



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

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**Plastics - Film and sheeting - Determination of cold-crack
temperature**

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Table of Contents

Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Principle	5
5 Equipment	5
6 Test specimens	7
7 Conditioning of specimens	8
8 Selection of impact block	8
9 Procedures	8
10 Result expression	9
11 Test report	10

1 Scope

This document describes a method for evaluating the brittleness of plastic films and sheeting at low temperature.

The cold-crack temperature is usually used to compare the low temperature performance of plastic film and sheeting, which is used as a reference for evaluation in this document.

This document applies to the characterization of finished products of a given thickness and pattern, regardless of the composition of their raw materials. Data derived from this document may not be transferred without limitation to any other type of application or condition.

2 Normative references

The following documents are normatively referenced in this document and are indispensable for its application. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

ISO 291, Plastics - Standard atmospheres for conditioning and testing

Note: GB/T 2918-2018, Plastics - Standard atmospheres for conditioning and testing (ISO 291:2008, MOD)

ISO 4593, Plastics - Film and sheeting - Determination of thickness by mechanical scanning

Note: GB/T 6672-2001, Plastics film and sheeting - Determination of thickness by mechanical scanning (ISO 4593:1993, IDT)

3 Terms and definitions

The following terms and definitions are applicable to this document.

3.1 Cold-crack temperature

The temperature at which 50% of the test specimens rupture or show damage when tested according to the method specified in this document.

4 Principle

Place the test specimen bent into a ring in the cooling chamber to make it withstand the instantaneous folding caused by the impact of the free fall of the impact block.

Repeat the test at temperatures in steps of 5 °C, starting when no test specimens are ruptured or damaged, and ending when all test specimens are ruptured or damaged.

5 Equipment

Figure 1 is a schematic diagram of a typical test setup. Other devices of the same physical principles can also be used. Figure 2 shows a schematic diagram of another applicable design scheme.

5.1.1 Specimen holder

Fasten one or more test specimens on the specimen table through clamps (such as leaf springs); clamp each test specimen along its entire width (15 mm) and ensure that each end of the specimen ring is clamped for a length of 10 mm (see Figure 1), so that the specimen ring bears the folded portion of the length of 40 mm.

The specimen table may be equipped with a device (such as revolving type) so that each specimen can be accurately rotated to the test position located under the impact block guide sleeve.

Another possibility is to install the test device with guide sleeves each provided with its own impact block. The guide tubes can be arranged in a row or in a circle, depending on the space permitting of the cooling chamber.

5.1.2 Rigid anvil

Rigid anvils may be attached to, or form part of, the specimen table on which the specimen is in the test position.

5.1.3 Two impact blocks

The masses of the two impact blocks are 200 g and 500 g, respectively.

The impact block is a metal cylinder with a diameter of 18 mm ~ 29 mm, and the edge of the lower surface is slightly curved.

The test specimens shall be composed of strips with a size of 60 mm x 15 mm. The edge of test specimens shall be free from cuts, scratches and other defects.

The thickness shall be measured according to ISO 4593.

6.2 Sampling

For each temperature, take 10 test specimens whose long side (60 mm) is parallel to the longitudinal direction of the sample and 10 test specimens whose long side is parallel to the transverse direction of the sample. All specimens shall be taken at least 150 mm from the edge and more than 1 m from the beginning and end of the roll.

7 Conditioning of specimens

Bow the test specimens into a ring shape and install them on the specimen holder. If the specimen film or sheeting is printed or textured on one side, this side shall be on the outside of the ring.

The installed test specimens shall be conditioned for at least 3 hours in an environment specified in ISO 291.

8 Selection of impact block

Where the impact block is not pre-agreed, if an impact block of 200 g is sufficient to effectively fold the specimen, start the test with this impact block, otherwise, use an impact block of 500 g.

The following specification can be used to verify effective folding. Bend a paper strip (approximately 70 g/m²) of the same size as the test specimen into a ring and place it in the specimen ring. According to the steps in Chapter 9, use a 200 g impact block to test the plastic/paper composite specimen, and use a temperature slightly higher than the cold-crack temperature to prevent the specimen from cracking. Check the paper strip, a sharp crease at the top of the ring indicates an effective folding.

9.2 Put the impact device mounted with specimens into the cooling chamber. When the

test temperature of the impact device reaches stability (about 15 minutes), place the specimen (in case of a revolving-type device, the first specimen) under the guide sleeve, release the impact block, and then reset the impact block to its original position. Repeat this operation if there are other specimens.

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