

## Appendix 1 to SPCR 141

### Industrially compostable polymeric waste – Requirements and test methods

This appendix treats requirements and associated test methods to certificate polymeric waste intended to be finally settled by industrial composting. This appendix is based on EN 13432. A flowchart on the last page of this appendix gives an overview of the procedure for judgement.

This is a translation from the Swedish original document. In the event of any dispute as to the contents of the document, the Swedish text shall take precedence.

#### Definitions

Polymeric waste refers to polymeric materials, polymeric products and combined polymeric products. For definitions of these three types, see the main document SPCR 141.

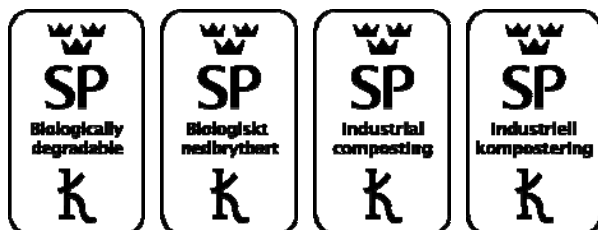
Industrially compostable polymeric waste refers to polymeric waste that can be biodegraded and disintegrated in an aerobic process in an industrial composting plant.

An industrial composting plant refers to a large scale composting facility with a process having a specified throughput time and controlled parameters leading to a product. The product in the form of compost with measured values on the contents below stated limit values.

For definitions concerning biodegradable and compostable plastics we refer to documents CEN/TR 15351 “Plastics – Guide for vocabulary in the field of degradable and biodegradable polymers and plastic items” and ISO 14021 “Environmental labels and declarations – Self-declared environmental claims (Type II environmental labelling)”.

#### Methods, certification and requirements

The three types of polymeric waste will be dealt with under each headline. Approved materials and products can be marked with the symbol of SP for biological degradability or industrial composting, depending on which properties have been tested, see pictures below.



Examples of SP's symbol (English and Swedish versions) Materials which fulfils the requirements for chemical composition and biodegradation can be marked “Biologically degradable” Products which fulfils the requirements for chemical composition and biodegradation and disintegration, compost quality and test of function if necessary can be marked “Industrial composting”.

Any addition or exception from the requirements is specified separately for each material or product under the respective headline.

During an initial test of a new material or a new product, all tests under the headline must be performed according to mentioned methods or equivalent methods. Surveillance inspection is performed according to conditions stipulated in an ongoing inspection agreement between SP and the commissioner.

## **A. Polymeric materials**

### **A.1. Chemical composition and characterization**

All included components like polymers, organic additives (plasticizers, impact resistance additives, fibres, etc), inorganic fillings, pigments, stabilizers, pro-oxidants, etc must be declared with chemical name and trade name, CAS-number and percentage of each component. None of the included components constituting  $\geq 0.1$  % may be officially classified as environmentally hazardous. In addition, a quantitative specification stating the following components is demanded:

1. total quantity of organic and inorganic carbon (C).
2. total quantity of inorganic (inert) material, requirements: < 50 %.
3. elements with the following high limit values according to EN 13432:

<b>Element</b>	<b>mg/kg of dry substance</b>	<b>Element</b>	<b>mg/kg of dry substance</b>
Zn	150	Cr	50
Cu	50	Mo	1
Ni	25,0	Se	0,75
Cd	0,5	As	5
Pb	50	F	100
Hg	0,5		

4. Unambiguous physical-chemical characterization of the material for reference. Suitable methods for plastics are for example one or several of the following methods: IR, UV-VIS, SEC and GC-MS and for papers e.g. tensile energy absorption, wet strength and Cobb.

### **A.2. Biodegradability**

The material shall be tested for the ultimate biodegradability during optimal conditions in an aerobic environment. The material shall be biodegraded to at least 90 % compared to the reference material during the time of maximum 6 months. If the reference material is degraded to more than 100 % the absolute value 90 % is the requirement for the material. The test method to be used shall either be aerobic aquatic biodegradation according to ISO 14852 or aerobic composting in laboratory scale according to ISO 14855-1 or equivalent standard.

<b>Type of analysis</b>	<b>Standard</b>	<b>Requirements</b>
<u><i>Aerobic aquatic biodegradation</i></u> - Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium – Method by analysis of evolved carbon dioxide	ISO 14852	Biodegradation $\geq 90$ % of the reference material within 6 months
<u><i>or:</i></u> <u><i>Composting in laboratory scale</i></u> – Determination of the ultimate aerobic biodegradability of plastics materials under controlled composting conditions – Method by analysis of evolved carbon dioxide. Part 1: General method	ISO 14855-1	Biodegradation $\geq 90$ % of the reference material within 6 months

*Natural polymeric raw materials*

Chemically unmodified natural polymeric materials like starch, cellulose etc. do not need to be tested for biodegradability. Chemical characterization shall be performed according to A1.

When testing according to A has been approved, certification and labelling with “Biologically degradable” is possible.

**B. Polymeric products**

**B.1. Disintegration (decomposition)**

All components included in the product shall be declared according to A1. Polymeric materials that constitute more than 1.0 % of the product shall fulfil the requirements in classification A. A product to be classified as compostable shall furthermore be disintegrated in a biological waste treatment process within maximum 12 weeks or 6 months (depending on chosen method) to fragments < 2 mm that can not be sieved out to more than 10 % of the original amount. In case of the same product occurring in different thickness it is sufficient to declare that the thickest one has passed the disintegration test.

## B.2. Quality of compost/ Test methods for analysis of environmentally hazardous substances

The compost obtained after the disintegration test is composted until maturity for use, whereafter tests are performed to guarantee that no negative effects on different plants can be observed. The tests consist of germination- and growth tests with at least 2 higher plants according to SP method 4149.

Type of analysis	Standard/method	Requirements
<i>Disintegration-</i> Plastics – Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot scale test <i>or:</i> Plastics - Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test	ISO 16929  ISO 20200	≥ 90 % disintegrated into < 2 mm pieces after 12 weeks ≥ 90 % disintegrated into < 2 mm pieces after 180 days
<i>Methods for investigation of environmentally hazardous substances</i>	SP method 4149  <i>based on:</i> OECD guideline 208 + annex E in SS-EN 13432	> 90% germination and biomass for both plants compared to controls

## B.3. Test of function

Certified products must be suitable for their purpose and not cause any damage or inconvenience. A control of the finished product shall be made at intervals necessary to secure that the product fulfils functional demands and is decided upon in each individual case.

When testing according to both A and B has been approved, certification and labelling with “Industrial composting” is possible.

## C. Combined polymeric products

All polymeric materials included in a product must fulfil requirements according to A and B. If technically possible the product shall be tested for disintegration in the form intended for use. Exceptions can be made where compostable materials comprise easily separable parts of a combined product. In such a case, clear information about which part of the product the labelling is intended for and under what circumstances the label is valid must be added. SP shall approve the formulation of the label and the attached information.

### Flow chart to appendix 1, SPCR 141

