
TEST REPORT

for Certificate
No. 2215-2019-001062

Verification and examination of recyclability
on basis of the requirements and assessment catalogue
of the Institute cyclos-HTP for EU-wide certification



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Appendix: Certificate No. 2215-2019-001062



Chapter 1: Preliminary remark for verification and examination

1.1 Recyclability

Important underlying principles for declaration of a product, e.g. packaging, as "recyclable" or "100% recyclable" are defined in DIN EN ISO 14021 "Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)" and DIN EN 13430 "Packaging - Requirements for packaging recoverable by material recycling". For substantial verification and examination following the requirements and assessment catalogue of the institute cyclos-HTP further more specific requirements are laid down and the recyclability is defined as follows:

Recyclability is the individual gradual suitability of a packaging or a product to substitute factual identical material in the post-use phase; "factual" means that collection and processing structures in industrial scale are required.

Recyclability is instrumentalized by § 21 ("ecological design of participation fees") in the German Packaging Law for the first time. Corresponding provisions within the scope of the European legislation can be expected.

For the translation of recyclability in monetary added value, bonification etc., it should be noted, that this proportional relation is quantified by a material- and path-dependent constant. In addition to the indicator "recyclability", the suitable recycling path is also named on the certificates resp. examination documents of the institute cyclos-HTP. With these two indicators, it can be assured, that the test result is a reliable assessment basis in the sense of § 21 packaging law.

1.2 Scope of application

The requirements and assessment catalogue pursues the claim of a pan-European scope of application. It should be noted, that actually existing (and supplied) collection and processing structures are the basis for the certification of recyclability by the institute cyclos-HTP which requires nation-state differentiation. Collection and processing structures in European countries are developed continuously to, inter alia, fulfil the targets of the EU Packaging Directive. In this regard, the institute cyclos-HTP is constantly working on keeping the catalogue up-to-date with no warranty having always the latest developments cited. As a consequence, those countries for which appropriate requirements are clearly given are explicitly named in the requirements and assessment catalogue. This does not mean that outside the scope no recyclability exists, but rather that the recyclability is not tested yet for not mentioned countries. For countries which are not explicitly named in the requirements and assessment catalogue, available recycling paths still need to be identified.

1.3 Test report and certificate

The test result of the assessment of recyclability of packaging is designated on the certificate with a total duration of validity of 1 year upon issue. The further examination document attached contains additionally:

- the path specific assessment criteria with determined or calculated factors and the overall result in tabular form (see chap. 3.3 Summary of results),
- the calculation basis according to manufacturer's specifications resp. basic data form and the calculated recyclable contents with categorised contaminant proportions (further calculations of single factors or recyclability of multi-piece packaging where necessary),
- the comments on the summary of results with path allocation, information on scope of application and explanations of relevant test criteria.

For packaging material or preliminary packaging formats (e.g. unprinted packaging or cuts) as well as for packaging with a test result of 0%, no certificate but an test report is issued. The certificate and the test report show the numerical test result as well as the allocation (type/specification) and the examined material recycling path.

1.4 Test item

Test item for the assessment of recyclability is generally the entire packaging including all associated components such as labels and lid films. The assessment of individual components of a packaging is only allowed if the single packaging components are separable by the treatment steps, established in the recycling process. The potential possibility of a manual separation by the end consumer does not fulfil these requirements. (Please compare: "Orientation guide for the assessment of recyclability for packaging bound to licencing", in the version dated 30.08.2019, 'minimum standard'.)

In the present case, the object of testing is the functional packaging unit (PU) "**APRIC - foil bag**" as part of a single examination. The foil bag is white coloured and printed with an exemplary design.

The present certificate is also valid for printed and coloured film structures as long as no soot-based printing inks or printing inks with metallic or metal effect pigments are used.

Chapter 2: Presentation of test sample

2.1 Description and composition

Information about material composition was provided by the producer and is shown below. For the printing ink a standard approach is made.

The present objects of testing have the size: ~10,0 cm x 9,5 cm and 9,0 cm x 7,0 cm

	Single components	Thickness	Density	Surface weight	Percentage total
Packaging: APRIC - foil bag	PP REB 20	20,0 µm	0,91 g/cm ³	18,20 g/m ²	27,9%
	glue + resin MORCHEM	1,8 µm	1,00 g/cm ³	1,80 g/m ²	2,8%
	PP REB CM	18,0 µm	0,91 g/cm ³	16,38 g/m ²	25,1%
	glue + resin MORCHEM	2,0 µm	1,00 g/cm ³	2,00 g/m ²	3,1%
	PP CAST	27,0 µm	0,90 g/cm ³	24,30 g/m ²	37,3%
	printing ink *	-	-	2,50 g/m ² *	3,8%
	Sum	-	-	65,2 g/m ²	100,0%

* standard approach

2.2 Image



2.3 Specification

Specifications define recycling specific material properties such as purity or positive listed packaging groups. If a packaging can be assigned to an existing specification, established sorting and recycling structures can be assumed. Frequently, packaging can also be assigned to several specifications. These are then named in the order of high quality of potential recovery.

The present packaging can be assigned to the following specifications:

Mixed Polyolefins, Fraction No. 323 (DE)

Mixed Plastics, Fraction No. 350 - 352 (DE)



Chapter 3: Test results / overview

3.1 Path allocation (C 0)

Under path allocation, we indicate which recycling path for the packaging is to be taken into consideration. At this point in time, we distinguish between 13 different paths. The path allocation is analogous to the designation of specifications mentioned above. Individual criteria for assessing recyclability are based on the reference process listed for each path in the requirements and assessment catalogue.

For the present packaging, the recyclability is determined via the following recycling path:

Path 7: Mixed plastics (flexible)

3.2 Collection and recycling structures

Collection and recycling structures are established according to the path assignment for the following states:

Austria, Germany



Chapter 3: Test results / overview

3.3 Summary of results

Packaging: APRIC - foil bag

Specification: Mixed Polyolefins, Fraction No. 323 (DE)
Mixed Plastics, Fraction No. 350-352 (DE)

Criteria		Analysis	Comments	Value	
C 0	Path allocation	-	Path 7: Mixed plastics (flexible)	1,0000	
C 1	Valuable material content	Evaluation of material properties	Σ PP	0,9033	
			CAT 1		
			CAT 2	glue and resin, printing ink	0,0967
			CAT 3		
C 2	Identifiability with NIR; optical detection	NIR-detection-measurement	identification as PP	1,0000	
C 2'	Discharge behaviour	NIR reference test	good discharge behaviour	1,0000	
C 3	Effective electrical conduction	Eddy current separator - reference test	no metal components	1,0000	
C 4	Ferro-magnetism	Magnetic separator - reference test	not relevant	n.a.	
C 5	Material density after disintegration	Float-sink analysis	material density < 1 g/cm ³	1,0000	
C 6	Disintegration rate/degree of disintegration in water	Further laboratory testings	not relevant	n.a.	
C 7	Melting behaviour	Evaluation of material properties	no separable components in the melt	1,0000	
C 8	Inseparable contaminants	Evaluation of material properties	no inseparable contaminants	1,0000	
C 9	other criteria	Evaluation of material properties	does not apply	n.a.	

Result: **0,9033**



Chapter 4: Comments on relevant test criteria

4.1 Criterion 1: Valuable material content

The "valuable material content" specifies the potentially recyclable mass proportion of the total mass of the product. C1 thus stands for the potentially recoverable recyclable proportion of material in the narrower sense of the word.

Specific explanation for path 7: The recovery process of mixed Polyolefins (MPO) targets primary on PP and HDPE. A certain percentage of LDPE is used for the production of blends in suitable qualities (injection moulding). For the assessment in path 7, a factor of 75% of the LDPE-content is determined as recyclable material.

Comments / Results:

In the allocated path PP is considered for material recycling. Glue, resin and printing ink are deducted as non-separable component.

4.2 Criterion 1: Categories of contaminants

With regard to the quality of contaminants, three categories are to be distinguished:

- CAT 1:** Materials, quantitatively separable by the treatment steps of the recycling process.
- CAT 2:** Materials, not separable by the treatment steps of the recycling process, having no or negligible impact on the recyclate properties up to a defined relevant concentration.
- CAT 3:** Materials, not separable by the treatment steps of the recycling process, degrading the quality of the recyclate to uselessness or otherwise lead to disproportionately high process costs.

Comments / Results:

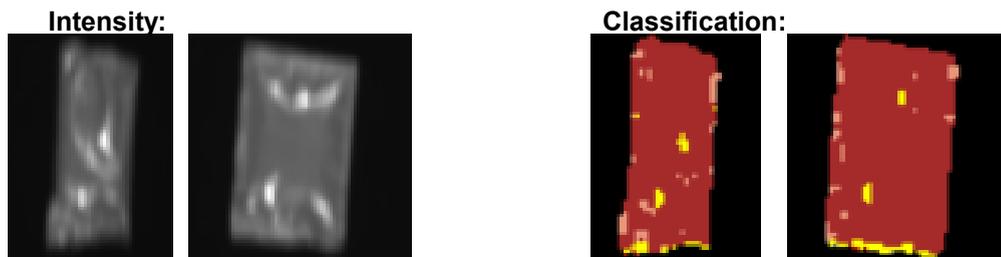
Percentage CAT 1: -	0,0%
Percentage CAT 2: glue and resin, printing ink	9,7%
Percentage CAT 3: -	0,0%

4.3 Criterion 2: Identifiability in NIR reflection measurement / optical detectability

Materials that are separated by default using NIR spectrometric reflection measurements are tested for compliance with the requirements of unambiguous detection with regard to the target fraction.

Comments / Results:

The packaging was tested on both sides with a classifier usually used for lightweight packaging (database with stored spectra) and clearly identified as PP. The following illustrations show the intensity and classification image of the test sample and provide information about the pixel identification.



Legend:

Material:

PET bottle	PET blister	PP 3D	PP 2D	PE 3D
PE 2D	PS	Paper/ Cardboard	Liquid packaging board	EPS
PVC	Wood	Textile	PC	PUR
Unknown	Elastomer	POM/ PMMA/ PLA	PA	ABS



4.4 Criterion 2': Discharge behaviour

The sensor-based sorting methods show, compared to other separation techniques, the specialty that the separation of items from the material stream is a separate stand-alone part of the process in particular independent of the detection of physical properties such as mass and shape.

Comments / Results:

The packaging shows a good discharge behaviour with the settings for PP.

4.5 Criterion 3: Effective electrical conductivity

This criterion for materials to be recycled via the fraction non-ferrous metals/aluminium takes into account whether sufficient requirements for separation using the standard eddy current separation process are met. Metallic components in packaging units are generally a decisive feature due to the fact that the eddy current separation step is upstream to the, inter alia, plastic and paper separation step.

Comments / Results:

There are no metal components.

4.6 Criterion 4: Ferromagnetism

Ferromagnetic product properties are usually dominant for recyclability. If the product has ferromagnetic components, it has to be checked first whether these are sufficient to define the recycling path.

Comments / Results:

In path 7, this criterion is not relevant.

4.7 Criterion 5: Material density after disintegration

The density criterion takes into account the fact that float-sink sorting is the central process step to produce high-quality recyclates within plastics reprocessing. For positive recycling, it is required that the plastic packaging are not filled, foamed, or e.g. connected as a multilayer in such a way that it occurs completely or partially in atypical target classes.

Comments / Results:

According to the float-sink analysis the film shows a density of $< 1 \text{ g/cm}^3$, i.e. in the recycling process of polyolefins this film bag is discharged as floating material after cutting and thus remains in the product stream.

4.8 Criterion 6: Dissolution rate/degree in water

If products are to be recycled using one of the existing recycling paths for waste paper, fibres need to be dissolved under the technical operation parameters of the paper recovery process.

Comments / Results:

In path 7, this criterion is not relevant.

4.9 Criterion 7: Melting behaviour

The extrusion as a final process stage relates to the solid / liquid separation, as implied e.g. in melt filtration for regranulation of plastics and is basically assessed as physical separation processes without phase change.

Comments / Results:

There are no separable components in the melt.

4.10 Criterion 8: Inseparable contaminants / material-conditional cross contamination

If the product to be assessed contains contaminants of CAT 3, economic production of marketable recyclate can no longer be assumed and the product is classified as non-recyclable (factor 0).

Comments / Results:

There are no inseparable contaminants.



4.11 Criterion 9: Other criteria

In addition to the dependencies described under C 0 to C 8, other packaging properties - such as the format - may have process relevance under these criteria in individual cases.

Comments / Results:

This criterion does not apply.