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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Replacing GB/T 15171-1994

Test method for sealing performance of package

包装件密封性能试验方法

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Table of Contents

Foreword	3
1 Scope	5
2 Normative References	5
3 Terms and Definitions	5
4 Test Principle	6
5 Specimen	6
6 Instruments	6
7 Specimen Conditioning and Test Conditions	10
8 Test Procedures	10
9 Test Results	11
10 Test Report	12
Bibliography	14

1 Scope

This document describes two test methods for the sealing performance of package---the underwater bubble method and the vacuum decay method. It provides test principles, specimens, instruments, specimen conditioning and test conditions, test procedures, test results and test reports for both test methods.

This document applies to non-vacuum package, as well as non-vacuum sealed package without contents, for the test of sealing performance.

2 Normative References

This document does not have normative references.

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Flexible package

Packaging with variable container shapes after filling or removing the contents.

[source. GB/T 4122.1-2008, 2.8, modified]

3.2 Rigid package

Packaging whose container shape remains essentially unchanged after filling or removing the contents.

[source. GB/T 4122.1-2008, 2.7, modified]

3.3 Sealing performance

The property of package to prevent the entry of other substances or the escape of its contents.

3.4 Vacuum decay rate

Under a given pressure difference, the extent, to which, the vacuum degree changes over time within the unit time. NOTE. the unit is (Pa/s).

3.5 Target vacuum degree

The expected vacuum degree to be achieved. NOTE. the unit is (kPa).

3.6 Reference vacuum degree

After the target vacuum degree is achieved, within the equilibrium time of the test, the lower limit of the vacuum degree maintained in the test chamber. NOTE. the unit is (kPa).

4.1 Underwater Bubble Method

Place the specimen in a vacuum chamber filled with test water. Vacuumize the vacuum chamber, resulting in a pressure difference between the inside and outside of the specimen. Observe the escape of gas from the specimen and the infiltration of test water into the specimen to determine the sealing performance of the specimen.

This method is suitable for testing the sealing performance of package where the test water has no significant impact on the outer-layer material of the package.

4.2 Vacuum Decay Method

Place the specimen in a test chamber. Vacuumize the vacuum chamber, resulting in a pressure difference between the inside and outside of the specimen. Through a pressure sensor, monitor the change in the vacuum degree in the test chamber to determine the sealing performance of the specimen.

This method is suitable for testing the sealing performance of various non-vacuum packages, including flexible and rigid packages, etc.

5 Specimen

5.1 The specimen can be a non-vacuum package containing actual or simulated contents, or a non-vacuum sealed package without any contents.

5.2 The specimen shall not have defects, such as cracks, unsealed areas, or open seals that affect the sealing performance.

5.3 The number of specimens shall generally be no less than 3.

6.2.6 Gas flow controller

It is used to introduce variable-rate artificial leakage, which can be used to verify test sensitivity.

6.2.7 Leak-free standard specimen

It is used to remove system background generated by residual or adsorbed gases in the test chamber and pipelines.

7.1 Underwater Bubble Method

Under normal room temperature conditions, carry out the test.

7.2 Vacuum Decay Method

The specimen shall be conditioned for at least 4 hours under environmental conditions of (23 ?

2) ?C and a relative humidity of (50 ? 10) %, and the test shall be conducted under these conditions. If otherwise specified or required by practical application, the conditioning and test conditions can be determined in accordance with the specified or practical application demands.

8.1 Underwater Bubble Method

8.1.1 Place an appropriate amount of clean, transparent test water in the vacuum chamber.

8.1.2 Before testing the specimen, properly put on the sealing cover. Under conditions where it is not lower than the target vacuum degree, vacuumize the vacuum chamber and maintain the pressure for a period of time. Repeat this process, until no bubbles are generated that may affect observation, thus removing any trace gases that may be present in the test water.

8.1.3 Place the specimen in the water and properly put on the sealing cover. Use a transparent porous pressure plate to press the specimen into the water, and the liquid level shall be above the upper surface of the pressure plate. Provided that leakage at all parts of

the specimen can be observed during the test, multiple specimens can be simultaneously tested.

8.1.4 Depending on the characteristics of the specimen (e.g., packaging materials used, sealing

conditions, etc.) or the provisions of the relevant product standards, the target vacuum degree can be set between 20 kPa ~ 90 kPa.

8.1.5 Vacuumize the vacuum chamber, until the target vacuum degree is reached within 30 s ~ 60 s, then, stop vacuumizing, and maintain this vacuum degree for 30 seconds. If otherwise specified or required by the practical application, the vacuum holding time can be determined in accordance with the specifications or the practical application demands.

8.1.6 Observe whether continuous bubbles are generated during the vacuumizing process and

the vacuum holding period. A single isolated bubble is not considered a specimen leak.

8.1.7 After the test, open the inlet pipe valve to allow the vacuum chamber to circulate with the atmosphere.

8.1.8 Open the sealing cover and remove the specimen. If applicable, wipe the water off the specimen surface and check for any test water seepage inside the specimen.

8.1.9 Repeat the test steps from 8.1.3 ~ 8.1.8 to test other specimens to be tested.

8.2 Vacuum Decay Method

8.2.1 Place the leak-free standard specimen in the lower chamber and close the upper chamber.

Ensure the upper and lower chambers of the test chamber are sufficiently sealed.

8.2.2 In accordance with the characteristics of the specimen (e.g., packaging materials used,

sealing conditions, etc.) or the provisions of the relevant product standards, set the target vacuum degree. In accordance with the test requirements, set the reference vacuum degree within the equilibrium time.

8.2.3 Turn on the vacuum source and vacuumize-purge the system. After removing the

background, remove the leak-free standard specimen.

8.2.4 Place the specimen in the lower chamber and close the upper chamber. Vacuumize