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

GB/T 14190-2017

Replacing GB/T 14190-2008

Test methods for fibre grade polyester (PET) chip

纤维级聚酯（PET）切片试验方法

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1 Scope

China's national test methods for fibre grade polyester chip - the PET granules from which polyester fibre is spun, and a material China produces in enormous quantity. It specifies the test methods for each of the analysis items of fibre grade polyester chip. What a spinner needs to know about a chip is not what a chemist would first think of, and the list of tests reflects that. The intrinsic viscosity is the primary measurement: it stands for the molecular weight of the polymer, and it determines the melt viscosity, the spinnability and the strength of the fibre that results - a chip outside its viscosity band cannot be spun on a line set up for it. The diethylene glycol content is next, because it is formed as a by-product during polymerisation and it lowers the melting point and changes the dye uptake of the fibre, so a variation between batches shows up as a dye streak in the finished fabric, which is the most expensive defect in the industry. Then the carboxyl end group content, which governs the hydrolytic stability of the polymer and therefore how the chip behaves if it is dried imperfectly. Then the colour, measured instrumentally, since polyester is dyed and a yellow chip cannot be made white again. And the ash, the moisture, the melting point, the particle size and the dust and fines content, which decide how the chip behaves in the dryer and the extruder rather than in the fibre. The standard sets each determination in full - the apparatus, the reagents, the procedure, the calculation and the precision - and it is used as an acceptance method between the polymer plant and the spinner. Issued on 29 December 2017 and in force since 1 July 2018, it replaces GB/T 14190-2008.

This Standard specifies the test methods for each analysis item of fiber grade polyester (PET) chips. This Standard applies to fiber grade polyester (PET) chips produced from terephthalic acid and ethylene glycol. Other differential and functional polyesters may also refer to this Standard.

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 601 Chemical reagent - Preparations of standard volumetric solutions

GB/T 603 Chemical reagent - Preparations of reagent solutions for use in test methods

GB/T 4146 (all parts) Textiles - Man-made fibers

GB/T 6283 Chemical products - Determination of water Karl. Fischer method (general method)

GB/T 6678 General principles for sampling chemical products

GB/T 6682 Water for analytical laboratory use - Specification and test methods

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

ISO 3105 Glass capillary kinematic viscometers - Specifications and operating instructions

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in GB/T 4146 (all parts) and the following apply.

3.1 bright polyester (PET) chip Polyester (PET) chips that are not matted.

3.2 semi-dull polyester (PET) chip Polyester (PET) chips of which the titanium dioxide content is greater than 0.20 % and less than or equal to 0.50 % (mass fraction).

3.3 full dull polyester (PET) chip Polyester (PET) chips of which the titanium dioxide content is greater than or equal to 1.50 % (mass fraction).

3.4 agglomerate particle Particles, in PET chips, that are determined to be greater than or equal to 10 μm .

3.5 irregular chip Polyester chip (PET) of which the length is greater than or equal to 4 times that of the normal chip; the thickness, width or diameter is greater than or equal to 2 times that of the normal chip; less than 1/4 of the conventional particle (or prescribed size); and of irregular shape.

4 General rules of test

4.1 Sampling The laboratory samples in batch samples are in accordance with GB/T 6678, and the sample volume is not less than

0.5 kg.

4.2 General specifications The reagents and water used in this Standard refer to the analytical reagents and the tertiary water specified in GB/T 6682 when no other requirements are specified. The standard titration solutions, preparations and products used in this Standard are prepared in accordance with GB/T 601 and GB/T 603 when no other requirements are specified.

5.1.1 Method A (capillary viscometer method)

5.1.1.1 Method summary DETERMINE the elution time of the solvent at 25 °C and the PET solution at a concentration of

0.005 g/mL, and CALCULATE the intrinsic viscosity according to the determined elution time and the solution concentration of the sample. The capillary viscometer uses 1B to meet the requirements that the kinetic energy correction term of the viscometer is not considered.

5.1.1.2 Instruments and equipment 5.1.1.2.1 Constant temperature bath. temperature control (25.00 ± 0.05) °C.

5.1.1.3 Solvents 5.1.1.3.4 Selection of solvents The calculation method for the intrinsic viscosity of PET chips is related to the solvent used. Two different solvents are available.

5.1.1.3.1, 5.1.1.3.2. 5.1.1.3.5 Solvent stability test The elution time of the solvent used is measured periodically. If the elution time of the solvent exceeds 1 % of the initial value (the initial value is the solvent elution time measured after solvent preparation), the solvent shall be discarded, and a new solvent shall be prepared.

5.1.1.4 Sample 5.1.1.4.1 WEIGH (0.125 ± 0.005) g of sample to the nearest

0.1 mg, and PLACE it in an Erlenmeyer flask with stopper. If the water content of the sample is more than 0.5 %, the sample shall be placed in a vacuum drying oven at a

5.1.1.6 Test procedure 5.1.1.6.1 FILTER the solution through a filter and ADD it to the Ubbelohde viscometer so that the liquid level is between the liquid filling lines.

5.1.1.7 Calculation of results 5.1.1.7.1 For tests using phenol/1,1,2,2-tetrachloroethane (mass ratio 50.50) as solvent, calculate the relative viscosity (η_{rel}), the specific viscosity (η_{sp}) and the intrinsic viscosity ($[\eta]$) according to formula (3) ~ formula (5).

5.1.1.8 Expression of results The calculation result of the intrinsic viscosity is expressed as the average value of the test values of the two parallel samples, and rounded off to the third decimal place according to GB/T 8170.

5.1.1.9 Precision 5.1.1.9.1 Repeatability For the determined values of two independent test results obtained under repeatability conditions, when the intrinsic viscosity is

0.630 dL/g ~

0.720 dL/g, the absolute difference between the two tests does not exceed the repeatability limit (

0.006 dL/g), and the case where it exceeds the repeatability limit (

0.006 dL/g) does not exceed 5 %. 5.1.1.9.2 Reproducibility The absolute difference between the two independent test results obtained under reproducibility conditions, when the intrinsic viscosity is

0.630 dL/g ~

0.720 dL/g, is not greater than the reproducibility limit (

0.010 dL/g), and the case where it exceeds the reproducibility limit (

0.010 dL/g) does not exceed 5 %.