Cd								x							
	Hg								x							
	Pb								x							
	Cr ⁶⁺								x							
RoHS 2 amended	Cd	x	x	x	x	x	x	x		x	x	x	x	x	x	x
	Hg	x	x	x	x	x	x	x		x	x	x	x	x	x	x
	Pb	x	x	x	x	x	x	x		x	x	x	x	x	x	x
	Cr ⁶⁺	x	x	x	x	x	x	x		x	x	x	x	x	x	x
	PBBs	x	x	x	x		x	x							x	
	PBDEs	x	x	x	x		x	x							x	
	DBP DIBP BBP DEHP	x	x	x	x		x	x							x	
Halogen-Free ¹	Sb ²	x	x	x	x	x	x	x		x	x	x	x	x	x	x
	Cl	x	x	x	x		x	x							x	
	Br	x	x	x	x		x	x							x	
Customer-Required	F ³	x	x	x	x		x	x								
	As					x										
	Be ⁴									x	x	x	x	x		
	PFOS PFOA			x	x											

¹ Only in-scope if the respective homogeneous material is designated to be incorporated into a Halogen-Free product.

² Antimony tests are recommended but not mandatory.

³ Fluorine shall be tested using CIC per IEC 62321-3-2:2020 with an MDL of ≤ 50 ppm. In case a fluorine concentration exceeding 50 ppm is found, Supplier must ensure that a credible non-PFAS source for the fluorine contents is provided in the full material declaration made available to Nexperia using NEX-ECO-MDF.

⁴ Required only for metal alloys of aluminium, gold, copper, and titanium.

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5.2 Testing Laboratory Requirements

Tests shall be performed by a third-party laboratory accredited to ISO/IEC 17025:2017 for the specific test methods used. Examples of laboratories Nexperia currently accepts include CCIC, Centre Testing International (CTI), Eurofins, Integrated Service Technology (IST), Intertek, KOTITI, SGS (including SGS-CSTC and SGS Institut Fresenius), and Waltek Testing Group. A current accreditation certificate covering the scope of the report is required as evidence; in-house and non-accredited third-party laboratories are not acceptable.

5.3 Material Testing Requirements

- All materials shall be tested at the homogeneous material level. The definition of homogeneous material, including worked examples and the e-plated lead frame exception, is given in section 7.2. Mechanical separation procedures are described in IEC 62321-2.
- Multi-material parts (see section 7.2 for examples) contain several homogeneous materials, each of which shall be tested separately, preferably prior to assembly.
- Where homogeneous materials cannot be practically separated (e.g. multi-layer films, tightly adhered sub-micrometre coatings, conformal coatings on populated PCBAs), composite testing as defined in IEC 62321-2:2021 (3.1.1) and described in its 5.7.4 and Annex C is acceptable. The test report shall identify the constituent materials, their mass fractions, and demonstrate via the back-calculated worst-case concentration that the regulatory limit is not exceeded for any constituent. The e-plated lead frame case is treated separately under section 7.2 and does not require Annex C back-calculation.
- For layer-like packaging materials such as papers with adhesive backing, Nexperia accepts test reports at the whole-material level.
- Non-metallic materials (adhesives, molding compounds, die-attach, encapsulants, solder pastes, non-metallic coatings such as passivation or solder mask) shall be tested in their final cured/reacted state. Curing conditions need not replicate Nexperia's process exactly, but the supplier shall confirm that the tested state is representative of the analyte distribution in the final product.
- All pre-treatment and test methods shall follow Table 1. Sample mass and replicates per IEC 62321-2; any deviation shall be documented in the report.
- Use of test methods other than those listed in Table 1 requires prior written approval from the Manager ECO-Products before testing.

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Table 1: Individual ATR test items including pre-treatment/test methods, analytical equipment, and expected minimum MDL.

Substance	Pre-Treatment and Test Method	Analytical Equipment	MDL / ppm
Arsenic (As)	US EPA 3052 ⁵	ICP-OES ICP-MS	10
Antimony (Sb)	US EPA 3052 ⁵	ICP-OES ICP-MS	2
Beryllium (Be)	US EPA 3052 ⁵	ICP-OES ICP-MS	2
Cadmium (Cd)	IEC 62321-5:2013	ICP-OES ICP-MS AAS	2
Hexavalent chromium (Cr ⁶⁺)	IEC 62321-7-1:2015 (for corrosion-protective coatings on metal substrates)	UV-VIS	n/a
	IEC 62321-7-2:2017 (for polymers/electronics)	UV-VIS	8
Lead (Pb)	IEC 62321-5:2013	ICP-OES ICP-MS AAS	2
Mercury (Hg)	IEC 62321-4:2013 +AMD1:2017	CV-AAS CV-AFS ICP-OES ICP-MS	2
PFOS and PFOA	EN 17681-1:2025 ⁶	LC-MS/MS	0.01
Phthalates (DBP, DIBP, BBP, DEHP)	IEC 62321-8:2017 IEC 62321-12:2023 ⁷	GC-MS	50
Polybrominated biphenyls (PBBs) Polybrominated diphenyl ethers (PBDEs)	IEC 62321-6:2015 IEC 62321-12:2023 ⁷	GC-MS	5
Halogens F, Cl, and Br	IEC 62321-3-2:2020	CIC	50

⁵ Test method US EPA 3050B may be accepted in exceptional cases for customer-specific reporting on acid-soluble constituents, including verification of the recovery rate for each matrix and analyte. EPA 3050B is not recommended as the primary method for semiconductor components.

⁶ PFAS testing method standard for textile and textile products, modified for electrotechnical products. Currently the best and internationally recognized standard method—until the IEC publishes a dedicated test method specifically for PFAS in electronic components. Reports shall include PFOS and PFOA results at minimum; full EN 17681-1 panel results are accepted but not required.

⁷ IEC 62321-12 is preferred when simultaneous determination is feasible. The older standards are retained as fallback.

⁸ Result in µg/cm².

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5.4 Test Report Validity and Update Schedule

ATRs do not have an intrinsic expiry. Under IEC 63000:2016, the manufacturer's RoHS technical documentation must reflect the current product/material; consequently, Nexperia requires Suppliers to provide an updated report when (1) manufacturing location, chemical composition, or raw material source changes, or (2) the previous report is older than 12 months.

Suppliers shall deliver the updated analytical test report to Nexperia no later than 365 days after the issue date of the previous report. Nexperia reserves a 14-day internal grace period beyond that date for completeness and plausibility checks per section 5.5, integration into the ECO-Products tracking system, and onward sharing with customers. During this 14-day window the previous report continues to serve as customer-facing compliance evidence.

5.5 Requirements for Analytical Test Reports

- Reports must be issued in English. Bilingual reports are accepted provided the English version is complete and laboratory-issued.
- Incoming ATRs shall be one or more original and unaltered PDF file(s) containing text and images as provided by the accredited laboratory. Scanned, photographed, modified, and/or image-only PDF files are not accepted.
- Periods of more than one month between sample receiving date and date of issue are not acceptable.
- ATRs shall contain the following mandatory (M) and optional (O) information:
 1. (M) Name and address of testing laboratory
 2. (M) Report number
 3. (M) Report date (date of issue)
 4. (M) Name and signature of lab supervisor
 5. (M) Sample description (including type/model name of the product)
 6. (M) Sample receiving date and testing period
 7. (M) Tested substances with individual test methods and test results, together with analytical instruments used and the MDLs
 8. (O) Pre-treatment method and measurement process (flowchart)
 9. (O) Photograph of tested sample
- An ATR must be made available to Nexperia upon request for at least ten years after last shipment date. Suppliers shall acknowledge and respond to any Nexperia request for an archived or updated test report within seven business days.

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6 RECORDS

ATRs submitted by Suppliers shall be checked against the requirements in this procedure. Compliant reports are archived by the ECO-Products group per material or (sub-)component for traceability and retained for at least ten years after the last shipment date. Reports are kept as write-protected PDF documents on [SharePoint](#), in line with Nexperia's Document and Record Retention Policy (NDS-00822).

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7 TERMS, ACRONYMS AND DEFINITIONS

7.1 General

Acronym / Term	Definition
AAS	Atomic absorption spectroscopy
ATR	Analytical test report
BBP	Benzyl butyl phthalate
CIC	Combustion ion chromatography
CV-AAS	Cold vapour atomic absorption spectroscopy
CV-AFS	Cold vapour atomic fluorescence spectroscopy
DBP	Dibutyl phthalate
DEHP	Di(2-ethylhexyl) phthalate
DIBP	Diisobutyl phthalate
ECO-Products	Environmental Compliance Organization for Products
GC-MS	Gas chromatography-mass spectrometry
ICP-AES (= ICP-OES)	Inductively coupled plasma atomic emission spectroscopy (= inductively coupled plasma optical emission spectroscopy)
ICP-MS	Inductively coupled plasma mass spectrometry
IEC	International Electrotechnical Commission
LC-MS/MS	Liquid chromatography tandem mass spectrometry
MDL	Method detection limit
PBBs	Polybrominated biphenyls
PBDEs	Polybrominated diphenyl ethers
PCBA	Printed circuit board assembly
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
POPs	Persistent organic pollutants
PPWR	Packaging and Packaging Waste Regulation (EU) 2025/40
RoHS	Restriction of Hazardous Substances Directive 2011/65/EU
UV-VIS	Ultraviolet-visible spectroscopy

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7.2 Specific

Term	Definition
Coating	Product in liquid, paste, or powder form that, when applied to a substrate, forms a layer possessing protective, decorative, and/or other specific properties. Metallic plating layers are not included.
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. The definition is taken from Directive 2011/65/EU, Article 3(20). The following examples illustrate what is and is not a homogeneous material: – A plastic cover is a homogeneous material if it consists of one type of plastic that is not coated with other materials and has no other materials attached to it. – A cable that consists of metal wires surrounded by non-metallic insulation materials is not a homogeneous material because mechanical processes could separate the different materials. – A semiconductor package contains many homogeneous materials that include, e.g., caps, headers, molding compounds, die attach adhesives, die coatings, bonding wires, lead frames, platings, various types of solder (bumps, masks, pastes, wires, balls, flux), laminates, inks, etc. – Printed circuit board laminated materials consist of glass cloth, resins, and copper foil that each represent a homogeneous material. Metallic pre-plating applied to lead frames via electrogalvanic plating (e-plating) processes from a solution of the respective metal ion may be treated differently because the standard homogeneous-material approach is, in this specific case, impractical and inconsistent with the intent of the RoHS Directive (which concerns hazardous-substance content in the final product, not the analytical disassembly path used to verify it): i) Solution-based or salt-based test reports are not meaningful. The concentration of a hazardous impurity in the plating bath or in the solid metal salts used to make it cannot be directly compared to the concentration in the final solid plating layer, because deposition selectivity, co-deposition effects, and bath ageing change the partitioning of impurities between bath and deposit. ii) Mechanical separation of plating layers from each other and from the base metal is not feasible. Pre-plating layers are typically a few micrometres thick, and interlayer diffusion at the layer interfaces leaves no sharp boundary that mechanical methods (grinding, abrasion, peeling) can exploit. iii) Even if separation were possible, sufficient sample mass cannot be obtained from a reasonable number of products. ISO/IEC

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Term	Definition
	17025-accredited laboratories typically require ~10 g for the ten RoHS substances, ~10 g for PFAS, ~2 g for halogens, and ~5 g for additional elements. A typical pre-plating layer of a few micrometres on a single Nexperia semiconductor lead frame contributes well under 1 mg of plating material, which means obtaining the required sample mass would require the destructive disassembly of tens of thousands of finished products per analyte. Such an undertaking serves no compliance purpose and is not what RoHS verification is intended to require. In such cases, Nexperia accepts single test reports covering the aggregate of lead frame base material together with all plating layers, tested per the methods in Table 1. The aggregate result bounds the worst-case constituent concentration in the plating layer and is therefore sufficient to demonstrate compliance with the regulatory limits.
Packaging Material	An item, irrespective of the materials from which it is made, that is intended to be used by an economic operator for the containment, protection, handling, delivery or presentation of products to another economic operator or to an end user, and that can be differentiated by packaging format based on its function, material and design (Regulation (EU) 2025/40, Article 3(1)). Examples include reels, trays, cover tapes, carrier tapes, tubes, plugs, cushions, foams, boxes, quality assurance (QA) seals, labels, desiccants, and inks. The term "packaging" is the same as the semiconductor terminology for "outline packing".

8 REFERENCES

See Nexus, section "Applicable Documents"

9 ATTACHMENTS

See Nexus, section "Attachments"

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10 CHANGE LOG

Changes from the previous revision:

- 5.1.1, 5.1.4, 7.1: PPWD removed (repealed by PPWR on 2026-08-12); PPWR Article 5(4) is the packaging requirement.
- 5.1: Role name aligned to "Manager ECO-Products".
- 5.1.2: Material scope added for fluorine and beryllium tests.
- 5.3: Cross-references corrected to section 7.2; composite-testing reference corrected to IEC 62321-2:2021, 3.1.1, 5.7.4 and Annex C.
- Table 1: Cr(VI) MDL clarified; 8 ppm applies to IEC 62321-7-2, IEC 62321-7-1 results are in $\mu\text{g}/\text{cm}^2$.
- 3.1: Wording corrected in the ECO-Products row.
- 7.1: Added CV-AAS, CV-AFS, PCBA, POPs; LC-MS replaced by LC-MS/MS.
- 7.2: Homogeneous material definition now cited to Directive 2011/65/EU, Article 3(20); packaging definition updated to Regulation (EU) 2025/40, Article 3(1).
- NDS-00004 reference replaced by NEX-ECO-MDF.

Changes related to earlier revisions are stored in the document history in Nexus.

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