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

GB 18173.4-2010

**Polymer water-proof materials -- Part 4: Rubber gasket for
shield-driven tunnel**

高分子防水材料 第4部分：盾构法隧道管片用橡胶密封垫

(English Translation)

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Foreword

4.1,4.2,4.3 this section (except hardness in Table 3), 7.3, 7.4 are mandatory, the rest are recommended.

GB 18173 "polymer waterproof material" is divided into the following four parts.

- Part 1. a sheet;
- Part 2. Sealing;
- Part 3. water swelling rubber;
- Part 4. shield tunnel segment rubber seal.

This is Part 4.

This section in Appendix A, Appendix B is an informative annex.

This part is proposed by the China Petroleum and Chemical Industry Association.

This part of the National Standardization Technical Committee rubber products rubber sundries and Technical Committee (SAC/TC35/SC7) centralized.

This section is drafted. Northwest Rubber Plastic Research and Design Institute, Jiangyin Haida Rubber and Plastic Co., Ltd., Shanghai tunnel bridge special rubber plant, Jiangsu Province Product Quality Supervision and Inspection Institute, Shanghai Zijiang Rubber

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1 Scope

GB 18173 provisions of this part of the shield tunnel segment rubber seal (hereinafter referred to as the rubber gasket) classification, requirements, test Test methods, inspection rules and signs, packaging, transportation and storage and so on.

This section applies to rubber as the main material, shield tunnel segments Assembled waterproof rubber seal. Mainly used for subway, public Roads, railways, water supply and drainage, power engineering shield tunnel seam waterproof.

2 Normative references

The following documents contain provisions which, through reference in this section GB 18173, constitute provisions of this part. For dated reference documents Member, all subsequent amendments (not including errata content) or revisions do not apply to this section, however, encouraged to reach under this section Parties to research agreement to use the latest versions of these documents. For undated reference documents, the latest versions apply to this section.

GB/T 528-1998 vulcanized rubber or thermoplastic rubber tensile stress strain properties (eqvISO 37.1994) GB/T 531.1-2008 vulcanized rubber or thermoplastic rubber indentation hardness test methods - Part 1. Method Shore Hardness (Shore Seoul hardness) (ISO 7619-1:2004, IDT) GB/T 2423.16-2008 Environmental testing for electric and electronic products Part 2. Test methods - Test J and guidance. Mould growth (IEC 60068-2-10:2005, IDT) GB/T 3512-2001 vulcanized rubber or thermoplastic rubber hot air and heat accelerated aging test (eqvISO 188.1998) GB/T 3672.1-2002 Rubber Products tolerance - Part 1. Dimensional tolerances (idtISO 3302-1.1996) GB/T 7759-1996 vulcanized rubber, thermoplastic rubber at room temperature, high and low temperature compression set was measured (eqvISO 815.

1991)

GB/T 18173.3 polymer waterproof materials - Part 3 water swelling rubber Category 3 Rubber gasket according to the functions are divided into three categories.

a) elastomeric gasket [including chloroprene rubber (CR) seals, EPDM rubber (EPDM) gasket];

b) water swelling rubber gasket;

c) water swelling rubber and elastic rubber compound seals.

4 Requirements

4.1

Structure type rubber gasket, size and tolerances shall comply with prescribed procedures approved by the drawings and technical documentation requirements. No Tolerance when requested, the allowable deviation should be consistent with GB/T 3672.1-2002 in E2 grade requirements.

4.2 Appearance quality

Rubber gasket appearance quality should meet the requirements in Table 1.

Table 1 Appearance quality

Defects name

Quality requirements Face part of a non-face portion bubble 0.50mm ~ 1.00mm diameter bubbles per meter is not allowed Xu more than three 1.00mm ~ 2.00mm diameter bubbles per meter is not allowed Xu more than four Impurity Area of 2mm² ~ 4mm² impurities allowed per meter super Over three an area of 4mm² ~ 8mm² impurities allowed per meter super Over three Joint defects not allowed to have cracks and "sponge" phenomenon. Height 1.00mm ~ 1.50mm projections not more than 2 per meter not allowed to have cracks and "sponge" phenomenon. Height 1.00mm ~ 1.50mm projections not more than 4 per meter dent the depth of not more than 0.50mm, the area of 3mm² ~ 8mm² Dent, not more than 2 per meter the depth of not more than 1.00mm, the area of 5mm² ~ 10mm² Dent, not more than 4 per meter the difference between the central bore hole surrounding the eccentric symmetrical parts should not exceed the thickness of 1mm Face refers to the contact surface and a sealed tube sheet assembly seal between the gasket and the gasket groove pad contact surface.

4.3 Physical properties

4.3.1

elastomeric gasket physical properties of the finished product should be consistent with the provisions of Table 2. If the finished product does not have a cross-sectional structure of the slice sample preparation conditions, with Standard test specimens vulcanized rubber.

Table 2 elastomeric gasket physical properties of the finished product

project

index

Neoprene EPDM

Hardness (Shore A)/50 to 60 degrees I type a II type b 50 ~ 60 60 ~ 70 Hardness deviation/degree $\pm 5 \pm 5 \pm 5$ Tensile strength/MPa ≥ 10.5 9.5 10 Elongation at break /% ≥ 350 350 330 Compression set/% 70 °C x 24 0-2h, 25% ≤ 30 25 25 23 °C x 72 0-2h, 25% ≤ 20 20 15 Hot air aging 70 °C x 96h Hardness change/degree ≤ 8 6 6 Tensile strength decrease rate /% ≤ 20 15 15 Elongation at break reduced rate /% ≤ 30 30 30 Mildew rating of not less than two of not less than two of not less than two a I type is non-porous seal.

b II type is perforated seal.

4.3.2

water swelling rubber gasket rubber physical properties shall conform to Table 3. When finished slicing test, tensile strength, breaking elongation Long rates, repeated immersion test tensile strength, elongation at break performance indicators should reach 80% of the indicators specified in Table 3.

Table 3 water swelling rubber seal rubber physical properties

Project Specifications Hardness (Shore A)/of 42 ± 10 45 ± 10 Tensile strength/MPa ≥ 3.5 3

Table 3 (Continued)

Project Specifications Elongation at break /% ≥ 450 350 Volume expansion rate /% ≥ 250 400 Repeated immersion test Tensile strength/MPa ≥ 3 2 Elongation at break /% ≥ 350 250 Volume expansion rate /% ≥ 250 300 Flexibility at low temperature (-20 °C x 2h) no crack no crack 4.3.3 composite elastic rubber gasket physical properties shall conform to Table 2, the water-swellaable rubber physical properties should be consistent with Table 3 Provisions.

5 Test methods

5.1

Size with a vernier caliper (accuracy 0.02mm) and steel tape (accuracy of 1mm) measurement.

5.2

Appearance quality inspection conducted by visual and vernier caliper (accuracy 0.02mm).

5.3

hardness measurement conducted according to GB/T 531.1-2008 requirements.

5.4

tensile strength, elongation at break for determination according to GB/T 528-1998 requirements, and adopt the type II dumbbell specimen.