Test Report

Client : BOOSTER(DONGGUAN)PLASTIC PRODUCTS CO.,LTD

Client Address : NO.497 Tangxia North Road, TangXia Town, Dongguan City, Guangdong, China

The following sample(s) and sample information was/were submitted and confirmed by the client:

Sample Name : Loop pin/Tag pin

Specification : /

Material : PP

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Date of Sample Received : 2019-11-13

Test Period : 2019-11-13~2020-01-21

Test Item(s) : Evaluation of potential biodegradation and disintegration of materials under the action of specific microorganisms (soil landfill test)

Test Result(s) : Please see the next page(s)

Compiled by: Haidong Pan **Inspected by:** Kaixuan Liu

Approved by: Amy Wang **Issued Date:** 2020-03-02

Shanghai Micro-spectial Chemical Analysis and Test technology Co., Ltd.

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1. Test Item:

Test Standard: GB/T 19275-2003

Lab Environment: The experiment was conducted in a biological incubator at 29℃±1℃ with relative humidity of 95%±2% for 28 days

Test Result(s):

The sample name	Test Item		Test Result
Loop pin/Tag pin	Evaluation of potential biodegradation and disintegration of materials under the action of specific microorganisms (soil landfill test)	Change in mass	+0.01%

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2. Detection process

2.1 Test conditions

2.1.1 Sample size: square with side length of 50mm×50mm;

2.1.2 Properties of landfill soil: the water retention capacity is 78.9%, the water content is 60.9%, the pH value is 4.72, and the biological activity meets the requirements.

2.1.3 Sterilization solution: o-phenyl phenol;

2.1.4 Test methods: methods C soil landfill test (evaluation of quality change).

2.2 Test group

2.2.1 Prepare 3 groups of samples, 6 samples for each group, a total of 18 samples;

2.2.1.1 Group 0: control samples, stored under standard temperature and humidity conditions;

2.2.1.2 GroupI: samples inoculated with microorganisms and cultured (directly buried in soil);

2.2.1.3 Group S: sterilized samples were cultured under the same conditions as group I.

2.2.2 Biological activity of soil.

The bleached but untreated cotton fabric (250g/m^2) strip (2.5cm×10cm) was buried in the soil at the same time with the sample and cultured for 7 days. After the end of the cultivation period, the stretch length of the cotton strip should not be more than 25%, and the biological activity of the soil should meet the requirements.

2.2.3 Fill 1 L jar with soil with water retention capacity with humidity of (60%±5%).

2.2.4Fill the samples

With a spoon and tweezers, the samples were buried in two jars, each containing a comparison strip of cotton to test the soil's activity (after the culture period, the stretch length of the strip should not be greater than 25%, and the soil's biological activity should meet the requirements). Each jar was filled with 3 samples vertically and arranged in parallel. A total of 6 samples of the two jars were used as group I samples. To get the oxygen flowing, a wire of about 1mm is wound between the jar and the cap. The soil in the jar shall not be compressed when filling the sample, and the soil covering the sample shall not be more than 12.5 cm thick.

2.2.5 Test inspection

The 1L sealed storage jar containing soil and cotton strips was placed in the autoclave sterilizer and sterilized continuously for 30min 3d at 120℃ and 2×105 Pa. The samples were first immersed in o-phenylphenol solution, then placed in two jars, and 3mL of o-phenylphenol solution was poured onto the soil. Each jar was filled with 3 samples, which were arranged in parallel with each other. The two jars contained 6 samples, which were used as group S samples. The sealing methods of jar caps and soil filling methods of group I and group S were consistent.

2.2.6 The process of cultivation

The prepared two jars in group I and group S were placed in the incubator and cultured for 28 days in the biological incubator with the temperature of 29℃±1℃ and the relative humidity of 95%±2%.

2.2.7 The measurement process

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2.2.7.1 Cleaning steps

After the experiment, the samples of group I, group S and group 0 were immersed in 70% ethanol solution for about 5min, then rinsed under running water, wiped with filter paper, and placed in a petri dish with no cover. Then the samples were dried to constant weight in a dryer together with the petri dish.

2.2.7.2 Quality of change

Cleaning：Dip the test specimens for 5 min into an 70% ethanol-water mixture , rinse under running water, wipe with filter paper place it into a clean petri dish and allow to dry overnight at room temperature. And then put it in a desiccator until constant mass is attained.

Changes in mass：For the determination of the change in mass, place the cleaned specimens in a desiccator and weight them regularly to the nearest 0.1mg until constant mass is attained. Record the final masses. For each specimen, the difference in mass Δ m before and after exposure. The average percentage change in mass using the formula：

$$(\overline{\Delta mI} - \overline{\Delta mS}) / \overline{m\ e} \times 100$$

Where $\overline{\Delta mI}$ and $\overline{\Delta m\ S}$ is the arithmetic mean of the changes in mass of test series I and S. $\overline{m\ e}$ is the mean of the original specimen masses.

2.3 The results

2.3.1 The resultsof quality change

The results of quality changes of samples in each group are shown in Table 1.

According to the results in Table 1, the sample quality change is +0.01%.

Table1Theresultsof quality change

Group	GroupI					GroupS					Group0				
Project	The initial qualitym_I（mg）		The final qualitym_I'（mg）		The quality change after testΔm_I（mg）	The initial qualitym_S（mg）		The final qualitym_S'（mg）		The quality change after testΔm_S（mg）	The initial qualitym_0（mg）		The final qualitym_0'（mg）		The quality change after testΔm_0（mg）
The mass	m_1	627.37	m_1'	628.31	0.94	m_1	281.03	m_1'	281.37	0.34	m_1	281.79	m_1'	281.96	0.17

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after constant weight	m_2	637.72	m_2'	638.23	0.51	m_2	638.04	m_2'	639.06	1.02	m_2	633.75	m_2'	634.19	0.44
	m_3	276.82	m_3'	277.58	0.76	m_3	278.62	m_3'	279.55	0.93	m_3	285.92	m_3'	286.13	0.21
	m_4	630.47	m_4'	631.02	0.55	m_4	635.73	m_4'	636.69	0.96	m_4	266.71	m_4'	266.88	0.17
	m_5	286.91	m_5'	287.77	0.86	m_5	277.22	m_5'	277.99	0.77	m_5	630.50	m_5'	631.25	0.75
	m_6	280.64	m_6'	281.93	1.29	m_6	627.51	m_6'	628.17	0.66	m_6	633.27	m_6'	633.61	0.34
Average result	$`m_I$	456.66	$`m_I'$	457.47	0.82	$`m_S$	456.36	$`m_S'$	457.14	0.78	$`m_0$	455.32	$`m_0'$	455.67	0.35
m_e（The mean mass of the original sample）（mg）								456.11							
The average percentage change in mass（%）								0.01							

Remark:

1. In the table, mis the quality before the test,m' is the quality after the test, and ∆m is the quality difference before and after the test. $m_e$is the mean value of original sample quality.
2. Please refer to the attached drawings for sample changes before and after the test.

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3. Representative attachments: pictures of samples before and after the test

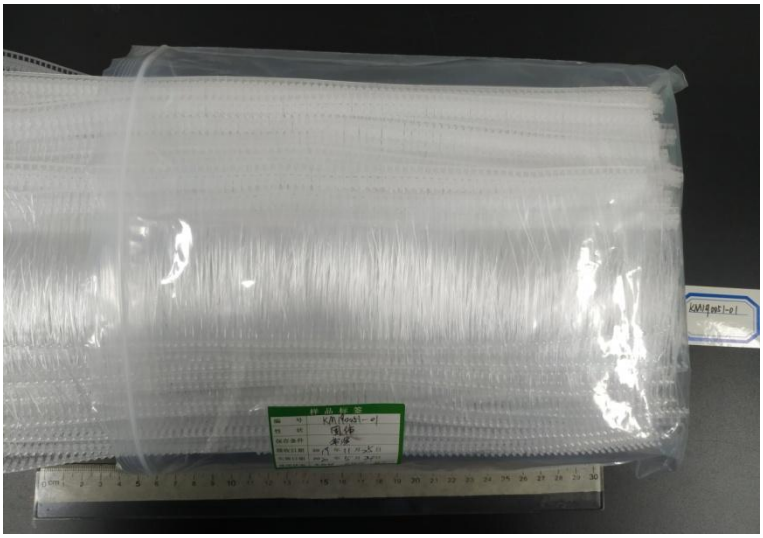

Fig. 1: Specimens before test

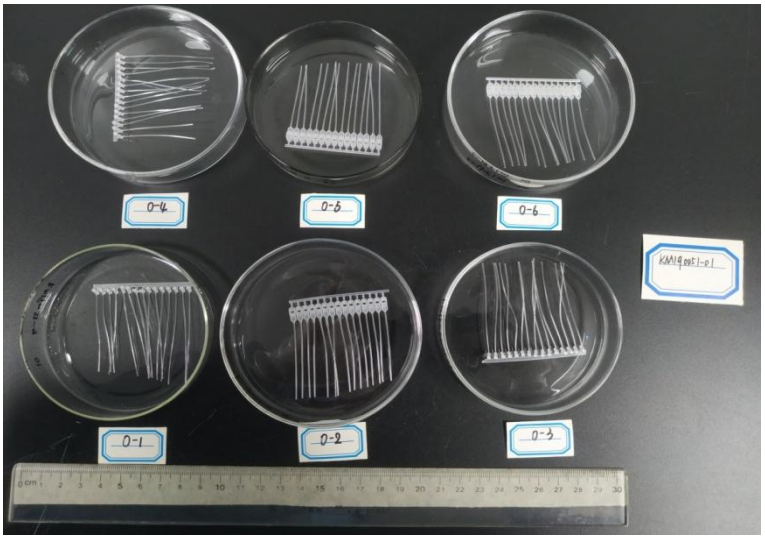

Fig. 2: Specimens of test series 0 before test

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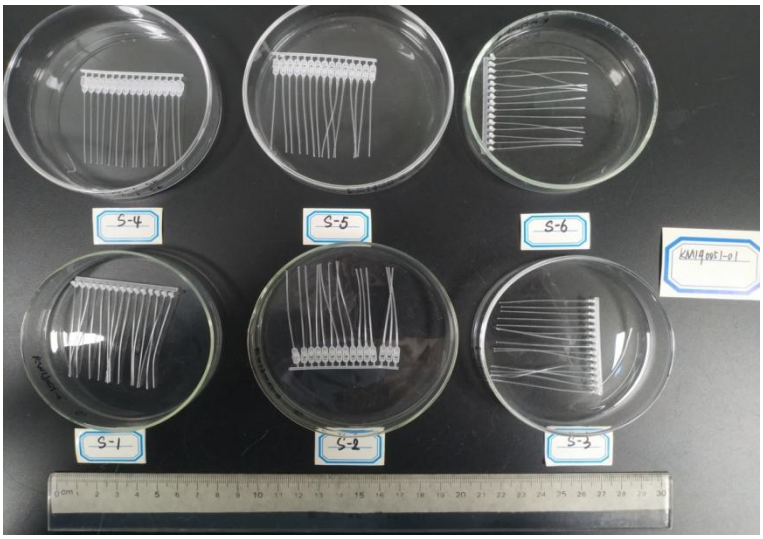

Fig. 3: Specimens of test series S before test

Fig. 4: Specimens of test series I before test

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Fig. 5: Specimens of test series S after test

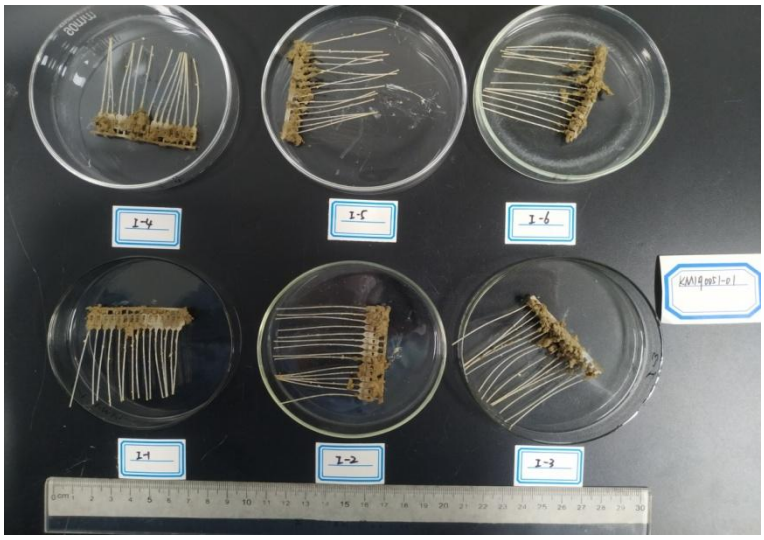

Fig. 6: Specimens of test series I after test

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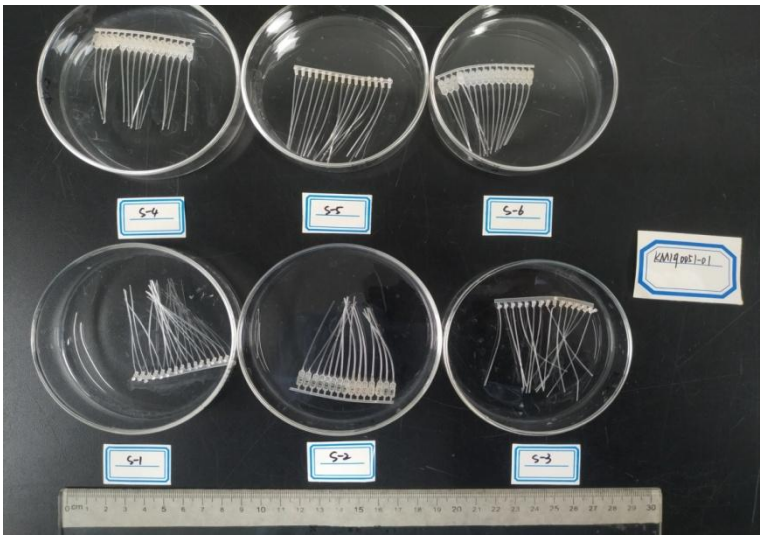

Fig. 7: Specimens of washed test series S after test

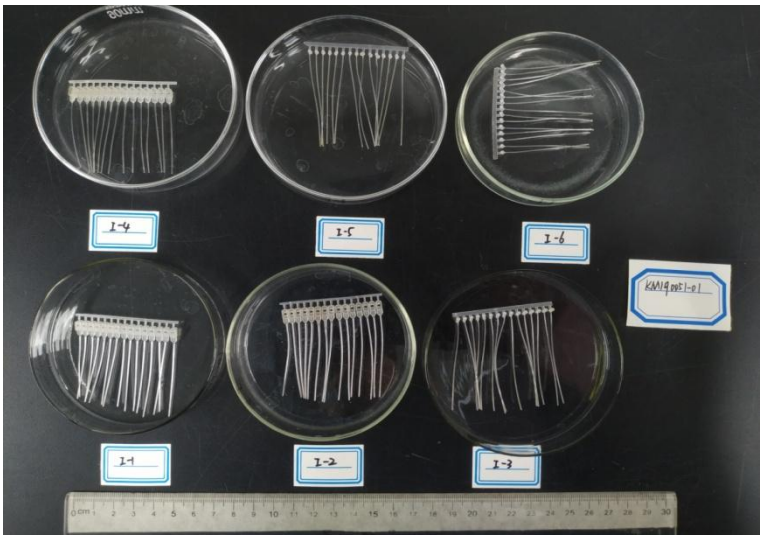

Fig. 8: Specimens of washed test series I after test

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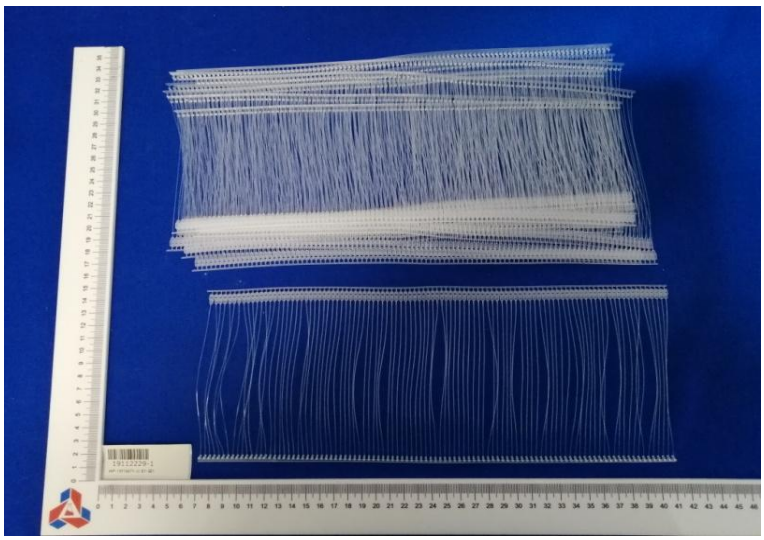
4. Sample photos:



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DECLARE

1.The report is invalid without the stamp of special seal for test or without the signature of the compiler, the inspector and the approver.

2. No unauthorized changes, additions or deletions shall be made to the report.

3. Neither fragmented report nor its incomplete copy shall be deemed valid. The complete copy is invalid without the stamp of special seal for test.

4. Any queries on the report shall be presented to Shanghai Micro-spectial Chemical Analysis and Test technology Co.,Ltd. within 15 working days after receipt of the report.

5.The results described here in this report are based on the sample(s) tested. The results are presented to the client for internal uses only and do not constitute any social grounds in the People's Republic of China.

6. The client takes full responsible for the truthfulness of the testing sample(s) and information related thereto.