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GB/T 479-2016

Replacing GB/T 479-2000

Determination of plastometric indices of bituminous coal

烟煤胶质层指数测定方法

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1 Scope

China's national method for the plastometric indices of bituminous coal - the Sapozhnikov test, which measures what a coal does in the narrow band of temperature where it softens, becomes plastic and then resolidifies into coke. It is one of the two or three determinations on which a coking blend is actually built, because a coal that does not pass through a plastic stage will not bond the blend, and one that swells too much in it will damage the oven wall. The standard specifies the method for determining the plastometric indices of bituminous coal: the maximum thickness of the plastic layer, the final contraction, and the shape of the volume curve that records the movement of the charge throughout the heating. It applies to bituminous coals. A weighed charge is packed into a standard coal cup and heated from below at a controlled rate so that a plastic layer forms and travels upward through the charge; a probe is lowered at intervals to find the upper and lower boundaries of that layer, and a recorder traces the movement of the load plate against time, from which the contraction and the character of the volume curve are read. The determination is unusually dependent on technique, which is why the standard runs to thirty pages and six annexes: the packing of the cup and the asbestos gasket that seals it, the heating schedule and its tolerance, the probing, the cleaning of the cup between tests, and the removal of the coke button all affect the result, and the standard gives each of them, together with a normative annex on discriminating the technical characteristics of the coke produced and a

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test record sheet. Issued on 13 December 2016 and in force since 1 July 2017, it replaces GB/T 479-2000.

This Standard specifies the terms and definitions, method summary, reagents and materials, instruments and equipment, coal samples, test preparation, test procedures, result expression, method precision and test report for the plastometric indices of bituminous coal. This Standard is applicable to the bituminous coal.

2 Normative references

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

GB 474 Method for preparation of coal sample

GB/T 483 General rules for analytical and testing methods of coal

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 483 and the following ones apply. For ease of use, some of the terms and definitions in GB/T 483 are repeatedly listed below.

3.1 Plastometric indices Indices for characterizing the plasticity of bituminous coal proposed by Sapozhnikov, expressed in the maximum thickness of plastic layer, value of Y, the final contraction value (plastometric shrinkage), value of X, etc.

3.2 Maximum thickness of plastic layer The maximum distance between the curves of the layers plotted at each point on the upper and lower layers of the colloid, which is measured in the determination of the plastometric indices of bituminous coal.

3.3 Volume curve of plastic layer The curve on the upper layer of the colloid, changing with the temperature, which is recorded in the determination of the plastometric indices of bituminous coal.

4 Method summary

PUT a certain amount of coal sample into a coal cup. PLACE the coal cup in a special electric furnace. Then, PERFORM one-sided heating at a predetermined heating rate. Correspondingly, coal sample forms three isothermal layers of semi-coke layer, plastic layer and un-softened coal sample layer.

5 Reagents and materials

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5.1 Paper tube. On a thin steel rod, cigarette paper is made into a paper tube with a diameter of 2.5mm to 3mm and a height of about 60mm by adhesion. When installing the coal cup, INSERT the steel rod into the paper tube. FOLD the paper tube at the bottom for about 2mm.

5.2 Filter paper strip. qualitative filter paper in strips, about 60mm wide and 190mm to 200mm long.

5.4 Volume curve recording paper. Standard calculation paper (millimeter coordinate paper) is used as the volume curve recording paper, whose

5.5 Certified reference material for the plastometric indices of bituminous coal.

5.6 Dry abrasive cloth. brown corundum abrasive, with a particle size of P80,

6.1 Plastometric index tester

6.1.1 Instrument structure There are two types of instruments. One type has counterweights (Figure 1), and the other type has no counterweights (except that there is no counterweight, the rest of the structure is the same as that shown in Figure 1).

6.1.2 Pressure inspection on the cross section of coal sample After purchasing or moving the instrument and replacing the main parts of the instrument, it is necessary to check the pressure on the cross section of coal sample. SEE Annex B for the inspection method.

6.1.3 Automatic plastometric index tester The instruments and equipment, accessories, temperature and heating rate of the automatic plastometric index tester shall meet the relevant requirements specified in this Standard.

6.2 Heating furnace The heating furnace is composed of upper brickwork (Figure 2), lower brickwork (Figure 3) and electric heating elements. The requirements for each part are as follows:

6.3 Programmable temperature controller The temperature in a heating furnace is able to be controlled as follows: When the temperature is lower than 250°C, the heating rate is about 8°C/min. When the temperature is above 250°C, the heating rate is 3°C/min. When the temperature is within the range of 350°C to 600°C, the difference between the display temperature and the temperature that shall be reached shall not exceed 5°C. In the rest of the time, the difference shall not exceed 10°C.

6.6 Probe Each probe (Figure 7) consists of a steel pin and an aluminum scale. The steel pin has a diameter of 1mm, which is blunt at the bottom. The minimum scale on the scale is 1mm.

6.7 Counter balance It shall have a maximum weighing capacity of 500g, with a sensitivity of 0.5g.

6.8 Sampling shovel The sampling shovel is rectangular, with a width of 30mm and a length

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of 45mm.

6.9 Thermocouple Nickel chromium-nickel aluminum or nickel chromium-nickel silicon thermocouple shall be generally calibrated once a year. Re-calibration shall be carried out after thermocouple replacement or re-welding.

7 Coal sample

7.1 The coal samples for the determination of plastometric indices shall be prepared according to GB 474 to a particle size of not less than 3mm.

7.2 The samples that reach air-dried status shall be stored in a ground-glass stoppered flask or other closed containers. KEEP in a cool place.

8 Test preparation

8.1 Cleaning the coal cups The residual coke breeze on the coal cups, thermocouple wells and pressure plates shall be manually cleaned up with a piece of adhesive cloth (5.6), and may also be removed by using the mechanical method of Annex D. Each blowhole on the bottom of the cup and the pressure plate shall be smooth. There shall be no foreign matter in the thermocouple wells.

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8.2 Installing the coal cups

8.2.1 PLACE the bottom of the cup into the coal cup so that the lower part of the cup protrudes into the round hole at the bottom of the coal cup. The center point of the groove of the thermocouple iron pipe at the bottom of the cup shall be aligned with the center point of the cavity of the thermocouple on the pressure plate.

8.2.4 Each sample is divided into four parts by coning and quartering, and then loaded into the coal cup four times. After each 25g is loaded, USE a metal wire to flatten the coal sample without tamping.

8.2.5 After loading the sample, REMOVE the pressing plate temporarily. Carefully LAY the upper asbestos round cushion flat on the coal sample. FOLD the exposed edge of filter paper on the asbestos round cushion.

8.2.6 During the test, in case of producing colloids with a large fluidity and thus overflowing the pressure plate, the sample shall be reloaded according to the procedures of

8.2.1 To

8.2.5 for testing. In the process of sample reloading, after folding the filter paper, USE a pressure plate for flattening, then USE an asbestos rope with a diameter of 2mm to 3mm to round the cup wall and the outer wall of the thermocouple iron pipe above the filter paper and the asbestos cushion in a circle.

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