

**Please note: This English version is a convenience translation – the German version shall prevail**

**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)**

**Osnabrück, 31 August 2020**

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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.<sup>1</sup> 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.<sup>2</sup> 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 minimum standards by the Zentrale Stelle Verpackungsregister (Central Agency Packaging Register – ZSVR), in agreement with the German Environment Agency (Umweltbundesamt).<sup>3</sup>

The Verpackungsgesetz requires annual publication of a 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.

## 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.

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

<sup>2</sup> ibid

<sup>3</sup> 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 6.10 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 whole<sup>4</sup>, 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, etc. (packaging as a whole). Determination of recyclability must not be based on individual packaging components that could only be obtained by a merely theoretical dismantling of the packaging.

Components of combination packaging can only be determined separately if these components typically accumulate separately during use or consumption.

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. 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. 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 practice.<sup>5</sup> In the determination, the recyclable materials named in **Appendix 1, column 6**, are included proportionally.

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<sup>4</sup> '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).

<sup>5</sup> 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 an adequate quantity of material is being recovered through this recycling path.

## 4.2 Sortability and separability

For the determination of recyclability, **sortability by means of sensor-based sorting** must be taken into account for the following materials: glass, plastics (excluding films group), liquid packaging board, and PPC. Empirical testing is only required if one of the exclusion criteria listed in **Appendix 2 ('Packaging characteristics requiring the testing of identifiability in sensor-based sorting by measurement')** applies.<sup>6</sup>

When determining the recyclability of **plastic packaging**, it must be ensured that the **density** of the shredded material (usually <1 cm<sup>2</sup>) allows for it to be assigned to the correct flow of recyclables. For example, packaging or packaging components made of polyolefins, which have a density of more than 0.995 g/cm<sup>3</sup> as a result of additives, fillers or multi-layering, must be regarded as non-recyclable.

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 conducted according to the relevant testing methodology.

## 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 incompatibilities. For any deviating determination in the sense that incompatible substances do not negatively affect recyclability, individual evidence must be provided.

## 4.4 Available recyclable content and determining recyclability

The content available for recycling (based on the packaging as a whole, see 6.10 below) determines the recyclability according to this minimum standard.

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.<sup>7</sup> This does not apply to metallised packaging, or pots with aluminium lids. Liquid packaging board with a metal share is also excluded; here, recyclability shall be limited to the fibrous material content.

For **fibre-based packaging** that does not contain any metal the determination of recyclability must be limited to the fibrous material content; their recyclability must be determined according to their fibrous material content.<sup>8</sup>

Recyclability must then be ranked on a metric or ordinal scale (the latter with more than three scale degrees).<sup>9</sup> The scale value and, if not self-explanatory, the scale units are required for the documentation of the determination result by the systems.

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<sup>6</sup> 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.

<sup>7</sup> Otherwise, an individual statement including supportive evidence must be provided.

<sup>8</sup> Otherwise, an individual statement including supportive evidence must be provided.

<sup>9</sup> Once the system reports submitted in 2020 have been evaluated, a decision will be made on further requirements for the representation of recyclability in the minimum standard (2020).

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

## **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 Combination packaging**

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

### **6.3 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).

### **6.4 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.

### **6.5 Metric scaling**

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

### **6.6 Ordinal scaling**

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

## **6.7 Recyclates<sup>10</sup>**

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

## **6.8 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.).

## **6.9 Foreign materials**

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

## **6.10 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).

## **6.11 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: tinfoil packaging, aluminium packaging, PE bottles, liquid packaging board, PET bottles, each including ancillary components such as labels and closures.

## **6.12 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.

## **6.13 Composites and differentiation from single-component materials**

Composite packaging is packaging made from various material types that cannot be separated by hand; no single material type exceeds 95 mass% (section 3 (5) VerpackG).

As a consequence, single-component materials are materials that account for more than 95% of packaging mass (e.g. hence, metallised plastic films are to be classified as plastics).

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<sup>10</sup> This definition of recyclates is applicable only to the minimum standard in relation to section 21 (1) no. 1 VerpackG.

## 6.14 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).

## 7. Abbreviations

In this document, the following relevant abbreviations are used:

Al	Aluminium
BT	<i>Bundestag</i> (German parliament)
EPS	Expanded polystyrene
EVOH	Ethylene vinyl alcohol copolymer
o.k.FKN	Liquid packaging board
HDPE	High-density polyethylene
KrWG	<i>Kreislaufwirtschaftsgesetz</i> (German Circular Economy Act)
KS	Plastic
LDPE	Low-density polyethylene
Lightweight packaging	Lightweight packaging
MHD	Minimum shelf life
MPO	Mixed polyolefin
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
PVDC	Polyvinylidene chloride
VerpackG	<i>Verpackungsgesetz</i> (Packaging Act)

## II. Appendices

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## Appendix 1: material types, material groups and recycling paths<sup>11</sup>

The following steps are required to verify whether there is a sorting and 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** (result, for example: PP (PO) share).  
**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).

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<sup>11</sup> The Appendix is based on the following product specifications:

- Duales System Deutschland GmbH, DSD: Downloads – specifications, as per 2014. Available online at <https://www.gruener-punkt.de/en/downloads>;
- Duales System Deutschland GmbH, DSD: Downloads – specifications, as per 2017. 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.

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).
- If the corresponding group number is listed in **column 3C**, the sorting and recycling infrastructure for this packaging only marginally or in individual cases meets the criterion specified under 4.1 (subject to the remaining minimum criteria being met; e.g. EPS). In such cases, **individual evidence** supporting a high-quality, mechanical recycling is strictly necessary<sup>12</sup>. 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).

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<sup>12</sup> See footnote 5.

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			Good material description <sup>13</sup>	Packaging that does 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"> <li>- Bottles ≤ 5l in volume</li> <li>- Cups, pots</li> <li>- Trays, blisters</li> <li>- Tubes</li> <li>- Tins</li> <li>- Buckets ≤ 5l in volume</li> <li>- Canisters ≤ 5l in volume</li> <li>- etc.</li> </ul>	PE	<b>329</b> (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
	PP	<b>324</b> (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
	PS			<b>331</b> (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

<sup>13</sup> For many groups, the product specification for good material (see footnote 13) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

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			Good material description <sup>14</sup>	Packaging that does 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"> <li>- Buckets &gt; 5l in volume</li> <li>- Canisters &gt; 5l in volume</li> </ul>	PE, PP	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

<sup>14</sup> For many groups, the product specification for good material (cf. footnote 11) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

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
PET bottles, transparent	PET-A	<b>325</b> (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 - Other thermoforms	PET-A monolayer			<b>328-5<sup>15</sup></b> (328-1) (328-2) (328-3)	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

<sup>15</sup> For the 328-5, 328-1, 328-2 and 328-3 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			Good material description <sup>16</sup>	Packaging that does 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 wrap - Bubble wrap - etc.	PE	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.	Aluminised plastics	LDPE (PO) share
	PP		(310)				PO share

<sup>16</sup> For many groups, the product specification for good material (cf. footnote 11) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

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			Good material description <sup>17</sup>	Packaging that does 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 - Foams - etc.	PE		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
	PP		323-2 (323)	(324-1) <sup>18</sup>	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

<sup>17</sup> For many groups, the product specification for good material (see appendix introduction) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

<sup>18</sup> 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			Good material description <sup>19</sup>	Packaging that does 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.	PS			340 <sup>20</sup>	System-compatible components made from white and granular expanded polystyrene, including ancillary components such as labels, etc.		PS

<sup>19</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

<sup>20</sup> 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			Good material description <sup>21</sup>	Packaging that does 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	510			System-compatible retail packaging made from cardboard composite materials, consisting of cardboard/PE or cardboard/aluminium/PE, for liquid and paste product filling, including ancillary components such as closures, etc.	Other articles made from paper, paperboard, cardboard	Share of fibrous material

<sup>21</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

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			Good material description <sup>22</sup>	Packaging that does 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 (no metal share) such as <ul style="list-style-type: none"> <li>- Laminated folding boxes</li> <li>- Composite cans</li> <li>- Coated paper</li> <li>- Paper cups coated on both sides</li> </ul>	Paper, paperboard, cardboard		550		System-compatible PPC articles as well as PPC-based composites, including ancillary components.	Liquid packaging board, waxed, paraffin, bitumen and oil paper	Share of fibrous material

<sup>22</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

- Cardboard tubes etc.							
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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			Good material description <sup>23</sup>	Packaging that does not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
PPC packaging - Corrugated board - Folding boxes - Paper bags and pouches - etc.	Paper, paperboard, cardboard	5.01.00			System-compatible PPC articles as well as PPC-based composites, including ancillary components.	Liquid packaging board, waxed, paraffin, bitumen and oil paper	Share of fibrous material

<sup>23</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

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			Good material description <sup>24</sup>	Packaging that does 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 <ul style="list-style-type: none"> <li>- Tins of preserves</li> <li>- Aerosol cans</li> <li>- Lacquer and paint cans</li> <li>- Tin buckets</li> <li>- Composite cans with a tinplate bottom</li> <li>- etc.</li> </ul>	Steel	410/412			System-compatible articles made from tinplate, such as beverage or food cans and buckets, including ancillary components such as labels, etc.		Steel share and aluminium share

<sup>24</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely 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			Good material description <sup>25</sup>	Packaging that does 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 <ul style="list-style-type: none"> <li>- Tins of preserves</li> <li>- Aerosol cans</li> <li>- Aluminium trays</li> <li>- Aluminium tubes</li> <li>- etc.</li> </ul>	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.		Aluminium share and steel share

<sup>25</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely 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							
Subgroups: composite packaging containing aluminium foil							
1	2	3			4	5	6
Packaging types	Main component material	Recycling infrastructure existence per group number			Good material description <sup>26</sup>	Packaging that does 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

<sup>26</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely 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			Good material description <sup>27</sup>	Packaging that does not meet the specification	Recyclable material
		3A	3B	3C			
		Given	To a limited extent	In individual cases / to a marginal extent			
Container glass and glass packaging - Food jars - Jam jars - Bottles - Cosmetic jars - Flacons - etc.		T 120			Container glass from households, commerce and manufacturing, such as bottles, glasses, pharmaceutical and cosmetic glass (soda-lime glass).	Lead glass, untreated safety glass, glass-ceramic, illuminants, TV glass, quartz glass, borosilicate glass and any other lead-containing glass	Glass share; steel and aluminium share from lids and closures

<sup>27</sup> For many groups, the product specification for good material (see footnote 11) includes the addition that packaging must be 'used, completely emptied'. Within the meaning of this minimum standard, this passage would be ambiguous; it was thus not added to this appendix.

## **Appendix 2: packaging characteristics requiring the testing of identifiability in sensor-based sorting by measurement**

### Plastic packaging

- Large labels (taking up > 50% of the surface) made from foreign material
- Full sleeve label
- Multi-layer structure (excluding PE/PP EVOH)
- Metallisation (excluding on the inside/in the middle layer)
- Dark colours using soot-carbon-based pigments (also when used for internal layers)
- Different types of plastic used on front and back sides
- Metal pigments applied on a large scale (taking up > 50% of the surface) (lacquering, coating or embossing)

### PPC packaging as well as PPC-based composites

- Lacquered surface (excluding clear protective lacquer up to a thickness of  $\leq 5$  micrometer)
- Plastic coating
- Dyed black, using soot-carbon-based pigments

### Liquid packaging board

- Design different from standard structure (no wet-strength cardboard, PE  $\pm$  aluminium)

### Glass

- Lack of transparency/translucency

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

Group/sort	Incompatibilities
Film and LDPE	Water-insoluble adhesive applications in combination with wet-strength paper-based labels; PA barriers, PVDC barriers, non-polymer barriers (excluding SiOx/AlOx/metallisations), non-EVOH barriers.
Rigid PE	Silicone components; components of foamed non-thermoplastic elastomers; water-insoluble adhesive applications in combination with wet-strength paper-based labels; PET sleeves with a density of < 1g/cm <sup>3</sup> PA barriers, PE-X components, PVDC barriers non-PO plastics with a density of < 1 g/cm <sup>3</sup> .
Rigid PP	Silicone components; components of foamed non-thermoplastic elastomers; water-insoluble adhesive applications in combination with wet-strength paper-based labels; PET sleeves with a density of < 1g/cm <sup>3</sup> PA barriers; PVDC barriers; non-PO plastics with a density of < 1 g/cm <sup>3</sup> .
Rigid PS	Foreign plastics or multi-layers with a density of 1.0-1.08 g/cm <sup>3</sup> ; water-insoluble adhesive applications in combination with wet-strength paper-based labels.
Transparent PET bottles and other transparent, rigid PET packaging	PET-G components; POM components; PVC components; EVOH barriers; silicone components, PA monolayer barriers for transparent PET bottles, colourless and 'light blue'; PVC labels/sleeves, PS labels/sleeves, PET-G labels/sleeves; other blended barriers; PA additives for transparent PET bottles, colourless and 'light blue'; insoluble adhesive applications (in water or alkaline at 80° C); non-magnetic metals; elastomer components with a density of > 1 g/cm <sup>3</sup> ; direct print (excluding production codes and 'best before' dates).
PO	Silicone components; foamed non-thermoplastic elastomers with a density of < 1 g/cm <sup>3</sup> ; foamed non-polyolefin components.
PPC PPC composites Liquid packaging board	Water-insoluble or redispersing adhesive applications where it has not been specifically proven that they can be removed. A testing method suitable for adhesive applications is PTS-RH 021/97, or INGEDE Method 12 adjusted for packaging. <sup>28</sup> The exceptions granted for hotmelt adhesives in the ERPC Scorecard <sup>29</sup> apply (softening temperature of the adhesive (according to R&B): ≥ 68°C, layer thickness (non-reactive adhesives): ≥ 120 µm, layer thickness (reactive adhesives): ≥ 60 µm, horizontal dimension of the application (in either direction): ≥ 1.6 mm). <sup>30</sup>
Glass	Lead and barium from crystal glass packaging; swing tops with non-ferromagnetic metal shares only.

<sup>28</sup> As INGEDE Method 12 was designed for deinking products (graphic paper), the defibration parameters must be adjusted to packaging paper for recycling: defibration in the case of low consistency, with no chemicals added (e.g. DIN EN ISO 5263). If a method is developed that includes a determination model for packaging paper, a corresponding adjustment of the minimum standard will be decided upon in the following year.

<sup>29</sup> [www.paperforrecycling.eu/download/882](http://www.paperforrecycling.eu/download/882).

<sup>30</sup> These exceptions were defined based on INGEDE Method 12, not adjusted to packaging. They must be reviewed before the minimum standard is revised in 2021, using a methodology adjusted to packaging paper for recycling. Failing this, the exception shall be void.

## 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.

