body of the present invention. In certain embodiments, the piston is a concrete piston.

Further, the present application also provides a delivery cylinder comprising the piston sealing body or piston of the present invention.

Further, the present application also provides a concrete pumping device (e.g., pump trucks, dragging pumps, truck-loaded pumps), comprising the piston sealing body, piston, or delivery cylinder of the present invention.

FIG. 1 and FIG. 2 exemplarily show the structure of the concrete piston sealing body of the present invention. FIG. 1 is a sectional diagram, and FIG. 2 is a local schematic diagram of the section of FIG. 1.

In the figures, the numbers in the figures denote:

1-angle of inner ring of the lip opening of concrete piston relative to horizontal plane,

2-angle of lip opening of concrete piston relative to horizontal plane,

3-angle of outer slope of the lip opening of concrete piston relative to vertical direction,

4-side friction surface of concrete piston,

5-lubricating grease storage groove of concrete piston,

6-schematic diagram of ultrahigh-molecular-weight polyethylene powder, ~~and~~

7-schematic diagram of polytetrafluoroethylene powder, and

8-schematic diagram of alumina powder.

~~7-schematic diagram of alumina powder.~~

In certain embodiments, the concrete piston sealing body of the present invention has the following main dimensions:

angle of inner ring of lip opening relative to horizontal plane: 40-45^{o};

angle of lip opening relative to horizontal plan: 3-10^{o};

angle of outer slope of lip opening relative to vertical direction: 15-25^{o};

width of side friction surface: 10-15 mm;

depth of lubricating grease storage groove: 3-5 mm.

The above piston sealing body is provided with a special oil storage groove that may take better lubricating effects.

Advantageous effects of the present invention

The piston sealing body of the present invention has one or more of the following

Claims

1. A composition for preparing a piston sealing body, in parts by weight, comprising the following components: 100 parts of a polyurethane prepolymer, 10 to 20 parts of a chain extender, 5 to 10 parts of a surface-silylated ultrahigh-molecular-weight polyethylene powder, 1 to 1.5 parts of an antioxidant, 1 to 2 parts of a surface-silyated alumina powder, and 1 to 3 parts of molybdenum disulfide or a sodiumized polytetrafluoroethylene powder.

2. The composition of claim 1, wherein the polyurethane prepolymer is in a polyether type;
preferably, the polyurethane prepolymer is selected from one or both of LF M2050 model and LF M2032 model;
preferably, the polyurethane prepolymer has one or more of the following features:
(1) free MDI content: lower than 0.1 wt%;
(2) isocyanate (-NCO) content: 3.0% to 5.0%;
(3) viscosity: 120 to 500 cps.

3. The composition of claim 1 or 2, wherein the surface-silylated ultrahigh-molecular-weight polyethylene powder is prepared according to a method comprising the following steps:
Step 1: oxidation treating an ultrahigh-molecular-weight polyethylene powder;
Step 2: making the oxidation-treated ultrahigh-molecular-weight polyethylene powder react with a silane coupling agent;
preferably, the oxidation treatment in Step 1 is conducted in a solution comprising potassium permanganate and nitric acid;
preferably, the solution is a mixed solution of a saturated potassium permanganate aqueous solution and a nitric acid aqueous solution (e.g., 50% to 60% nitric acid aqueous solution);
preferably, Step 1 comprises: charging the ultrahigh-molecular-weight polyethylene powder into the solution comprising potassium permanganate and nitric acid; after heating and stirring, filtering them to obtain a powder; and then repeatedly washing the powder with deionized water, and filtering and oven drying it;
preferably, the silane coupling agent is selected from the group of silane coupling agent KH540, silane coupling agent KH550, silane coupling agent KH560, and silane

coupling agent KH 570;
preferably, the weight of the silane coupling agent is 0.1% to 1% of the weight of the ultrahigh-molecular-weight polyethylene powder.

4. The composition of any one of claims 1 to 3, wherein the sodiumized polytetrafluoroethylene powder is polytetrafluoroethylene powder treated with sodium naphthalene;
preferably, the polytetrafluoroethylene powder is treated by the following steps: adding the polytetrafluoroethylene powder into a sodium naphthalene treatment solution where it is fully immersed, stirring for 10 to 15 minutes, filtering, and washing the powder with tetrahydrofuran and deionized water several times until no smell of the sodium naphthalene treatment liquid exists;
preferably, the sodium naphthalene treatment further comprises, after placing the sodiumized polytetrafluoroethylene powder in an oven for drying, grinding and dispersing it.

5. The composition of any one of claims 1 to 4, wherein the surface-silylated alumina powder is prepared according to a method comprising the following steps: under the conditions of stirring and heating, making alumina powder react with a silane coupling agent;
preferably, the silane coupling agent is selected from the group of silane coupling agent KH540, silane coupling agent KH550, silane coupling agent KH560, and silane coupling agent KH570;
preferably, the weight of the silane coupling agent is 1% to 5% of the weight of the alumina powder.

6. The composition of any one of claims 1 to 5, having one or more of the following features:
(1) the chain extender is an alcohol chain extender or an amine chain extender, e.g., aromatic alcohol chain extenders or diamine chain extenders, such as 1,4-bis(2-hydroxyethoxy)benzene or 3,3'-dichloro-4,4'-diaminodiphenylmethane;
(2) the ultrahigh-molecular-weight polyethylene powder has a particle size of 30 to 50 μm;
(3) the ultrahigh-molecular-weight polyethylene powder has a molecular weight of 4,000,000 to 5,000,000;

(4) the alumina powder has a particle size of 3000 to 5000 meshes;

(5) the antioxidant is a hindered phenol antioxidant, such as antioxidant 1010;

(6) the sodiumized polytetrafluoroethylene powder has a particle size of 3 to 20 μm.

7. Use of the composition of any one of claims 1 to 6 for preparing a piston sealing body;

preferably, the piston sealing body is a concrete piston sealing body.

8. A piston sealing body that is prepared by casting the composition of any one of claims 1 to ~~7~~6;

preferably, the piston sealing body is a concrete piston sealing body;

preferably, the piston sealing body has one or more of the following features:

tensile strength: ≥60 MPa;

elongation at break: ≥550%;

tear strength: ≥115 kN/m;

Shore hardness: 96-98 HA;

Akron abrasion: ≤0.025 cm^3;

service life: above 550 h.

9. A method of preparing a piston sealing body, comprising casting the composition of any one of claims 1 to 6;

preferably, the method comprises the following steps:

a) in parts by weight, weighing a polyurethane prepolymer, a chain extender, a surface-silylated ultrahigh-molecular-weight polyethylene powder, molybdenum disulfide or a sodiumized polytetrafluoroethylene powder, a surface-silylated alumina powder and an antioxidant respectively;

b) charging the polyurethane prepolymer, the surface-silylated ultrahigh-molecular-weight polyethylene powder, the molybdenum disulfide or the sodiumized polytetrafluoroethylene powder, and the surface-silylated alumina powder

into tank A of a caster, mixing them uniformly and stirring them at a low speed of 650 rpm to 950 rpm by controlling temperatures at 80 to 100 °C;

c) charging the chain extender into tank B of the caster, and temperature was controlled at 110 to 120 °C; after the chain extender is completely melted, adding the antioxidant while stirring at a high speed of 1500 to 2500 rpm;

d) cleaning the cavity of a mold, spraying a release agent in the mold, and preheating it in an oven at 110 to 130 °C;

e) mixing the liquids in tank A and tank B in a ratio controlled by the caster while vacuuming, and after stirring at a high speed of 2000 to 3500 rpm while keeping temperatures at 100 to 120 °C, casting the liquids into the mold;

f) placing the mold in an oven for heating at 100 to 120 °C for 16 to 20 h, and conducting a demolding after it is taken out; and

g) machine processing the demolded blank, to obtain the piston sealing body;

preferably, the surface silylated ultrahigh-molecula-weight polyethylene powder, the sodiumized polytetrafluoroethylene powder, and/or the surface silylated alumina powder are prepared according to the methods as defined in claims 3, 4, and/or 5.

10. A piston, comprising the piston sealing body of claim 8;

preferably, the piston is a concrete piston.

11. A delivery cylinder comprising the piston sealing body of claim 8 or the piston of claim 10.

12. A concrete pumping device (e.g., a pump truck, a dragging pump, or a truck-loaded pump), comprising the piston sealing body of claim 8, the piston of claim 10, or the delivery cylinder of claim 11.