

EVALUATION SYSTEM 501:2019

Assessment of the level of recyclability
of materials and products predominantly
cellulosic on the basis of the UNI 11743:
2019 standard



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SUMMARY

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Introduction

The Aticelca evaluation system was initially developed following the need to provide for a better technical definition of what is reported in the UNI EN 13430 standard and annexes (CR 13688), and their related updates, regarding the recyclability in the paper industry of paper and cardboard packaging. However, the system is applicable to all materials and products with a prevalence of cellulose, even non-packaging, which can be sent for recycling. In addition, the following system aims to encourage the eco-design, in terms of recyclability, of products mainly consisting of cellulosic fiber that are introduced into the separate collection, as well as new materials under study and additives used in the transformation phase that can affect the recyclability of the final product.

The Aticelca evaluation system was created by Aticelca with the contribution of Assocarta, Assografici and Comieco and the technical support of Innovhub and Lucense. The development of the criteria was carried out by means of a preliminary study, numerous laboratory tests and a public consultation in which the different actors in the supply chain (paper mills, processing companies and users of paper and cardboard products) participated. It was founded in 2011 as a test method, including both the laboratory methods with which to conduct the analysis on paper and cardboard materials and products and the procedure for evaluating the results and assigning the level of recyclability. Further reviews were conducted in 2013 and 2017. With the publication, in April 2019, of the UNI 11743:2019 standard, the laboratory method was abolished, maintaining the procedure for evaluating the results and assigning the level of recyclability, becoming an "evaluation system".

1. Purpose

The aim of this system is to determine the level of industrial recyclability from the results of laboratory-scale analyses of materials and products predominantly cellulosic and able to simulate some of the main phases of industrial paper processing processes. to be recycled in order to produce new paper and cardboard. In this context, the criteria adopted for the evaluation use the evidence that emerges from the conduct of the analyzes in accordance with the UNI 11743: 2019 standard. This standard analyzes both process parameters (pulp, coarse rejects, flakes, content of adhesive particles less than 2.0 mm) and quality of the product obtained with recycled fibers (sheet formation and optical inhomogeneities).

This evaluation system is applicable only to paper and paperboard, understood as predominantly cellulosic materials, and to products consisting predominantly of such materials and allows a classification on four levels of recyclability (level A+, A, B, C), in addition to the assessment of non-recyclability with paper. Additional specifications necessary for the processing of paper to be recycled by means of de-inking technology are not considered.

2. Regulatory references and methods

The evaluation system refers to the UNI 11743 standard. Paper and cardboard – Determination of parameters of recyclability of materials and products with a prevalence of cellulose. Other documents recommended but not essential for the application of this system are listed below.

UNI EN 13430:2005 Requisiti per imballaggi recuperabili per riciclo di materiali;

ISO 18604:2013 Packaging and the environment - Material recycling;

UNI EN 643:2014 Paper and cardboard - European list of unified qualities of paper and cardboard to be recycled.

For dated references, only the cited edition and their subsequent updates apply.

3. Terms and definitions

For the purposes of this evaluation system, the following terms and definitions shall apply:

paper and board to be recycled: paper and board based on natural fibres suitable for recycling and consisting of:

1. paper and cardboard of any shape;
2. products consisting predominantly of paper and cardboard, which may include other constituents that cannot be removed by dry separation such as coatings and laminates, spiral bindings, etc. [UNI EN 643]

use of paper and cardboard to be recycled (recycling process in the paper mill): set of processes applied in the recycling of paper and cardboard to be recycled by the paper industry. These processes mainly include the pulping of paper and cardboard to be recycled and the subsequent purification of the pulp obtained from the non-cellulosic components and use different types of plant depending on the nature of the paper and cardboard to be recycled and the desired final product. [UNI 11743]

predominantly cellulosic material: paper and cardboard which need further processing to become finished products (e.g. rolls and sheets of paper intended for printing or papermaking, sheets of corrugated cardboard intended for the production of packaging, rolls of tissue paper destinate to the production of handkerchiefs). Such material may contain other non-cellulosic constituents not more than 50% by weight. [UNI 11743]

mainly cellulosic product: finished object (such as, for example, packaging, printed, steel for domestic use) consisting of more than 50% by weight of materials with a prevalence of cellulosic. [UNI 11743]

recyclability: ability of the product to be processed in an effective and efficient way from a technological and economic point of view, in order to reuse the cellulosic fibers contained in it through the currently most widespread paper production technologies for the processing of paper to be recycled. [UNI 11743]

4. Principle of the evaluation system

The recyclability of the predominantly cellulosic material or product is determined by evaluating the most significant parameters that can prevent or reduce the efficiency of the recycling process. The reference for the execution of the laboratory analyzes necessary to determine the characteristics listed above is the UNI 11743: 2019 standard.

The evaluation criterion of this system uses the results obtained by means of the analyzes conducted in accordance with the UNI 11743: 2019 standard, comparing them with an evaluation table elaborated taking into account the needs of the current recycled paper production technologies widely present in Italy.

5. Determination of results

A sample of material or product is subjected to analysis in accordance with the UNI 11743: 2019 standard, which simulates the recycling process in plants of a more widespread type and used for the processing of paper to be recycled and goes to determine analytically the behavior of the material or product in these conditions. At the end of the test, a test report is drawn up.

The laboratory tests required by the UNI 11743:2019 standard are briefly described below:

1. **Sampling and sample preparation:** sampling is carried out by selecting a certain quantity of material while preserving its essential characteristics and proportions between the different components.
2. **Determination of dry matter content:** the sample is subjected to a test in the stove to eliminate the moisture present and determine the dry matter content to which subsequent measurements will refer.
3. **Crushing and dilution of the dough:** we then proceed with the crushing in a laboratory cleaning of the material to obtain a sample of dough for subsequent analysis. Pulping takes place under conditions and times that simulate the process that commonly occurs in low-density industrial pulpers. The dough sample is then diluted for subsequent tests.
4. **Measurement of coarse waste and preparation of the first accepted:** the coarse waste is determined through a process of mechanical separation of the different components in the ti in the diluted dough. The solid fraction that does not pass through the cracks represents coarse waste. The dough that instead passes through the perforated plates represents the first accepted on which the subsequent tests are conducted.
5. **Flake measurement: the flakes are determined with a mechanical separation of the different** components of the first accepted using plates with slits of lower width than those used for coarse waste. The solid fraction that is retained by the plate represents the flakes.
6. **Measurement of adhesive particles (macrostickies):** The adhesive particles (macrostickies) are determined by a mechanical separation of the different components of the first accepted using even thinner cracks, the subsequent preparation of specimens and the use of a system image analysis capable of distinguishing adhesive particles with an equivalent diameter between 0.1 and 2.0 mm. The overall surface covered by adhesive particles is then measured.
7. **Preparation of the second accepted dough and formation of laboratory** leaflets: the

accepted meal of the measurement of adhesive particles is homogenized, the consistency in fibers and test leaflets are formed.

8. **Adhesion** test: the adhesion test is conducted by verifying that the paper sheet does not adhere to the support and cover sheets after the set has been pressed between two metal plates and placed at high temperature. Adhesiveness is considered absent if the sheet can be separated in its entirety from the support and cover, without presenting damage and breakage. Traces of fibers on the support and / or on the cover are allowed. Fragments of paper on the support and/or cover are not allowed.
9. **Evaluation of optical inhomogeneities:** optical inhomogeneity is evaluated by observing the paper sheet on both sides and assigning a judgment by comparison with the references reported in the UNI 11743: 2019 standard. The result is reported on a scale from 1 to 3 in which level 1 represents a weak or absent optical inhomogeneity (on a white or Havana basis), level 2 a medium inhomogeneity and level 3 a high one. Intensely homogeneously colored sheets re-enter Level 2 even if they have weak or no optical inhomogeneity.

6. Evaluation of results

The material or product is classified as recyclable or non-recyclable according to the parameters set out in Table 1. There are four levels of recyclability (level A +, A, B, C), in addition to the assessment of non-recyclability with paper, depending on the evidence reported by the test report obtained in accordance with the UNI 11743: 2019 standard.

Table 1. Evaluation criteria for the recyclability of a material/product with a prevalence of cellulose.

Recyclability assessment system* Aticelca 501:2019	Recyclable with paper				Non-recyclable with paper
	Level A+	Level A	Level B	Level C	Non-recyclable with paper
Coarse reject (%)**	< 1.5	1.5 - 10.0	10.1 - 20.0	20.1 - 40.0	> 40.0
Area of adhesive particles $\varnothing < 2000 \mu\text{m}$. (mm²/kg)	< 2.500	2.500 - 10.000	10.001 - 20.000	20.001 - 50.000	> 50.000
Flakes (%)***	< 5.0	5.0 - 15.0	15.1 - 40.0	> 40.0	-
Adhesiveness	absent	absent	absent	absent	present
Optical inhomogeneity	level 1	level 2	level 3	level 3	-

The parameter with the worst value characterizes the class to which the sample belongs.

NOTE:

* recyclability means the ability of the product to be processed in an effective and efficient way from a technological and economic point of view, in order to reuse the cellulosic fibers contained in it through the currently most widespread paper production technologies for processing of paper to be recycled [UNI 11743]. In case the sample is classified as "Not

recyclable with paper", this material or product is not suitable for separate collection with paper. It remains unless it can be used in other industrial processes or started to energy recovery.

** in the case of papers that have a resistance to crushing and that are not coupled with plastic, aluminum or other non-paper materials, if the coarse waste after conducting the test for 10 minutes is more than 40%, it is admitted to take into account the result obtained by conducting the test for 20 minutes. If in the 20-minute test the result of the coarse deviation is less than 40%, it shall be permissible, for the purposes of applying the evaluation criteria and for the Parametro "coarse waste", use Level C.

in the case of prevalence of flakes in clearly identifiable non-cellulosic material, the result of the flake parameter is not evaluated, but the value is added to the coarse difference (calculated on the weight of the starting product).

7. Evaluation report

Il resoconto di valutazione deve contenere le seguenti informazioni:

- a) Reference to this rating system and the site aticelca.it where it is publicly available for download;
- b) Description of the material or product with a prevalence of cellulose, specifying the following:
 - if there is visible presence of adhesives, sealing, printing, metallizations, coupled materials, accessory components or other specific characteristics useful for the identification of the sample tested in accordance with UNI 11743:2019;
 - in the case of a product, indicate whether before the test in accordance with the UNI 11743: 2019 standard it has been subjected to the use for which it was designed;
- c) General assessment of the recyclability (level A+, A, B, C) or non-recyclability of the product;
- d) Date and place of the test;

A copy of the test report in accordance with UNI 11743:2019 must be attached to the evaluation report.

Particular test conditions, variants of the UNI 11743: 2019 method and everything not explicitly contemplated by the UNI 11743: 2019 standard and reported in the test report must also be reported on the evaluation report.

The content of the test report in accordance with the UNI 11743: 2019 standard and of the assessment report in accordance with this Aticelca 501: 2019 system can be combined, by the qualified laboratory, in a single test and evaluation report.

8. Use of the results and voluntary declaration of recyclability by the client

This evaluation system allows to certify the level of recyclability from a technical point of view and does not include compliance with any legal requirements in force in the country of use of the product.

The result refers to the sample as received by the laboratory and analyzed in accordance with the UNI 11743: 2019 standard, and described in the test report. Recyclability is therefore excluded from the evaluation as a result of subsequent processing or as a result of uses of the material or product other than that to which the sample itself was subjected before the analysis.

On the basis of the outcome of the test, the client may:

- a) Use the results in order to guide the development of the material or product in a perspective of Eco-design and Circular Economy;
- b) Use the results as one of the useful elements in order to prove compliance with the UNI EN 13430 standard and its annexes (CR 13688);
- c) Use the results in order to draw up your own voluntary self-declaration, with icons and words of your own, designed to communicate the recyclability of the material or product;
- d) Use the results in order to draw up your own voluntary self-declaration, using the icon and / or the word Aticelca in Annex 4, suitable to communicate the level of recyclability of the material or product.

9. Use of the wording and the mark certifying recyclability according to the Aticelca evaluation system

The use for commercial purposes of the wording and/or trademark RECYCLABLE WITH PAPER – Aticelca® 501 associated with a material or product is linked to the outcome of the test, carried out in full compliance with the UNI 11743: 2019 standard and according to good laboratory practices and is allowed only to natural and legal persons to whom Aticelca has expressly granted its use. The name Aticelca® is a registered trademark and the trademarks RECYCLABLE WITH PAPER – Aticelca® 501 are registered. The use of the name Aticelca®, the wording and trademarks below is subject to compliance with the "Regulations for the use of the wording and the icon to certify the level of recyclability according to the Aticelca 501/19 evaluation system" published on the aticelca.it website. Aticelca is not responsible for the improper use of the name Aticelca®, wording and / or trademarks by unauthorized third parties.

Simplified wording:

Recyclable with paper. Level A+ (Aticelca® 501);
Recyclable with paper. Level A (Aticelca® 501);
Recyclable with paper. Level B (Aticelca® 501);

Recyclable with paper. Level C (Aticelca® 501);

Not recyclable with paper (Aticelca® 501).

Extended wording:

Level A+ (Aticelca® 501): recyclable with paper in an effective and efficient way from a technological and economic point of view when used, through the currently most widespread paper production technologies, in mixture with other secondary fibers obtained from the separate collection of paper. Its recycling results in a waste of less than 1,5 %;

Level A (Aticelca® 501): recyclable with paper in an effective and efficient way from a technological and economic point of view when used, through the currently most widespread paper production technologies, in mixture with other secondary fibers obtained from the separate collection of paper. Its recycling results in a waste of less than 10 %;

Level B (Aticelca® 501): recyclable with paper in an effective and efficient way from a technological and economic point of view when used, through the currently most widespread paper production technologies, in mixture with other secondary fibers obtained from the separate collection of paper. Its recycling results in a waste of less than 20 %;

Level C (Aticelca® 501): recyclable with paper when used, through the currently most widespread paper production technologies, in mixture with other secondary fibers obtained from the separate collection of paper. Its recycling involves a waste of up to 40 % and/or a significant contribution of adhesive particles or agglomerates of cellulose fibres;

Non-recyclable (Aticelca® 501): non-recyclable with paper in an effective and efficient way from a technological and economic point of view when used, through the currently most widespread paper production technologies, in mixture with other secondary fibers obtained from the separate collection of paper.

BRAND (black and white)*

The trademark is not modifiable, its parts cannot be separated and, in case of reduction or in-grandimento, it must be maintained unaltered aspect ratio.



*Below are the color codes used in the brands in the CMYK and RGB standards.

	CMYK	RGB
White	0, 0, 0, 0	255, 255, 255
Black	0, 0, 0, 100	26, 23, 27

BRAND (colour)*

The trademark is not modifiable, its parts cannot be separated and, in case of reduction or in-
grandimento, it must be maintained unaltered aspect ratio.



Below are the color codes used in the brands in the CMYK and RGB standards.

	CMYK	RGB
Green	70, 0, 99, 0	87, 171, 39
Grey	12, 9, 8, 0	229, 229, 230
White	0, 0, 0, 0	255, 255, 255
Black	0, 0, 0, 100	26, 23, 27



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