

Recommendation Quality Standard Impurities



Authors: Wim Vanden Auweele (Vlaco vzw) Elke Vandaele (Vlaco vzw), Esther Hessel(Hessel Marketing & Communication)
Date: June 2023
Workpackage: Soilcom WP7

Soilcom

Interreg
North Sea Region
SOILCOM
European Regional Development Fund



EUROPEAN UNION

Quality standards for physical impurities in compost

According to Porterfield et al. (2023)¹ plastic contamination can impede circular economy efforts by making composts and digestates less attractive to farmers and consumers (Friege & Eger, 2021; Roy et al., 2021). “Biodegradable” and “compostable” plastics have been touted as a more environmentally friendly alternative compared to conventional petroleum-based plastics (European Commission, 2018; Folino et al., 2020; Shaikh et al., 2021), but are problematic for multiple reasons and do not yet represent a clear solution (Calabrò & Grosso, 2018; Haider et al., 2019; Markowicz & Szymańska-Pulikowska, 2019; Serrano-Ruiz et al., 2021).²

Recent regulatory actions in the EU and in specific European countries have resulted in stricter limits for plastic contamination in recycled organic waste products.³ In the (near) future, the limit values for the presence of (plastic) impurities will be lowered further. In the European Fertilising Products Regulation (EU) 2019/1009, the limit value for plastic impurities will be lowered from 0,3 weight percent on dry matter (w/w% DM) to 0,25 from 16.07.2026 onwards.

This document gives some examples of standards for impurities on EU or country level, and proposes a quality standard for premium compost quality.

ECN-QAS

In the last 20 years, quality assurance schemes for compost and digestate products were successfully established in various European Member States and contributed significantly to the sustainable recycling of bio-waste. The example of the advanced countries clearly demonstrates that for the sustainable recycling of bio-waste, strict quality standards are essential. The quality assurance of compost and digestate products guarantees environmental safety and supports a successful marketing and application of the final products. Based on existing experiences in countries with running quality assurance schemes, the European Compost Network ECN has developed a European Quality Assurance Scheme (ECN-QAS) for compost and digestate products. National Quality Assurance Organisations can benchmark their national scheme with ECN-QAS. This helps to create a level playing field for compost and digestate quality across Europe.

The current limit value for impurities in ECN-QAS is 0,5 w/w% on dry matter for impurities >2mm.

EU Fertilising Products Regulation (FPR)

The EU Fertilising Products Regulation (EU) 2019/1009, approved on 5 June 2019, plays a key role for the opening of the market for CE labelled bio-based fertilisers. The fertilising products are divided into different product function categories (PFC), according to their main properties. The material that is used to assemble these PFC's, is subdivided into so-called CMC's (Component Material Classes). Compost derived from waste materials is categorised as CMC3, digestate from waste materials as CMC5. The EU FPR proposes limit values for impurities for both CMC3 and CMC5. These standards are described in Table 1.

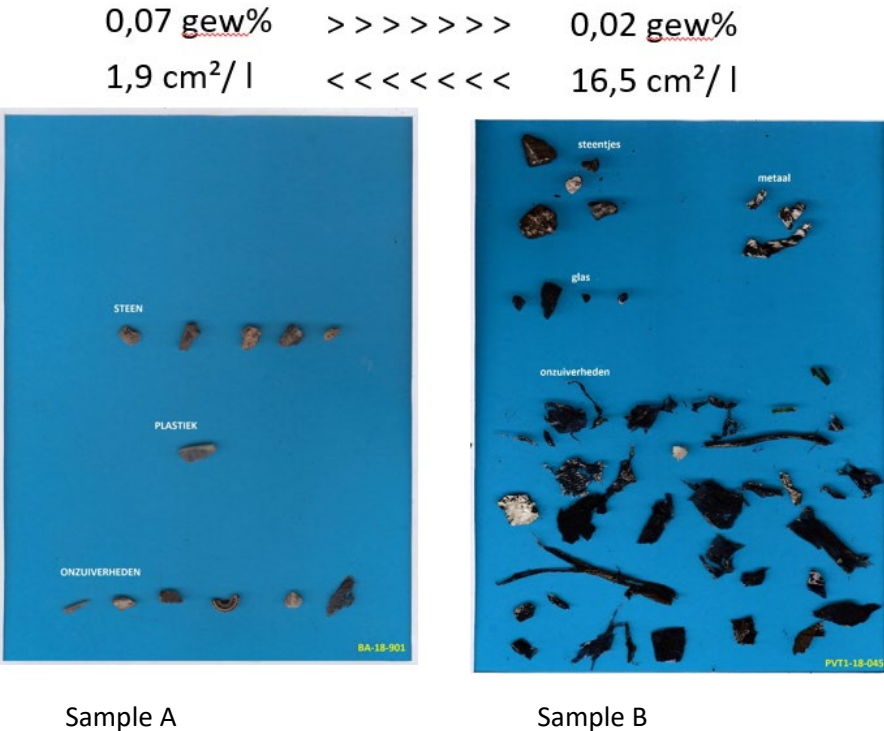
Most of the EU countries have national standards for impurities in compost. A selected overview for some member states is given in Table 1. There are two types of analytical standards to assess the presence of impurities in compost: (a) a standard based on the weight fraction of the impurities and (b) a standard based on the visual assessment of impurities by determination of the surface area.

¹ **Microplastics in Composts, Digestates and Food Wastes: A Review** Katherine K. Porterfield, Sarah A. Hobson, Deborah A. Neher, Meredith T. Niles, Eric D. Roy

²

³ USEPA. (2021). *Emerging issues in food waste management: Plastic contamination* (Report No. EPA/600/R-21/116). <https://www.epa.gov/system/files/documents/2021-08/emerging-issues-in-food-waste-management-plastic-contamination.pdf>

With both standards, the impurities are hand-picked from a sieved compost sample, and sorted out in a specific category (plastic, glass, metal, other impurities). With method (a), the weight of the impurities is calculated on dry matter basis of the entire sample and presented as a weight %. With method (b), after sorting and grouping the impurities, a picture is taken and a specific software programme is used to calculate the surface area per group of impurities. The result is recalculated to a specific area per litre of sample (cm²/litre). With method (b), larger particles that have a low mass (like plastic foils) which give a negative visual impression, can be identified. Both methods have their advantages and are complementary. This is illustrated by the figure below: a higher degree for standard (a) in sample A doesn't necessarily imply a higher degree of visual impurities (which is clearly higher in sample B).



Standard	Parameter	Unit	Limit value
EU level			
ECN-QAS	Impurities > 2mm (sum)	w/w% DM	0,5
ECN-QAS growing media	Impurities > 2mm (sum)	w/w% DM	0,25
EU Fertilising Products Regulation	Impurities > 2mm (sum)	w/w% DM	0,5
EU Fertilising Products Regulation	Plastics or glass or metal >2mm (individual)	w/w% DM	0,3
EU Fertilising Products Regulation from 16.07.2026 onwards	Plastics >2mm	w/w% DM	0,25
EU Countries			
Flemish Region: Reference value	Impurities > 2mm (sum)	w/w% DM	0,5
Flemish Region: Quality target	Visual assessment of impurities by determination of the surface area	cm ² /l	25 (2023), 20 (2024) and 15 (2025)
Austria	Plastics > 2mm	w/w% DM	0,2
Austria	Impurities > 2mm (sum)	w/w% DM	0,5

Austria (draft compost ordinance) agriculture and hobby gardening	Impurities > 2mm (sum)	w/w% DM	0,2
Austria (draft compost ordinance) agriculture and hobby gardening	Visual assessment of <i>plastics</i> by determination of the surface area	cm ² /l	15
Austria (draft compost ordinance)	Metal impurities > 2mm	w/w% DM	0,2
Austria (draft compost ordinance)	Glass impurities > 2mm	w/w% DM	0,1
Scotland	Impurities > 2mm (sum)	w/w% DM	0,25
Scotland	Plastics > 2mm	w/w% DM	0,06
Germany	Film plastics > 1mm	w/w% DM	0,1
Germany	Impurities > 1mm (sum)	w/w% DM	0,4
Germany	Visual assessment of impurities by determination of the surface area	cm ² /l	15
Germany organic farming	Visual assessment of impurities by determination of the surface area	cm ² /l	10
Netherlands keurcompost A	Glass 2-20mm	w/w% DM	0,05
Netherlands keurcompost A	Other impurities 2-20mm	w/w% DM	0,05
Netherlands keurcompost B	Glass 2-20mm	w/w% DM	0,1
Netherlands keurcompost B	Other impurities 2-20mm	w/w% DM	0,1

Table 1: National standards for impurities in compost

Prevention of plastics and other impurities in compost

Strict limit values are essential. But a decent level of separate collection of bio-waste remains however an essential prerequisite for qualitative recycling through composting and anaerobic digestion. Therefore, we also need to consider the technical ability of the treatment facilities to meet these strict limit values. We see 2 key principles. On the one hand, the effort in prevention should be increased: the occurrence of plastics or other impurities ending up in bio-waste must be minimised. Sensitising citizens and setting strict acceptance rules for the treatment of the waste are essential for achieving this goal. On the other hand, the producers of compost and digestate should invest in the best available techniques to remove the impurities that are still present in the compost or digestate, and the occurrence should be closely monitored through sampling and analysis.

Although all types of impurities are stones are detrimental, the focus is increasingly set on plastic impurities. Plastic impurities have the largest environmental impact on the soil. Due to analytical issues (physical impurities can only be measured in compost samples by visual detection and manual removal), the maximum size of the particles is currently restricted to a size > 2mm.

Too soon for additional regulations for microplastics!

According to the paper 'Microplastics in compost, digestates and food wastes: a review¹', there are multiple limitations to the existing regulatory approach to microplastic contamination in compost and digestate products.

1. Regulatory standards are in units of w/w, while 44% of the studies we reviewed reported microplastic abundance in composts and/or digestates exclusively on a count per weight

basis. This results in a mismatch between science and policy whereby a large fraction of the existing body of knowledge cannot effectively assess the results.

2. Due to an incomplete understanding of the risks posed by microplastics in soils under different conditions (e.g. dosing rates, edaphic factors, polymer types, size distributions etc.), allowable contamination levels and lower particles size thresholds may instead be determined by aesthetic concerns and detection limits rather than known risk (USEPA, 2021a).
3. Regulating microplastics content in finished products, without considering the fertilizer value of the material or application rate, does not limit the ultimate flow of microplastics to soils via organic amendments. For example, under the current regulatory structure, it may be permissible to apply a large amount of microplastics in a dilute form on land, but not a smaller amount of microplastics in a more concentrated form??.
4. Regulating contamination levels in organic amendments alone may be insufficient to fully mitigate the flow of microplastics into agricultural soils given the existence of other entry points. There are other examples of narrowly focused microplastics policy that similarly do not address multiple pathways of introduction to the environment.

For analysing microplastics in compost or digestate the main problem is that there is no agreement about how to get the microplastics in solution to count/weight them. Each lab or research centre uses his own method. Collecting data is difficult and comparing these results is even less obvious.

Together for a Premium compost quality

Last years, within the SOILCOM project around 170 interviews were conducted among growers. In almost 70% of the companies more compost was used. In decision making and application, especially price and certification were leading. Companies which didn't use any compost were in 10% of the cases concerned about the presence of impurities in compost, or had bad experiences with compost in the past (15%). Surprisingly, 50% of the non-users didn't think of using compost. Researchers as well as the composting industry engaged themselves, strengthened by the Soilcom project, to optimise the quality of compost concerning the degree of impurities. The goal is to develop an additional standard for premium quality compost complementary with the ECN-QAS quality requirements.

For this purpose, the SOILCOM consortium proposes the following quality standards for premium compost quality:

- A **general standard** for the **sum of impurities** of **< 0,5 w/w % DM**
- Differentiated standards for the different fractions of impurities (separately glass, metal, plastic and other impurities), with the most strict quality standard for **plastic impurities** of **< 0,25 w/w % DM**
- A quality standard for the **surface area of plastic impurities** of **< 20 cm²/litre**