

**Minimum standard for determining the recyclability of
packaging subject to system participation pursuant to
section 21 (3) VerpackG**

**in consultation with the German Environment Agency
(Umweltbundesamt)**

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1 Introduction

An essential goal of extended producer responsibility regulations is to provide producers with incentives to take the environmental impact of their products throughout the entire product lifecycle and in particular their eventual disposal into account as early as in the process of designing and producing their products.¹ For this reason, the legislative body has broadened extended producer responsibility provisions under the Verpackungsgesetz (Packaging Act – VerpackG) to include an obligation for systems (system operators according to section 18 VerpackG) to set monetary incentives within the framework of system participation fees.

Section 21 VerpackG requires taking general recyclability into account when calculating participation fees. In this context, legal requirements in the form of specific increases or reductions in participation fees have not been enacted since, on the one hand, with the current state of knowledge they could not be quantified in a generally binding manner and, on the other hand, it would be a significant encroachment on the freedom of the systems to set prices as protected under German antitrust law.² Specifically, section 21 (1) VerpackG stipulates that:

'(1) Systems are obliged to calculate their participations fees in such a way that incentives are included with a view to the production of packaging subject to system participation

1. to promote the use of materials and material combinations that allow for the highest possible percentage to be recycled, taking into account the practice of sorting and recovery [...]

In order to provide the systems with a uniform framework for the determination of recyclability as defined in section 21 (1) no. 1, section 21 (3) provides for the annual publication of a minimum standard by the Zentrale Stelle Verpackungsregister (Central Agency Packaging Register – ZSVR), in agreement with the German Environment Agency (Umweltbundesamt – UBA).³ The Verpackungsgesetz requires annual publication of the minimum standard, in agreement with the German Environment Agency and no later than 1 September.

The stakeholders were initially involved in the preparation of this minimum standard in the form of an expert committee. The minimum standard was drafted largely on the basis of the recommendations of the ZSVR's Expert Committee III; following that, results from a consultation procedure on the draft guidelines were included as well. The minimum standard was finalised following completion of the consultation procedure.

The minimum standard is to be used to determine the recyclability of packaging placed on the German market during the year following the minimum standard's publication.

2 Minimum criteria

When determining recyclability, the available recyclable content of a packaging should be taken as the minimum starting point for further considerations. In determining the available recyclable content, at least the following three requirements must be verified and taken into account:

- 1) There must be a **sorting and recycling infrastructure** that allows for high-quality mechanical recycling for this packaging.

¹ Bundestag-Drucksache 18/11274, explanatory statement for section 21, p. 107

² *ibid*

³ *ibid*

- 2) The packaging must be designed in a way that the share to be transferred for high-quality recycling can be **sorted**; the packaging components must be **separable** to the extent that this is required for high-quality mechanical recycling.
- 3) The packaging components, or substances contained in the packaging materials, must not be recycling-incompatible; **recycling incompatibilities** could render recycling unsuccessful.

If a packaging meets these requirements, the available recyclable content (per packaging as a whole, see 6.11 below) determines (maximum) recyclability. If the minimum criteria no. 1 or 3 are not met, the packaging is not recyclable under this minimum standard. Criterion no. 2 can have a quantitative impact upon determination. Systems may also take further criteria into account when determining recyclability.

3 Object of determination

It is the packaging as a whole⁴, after use, that is the object of determination.

The determination of recyclability refers to the unfilled packaging as a whole, including all related packaging components such as labels, sealing films, lids and closures, adhesive applications, safety seals and closures, wrapping films, etc. (packaging as a whole). Determination of packaging recyclability must not be based on the recyclability of individual packaging components that could only be obtained by a merely theoretical dismantling of the packaging.

Components of combination packaging are to be determined separately if and to the extent that they necessarily and irrevocably have to be separated for consumption or use (e.g. tear-off strips, wrapping films). Grouped packaging and non-connected packaging components that serve to protect the product during transport or to package individual product or assembly components are also to be determined separately. Recyclability must also be determined based on individual packaging components in cases where the packaging components can be separated from each other simply through mechanical stress during transportation or preparation for sorting; as such, they would appear separately in the first relevant sorting stage, as can be assumed, e.g. for slip and snap-on lids and overcaps.

The determination of packaging in groups is permissible if the individual packagings in such a group possess the same material structure and only differ in terms of contents and/or quantity, but not in terms of relevant process-specific criteria (see **criteria in 4 and the respective appendices**). An example of where classification of packaging as a group is not possible, are plastic articles which are identical in their material structure but which are only partially sortable due to their different colouring.

⁴ 'Functional unit of packaging' within the meaning of DIN/EN 13430, or DIN/EN 13427. This functional unit of packaging usually consists of various components (the smallest parts of a packaging).

4 Details of the requirements set forth in 2

4.1. Existence of sorting and recycling infrastructure

If a packaging matches the 'good material description' in **Appendix 1, column 4 ('Good material description')** (taking into account any disqualifications in column 5), it can be assumed that an infrastructure of sorting and high-quality mechanical recycling is available on the market. In the determination, the recyclable materials named in **Appendix 1, column 6**, are included proportionally.

If a packaging material cannot be assigned to one of the (listed) material groups, the packaging material is considered to be not recyclable according to current common practices. For packaging types and materials that are not included in Appendix 1 (see column 1 in conjunction with column 2), a lack of recycling infrastructure is to be assumed as a matter of principle. These packaging types and materials are usually not sorted out and therefore not recycled; as a consequence, they are to be classified as non-recyclable.

If, in individual cases, the existence of the infrastructure required for high-quality mechanical recycling as well as its use can be proven, an exception may apply. Proof must be provided for each individual case, and comprise the following:

- 1) evidence that the result of the recycling process is of high quality within the meaning of the minimum standard, and
- 2) weighing notes evidence that this recycling path has received at least the equivalent of the target material volume in the reference year.

Requirements for individual evidence are specified in Appendix 1.

The following examples serve to clarify the procedure:

Example 1:

A producer of frozen products distributes these goods in large polystyrene (EPS) boxes. It has been determined that the packaging complies with the process-specific criteria under 4.2 and 4.3 of this minimum standard. To fulfil their producer responsibility, the party subject to system participation has agreed that the system will ensure that during the reference year at least the equivalent of the specific EPS participation volume be transferred for high-quality recovery. The system has classified the packaging as recyclable.

Evidence must be produced as follows:

-
- certificate issued for the EPS recycling plant(s) as the final recipient pursuant to the Verpackungsgesetz, certifying high-quality, mechanical EPS recycling;
 - verifiable documentation demonstrating that packaging subject to system participation in a volume in line with the specific participation volume has been collected, as well as verifiable documentation of the corresponding volumes delivered to the certified EPS recycling plant(s).
-

Example 2:

A producer packages goods in transparent PET-A monolayer trays. All packaging characteristics comply with the process-specific criteria under 4.2 and 4.3, for example labels made from PP have been applied with wash-off adhesives. The participation volume is 600 tonnes p.a. The system has classified the packaging as recyclable. The system has committed to transferring a corresponding volume of PET trays for high-quality mechanical recycling in the reference year. To this end, the system has entered into an agreement with a PET recycling plant that produces PET pellets from these trays and has been certified for the 328-2 group with a mechanical recycling rate of 100%.

Evidence must be produced for:

-
- In the case of the 328-2 group, a delivery volume of at least 2,000 tonnes (equivalent to a maximum of 600 tonnes of trays)
 - Actual existence of the equivalent in trays
 - Transfer for high-quality mechanical recycling (facility certificate)
-

4.2. Sortability and separability, impact on recyclable content

For the determination of recyclability, **sortability by means of sensor-based sorting** must be taken into account for the following materials: glass, plastics, liquid packaging board and fibre-based packaging. If sortability is not or not completely given, a corresponding deduction must be made when determining the recyclable content. Empirical testing is only required if one of the characteristics listed in **Appendix 2 ('Packaging characteristics requiring the testing of identifiability, including targeted separability, in sensor-based sorting by measurement')** applies.⁵ Requirements for individual evidence are specified in Appendix 2.

If identifiability has been evidenced for individual packaging by way of measurement and the underlying sorting technology has changed to no longer be covered by the existing evidence, testing must be repeated. The following provisions must also be taken into account:

4.2.1 Plastic packaging

When determining the recyclability of plastic packaging, it must also be taken into account that the **density** of the shredded material (usually $<1 \text{ cm}^2$) is decisive for it to be assigned to the correct flow of recyclables. For example, at a minimum, PE or PP-based packaging components with a density of more than 0.995 g/cm^3 because of additives, fillers or multi-layering cannot be included in recyclable content.

4.2.2 Fibre-based packaging

When determining the recyclability of fibre-based packaging, the **gradual defiberability** of the fibrous material is a decisive factor. For fibre-based composite packaging (except for liquid packaging board) and PPC packaging for non-dry contents – i.e. fibre-based packaging for example for liquids, certain foodstuffs, oils and emulsions – evidence must be provided that the operating conditions (for example, dwell time and other operating parameters in the processing of the material) of the respective recovery path (PPC or lightweight packaging collection) result in the dispersion of the fibrous material, and that the fibrous material is recycled. This obligation to provide evidence does not apply to fibre-based packaging that is typically filled with contents that are dry ($< 15\%$ moisture content), free-flowing or particulate, such as flour or sugar.

Where **wet-strength agents, impregnating agents, waxes**, etc., are used for fibre-based packaging, and in the case of paper or cartons (excluding liquid packaging board) **coated or metallised on both sides**, the determination of recyclability needs to be based on a suitable testing methodology, regardless of the filling material.

If, during the pulping of **fibre-based packaging**, substances that cannot be classified as fibrous material pass into the aqueous phase (water-soluble, colloiddally dissolved or finely dispersed), these shall be quantified by a suitable testing method and deducted when calculating the fibrous material yield.⁶

⁵ This means that, as a rule, no empirical test is required. If an empirical test is necessary in exceptional cases, it must be carried out with a standard operating detection unit, not with a hand-held scanner. In such a case, the result of this empirical test is included in the determination.

⁶ A testing method suitable for this purpose is, for example, PTS-RH 025/2022.

4.2.3 Container glass / glass packaging

In the case of glass packaging with adhesive labels made from plastic, **the glass share covered by these labels** cannot be classified as recyclable content if the adhesive use is water-insoluble.

Glass shares with a **level of transmission** of less than **10%** in a 400 nm to 780 nm wave range (e.g. due to varnishing or tinting) cannot be classified as recyclable content either.

With **demijohns**, i.e. bottles covered with a basket, the glass share is to be considered completely lost.

4.2.4 Metal packaging, metal-containing packaging and metal-containing composites

In the case of metal packaging, metal-containing packaging as well as **metal-containing composites** (multi-layer packaging with an aluminium layer, aerosol cans, composite cans with a tinplate bottom, etc.), the determination of recyclability is limited to the metal shares.⁷ This does not apply to metallised packaging, or pots with aluminium lids. Liquid packaging board with a metal share is also excluded.

4.3. Recycling incompatibilities

The declaration of the recyclability of a packaging requires that no combinations of materials or substances are used that can impede a successful recycling. **Appendix 3 ('Overview of packaging groups/sorts and material-specific recycling incompatibilities')** provides the basis for determining recycling incompatibilities. For any deviating determination in the sense that incompatible substances do not negatively affect recyclability in individual cases, individual evidence produced through analytical testing must be provided. If compatibility has been evidenced for individual packaging by way of measurement and the underlying recycle use has changed as per the minimum standard to no longer be covered by the existing evidence, testing must be repeated.

Requirements for individual evidence are specified in Appendix 3. Where packaging has been designed in such a way that residual contents remain inside the packaging even after the packaging has been emptied as intended, the influence of the residual contents has to be taken into account when determining recycling incompatibilities⁸ if the contents cannot be separated during the recycling process.

4.4. Available recyclable content and determining recyclability

The content available for recycling (based on the packaging as a whole, see 6.11 below) determines the recyclability according to this minimum standard.

Recyclability must then be ranked on a metric or ordinal scale (the latter with more than three scale degrees). The indication of the scale value and, if not self-explanatory, the scale units are required for the documentation of the determination result by the systems.

In addition, the assignment according to 4.1 must be specified.

⁷ Otherwise, an individual statement including supportive evidence as per 4.2 must be provided.

⁸ Contents to be considered in combination with plastic packaging include silicones, acrylates, polyurethanes and other cross-linking substances, waxes and paraffins, as well as bituminous compounds.

5 Determination procedure

A flowchart of the determination procedure is contained in **Appendix 4**.

6 Definitions

In this document, the following definitions apply:

6.1 Recyclability

In contrast to the recycling concept as defined in the Kreislaufwirtschaftsgesetz (Circular Economy Act – KrWG), 'recyclability' in this document always refers to high-quality and mechanical recycling (mechanical recycling is defined in section 3 (19) VerpackG) This concept of recyclability encompasses the fundamental and gradual suitability of any given packaging to substitute virgin material in applications typical for that material after undergoing recovery processes available on an industrial scale.

6.2 High-quality recycling

For the purposes of this minimum standard, high-quality recycling means a process that leads to a recyclate of a quality that allows it to be substituted for primary raw material of the same substance. To be classified as 'high-quality recycling', it is irrelevant whether the recyclate is deployed in primary⁹ or secondary¹⁰ use cases. Recycling methods are not classified as leading to 'high-quality' recycling if they enable packaging waste to be processed only up to the point required for incorporating the recyclate into foreign material products¹¹ or products¹² that are not typically made from virgin material of the same substance.

6.3 Combination packaging

Combination packaging is multi-part retail packaging that consists of different materials separable by hand.

6.4 Packaging as a whole

The packaging as a whole is the entire unfilled packaging, including all related packaging components such as labels, sealing films, lids and closures, adhesive applications, etc. Determining the recyclability based on the individual packaging components as a result of a theoretical decomposition of the packaging is not permitted (exception: combination packaging under the conditions listed under 3.).

⁹ Examples of primary use cases (i.e. deployment in use cases of the same type) include using glass fragments from recycled waste glass to produce container glass or using polypropylene granulate to produce paint buckets or nursery plant pots for garden beds.

¹⁰ Examples of secondary use cases include using packaging steel scrap in the production of constructional steel or polypropylene granulate in the production of cleaning buckets or filing trays.

¹¹ Examples of use cases with low recyclate requirements include using cellulose fibres as filler material in road construction.

¹² In particular, substitutes for wood, concrete or natural stone made from plastics that have undergone dry-mechanical treatment, such as palisades.

6.5 Metallisation

Metallised films are produced by coating a carrier film, e.g. made of plastic, with a very thin film of (ultrapure) aluminium. This gives the film a metallic sheen; also, metallised film offers protection against light and oxygen.

6.6 Metric scaling

A characteristic that consists of a number and has a dimension as well as a zero point.

6.7 Ordinal scaling

A qualitative characteristic with a natural order (e.g. school grading system or 'very good', 'good', 'bad', etc.).

6.8 Recyclates¹³

A product (substance or mixture) obtained from waste which is suitable to substitute virgin material in applications typical for that material.

6.9 Recyclable materials / recyclables

Recyclable materials / recyclables are those materials of a packaging that are to be recovered as recyclates through the respective material-specific recycling process (e.g. steel, metallic aluminium, PE, (cellulose) fibre, PET, etc.).

6.10 Foreign material

Foreign material is material that cannot be classified as recyclable content of any given packaging.

6.11 Available recyclable content

The available recyclable content is the proportion of recyclable materials of the packaging as a whole that is available for recycling, taking into account the provisions of this minimum standard (see 2 to 5 above).

6.12 Good materials

Within the meaning of this document, good materials are the components of any given packaging designated as desirable in a waste specification/sorts definition. Examples of good material – in particular in contrast to 'recyclable materials/recyclables' – include: tinsplate packaging, aluminium packaging, PE bottles, liquid packaging board, PET bottles, each including ancillary components such as labels and closures.

¹³ This definition of recyclates is applicable only to the minimum standard in relation to section 21 (1) no. 1 VerpackG.

6.13 Fibrous material

For determining the recyclable content, 'fibrous material' can be defined as the sum of fibre, filling material, starch, coating colour including binder, as well as additives typically used in the paper industry such as wet-strength agents, glue and bound water.

6.14 Composite packaging / composites

Composite packaging is packaging made from two or more material types that cannot be separated by hand (section 3 (5) VerpackG). For determining the recyclability of composite packaging within the meaning of this minimum standard, it means such packaging where no single material type accounts for more than 95% of packaging mass (section 16 (3) VerpackG).

6.15 Plastics

To the determination of recyclable content for plastic-based packaging the following applies: the recyclable content (PE, PP, PO, etc.) for 'plastic-based packaging' is equal to the eponymous main part of polymer (plus additives, fine-disperse filling and strengthening agents, as well as pigments included in the polymer matrix composite).

6.16 Targeted separability

Targeted separability is the mechanical separability of packaging into target groups (pursuant to Appendix 1, column 3) during industrial sorting, based on the degree of identification, mass and geometric properties.

6.17 Fibre-based packaging

Fibre-based packaging within the meaning of this minimum standard is packaging containing more than 50% fibrous material (see 6.13 above).

6.18 Fibre-based composite packaging

Fibre-based composite packaging within the meaning of this minimum standard is composite packaging (see 6.14 above) containing more than 50% fibrous material (see definitions under 6.13 above).

7 Abbreviations

In this document, the following relevant abbreviations are used:

Al	Aluminium
BT	<i>Bundestag</i> (German parliament)
DM	Dry mass
EAN	GS1 European Article Number
EPRC	European Paper Recycling Council
EPS	Expanded polystyrene
EVA	Ethylene vinyl acetate
EVOH	Ethylene vinyl alcohol copolymer
Fe	Ferrous metal
FKN	Liquid packaging board
GTIN	GS1 Global Trade Item Number
HDPE	High-density polyethylene
HV	Adhesion promoters
KrWG	<i>Kreislaufwirtschaftsgesetz</i> (German Circular Economy Act)
KS	Plastic
LDPE	Low-density polyethylene
MAH	Maleic anhydride
MHD	Minimum shelf life
MPO	Mixed polyolefin
MSN	Volume flow record
NC	Nitrocellulose (also known as cellulose nitrate)
OPS	Oriented polystyrene
PA	Polyamide
PE	Polyethylene
PE-X	Cross-linked polyethylene
PET	Polyethylene terephthalate
PET-A	(Amorphous) PET
PET-G	Glycol-modified polyethylene terephthalate
PO	Polyolefin
POM	Polyoxymethylene
PP	Polypropylene
PPC	Paper/paperboard/cardboard

PPC from lightweight packaging	Paper/paperboard/cardboard from the lightweight packaging collection group
PS	Polystyrene
PTS	<i>Papiertechnische Stiftung</i> (Paper Technology Foundation)
PVC	Polyvinyl chloride
PVDC	Polyvinylidene chloride
UFI code	Unique Formula Identifier Code
VerpackG	Verpackungsgesetz (Packaging Act)

Appendices

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Appendix 1: Material types, material groups and recycling paths¹⁴

The following steps are required to verify whether there is a sorting and recovery infrastructure (recycling infrastructure) for a certain packaging and to determine its recyclable content, based on this Appendix:

1. Packaging whose recyclability is to be determined is assigned to a packaging type and the corresponding material of the main component based on the listing in **column 1** in conjunction with **column 2**. Assignments based solely on column 4 – with column 1 in conjunction with column 2 being disregarded – are not permissible.
2. Check conformity of the packaging whose recyclability is to be determined (example: PP yoghurt pot with PP/EVOH sealing film) with the corresponding good material description in **column 4** (result, for example: the 'pot' packaging type with PP as the main component, in the subgroup of 'three-dimensional plastic packaging, matches column 4).
3. Check conformity of the packaging with the specification. This is the case if the packaging does not match the corresponding description in **column 5** (result, for example: no conformity).
4. **Case A:** If the previous steps have yielded positive results: identify the recyclable materials from **column 6**
Case B: If the previous steps have yielded negative results: check for an alternative in column 1 in conjunction with column 2 (see first step).
5. Check whether it can be assumed – without further evidence – that there is a recycling infrastructure.
If the group number corresponding to the packaging's assignment is listed in **column 3A**, it can be assumed that the packaging will be transferred extensively, or to a high degree, to high-quality, mechanical recycling procedures (subject to the remaining minimum criteria being met).¹⁵
If the corresponding group number is listed in **column 3C**, the sorting and recycling infrastructure for this packaging only marginally or in individual cases

¹⁴ The Appendix is based on the system's specifications as stated in their volume flow records, as well as on the following product specifications:

- Der Grüne Punkt – Duales System Deutschland GmbH, DSD: Downloads – Specifications. Available online at <https://www.gruener-punkt.de/en/downloads>;
- EcoPaperLoop: Enhancing Paper Recycling in Europe – Optimising Paper Products, Packaging and Collection Systems, as per 2014. Available online at <http://www.ecopaperloop.eu/outcome/EcoPaperLoop-Complete.pdf>;
- BDE, BV Glas, bvse: T 120 guideline on 'Quality requirements for glass fragments, to be used in the container glass industry';
- List of grades of paper: DIN EN 643: paper, cardboard and paperboard – European List of Standard Grades of Paper and Board for Recycling, as per 2014;
- ReCarton Gesellschaft für Wertstoffgewinnung aus Getränkekarton mbH: PolyAl product specification. Available online at <https://www.getraenkekarton.de/wp-content/uploads/2024/05/20240101-spezifikation-323-512.pdf>.

The classification of packaging types and materials in column 3 is based on the German Environment Agency's annual analysis of sorting and recovery practice available at <https://www.umweltbundesamt.de/publikationen/praxis-der-sortierung-verwertung-von-verpackungen-1>.

¹⁵ Explanation: The ZSVR and UBA define the delineation criterion for column 3A as the availability of sorting and recycling capacities for at least 80% of the corresponding packaging material based on the current practice of sorting and recovering the waste collected by the systems.

meets the criterion specified under 4.1 (subject to the remaining minimum criteria being met; e.g. EPS).¹⁶ In such cases, **individual evidence** supporting a high-quality, mechanical recycling is strictly necessary¹⁷. The criterion of 4.1 above is only deemed met for the volumes for which evidence can be produced that the competent system has transferred them for high-quality recycling. Evidence for the applicable reference period must be included in the report pursuant to section 21 (2) VerpackG; if no such evidence is included, it will be assumed that no recycling infrastructure is available.

If the corresponding group number is listed in **column 3B**, it is generally and technically possible to recycle the packaging (subject to the remaining minimum criteria being met), or the packaging is generally recycled, but as things currently stand a high-quality, mechanical recycling only applies in part. In this case it is also recommended that individual evidence be supplied for the transfer for high-quality, mechanical recycling (see the procedure in the case of classifications under column 3C).

If a group number is given in brackets, evidence is required exclusively for those shares that are assigned to the packaging type group listed in column 1.

6. If there is a recycling infrastructure, the recyclable content will be taken into account when determining recyclability. The remaining minimum criteria must be verified (see 4.2 et seqq. above).

Treatment of packaging types and materials that are not mentioned:

For packaging types and materials that are not mentioned (see column 1 in conjunction with column 2), e.g. packaging based on biodegradable or compostable plastics, polylactide, cellophane, ceramic or natural materials such as wood, a lack of recycling infrastructure is to be assumed as a matter of principle. These packaging types and materials are usually not sorted out and therefore not recycled; as a consequence, they are to be classified as non-recyclable.

¹⁶ Explanation: The ZSVR and UBA define the delineation criterion for column 3C as a maximum of 20% of the packaging material being transferred to the corresponding sorting and recycling paths.

¹⁷ See 4.1.

Material group: plastic packaging							
Subgroup: three-dimensional (rigid and semi-rigid) plastic packaging made from PE, PP, PS or PET							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ¹⁸	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
<ul style="list-style-type: none">- Bottles ≤ 5l in volume- Cups, pots- Trays, blisters- Tubes- Cans- Buckets ≤ 5l in volume- Canisters ≤ 5l in volume- etc.	Rigid PE ¹⁹	329 (323, 351)			Rigid, system-compatible plastic articles made from PE, ≤ 5l in volume, such as bottles and trays, including ancillary components such as closures, labels, etc.	Sealant cartridges	HDPE (PO) share
	Rigid PP ²⁰	324 (323, 351)			Rigid, system-compatible plastic articles made from PP, ≤ 5l in volume, such as bottles, trays and cups, including ancillary components such as closures, labels, etc.	Sealant cartridges	PP (PO) share
	Rigid PS ²¹		331 (351)		Rigid, system-compatible plastic articles made from PS, ≤ 1l in volume, such as cups and trays, including ancillary components such as closures, labels, etc.	Foamed plastics, including EPS articles	PS share, rigid PE and PP share

¹⁸ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

¹⁹Decisive reference use cases for the recyclable material in column 6: blown film or injection moulding products

²⁰Decisive reference use cases for the recyclable material in column 6: injection moulding products or thermoforms

²¹Decisive reference use cases for the recyclable material in column 6: injection moulding products

Material group: plastic packaging							
Subgroup: three-dimensional (rigid and semi-rigid) plastic packaging made from PE, PP, PS or PET							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ²²	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
- Buckets > 5l in volume - Canisters > 5l in volume	PE ²³ , PP ²⁴	322 (324, 329, 323, 351)			Rigid, system-compatible plastic articles, such as bottles > 5l in volume, and buckets, canisters and bulk packs ≤ 200l in volume, including ancillary components such as closures, labels, etc.	Sealant cartridges	PO share

²² For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

²³Decisive reference use cases for the recyclable material in column 6: blown film or injection moulding products

²⁴Decisive reference use cases for the recyclable material in column 6: injection moulding products or thermoforms

Material group: plastic packaging							
Subgroup: three-dimensional (rigid and semi-rigid) plastic packaging made from PE, PP, PS or PET							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ²⁵	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
PET bottles, transparent (clear or coloured)	²⁶ PET-A	325 (328-1) (328-2) (328-3)			Rigid, system-compatible articles made from PET, ≤ 5l in volume. Includes ancillary components such as closures, labels, etc. Examples include bottles containing beverages, detergent and household cleaning agents.	Opaque PET bottles and other PET articles	PET, PO from closures
Other PET packaging - Trays - Slip lids - Cups, pots - Cans - Cosmetic jars - Blister packs - Other - Thermoforms	PET-A monolayer ²⁷			328-5²⁸ (328-1) (328-2) (328-3) 328-6	System-compatible tray packaging made from polyethylene terephthalate (PET), ≤ 5l in volume when assembled 1. Trays, e.g. for cold cuts, fruits and vegetables, salads, etc. 2. Transparent PET bottles, including ancillary components such as labels, etc.		PET

²⁵ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

²⁶Decisive reference use cases for the recyclable material in column 6: non-contact-sensitive bottles or thermoforms or strapping bands

²⁷Decisive reference use cases for the recyclable material in column 6: thermoforms or strapping bands

²⁸ For the 328-5, 328-1, 328-2, 328-3 and 328-6 groups, a recycling infrastructure can only be deemed to exist where **individual evidence** is provided.

Material group: plastic packaging							
Subgroup: films and flexible plastic packaging as well as foams							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ²⁹	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Large-format films > A4 - Films - Bags - Carrier bags - Shrink wraps - Bubble wrap, foam rolls - etc.	Flexible PE ³⁰	310			System-compatible articles made from plastic film, surface area > A4 in size, such as bags, carrier bags and shrink wrap, including ancillary components such as labels, etc.	Metallised plastics	LDPE (PO) share
	Flexible PP ³¹		324-2 (310)		System-compatible articles made from PP plastic film, including ancillary components such as labels, etc. Examples include bags, carrier bags and shrinkwrap.		PO share

²⁹ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

³⁰Decisive reference use cases for the recyclable material in column 6: blown film **and** injection moulding products

³¹Decisive reference use cases for the recyclable material in column 6: injection moulding products or thermoforms

Material group: plastic packaging							
Subgroup: films and flexible plastic packaging as well as foams							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ³²	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Flexible plastic packaging made from PP and PE - Sachets - Bags - Pouches - Stand-up pouches - Tubular bags, flow packs - Foams - Nets - etc.	Flexible PE ³³		323-2 (310, 323)		System-compatible, flexible articles that are typically considered packaging, made from PO plastics (PE, PP), such as films, bags (incl. aluminised), and rigid PO plastics, such as trays, lids, including ancillary components such as closures, labels, etc.		PO share
	Flexible PP ³⁴		324-2 (323-2, 323)	(324-1) ³⁵	System-compatible articles made from PP plastic film, including ancillary components such as labels, etc. Examples include bags, carrier bags and shrinkwrap.		PO share

³² For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

³³Decisive reference use cases for the recyclable material in column 6: blown film or injection moulding products

³⁴Decisive reference use cases for the recyclable material in column 6: injection moulding products or thermoforms

³⁵ For the 324-1 group, a recycling infrastructure can only be deemed to exist where **individual evidence** is provided.

Material group: plastic packaging							
Subgroup: films and flexible plastic packaging as well as foams							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ³⁶	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Expanded polystyrene (EPS) - Coolboxes - Edge protectors and other shock absorbers for electronic equipment - etc.	EPS			340 ³⁷	System-compatible components made from white and granular expanded polystyrene, including ancillary components such as labels, etc.		EPS

³⁶ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

³⁷ For the 340 group, a recycling infrastructure can only be deemed to exist where **individual evidence** is provided. Another requirement whose fulfilment must currently be evidenced is that the volumes in question were previously collected by the competent system in a **mono-collection**, outside the usual LVP kerbside collection.

Material group: fibre-based packaging							
Subgroup: liquid packaging board							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ³⁸	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Liquid packaging board	Paper, paperboard, cardboard ³⁹	512/510			System-compatible retail packaging made from cardboard composite materials, consisting of cardboard/PE or cardboard/aluminium/PE, for liquid or flowable product filling (liquid, paste or flowable/particulate), including ancillary components such as closures, etc.	Other articles made from paper, paperboard, cardboard	Fibre share as well as PO and AI share ⁴⁰

³⁸ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

³⁹ Decisive reference use cases for the recyclable material in column 6: corrugated base paper (fibre share) and injection moulding products (PO share)

⁴⁰ Individual evidence is recommended for the PO and AI share (polyolefins from PE/PP film and PE/PP caps and closures as well as aluminium foil), as the existence of the recycling infrastructure for polyAl (by-product from the fibre processing of paper grades 5.03.00 as per EN 643 or group number 512 consisting of polyolefin-based plastics, plastic-aluminium composites and aluminium, largely fibre-free (< 5% DM) according to technical standards) has been limited to date.

Material group: fibre-based packaging							
Subgroup: other fibre-based composite packaging							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ⁴¹	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Other fibre-based composite packaging (main component not metal) such as - Laminated folding boxes - Composite cans - Coated paper - Paper cups coated on both sides - Cardboard tubes etc.	Paper, paperboard, cardboard ⁴²		(550) ⁴³		System-compatible PPC articles as well as PPC-based composites, including ancillary components.	Liquid packaging board, waxed, paraffin, bitumen and oil paper	Fibrous material content

⁴¹ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

⁴²Decisive reference use cases for the recyclable material in column 6: corrugated base paper

⁴³ For packaging that is not typically filled with dry contents, individual evidence must be submitted in accordance with the more detailed provision in 4.2.

Material group: fibre-based packaging							
Subgroup: PPC packaging							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ⁴⁴	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
PPC packaging (excluding fibre-based composite packaging) - Corrugated board - Folding boxes - Paper bags and pouches - etc.	Paper, paperboard, cardboard ⁴⁵	1.01.00 ^{46, 47}			System-compatible articles made from PPC	Liquid packaging board, waxed, paraffin, bitumen and oil paper	Fibrous material content

⁴⁴ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

⁴⁵Decisive reference use cases for the recyclable material in column 6: corrugated base paper

⁴⁶ As per DIN EN 643.

⁴⁷ For packaging that is not typically filled with dry contents, individual evidence must be submitted in accordance with the more detailed provision in 4.2.

Material group: ferrous metals packaging and ferrous metals composite packaging							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ⁴⁸	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Tinplate and sheet metal packaging, as well as composites containing tinplate such as - Food cans - Aerosol cans - Lacquer and paint cans - Tin buckets - Composite cans with a tinplate bottom - etc.	Steel	410/412			System-compatible articles made from tinplate, such as beverage or food cans and buckets, including ancillary components such as labels, etc.		Fe share and Al share

⁴⁸ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

Material group: aluminium packaging, and packaging containing aluminium							
Subgroup: aluminium packaging and aluminium-based composites							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ⁴⁹	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Aluminium packaging and aluminium-based composites such as - Food cans - Aerosol cans - Aluminium trays - Aluminium tubes - etc.	Aluminium	420			System-compatible articles made from aluminium or containing aluminium foil, such as trays and wrapping film, including ancillary components such as closures, labels, etc.		Fe share and Al share

⁴⁹ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

Material group: aluminium packaging, and packaging containing aluminium							
Subgroup: composite packaging containing aluminium foil							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ⁵⁰	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Composite packaging containing aluminium foil - Tablet blisters - Stand-up pouches - Powdered soup pouches - Tubes - etc.	Plastic or PPC	420			System-compatible articles made from aluminium or containing aluminium foil, such as trays and wrapping film, including ancillary components such as closures, labels, etc.		Al share

⁵⁰ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

Material group: glass packaging							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number(s)/sort name(s)			Good material description ⁵¹	Packaging/ materials that do not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Container glass / glass packaging - Preserving jars - Bottles - Cosmetic jars - Flacons - Ampoules - etc.	Soda-lime glass ⁵²	T 120			Container glass from households, commerce and manufacturing, such as bottles, glasses, pharmaceutical and cosmetic glass (soda-lime glass).	Leaded glass, untreated safety glass, glass-ceramic, illuminants, TV glass, quartz glass and any other glass containing lead	Glass share; Fe share and Al share from lids and closures

⁵¹ For many groups, the product specification for good material (see footnote 16) includes the addition that packaging must be 'used, emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this Appendix.

⁵²Decisive reference use cases for the recyclable material in column 6: container glass

Requirements for documenting individual evidence under 4.1, applicable to dual systems

Individual evidence must be produced for each party under participation obligation, packaging type and reference year. The systems should provide the ZSVR with evidence for a given reference year in an aggregated form, i.e. with a report pursuant to section 21 (2) VerpackG. They are required to document recovery volumes and participation volumes, the latter classified as recyclable by individual evidence.

1. Evidence of recovery volumes for the reference year includes:

- (1) Supply volumes received by the system as per the list of weighting notes, broken down by group number, showing sender and final recipient facility
- (2) Evidence of high-quality mechanical recycling under 6.2 for final recipient facilities
- (3) Eligible shares of the packaging type to be documented as per product specification, broken down by group number (based on a Germany-wide analysis, if required)
- (4) Recovery ratio recommended for the final recipient facilities, as per certificate and broken down by group number (for the packaging type to be documented)
- (5) Subtotals and totals for the volumes of the packaging type that is to be documented and was transferred for high-quality mechanical recycling. Proof used as individual evidence of recovery volumes must be attested by the expert instructed to audit the volume flow report.

2. Evidence of participation volumes for the reference year includes:

- (1) Participation volumes, broken down by packaging type to be documented and party under obligation, including a conclusive indication of individual packaging (EAN, GTIN or internal product code)
- (2) Information about the recyclability of the packaging included in the individual evidence (recyclability as defined under 4.2 et seqq. in this minimum standard)
- (3) Total participation volumes covered by the individual evidence, broken down by packaging type

Note: The sums of specific recovery volumes by packaging type under 1 (5) must be equal to or exceed the corresponding volumes under 2 (3).

Appendix 2: Packaging characteristics requiring the testing of identifiability, including targeted separability, in sensor-based sorting by measurement

Plastic packaging

- Large labels (taking up > 50% of the projected surface) made from foreign material
- Full sleeve labels (excluding full sleeves of PET hollow bodies without a light barrier – clear or light blue – where OPS PET or PO sleeves are used)
- Multi-layer structure (excluding PE/PP EVOH)
- Metallisation (excluding on the inside/in the middle layer)
- Dyeing using soot-carbon-based pigments (also when used for internal layers)
- > 50% fully printed black (including background) using soot-carbon-based pigments
- Different types of plastic used on front and back sides
- Metal pigments applied on a large scale (taking up > 50% of the projected surface) (lacquering, coating or embossing)
- Nets

Fibre-based composite packaging

- Fully lacquered surface
 - Excluding clear protective lacquer up to a thickness of ≤ 5 micrometers
 - Excluding internal bag layers if the grammage is at least 100 g/m^2
- Plastic-coated surface
 - Excluding internal bag layers if the grammage is at least 100 g/m^2
- Metal pigments applied on a large scale (taking up > 50% of the projected surface) (lacquering, print, coating or embossing)
- Dyed black, using soot-carbon-based pigments
- > 50% fully printed black (including background) using soot-carbon-based pigments

PPC packaging

- Fully lacquered surface
 - Excluding clear protective lacquer up to a thickness of ≤ 5 micrometers
 - Excluding internal bag layers if the grammage is at least 100 g/m^2
- Plastic-coated surface
 - Excluding internal bag layers if the grammage is at least 100 g/m^2
- Metal pigments applied on a large scale (taking up > 50% of the projected surface) (lacquering, print, coating or embossing)

Liquid packaging board

- Design different from standard structure (no wet-strength cardboard, PE ± aluminium)
- Metal pigments applied on a large scale (taking up > 50% of the projected surface) (lacquering, print, coating or embossing)
- > 50% fully printed black (including background) using soot-carbon-based pigments

Container glass / glass packaging

- Non-transparent/non-translucent glass packaging (see provision in 4.2)

Requirements for conducting and documenting individual evidence under 4.2 and Appendix 2

1. When evidence is mandatory, reviewing and determining the sortability and separability of a packaging variation's recyclable content requires measurements and calculations. These measurements and calculations must be conducted using reliable, exact and reproducible state-of-the-art methods whose results are subject to little uncertainty.
2. In the case of empirical analyses in laboratories, pilot plants or operations, the analysis methods, sample preparation and all relevant machinery and settings parameters must be documented and aligned with the requirements set out in the first paragraph. It is expressly noted that if measurements are conducted in operational plants with individual machinery or units being recognised, the functional integration of this individual machinery or these units into the overall process must also be documented (e.g. roughing stage for particles in the range of 20–140mm, cleaning stage, etc.) and the explicit indication of the maintenance state as per the manufacturer's maintenance requirements is mandatory (e.g. most recent calibration).
3. When planning and conducting analyses, it must be ensured (and explained in detail in the analysis report) that the chosen analysis and assessment method, i.e. the assessment parameters and criteria, is suitable for transferring the results to the practice of sorting and recovery. This particularly refers to the question whether state-of-the-art technology was used.
4. If the analysis results are used to trigger general exemptions from the individual evidence obligation for certain packaging variations, packaging components or packaging material variations, the analysis reports must be published in a suitable manner and in compliance with the requirements specified in the first to third paragraphs; the reports must be published prior to the start of the minimum standard consultation.

Appendix 3: Overview of packaging groups/sorts and material-specific recycling incompatibilities

Group/sort	Recycling incompatibilities	Individual evidence / exemptions for
Flexible PE ⁵³	<ul style="list-style-type: none"> - Fibre-based labels if the cellulose share cannot be removed by means of cold washing. - PA layers 	<ul style="list-style-type: none"> - Nylon 6 or co-polyamide 6-66 in coextruded PE/PA films (with or without EVOH), combined with MAH-grafted PE as an adhesion promoter at a ratio of at least 0.5g of adhesive per 1g of PA (+EVOH); nylon 6 in laminated PE/PA films, combined with MAH-grafted PE as a compatibiliser at a ratio of at least 0.15g of compatibiliser per 1g of PA - PE-Xc <= 50 kGy
PP-flex ⁵⁴	<ul style="list-style-type: none"> - PE-X components - PVDC layers - Other non-PE polymeric layers (excluding adhesion promoters, adhesives, PP, EVA and EVOH) - Non-polymeric layers (excluding SiOx/AIOx/metallisations) - NC inks used in adhesive side printing 	
	<ul style="list-style-type: none"> - Silicone components - Foamed non-thermoplastic elastomers with a density of < 1 g/cm³ - Foamed non-polyolefin components - Fibre-based labels if the cellulose share cannot be removed by means of cold washing. 	
Rigid PE ⁵⁵	<ul style="list-style-type: none"> - Silicone components - Fibre-based labels if the cellulose share cannot be removed by means of cold washing. - Components of foamed non-thermoplastic elastomers; PET sleeves with a density of < 1g/cm³ - PA layers - PE-X components - PVDC layers - Non-PO plastics with a density of < 1 g/cm³. 	
Group/sort	Recycling incompatibilities	Individual evidence / exemptions for

⁵³ Reference use cases: blown film **and** injection moulding products

⁵⁴ Reference use cases: injection moulding products or thermoforms.

⁵⁵ Reference use cases: blown film or injection moulding products

Rigid PP ⁵⁶	<ul style="list-style-type: none"> - Silicone components - Components of foamed non-thermoplastic elastomers - Fibre-based labels if the cellulose share cannot be removed by means of cold washing. - PET sleeves with a density of < 1g/cm³ - PA layers - PVDC layers - Non-PO plastics with a density of < 1 g/cm³.
Rigid PS ⁵⁷	<ul style="list-style-type: none"> - Foreign plastics or multi-layers with a density of 1.0–1.08 g/cm³ - Fibre-based labels if the cellulose share cannot be removed by means of cold washing.
Transparent PET bottles ⁵⁸ and other transparent, rigid PET packaging ⁵⁹	<ul style="list-style-type: none"> - PET-G components - POM components - PVC components - EVOH layers - Silicone components - PA monolayers for transparent PET bottles, colourless and 'light blue' - PVC labels/sleeves - PS labels/sleeves - PET-G labels/sleeves - Other labels, sleeves or printed top film with a density of > 1g/cm³ (including printing and lacquering) - Other blended barriers - PA additives for transparent PET bottles, colourless and 'light blue' - Non-removable washable adhesive applications (in water or alkaline at 80° C) - Non-magnetic metals - Elastomer components with a density of > 1g/cm³ - Direct print (excluding production codes, 'best before' dates and UFI codes⁶⁰)

Group/sort	Recycling incompatibilities	Individual evidence / exemptions for
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⁵⁶ Reference use cases: injection moulding products or thermoforms.

⁵⁷ Reference use cases: injection moulding products.

⁵⁸ Reference use cases: non-contact-sensitive bottles or thermoforms or strapping bands

⁵⁹ Reference use cases: thermoforms or strapping bands

⁶⁰ The UFI (unique formula identifier) code is used to uniquely identify hazardous mixtures in order to enable poison control centres to administer first aid faster. The code is found on products classified as hazardous to health or physical hazards under EU Regulation (EC) 1272/2008 (CLP Regulation).

PPC packaging ⁶¹	<ul style="list-style-type: none"> - Polymeric thermoplastic dispersion coatings and hot-melt adhesive applications, unless it is proven that they do not lead to incompatibilities in the recycle.⁶² 	<ul style="list-style-type: none"> - Application of hot-melt adhesives exempted as per the EPRC scorecard⁶³: <ul style="list-style-type: none"> ○ Softening temperature of the adhesive (according to R&B): $\geq 68^{\circ}\text{C}$ ○ Layer thickness (non-reactive adhesives): $\geq 120\text{ }\mu\text{m}$ ○ Layer thickness (reactive adhesives): $\geq 60\text{ }\mu\text{m}$ ○ Horizontal dimension of the adhesive application (in either direction): $\geq 1.6\text{mm}$
Fibre-based composite packaging ⁶⁴ (excluding liquid packaging board)	<ul style="list-style-type: none"> - Polymeric thermoplastic dispersion coatings and hot-melt adhesive applications, unless it is proven that they do not lead to incompatibilities in the recycle.⁶⁵ 	<ul style="list-style-type: none"> - Application of hot-melt adhesives exempted as per the EPRC scorecard⁶⁶: <ul style="list-style-type: none"> ○ Softening temperature of the adhesive (according to R&B): $\geq 68^{\circ}\text{C}$ ○ Layer thickness (non-reactive adhesives): $\geq 120\text{ }\mu\text{m}$ ○ Layer thickness (reactive adhesives): $\geq 60\text{ }\mu\text{m}$ ○ Horizontal dimension of the adhesive application (in either direction): $\geq 1.6\text{mm}$

⁶¹ Reference use cases: corrugated base paper

⁶² A testing method suitable to proof this is, for example, PTS-RH 021: 2012.

⁶³ www.paperforrecycling.eu/download/882.

⁶⁴ Reference use cases: corrugated base paper

⁶⁵ A testing method suitable to proof this is, for example, PTS-RH 021: 2012.

⁶⁶ www.paperforrecycling.eu/download/882.

Group/sort	Recycling incompatibilities	Individual evidence / exemptions for
Liquid packaging board ^{67,68}	<p>Fibrous material content:</p> <ul style="list-style-type: none"> - Polymeric thermoplastic dispersion coatings and hot-melt adhesive applications, unless it is proven that they do not lead to incompatibilities in the recycle.⁶⁹ <p>Plastic/Al share:</p> <ul style="list-style-type: none"> - PA layers <ul style="list-style-type: none"> - PET/PE composites - Biodegradable polymers - Non-polymeric layers (excluding aluminium foil and SiOx/AlOx/metallisations); - non-PO plastics with a density of < 1 g/cm³ 	<ul style="list-style-type: none"> - Application of hot-melt adhesives exempted as per the EPRC scorecard⁷⁰: <ul style="list-style-type: none"> o Softening temperature of the adhesive (according to R&B): ≥ 68°C o Layer thickness (non-reactive adhesives): ≥ 120 µm o Layer thickness (reactive adhesives): ≥ 60 µm o Horizontal dimension of the adhesive application (in either direction): ≥ 1.6mm - Nylon 6 or co-polyamide 6-66 in coextruded PE/PA films (with or without EVOH), combined with MAH-grafted PE as an adhesion promoter at a ratio of at least 0.5g of adhesive per 1g of PA (+EVOH); nylon 6 in laminated PE/PA films, combined with MAH-grafted PE as a compatibiliser at a ratio of at least 0.15g of compatibiliser per 1g of PA
Container glass / glass packaging ⁷¹	<ul style="list-style-type: none"> - Lead glass - Borosilicate glass - Container glass with ceramic components - Container glass with metal nets - Swing tops with non-ferromagnetic metal shares only 	

⁶⁷ The multi-stage recycling process for the fibre and plastic/aluminium shares of liquid packaging board means that recycling incompatibilities are relevant only for the given share, not for the packaging as a whole. For the 2025 edition of the minimum standard, it will be reviewed whether comparable multi-stage processes are in place for other recycling pathways.

⁶⁸ Reference use cases: corrugated base paper (fibre share) and injection moulding products (plastic share)

⁶⁹ A testing method suitable to proof this is, for example, PTS-RH 021: 2012.

⁷⁰ www.paperforrecycling.eu/download/882.

⁷¹ Reference use case: container glass

Requirements for conducting and documenting individual evidence under 4.3 and Appendix 3

1st Reviewing and determining the compatibility of packaging variations in deviation from the classification in Appendix 3 requires analyses, measurements or calculations. These analyses, measurements or calculations must be conducted using reliable, exact and reproducible state-of-the-art methods whose results are subject to little uncertainty.

2nd In the case of empirical analyses in laboratories, pilot plants or operations, the analysis methods, sample preparation and all relevant machine settings must be documented and aligned with the requirements set out in the first paragraph.

3rd When planning and conducting analyses, it must be ensured (and explained in detail in the analysis report) that the chosen analysis and assessment method, i.e. the assessment parameters and criteria, is suitable for justifying that a packaging variation has been classified differently from the specification in Appendix 3 based on the reference application(s) defined there.

4th If the analysis results are used to trigger general exemptions from the classification in Appendix 3 for certain substances, materials or recipes, the analysis reports must be published in a suitable manner and in compliance with the requirements specified in the first to third paragraphs; the timing of the publication must enable participation in the minimum standard consultation.

Appendix 4: Flowchart of the determination procedure

The flowchart models the determination procedure according to 2 to 4 above. It should be noted that the packaging being determined (object of determination) always undergoes the whole test, but that only the determined proportion of the relevant recyclable material is included in the final measurement/scaling.

