



Guidance on assessing PAS 110 test results against SEPA plastic limits

Background

In Scotland, there is an additional mandatory requirement in respect of plastic contamination for digestate outputs to meet 'end of waste status' under the Biofertiliser Certification Scheme (BCS).

Specifically, as per the Scottish Environment Protection Agency (SEPA) regulatory position statement issued in 2017, the acceptable level for plastic in digestate outputs is $\leq 8\%$ of the BSI PAS 110:2014 specified physical contaminant limit¹.

Operators (or their representatives) are required to review laboratory test results to ensure digestates pass SEPA's plastic limit, as well as the PAS 110 physical contaminant limit.

This document provides guidance on how to make such an assessment.

PAS 110 and SEPA limits based on N content

Both the PAS 110 and SEPA limits are based on the total (N) nitrogen content of the digestate i.e., the acceptable level of physical contaminants (plastic) is dependent on the nitrogen content of the tested digestate sample. You therefore need to know the N content of the digestate as well as the physical contaminant abundance to make an assessment against one / both limits.

In terms of the total (N) nitrogen content, you will find this on the laboratory report alongside other macronutrient analysis (e.g., ammoniacal nitrogen, total P, total K, etc.). The total nitrogen value can be found in a single line on the report and maybe include 'Kjeldahl' in the test parameter name as the common method used. Examples of current laboratory reports can be found below:

NRM report – the total N is reported in kg/tonne fresh weight as circled below.

Characteristics of WD / SL / SF for declaration, without limit values, that influence application rates
(Results on an 'as received' basis)

Parameter	Units	Result	M *	Amount per fresh tonne or m ³	Amount applied at an equivalent total Nitrogen application of 250 kg N/ha	Units
pH		8.1	1			
Oven Dry Matter	% m/m	3.74	2	37.40	3117	Kg DM
Loss On Ignition	% m/m	2.92	3	29.20	2433	Kg OM
Total Kjeldahl Nitrogen (N)	% m/m	0.30	4	3.00	250	Kg N
Ammoniacal Nitrogen (NH ₄ -N)	mg/kg	980	5	0.98	81.66	Kg NH ₄ -N
Total Phosphorus (P)	mg/kg	559	6	1.28	106.67	Kg P ₂ O ₅
Total Potassium (K)	mg/kg	2427	6	2.91	242.69	Kg K ₂ O
Total Magnesium (Mg)	mg/kg	238	6	0.40	32.92	Kg MgO
Total Sulphur (S)	mg/kg	204	6	0.51	42.50	Kg SO ₃
Equivalent field application rate		—		1.00	83.33	tonnes or m ³ / ha
* Method of Test						
1 BS EN 13037				2 BS EN 14346		
3 BS EN 15169				4 BS EN 13654-1 (Kjeldahl)		
5 Scianteq SOP S1162 (Kjeldahl)				6 BS EN 15587 (soluble in aqua regia)		

¹ [wst-ps-016-regulation-of-outputs-from-anaerobic-digestion-processes.pdf \(sepa.org.uk\)](https://www.sepa.org.uk/wst-ps-016-regulation-of-outputs-from-anaerobic-digestion-processes.pdf)

ATL report total N as a percentage (%). You can convert % to kg/tonne by moving the decimal point one place to the right e.g., 0.448 % becomes 4.48 kg/tonne.

Results of Analysis

Parameter	Result	Units	Field application Rate to apply Total Nitrogen at 250 kg N/ha = 55.8	Pass or Fail	Method Reference	Status
pH	8.61	pH units		N/A	BS EN 13037	N
Oven Dry Matter	4.69	% m/m	2617kg DM	N/A	BS EN 14346	N
Organic dry matter (Volatile solid, VS)	3.43	% m/m	1914kg ODM	N/A	BS EN 15169	N
Total Nitrogen (N)	0.448	% m/m	250kg N	N/A	BS EN 13654-2	N
Ammoniacal Nitrogen (NH ₄ -N)	3197	mg/kg	178kg NH ₄ -N	N/A	SOP Z/004	N
Total Phosphorus (P)	661	mg/kg	84kg P ₂ O ₅	N/A	BS EN 15587-1	U
Total Potassium (K)	2742	mg/kg	184kg K ₂ O	N/A	BS EN 15587-1	N
Total Magnesium (Mg)	200	mg/kg	19kg MgO	N/A	BS EN 15587-1	U
Total Sulphur (S)	245	mg/kg	34kg SO ₃	N/A	BS EN 15587-1	U
Parameter	Result	Units	PAS110 Limits ¹	Pass or Fail	Method Reference	Status

The below table can then be used to compare against both PAS 110 and SEPA limits (Table 1).

Table 1. PAS 110 and SEPA plastic limits based on digestate total (N) nitrogen content

Total nitrogen (N)	Kg/tonne	<1	1-1.9	2-2.9	3-3.9	4-4.9	5-5.9	6-6.9	7-7.9	8-8.9	≥9
PAS110 limit ^a	kg/tonne	0.04	0.07	0.11	0.14	0.18	0.22	0.25	0.29	0.32	0.36
SEPA limit ^b	g/tonne ^c	3.2	5.6	8.8	11.2	14.4	17.6	20	23.2	25.6	28.8
	kg/tonne	0.003	0.006	0.009	0.011	0.014	0.018	0.020	0.023	0.026	0.029

^alimit for physical contaminants ; ^blimit for plastic only; ^cunits used in SEPA position statement

Have I failed on physical contaminants or plastic?

As indicated above, there is a further difference between the PAS 110 and SEPA limits beyond the number – the PAS 110 limit is for total physical contaminants whereas the SEPA limit is for plastic only. If you use NRM, you can make a direct comparison with the above plastic limits. If you use ATL for lab testing and you find the total physical contaminants level fails against the SEPA plastic limit, check with ATL to find out if any physical contaminants other than plastic (e.g., glass or aluminium foil) was found in the sample. If other physical contaminants were found in the sample, subtract this value from the total physical contaminant result to calculate the total plastic result then check this against the SEPA plastic limit to determine if this is a pass or fail. Otherwise, if provided with the specific plastic result, check this against the SEPA plastic limit to determine if the sample passed or failed.

Future review

REAL BCS are currently in the process of making changes in respect of reporting / assessing against the SEPA limit. This guidance will be updated accordingly.