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Biodegradable mulching film for agricultural use

全生物降解农用地面覆盖薄膜

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Biodegradable mulching film for agricultural use

1 Scope

This Standard specifies requirements, test methods, inspection rules, marks, packaging, transport and storage of biodegradable mulching film for agricultural use.

This Standard is applicable to biodegradable mulching film for agricultural use that uses one or more resins in aliphatic polyesters, aliphatic-aromatic copolyesters, carbon dioxide-epoxy copolymers, and other biodegradable polymers that have biodegradation characteristics as main compositions, that it is allowed to add appropriate proportion of biodegradable natural polymer materials such as starch and cellulose, as well as other inorganic fillers and functional additives without environmental hazards to formulation, that is produced by processes such as blow molding or casting.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1037, *Test method for water vapor transmission of plastic film and sheet - Cup method*

GB/T 1040.1, *Plastics - Determination of tensile properties - Part 1: General principles*

GB/T 1040.3, *Plastics - Determination of Tensile Properties - Part 3: Test Conditions for Films and Sheets*

GB/T 2828.1, *Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

GB/T 2918, *Plastics - Standard atmospheres for conditioning and testing*

GB/T 6672, *Plastics film and sheeting - Determination of thickness by mechanical scanning*

GB/T 6673, *Determination of Length and Width of Plastics Film and Sheeting*

GB/T 15337, *General rules for atomic absorption spectrometric analysis*

GB/T 16422.1, *Plastics - Methods of the exposure to laboratory light sources - Part 1: General guidance*

GB/T 16422.2-2014, *Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc sources*

GB/T 19276.1, *Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - Method by measuring the oxygen demand in a closed respirometer*

GB/T 19276.2, *Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium - Method by analysis of evolved carbon dioxide*

GB/T 19277.1, *Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide - Part 1: General method*

GB/T 19277.2, *Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide - Part 2: Gravimetric measurement of carbon dioxide evolved in a laboratory-scale test*

GB/T 22047, *Plastics - Determination of the ultimate aerobic biodegradability in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved*

QB/T 1130, *Plastics Angle Tear Performance Test Method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 biodegradable materials

Materials that are degraded by the presence of microorganisms in nature under conditions such as soil and/or sand, and/or under specific conditions such as composting conditions or anaerobic digestion conditions or aqueous culture fluids, and eventually completely are degraded into carbon dioxide (CO_2) or/and methane (CH_4), water (H_2O) and mineralized inorganic salts of elements contained therein and new biomass

3.2 biodegradable mulching film for agricultural uses; biodegradable mulching film

Sample condition adjustment shall be in accordance with GB/T 2918. Temperature is 23°C ± 2°C. Adjustment time is not less than 4h. Perform test under such conditions, excluding appearance, net mass deviation.

6.3 Thickness deviation

According to GB/T 6672, use thickness measuring meter of which accuracy is 0.001mm to measure. Calculate limit thickness deviation according to formula (1). Calculate average thickness deviation according to formula (2).

$$\Delta d = d_{\text{max or min}} - d_0 \qquad \cdots\cdots (1)$$

Where,

Δd - Limit thickness deviation, in millimeters (mm);

$d_{\text{max or min}}$ - Actually-measured maximum or minimum thickness, in millimeters (mm);

d_0 - Nominal thickness, in millimeters (mm).

$$d = \frac{d_n - d_0}{d_0} \times 100 \qquad \cdots\cdots (2)$$

Where,

d - Average thickness deviation, %;

d_n - Average thickness, in millimeters (mm);

d_0 - Nominal thickness, in millimeters (mm).

6.4 Limit width deviation

According to GB/T 6673, use measuring tape or steel ruler of which accuracy is 1mm to measure. Calculate limit width deviation according to formula (3).

$$\Delta w = w_{\text{max or min}} - w \qquad \cdots\cdots (3)$$

Where,

Δw - Limit width deviation, in millimeters (mm);

$w_{\text{max or min}}$ - Actually-measured maximum or minimum width, in millimeters (mm);

w - Nominal width, in millimeters (mm).

6.10 Heavy metal content

When testing heavy metal content, perform microwave digestion to sample through high-pressure system. Then use atomic absorption spectrophotometer to test according to GB/T 15337.

6.11 Biodegradability

Determine organic component (volatile solid content) according to Method A in GB/T 9345.1. Measurement temperature is 650°C.

Use any method in GB/T 19277.1, GB/T 19277.2, GB/T 19276.1, GB/T 19276.2, GB/T 22047 to perform biodegradability test. In arbitration inspection, use GB/T 19277.1.

6.12 Artificial weathering performance

Sample preparation and treatment are in accordance with GB/T 16422.1. Age 3 pieces for each kind of sample. Extract individual sample from aged large sample to test. Take average value of three samples. Determinations for nominal strain of initial fracture of sample and nominal strain of fracture after exposure are in accordance with 6.7.

Test method is in accordance with GB/T 16422.2-2014. Irradiation method uses Method A. Irradiance is narrow band (340 nm) 0.51 W/(m^2·nm). Temperature control uses black mark thermometer. Exposure cycle uses cycle number 1. Test duration is 100h.

7 Inspection rules

7.1 Batching

Biodegradable mulching films for agricultural use are inspected and accepted in batches. One batch refers to products of continuous production of 50t from same formula and same specification. If continuous production is one week but production is less than 50t, one batch shall refer to one-week production.

7.2 Sampling

7.2.1 Limit width deviation, limit thickness deviation, appearance

According to once-sampling plan of normal inspection specified in GB/T 2828.1, use general inspection level-I. Acceptance quality limit (AQL) is 6.5, see Table 10. Biodegradable mulching film for agricultural use per roll is one sample unit.

a) test stereotype identification of new product or old product conversion production;

b) after formal production, for example, when structure, raw material, process have significant changes that may affect product performance;

c) during formal production, after regular production or accumulation of a certain amount of output, periodically perform an inspection to access product's quality stability;

d) when production is resumed after production has been discontinued for a long time;

e) when results of exit-factory inspection and previous type inspection are quite different;

f) when state quality supervision agencies require to carry out type inspection.

7.4 Rules for determination

7.4.1 Determination for accepted items

Limit width deviation, limit thickness deviation and appearance are in accordance with provisions of Table 10.

If there is any rejected item in inspection results of average thickness deviation, mechanical properties, water vapor transmission rate, heavy metal content, artificial weathering performance, it shall double sampling from this batch to re-inspect the rejected item. If there is still a rejected item in re-inspection, this item shall be rejected.

If there is rejected item in biodegradability, it shall not re-inspect but this item shall be rejected.

7.4.2 Determination for accepted batch

When inspection results of all inspection items are accepted, this batch shall be accepted.

8 Marks, packaging, transport, storage

8.1 Marks

Each roll of biodegradable mulching film for agricultural use shall be attached with product certificate, including: product name, category (including water vapor transmission category, effective service life), width, thickness, reference

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