

## REQUIREMENTS FOR PRINTING INKS USED IN COMPOSTABLE PACKAGING

Recyclable, compostable, reusable? What will the packaging of the future be like? There are countless articles on the subject on internet and specialized magazines. It is worth taking a look at these terms and seeing that they are not as “new”, even if they are hot news.

A recyclable object is one that once used and discarded, can be taken advantage of as raw material for the manufacture of new objects that may have the same or different application as the starting object. The recycling of glass bottles and corrugated cardboard are clear and well-known examples.

Reusable is that object that can be used an indeterminate number of times, within a single supply chain or in several. A fond memory is that of siphon bottles (which are now sold in antique dealers at astronomical prices) that our grandparents carried to the grocery store that, in turn, it sent them to the siphon factory where they were stuffed and remarketed. Today, most observers will have noticed that a well-known brand of soft drinks is reusing the bottles within the supply chain to bars and restaurants.

But, what about compostable? The word compost has recently been incorporated into our vocabulary. The definition of the dictionary is:

*Of the Fr. Compost, and this of lat. Compositus 'compound'. 1. M. Humus artificially obtained by Biochemical decomposition in hot organic residues.*

Therefore, we deduce that compostable materials are those which can be transformed in compost or “manure” in industrial plants with the ultimate purpose of using it to fertilize the fields. Traditionally, organic manure was made with vegetable remains, animal excrement, straw and anything that would rot. Each family of farmers made their own compost home, which at that time was not so far called manure.

Well, we check that our grandparents did not know what the life cycle was, but they applied in their day by day concepts that we now want to recover. Without a doubt, our standard of living is much better than theirs, but the philosophy of reuse and revalorization made its relationship with the environment more sustainable than ours. Our current “throw away” lifestyle is not ecological and viable in the long term, and therefore the EU has been legislating for years. Directive (EU) 2018/852 of the European Parliament and of the Council states that:

*Fostering a sustainable bio-economy can contribute to decreasing the Union’s dependence on imported raw materials. Bio-based recyclable packaging and compostable biodegradable packaging could represent an opportunity to promote renewable sources for the production of packaging, where shown to be beneficial from a life-cycle perspective.*



That sentence specifically refers to a strategic vision, in the sense of reducing the dependence of the EU on the importation of raw materials. In parallel, without a doubt, one of the ways to avoid the accumulation of used packaging in landfills and in the natural environment is to design them to be used in the manufacture of “compost” and they have a final use in the enrichment of the soil to vegetable cultivation. This waste treatment process is now considered a recycling, as the once “composted” packaging ends up having a practical application in agriculture.



At this point, it is necessary to explain the requirements for packaging recoverable through composting. Various European directives and their corresponding Spanish transpositions, including the recent Royal Decree 293/2018, transposition of the Directive (UE) 2015/720, on reduction of the consumption of plastic bags, refers to the European standard EN 13432:2000 whose title is Packaging - Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging.

The standard EN 13432:2000 establishes that the materials that compose the packaging must be compostable (paper, textile, plastic, bioplastic...) and meet the following requirements:

- Be biodegradable
- Disintegrate during biological treatment
- The product obtained after biodegradation and disintegration, compost or organic fertilizer, must not produce any negative effects on the environment when it be used as a fertilizer.

The main components of the packaging are those shape, contain and protect the product. No less important are the constituents involved in small quantities, such as adhesives and inks. These are responsible for transmitting the necessary messages throughout the distribution chain to the final consumer.

Printing inks are mixtures of chemical substances such as resins or organic polymers, pigments, additives and diluents. These raw materials are mainly derived from petroleum which, by their chemical nature, are not biodegradable and therefore non compostable.

However, the European standard UNE-EN 13432:2000 allows compostable packaging to contain a small percentage of non-compostable products, provided that they do not produce a negative effect on the quality of the final compost. We must not lose sight of the fact that the compost will be used as fertilizer in agriculture and should not damage in any case the growth or the final properties of the cultivated vegetables, in many cases destined to the human consumption. For that reason, the requirements regarding the content of certain chemical elements are very strict, to avoid their accumulation in the vegetal substrates.



It is important that the printer is aware that the inks have the certification of “suitable for compostability” and they are not compostable by themselves, but they do have to meet special requirements that make them minimally harmless for preparation of compost or fertilizers. In order for an ink to be certifying body, it is necessary to analyze and test its maximum content in certain chemical elements, specifically in zinc, copper, nickel, cadmium, lead, mercury, chromium, molybdenum, selenium, arsenic and flour. If the ink to be certified complies with this first filter, there are some tests of ecotoxicity that consist of verifying that its addition to the compost will not impair the germination speed or the characteristics of the cultivated vegetables. These chemical and biological tests are long and costly, as well as certification and maintenance.

In addition to the need to use a certified ink by a recognized organism, the printer must bear in mind that the standard UNE-EN 13432:2000 limits the number of non-compostable constituents of the packaging to 5 and each of them to an amount not exceeding 1 % in dry weight of the total packaging weight. These restrictions condition the maximum surface of the packaging that can be printed so it is necessary to calculate it for each specific case: lower total weight of the packaging, less surface can be printed and vice versa. The limitation is maximum in the case of the blue and green colors due to its special chemical composition (copper). Therefore, the percentage of surface that can be printed must be calculated a priori during the design of the packaging, taking into account factors such as the weight of the support, the contribution of ink and the colors that are going to be used. As a result, the designer must make use of their creative skills in order to offer a compostable packaging, with all the necessary information but not superfluous and, at the same time, attractive to the consumer.

**The technology advances very quickly, but never loses sight of the design of a sustainable packaging that is essential to make a complete study of the life cycle of it. It has no sense to design a compostable packaging if its carbon footprint is very high or if the raw materials are not manufactured entering into competition with the first need products for human feeding. It is essential that each part of the packaging life cycle, from its design to its disposal, are involved in optimizing each phase from an ecological and economic point of view without forgetting its main functions: contain, protect and present.**



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