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

GB/T 10707-2008

Replacing GB/T 13488-1992

Rubber - Determination of the burning

橡胶燃烧性能的测定

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Foreword

This standard replaces GB/T 10707-1989 "Rubber - Determination of flammability by oxygen index" and GB/T 13488-1992 "Rubber - Determination of the burning behavior of vertical specimens". The main technical differences between this standard and GB/T 10707-1989 "Rubber - Determination of flammability by oxygen index" and GB/T 13488-1992 "Rubber - Determination of the burning behavior of vertical specimens" are as follows:

- ADD clause 3 "Terms and definitions";
- In clause 5.4.3, ADJUST the distance between the lamp holder and the lower end of the specimen from 10 mm to $10\text{ mm} \pm 1\text{ mm}$; in clauses

- 5.4.3 and 5.4.4, ADJUST the flame time applied from 10 s to $10\text{ s} \pm 5\text{ s}$;
- For the number of specimens in the oxygen index method, CHANGE it from "at least 15 specimens" into that "for the rubber materials with a known oxygen index value range within ± 2 , it shall prepare

15 specimens; for the rubber materials with unknown oxygen index or unstable burning features, prepare 15 ~ 30 specimens"; - In clause

5.3.1 Vertical burning method, CHANGE the specimen size from the original "length 130 mm $\pm$ 3 mm, width

0.3 mm, thickness

0.2 mm" into "length 130 mm $\pm$ 5 mm, width

0.5 mm, thickness

0.25 mm"; - MODIFY the formula (1); - ADD the content of informative Appendix D. Appendix A of this standard is normative; Appendix B, Appendix C and Appendix D are informative. This standard was proposed by the China Petroleum and Chemical Industry Association. This standard shall be under the jurisdiction of the National Rubber and Rubber Products Standardization Technical Committee Sealing Products Subcommittee (SAC/TC 35/SC 3). Drafting organizations of this standard. Northwest Rubber Plastics Research and Design Institute, Anhui Zhongding Sealing Parts Co., Ltd., Zhuzhou Times New Material Technology Co., Ltd., Zhejiang Quality and Technical Supervision and Testing Institute. The main drafters of this standard. Dong Xiaowu, Chen Jinyang, Wang Jin, Shen Zhen. This standard replaces the standard previously issued as follows: - GB/T 10707-1989; - GB/T 13488-1992. Rubber - Determination of the burning

1 Scope

GB/T 10707-2008 is the Chinese national standard on rubber - determination of the burning, in the field of rubber and plastic industries. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 4 June 2008 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 December 2008. Classification: ICS 83.140.01, CCS G40. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies two methods for determining the burning properties of rubber in a laboratory environment. the oxygen index method (method A) and the vertical burning method (method B). This standard is applicable to evaluate the burning properties and flame- retardant properties of rubber materials in a laboratory environment. It is not suitable to evaluate the fire hazard of rubber materials under actual use conditions.

2 Normative references

The provisions in following documents become the provisions of this standard through reference in this standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this standard; however, parties who reach an agreement based on this standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 2941-2006 Rubber - General procedures for preparing and conditioning test pieces for physical test methods (ISO 23529.2004, IDT)

GB/T 3863 Industrial oxygen

3 Terms and definitions

The terms and definitions as established by HG/T 3095 as well as the following terms and definitions apply to this standard.

4 Methods A - Oxygen index method

4.1 Principle of test The specimen is vertically supported in a transparent burning cylinder, which has an upward flowing mixed-gas of oxygen and nitrogen.

4.2 Test device The test device is as shown in Figure 1.

4.2.1 Burning cylinder. A heat-resistant transparent glass cylinder that can stand upright on the base. Its inner diameter is 75 mm and the total height is 450 mm, to ensure the airflow velocity in the cylinder is $40 \text{ mm/s} \pm 10 \text{ mm/s}$.

4.2.2 Specimen holder. A clip that holds the specimen vertically at the axial center of the burning cylinder.

4.2.3 Gas source. Oxygen shall meet the requirements of GB/T 3863; nitrogen shall meet the requirements of GB/T 3864.

4.2.4 Gas measurement and control system. It consists of pressure gauge, regulating valve, rotameter (the minimum scale of oxygen and nitrogen rotameter is

0.05 L/min).

4.2.5 Ignitor. A tube that projects into the burning cylinder to ignite the specimen. The nozzle has a diameter of $2 \text{ mm} \pm 1 \text{ mm}$. Gas can be selected from propane, butane, liquefied petroleum gas, natural gas, etc., based on actual conditions. The length of the flame ejected vertically downward from the nozzle during burning is $16 \text{ mm} \pm 4 \text{ mm}$.

4.2.6 Timer. A stopwatch with a minimum scale value of

0.1 s or other equivalent timing device.

4.4 Test procedure

4.4.1 Check the test device to ensure it is in good condition. The burning cylinder should be placed vertically. The specimen is clamped vertically on the specimen holder at the center of the cylinder. The top of the specimen is at least 100 mm from the cylinder mouth.

4.4.5 Burning features are evaluated as follows:

4.4.5.1 If the specimen burns for less than 180 s or the flame self-extinguishes before it burns to the 50 mm mark, it is recorded as the feature "0", meanwhile the burning time and burning length are recorded.

4.4.5.2 If the specimen burns for more than 180 s or it burns beyond the 50 mm mark, it is recorded as the feature "X", meanwhile extinguish the specimen.

4.4.5.3 If there are phenomena such as droplets, caking, unstable burning, smoldering, etc., they are also recorded as burning features.

4.4.11 Calculate the estimated standard deviation σ of the oxygen concentration (including cf) which is used in the last 6 specimens (see 4.5.3). If the following relationship holds.

4.5.2 Determination of k value The k value and its positive-negative sign are dependent on the features of the specimen, which can be determined from Table 1 as follows:

4.5.2.1 If the feature "0" is obtained by the test in 4.4.8, then the first opposite feature (see 4.4.9) shall be "X". From the last four feature arrangements per row in the first column of Table 1, find the row that is exactly the same as the feature arrangement as obtained in 4.4.10. Then, based on the number of features "0" as obtained in

4.4.8 and 4.4.9, find the column with the same number from the row (a). The intersection of rows and columns is the calculated k value.

5 Method B - Vertical burning method

5.1 Principle of test The specimen is vertically clamped on the holder, the lower end is burned in a specified flame for a certain period of time, then move away the flame, meanwhile measure the burning behaviors such as the duration of flame burning and the flameless burning, to evaluate the burning property grade of the specimen.

5.2 Test device The test device is shown in Figure 2.