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GB/T 3780.18-2017

Replacing GB/T 3780.18-2007

Carbon Black - Part 18: Standard Test Methods for Evaluation in Natural Rubber (NR)

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Issued by: General Administration of Quality Supervision, Inspection and Quarantine;
Standardization Administration of PRC.

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Foreword

GB/T 3780 *Carbon Black* can be divided into the following parts:

--- Part 1: Test Method for Iodine Adsorption Number;

--- Part 2: Determination of Dibutyl Phthalate Absorption Number;

--- Part 4: Determination of Oil Absorption Number for Compressed Sample;

--- Part 5: Determination of Specific Surface Area - CTAB Test Method;

--- Part 6: Determination of Tinting Strength;

--- Part 7: Determination of pH Value;

--- Part 8: Determination of Heating Loss;

--- Part 10: Determination of Ash;

--- Part 12: Inspection of Impurity Material;

--- Part 14: Determination of Sulfur Content;

--- Part 15: Determination of Light Transmittance of Toluene Extract;

--- Part 17: Indirect Determination of Particle Size - Reflectance Method;

--- Part 18: Standard Test Methods for Evaluation in Natural Rubber (NR);

--- Part 21: Determination of Sieve Residue - Water Flushing Method;

--- Part 22: Calculation of Process Indexes from an Analysis of Process Control Data;

--- Part 23: Sampling and Testing of Carbon Black Fugitive Emissions or Other Environmental Particulate;

--- Part 24: Determination of Void Volume.

This Part belongs to Part 18 of GB/T 3780.

This Part was drafted as per the rules specified in GB/T 1.1-2009.

This Part replaced GB/T 3780.18-2007 *Carbon Black - Part 18: Standard Test Methods for Evaluation in Natural Rubber (NR)*; compared with GB/T 3780.18-2007, this Part has the major changes as follows:

Carbon Black - Part 18: Standard Test Methods for Evaluation in Natural Rubber (NR)

WARNINGS: Personnel using this Part shall have practical working experience in the formal laboratory. This Part does not address all the possible security issues. The users are responsible to take appropriate safety and health measures; and ensure the compliance with conditions set by relevant national regulations.

1 Scope

This Part of GB/T 3780 specifies the rubber ingredients, test formulations, compound mixing procedures and test methods for identifying the physical and mechanical properties of carbon black in natural rubber.

This Part is applicable to identify various types of rubber carbon black.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 528 Rubber, Vulcanized or Thermoplastic - Determination of Tensile Stress-Strain Properties

GB/T 3778 Carbon Black for Use in Rubber Products

GB/T 6038 Rubber Test Mixes - Preparation， Mixing and Vulcanization - Equipment And Procedures

GB/T 9869 Rubber - Measurement of Vulcanization Characteristics with the Oscillating Disc Cure Meter

HG/T 2725 Standard Practice for Carbon Black - Sampling Bulk Shipments

15) Mixing	1.5	3.0
Total	3.0	

5.4.2 Turn off the motor; lift the top plug; discharge from the mixing chamber. If necessary, record the rubber compound temperature.

5.4.3 Start the open mill at the room temperature; adjust the roll gap to 0.8mm; fold the rubber compound and pass it to the open mill for 5 times above; keep the rolling direction consistent for each time.

5.4.4 Review the mass of the rubber compound; if the mass of the rubber compound exceeds 64.12g ~ 64.76g, such rubber compound shall be discarded.

5.4.5 If a stress-strain test is required, the thickness of rubber compounding falling sheet shall be controlled at about 2.2mm.

5.4.6 If it is required to perform the vulcanization characteristics test as per the test method of GB/T 9869; the thickness of rubber compound falling sheet shall be controlled at about 6mm.

5.4.7 Place the rubber sheet on a flat and dry metal plate; stand for 1h ~ 24h at (23±2) °C; the relative humidity shall be controlled at (50±10) %; otherwise, store the rubber sheet into the cool and sealed container and prevent moisture absorption.

6 Preparation and Test of Vulcanized Test Piece

6.1 The preparation and vulcanization of vulcanized sheet for stress-strain test shall be performed as per the following procedures (see GB/T 6038):

a) The vulcanization mod shall be designed as per the test piece size of 150mm×150mm×2mm; cut the rubber sheet (5.2.5, 5.3.4, 5.4.7) into the rubber test piece with length and width 3mm less than that of the vulcanization mold; mark the specimen name, specimen number, rolling direction. Each piece of rubber sheet shall be weighed to be (54±1) g.

b) Adjust the temperature of vulcanizer (GB/T 6038) plate to be (145±1) °C.

c) Place the mold (6.1.1) in an appropriate position of the vulcanized flat plate (GB/T 6038); after pre-heating 20min, quick mold vulcanization.

d) After mold is applied, when the pressure applied to the mold meets the requirement (GB/T 6038), immediately time it; the vulcanization time error is allowed to be 20s.

e) Vulcanization time: S series carbon black is 50min; other carbon black is 30min.

The difference between two independent test results under reproducibility condition of 300% tensile stress at a given elongation shall not exceed 1.37MPa; the tensile stress shall not exceed 1.67MPa; the elongation at break shall not exceed 45.9%.

7.3 Micro internal mixer method – test method C

7.3.1 Repeatability

The difference between two independent test results obtained under repeatability condition of 300% tensile stress at a given elongation shall not exceed 0.64MPa; the tensile stress shall not exceed 0.62MPa; the elongation at break shall not exceed 28.7%.

7.3.2 Reproducibility

The difference between two independent test results under reproducibility condition of 300% tensile stress at a given elongation shall not exceed 1.07MPa; the tensile stress shall not exceed 3.02MPa; the elongation at break shall not exceed 86.4%.

8 Test Report

The test report shall contain the following contents:

a) Specimen name and mark;

b) The standard on which this test is based;

c) Laboratory temperature and humidity;

d) The name of the used reference carbon black;

e) Rubber compound mixing method;

f) Test results;

g) Difference between the applied test procedures and the basic analysis procedures;

h) Anomalies that occur during the test;

i) Test date.

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