

Subject: Compostability and Xeikon toners
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Concerning compostability and (bio-) degradability, there can be some confusion. Degradation means that the polymeric chain of a material will be cut under certain conditions, for example UV light. Bio-degradation means that the polymer chain of a material will be attacked by an organism, resulting in a cut of the polymer chain and a loss of stability and structure. Composting describes a biodegrading process subject to standardized requirements to be suitable for the use in aerobic composting and anaerobic treatment in an industrial waste treatment plant.

There are different standards globally, e.g. DIN EN 13432 (Europe), ASTM D6400 (North-America), BecauseWeCare (Australia), which differ only in some details. In general, a compostable material must meet 4 main requirements: (i) it must be bio-degradable, which is specified to mean it can contain max. 5% total dry weight of non-biodegradable components and each non-biodegradable component may make out max. 1% of the packaging; (ii) it must disintegrate; (iii) it should not have any negative effect on the environment and the treatment process; and (iv) the quality of the compost must not be effected.

Toner must be considered as a non-biodegradable component of a packaging material and be under the 5% limit as a whole, and each toner color must be under the 1% limit. Taking into account the weight of the package, this poses some restrictions on the amount of toner that can be printed on a biodegradable packaging material. Converting from the weight of the toner per m², the total toner page coverage divided by the substrate weight must be equal to or less than 1. The page coverage for each individual toner divided by the substrate weight must be equal to or less than 0.2.

$$\frac{\text{page coverage of total toner}}{\text{weight substrate (gsm)}} \leq 1$$

$$\frac{\text{page coverage of each individual toner}}{\text{weight substrate (gsm)}} \leq 0.2$$

For example, a typical 80 µm PLA foil (100 g/m²) can be printed in five colors (CMYKW), with a total page coverage of maximum 100% (or half of the package printed with 200% coverage), and complies with the 5% limit. Each individual toner color can be printed on this PLA foil with a maximal page coverage of 20%, and complies with the individual 1% limit. Of course, the heavier the substrate, the more toner can be printed, without compromising the compostability.

The above guideline is only valid when printing directly on a compostable film. In case the film is subsequently glued on a compostable flacon the page coverage limitation can be different (less stringent) depending upon the weight of the flacon. This is very difficult to put into a formula and should be investigated and calculated on a case by case scenario. The Xeikon Regulatory Affairs department is willing to help in this assessment.

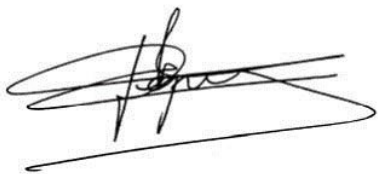
For the environmental requirements, there are limitations of several elements in the packaging material:

Zn	< 150 ppm	Mo	< 1 ppm
Cr	< 50 ppm	Se	< 0.75 ppm
Cu	< 50 ppm	Cd	< 0.5 ppm
Pb	< 50 ppm	Hg	< 0.5 ppm
Ni	< 25 ppm	F	< 100 ppm
As	< 5 ppm		

When subject to the same coverage limitations as above, packaging printed with Xeikon toner (QA-P, QA-CD, QB-I, QB-IC, QB-CH, QA-SR, QB-T, QBE and SPOT colours) will be compliant with these limits with respect to the toner.

Finally, the printed article will not contain any microplastics (also called SPMs “synthetic polymer microparticles”) originated from our toner. The toner particles are permanently modified during printing to become part of the finished printed article. As the toner particles are fixed to the final substrate, there is no risk of exposure of microplastics to humans or the environment from the printed article. During printing no exposure or release into the environment is expected when following the instructions of use; the toner particles are considered contained in the printing process.

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