



June 2018

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## Statement:

# Biodegradability by Composting of Printing Ink Layers

## 1. General information on biodegradability of printed products

The question of biodegradability of printing ink layers is in practice only relevant in connection with the composting of printed products and, therefore, depends primarily on the characteristics of the substrate. Printing ink layers are very thin (1 to 5 µm max.) and generally cover the substrate only partially. A typical example, which illustrates the subordinate role of printing inks in terms of quantity, is newsprint:

A common newspaper with a grammage of about 50 mg/m<sup>2</sup>, on the basis of 1/3 of covered area, contains only 0.6% of printing ink.

Some components of printing inks (e.g. inorganic components) are not microbially degradable at all. Others (e.g. organic pigments) are generally poorly degradable. Besides these usually fine-grained inert components also readily biodegradable components (e.g. many resins and vegetable oils) are used in printing inks.

**It is important to note that printing inks do not obstruct the biodegradability of printed products, that is to say the composting of packaging materials.**

The quality of the resulting compost is in no way impaired by the presence of printing ink layers on the material intended for composting. In the German ordinance on biowaste (Bioabfallverordnung/BioAbfV of 21. September 1998, changed 5.12.2013), rules are given for the quality of composting and of compostable, mostly organic raw materials. Limit values for heavy metal contents are laid down in § 4. In this respect it is emphasized that no toxic heavy metal compounds – e.g. on the basis of lead, cadmium, mercury or chromium(VI) – are used in printing inks manufactured by our member companies. Blue and green pigments contain copper which can bring excessively high results in the analysis of samples entirely printed with blue or green inks. Therefore, we recommend to always take mixed samples from different parts of the materials intended for composting.

Whilst substrates printed with black or colored pigments neither influence the composting process nor the quality of compost, we advise against the composting of **large quantities** of products printed with metallic inks (gold and silver effects). But if only small quantities of copper and zinc are transported via printed products into the compost, they are negligible compared with natural copper and zinc contents of the soil.

Due to a German regulation on the use of bio based waste (*Verordnung über die Verwertung von Bioabfällen auf landwirtschaftlich, forstwirtschaftlich und gärtnerisch genutzten Böden*) it is allowed to add 0,5% of waste paper to organic waste for composting.

## 2. Requirements for packaging recoverable through composting and biodegradation (based on DIN EN 13432:2000-12)

Packaging can only be designated as compostable and biodegradable if packaging is certified according to the criteria of DIN EN 13432. Packaging printed with printing inks is eligible for certification if the following conditions are fulfilled:



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- i. Each individual printed packaging must comply with the specific threshold values for heavy metals and fluorine (arsenic, lead, cadmium, chromium, copper, molybdenum, nickel, mercury, selenium, zinc, fluorine). It is up to the printer to specify the printing inks used, in respect of certain maximum contents of these elements. These tolerances must be oriented to the highest intended percentage by weight of the printing ink layer in the packaging as a whole.
- ii. The printing inks used shall not bother the composting process mainly the biodegradability of the printed substrate.
- iii. The dry printing inks remaining in the compost shall not have negative effects on the growth of plants (testing for ecotoxicity).
- iv. Printing inks are classified as additives. It has to be distinguished between additives which are completely biodegradable or not biodegradable.

Normally printing inks are not fully biodegradable. In this case, the following rule applies:

**< 1% per additive and < 5% for the total of all additives**

Example: 50 mg/m<sup>2</sup> of biodegradable film, 1 g/m<sup>2</sup> ink layer thickness

- With all-over print, the ink share does not conform with DIN EN 13432, because the ink share is ca. 2%;
- with 49% percent print, the ink share conforms with DIN EN 13432, because the ink share is < 1%;
- with all-over four color print, the ink share conforms with DIN EN 13432, because the share of each ink individually is 0.5% and the total of the inks is 2%.

Printing inks which can be tested according to item i, ii and iii may wear a seal of compliance for additives according to DIN EN 13432.

Additives which are completely biodegradable may be used in shares up to 50% in the packaging. Printing inks normally do not reach the needs for total biodegradability.

- Biodegradable or natural binders, waxes, plasticizers and additives can be used, as a matter of principle.
- A small number of natural colorants can fulfill the criteria, but they are suitable only with limitations for printing inks, because they will hardly fulfill the demands inter alia to hue and light fastness.
- Due to high pigment contents in the dried printing ink layer, the required biodegradability rate of > 90% cannot be achieved.

A certification of printed packaging is basically possible if the requirements under I - iv are fulfilled. If printing inks are used which are certified as additive according to DIN EN 13432 it has to be checked whether the limits of 1% for each additive or 5% for the sum of all additives are adhered. Normally no further tests are necessary. If printing inks are used which are not tested, the whole printed packaging has to be examined according to DIN EN 13432.