# GB

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# GB/T 19208-2008

Replacing GB/T 19208-2003

# Ground vulcanized rubber

硫化橡胶粉



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**Issued by:** **General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;**

**Standardization Administration of the People's Republic of China.**

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# Foreword

This Standard is corresponding to ASTM D 5603:2001 “Standard Classification for Rubber Compounding Materials - Recycled Vulcanized Particulate Rubber”. The consistent degree is not equivalent.

The main differences between ASTM D 5603:2001 and this Standard are as follows:

— ADD the terms and definitions;

— The ground vulcanized rubber is divided into three categories according to the category and special purpose of rubber products:

1) Ground vulcanized rubber of whole tire, which is divided into 2 series according to the structure: radial tire and diagonal tire;

2) Non-tire ground vulcanized rubber, which is divided into 4 series according to the texture: butyl rubbers, nitrile rubber, ethylene propylene diene monomer rubber, and polyurethane rubber;

3) Ground vulcanized rubber of road modified asphalt, which is divided into 2 series according to the application: all-steel radial tire and other tires.

— ADD the requirements for the content of harmful substances and the determination methods of harmful substances;

— DELETE the mechanical screening method for residues on sieve in the original edition;

— ADD the determination of tensile strength and elongation at break;

— DELETE “vulcanization flat band method” in the density determination items.

This Standard replaces GB/T 19208-2003 “Ground vulcanized rubber”.

Compared with GB/T 19208-2003, the main changes of this Standard are as follows:

— ADD the safety statement;

— ADJUST the normative references (see Chapter 2);

— ADD the terms and definitions (Annex A of this edition);

— RE-CLASSIFY ground vulcanized rubbers (Table 1 of this edition);

— MODIFY and add some technical indexes and requirements (Table 2 and Table 3 of this edition);

— ADD the requirements for the content of harmful substances and the determination methods of harmful substances (5.4 and 6.1.5 of this edition);

— CHANGE the inspection item of “moisture mass fraction” to “heating loss” (see 6.1.1);

— MODIFY the determination method of residues on sieve; DELETE the mechanical screening method in the determination of residues on sieve (6.2.1 of this edition);

— ADD the calculation equations of acetone extracts, residues on sieve, ferric content, and fiber content (6.1.3, 6.2.1.3, 6.2.2, and 6.2.3 of this edition);

— CHANGE “determination of injection density” to “determination of volume density” and specify the determination methods (6.2.4 of this edition);

— ADD the plasticating conditions of natural rubbers; CHANGE the roller temperature of “40 ± 5°C” to “(50 ± 5)°C” (Table 6 of this edition);

— MODIFY the vulcanizing time of samples (6.2.6.1 of this edition);

— MODIFY the inspection rules (Chapter 7 of this edition).

The Annex A of this Standard is normative.

This Standard was proposed by China Petroleum and Chemical Industry Association.

This Standard shall be under the jurisdiction of China National Technical Committee for the Standardization of Rubber and Rubber Products (SAC/TC 35).

Responsible drafting organization of this Standard: Tianjin Rubber Industry Institute.

Participating drafting organizations of this Standard: Shenyang Rubber Research & Design Institute of China Rubber Group, Jiangsu Yanning Jinbang Technology Development Co., Ltd., Jiangxi Yazhong Rubber Plastic Co., Ltd., and Jiangsu Jiangyin Tailian Superfine Rubber Powder Factory.

Main drafters of this Standard: Li Zian, Zheng Jiangong, Liu Huichun, Long Xiang, Luo Yazhong, and Xue Fengqing.

The historical version replaced by this Standard is as follows:

— GB/T 19208-2003.

# Ground vulcanized rubber

**Warning — Anyone who uses this Standard shall have working experience in professional laboratory. This Standard does not cover all the possible safety problems. Users have responsibilities to take suitable safety and health measures, which shall be ensured that they are conform to the conditions specified in the relevant national laws and regulations.**

## 1 Scope

This Standard specifies the classification, technical requirements, test methods, inspection rules, packaging, marks, storage, and transportation requirements of ground vulcanized rubbers that are extracted from various recycled vulcanized rubbers.

This Standard is applicable to the ground vulcanized rubbers of different particle diameters which are made from various vulcanized rubbers according to the process conforming to the national economic recycling requirements.

## 2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For 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 528 Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties (GB/T 528-1998, eqv ISO 37:1994)

GB/T 2449-2006 Sulfur for industrial use

GB/T 2941 Rubber - General procedures for preparing and conditioning test pieces for physical test methods (GB/T 2941-2006, ISO 23529:2004, IDT)

GB/T 3185-1992 Zinc oxide (Indirect method)

GB/T 3516-2006 Rubber - Determination of solvent extract (ISO 1407:1992, MOD)

GB/T 4498-1997 Rubber - Determination of ash (eqv ISO 247:1990)

GB/T 5330-2003 Industrial woven metal wire cloth (square opening series)

GB/T 6038 Rubber test mixes - Preparation, mixing and vulcanization - Equipment and procedures (GB/T 6038-2006, 150 2393:1994, MOD)

GB/T 8089-2007 Raw natural rubber - Smoked sheet, white crepes and pale crepes

GB/T 8829-2006 Vulcanizing accelerator NOBS (ISO 11235:1999, NEQ)

GB/T 9103-1988 Industrial stearic acids

GB/T 11407-2003 Vulcanizing accelerator M

GB/T 14837-1993 Rubber and rubber products - Determination of composition by thermogravimetry

SJ/T 11365-2006 Testing methods for hazardous substances in electronic information products

# 3 Terms and definitions

The terms and definitions defined in Annex A are applicable to this Standard.

# 4 Classification

The ground vulcanized rubbers are classified according to the category of materials used and the special purposes of ground rubbers; the method is shown in Table 1.

**Table 1 Classification of ground vulcanized rubbers**

| Class | Code | Material used |
|---|---|---|
| Ground vulcanized rubber of whole tire | $A_1$ | Radial tire which has no use value |
| | $A_2$ | Diagonal tire which has no use value |
| Ground vulcanized rubber of non-whole-tire | $B_1$ | Butyl rubber product which has no use value |
| | $B_2$ | Nitrile rubber product which has no use value |
| | $B_3$ | Ethylene propylene rubber product which has no use value |
| | $B_4$ | Polyurethane rubber product which has no use value |
| Ground rubber for road modified asphalt [a] | $C_1$ | All-steel radial tire which has no use value |
| | $C_2$ | Other tires which have no use value |
| [a] Ground vulcanized rubber of road modified asphalt is only applicable to the paving of pavement layer and stress-absorbing waterproof interlayer of road. | | |

# 5 Requirements

SJ/T 11365-2006. ADOPT XRF power-spectral method. The device used is X-ray fluorescence analyzer. For sampling method, directly measure the sample (do not destroy the sample). The test range covers lead (Pb), mercury (Hg), and cadmium (Cd).

**6.1.5.2 Determination of polybrominated diphenyl (PBB) and polybrominated diphenyl ether (PBDE) contents**

DETERMINE the contents of polybrominated diphenyl (PBB) and polybrominated diphenyl ether (PBDE) according to the specifications of Chapter 6 in SJ/T 11365-2006. ADOPT gas chromatography-mass spectrum (GC-MS) method and selective ion monitoring mode (SIM).

**6.1.5.3 Determination of hexavalent chromium ($Cr^{6+}$) content**

DETERMINE the content of hexavalent chromium ($Cr^{6+}$) according to the specifications of 8.2 in SJ/T 11365-2006. ADOPT colorimetric method.

**6.2 Physical tests**

**6.2.1 Determination of residues on sieve**

**6.2.1.1 Sieve**

The standard sieve to screen ground vulcanized rubbers is made of stainless steel or brass. The diameter of standard sieve is 200 mm. The sieve is selected according to R20 series mesh size method in GB/T 5330-2003.

**6.2.1.2 Test procedures**

USE the balance, of which the sensitivity is 0.01 g, to weigh 100 g of ground vulcanized rubbers; ADD 10 g of talcum powders with the particle diameter of 56 μm (300 mesh); PLACE in a 500 ml beaker; USE a glass rod to stir to make ground vulcanized rubbers and talcum powders uniformly distributed; PUT the mixed sample on the sample-screen-sieve which is installed with collection plate and cover. The sample-screen-sieve is the upper-level adjacent sample-screen-sieve (particle diameter is greater than the tested sample). When sieving, SHAKE the sieve with two hands horizontally for 1 min; then knock on the sample-screen-sieve's frame with one hand for 25 times (amplitude: 3 mm ~ 5 mm); USE the brush to brush the sieve, to make the sample sufficiently pass the sieve. If there are residues on the sample-screen-sieve, it is deemed as (non-zero sieve) unqualified sample, and the test is terminated. If there is not residue on the sample-screen-sieve, the samples which have passed the sieve and been collected on the collection plate shall be moved to the lower level sieve to conduct the same operation, so as to make the samples sufficiently screened. When the quantity of the sample that passes through the sieve is less than 0.01 g, stop the screening; weigh it, accurate to 0.001 g.

# 7 Inspection rules

## 7.1 Sampling

### 7.1.1 Sampling scheme

The quantity of randomly selected sample bags that contain ground vulcanized rubbers shall not be lower than the values given in Table 7. The sampling quantity of each bag shall be uniform. The total quantity of sample shall not be lower than 1500 g.

**Table 7 Minimum sampling quantity [a]**

| Total quantity of sample bag | Minimum quantity of selected sample bag |
|---|---|
| 0~100 | 3 |
| 100~500 | 6 |
| More than 500 | 9 |
| [a] The sampling quantity of the ground vulcanized rubbers packed in tons shall be conducted according to the standard agreed by both supplier and purchaser through negotiation. | |

### 7.1.2 Collecting method of samples

From the opened sealing of the selected packaging bag of sample ground rubbers, use the stainless steel sampling spoon with handle to take the sample; the quantity of sample taken from each bag shall be equal. Put the samples in the sample container. SEAL the bag after sampling. MIX the samples taken from different sample bags in a container to obtain the uniformly distributed samples.

## 7.2 Factory-exit inspection

The index-items specified in this Standard are factory-exit inspection items.

## 7.3 Determination rules

Inspection shall be conducted according to the technical requirements. If any one of items fails to conform to the standard, take the samples twice as much as the original quantity to re-inspect on the non-conforming items. If the re-inspection still fails to conform to this Standard, this batch of products is deemed as unqualified.

# 8 Packaging, mark, storage, and transportation

## 8.1 Packaging

The weight of each bag of ground vulcanized rubbers is 25 kg, or can be mutually agreed through negotiation of both supplier and purchaser.

The materials of inner package shall be sealed moisture-proof materials. The

materials of outer package shall be mutually agreed through negotiation of both supplier and purchaser.

Each batch of products shall be provided with product qualification certificate. The content of qualification certificate shall include product name, brand, model, production date, manufacturer, production batch, serial number of this Standard, and main technical parameters.

**8.2 Mark**

The following information shall be indicated on each package at least:

a) Name or brand of manufactures;

b) Serial number of this Standard;

c) Product name;

d) Product No.;

e) Product batch No.;

f) Production date.

**8.3 Storage and transportation**

There shall be covering on products during storage and transportation. It is strictly forbidden to put acid, alkali, oil, and other substances which may influence the product quality together with products during storage and transportation. The storage ambient temperature shall be lower than 50°C. The products shall be 1 m away from heat source and shall be kept at certain distance from ground and wall.

If the above storage conditions are satisfied, within 45 d since the delivery of products, the performance of products shall comply to this Standard.

# Annex A

**(Informative Annex)**
**Terms and definitions**

### A.1 Ground vulcanized rubber

The particulates of different particle sizes which are made from vulcanized rubbers in which non-rubber contents have been removed after being through various grinding and screening processes.

#### A.1.1 Ground vulcanized rubber of whole tire

The ground vulcanized rubbers which are made from scrap tires.

#### A.1.2 Ground vulcanized rubber of synthetics

The ground vulcanized rubbers which are made from various synthetic rubber products.

#### A.1.3 Ground vulcanized rubber of other

The ground vulcanized rubbers which are made from various-sized inner tubes, industrial rubber products, and civilian used rubber products.

#### A.1.4 Treated particle

The ground vulcanized rubbers of which the surface of particle has been treated by chemical agents, so it has some properties and can be directly used.

### A.2 Radial tire

The pneumatic tires with belt ply hooping carcass whose cord thread of carcass ply is 90° or near 90° from the central line of tread and cannot be expanded basically.

### A.3 Diagonal/bias-ply tire

The pneumatic tires whose carcass ply is crossed with cord thread of each adjacent layer, and is less than 90° from the central line of tread.

### A.4 Synthetic rubber

The macromolecule elastomer that is made from the monomers which are extracted from oil through copolymerization.

### A.5 Reclaimed rubber of general

The general term of the means of grinding at natural ambient temperature conditions.

**A.9.3 Super fine grinding**

The grinding process which grinds scrap rubbers into the ground rubbers with the particle size smaller than 140 μm (120 mesh).

**A.9.4 Fine grinding**

The grinding process which grinds scrap rubbers into the ground rubbers with the particle size of 1000 μm ~ 140 μm (20 mesh ~ 120 mesh).

**A.9.5 Coarse grinding**

The grinding process which grinds scrap rubbers into the ground rubbers with the particle size greater than 1000 μm (20 mesh).

**A.9.6 Cryogenic grinding**

The general term of the means of grinding vulcanized rubbers at the temperature lower than the glassy state temperature of vulcanized rubbers.

**A.9.7 Chopping by blade of hob**

The general term of the means of grinding scrap rubbers by the grinding force generated due to the rotation of multiple-cutting-edge rolling cutters.

**A.9.8 Scrunch by roller**

The general term of the means of grinding scrap rubbers by the velocity ratio generated due to the contra-rotating at different speeds of two rollers with groove, or two rollers without groove, or one roller with groove and one without groove.

**A.9.9 Grinding by millstones of wheel**

The general term of the means of grinding scrap rubbers by the grinding force generated due to the rotation of grinding wheels.

**A.9.10 Grinding by millstones**

The general term of the means of grinding scrap rubbers by the shear force generated due to the relative movement of toothed millstones.

**A.9.11 Wet (solution) grinding**

The general term of the means of grinding vulcanized rubbers by adding alkaline solution firstly and then adding acid solution to neutralize.

**A.9.12 Grinding by millstones of taper**

The general term of the means of grinding scrap rubbers by the shear force generated due to the relative movement of millstones with tapers.

**A.10 Magnetic separation**

The process of using magnetic separation devices to remove metals in ground rubbers which can be attracted by magnetic force.

**A.11 Inductive separation**

The process of removing metals and other impurities by electrostatic induction devices.

**A.12 Screening operation**

The process of removing parts of fibers through the grading-screening of various-mesh sieves.

**A.13 Defibering**

The process of removing fibers in ground rubbers through winnowing, screening or by electrostatic separation devices.

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