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Īsziņas

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⑤④ Virsraksts: **Bitumena emulsija, tās sagatavošana un lietošana un sacietēšanu regulējoša piedeva izmantošanai tajā**

⑤⑦ Kopsavilkums: Aprakstīta katjonīta vai anjonīta tipa bitumena emulsija ar sacietēšanu regulējošu piedevu, kurā sacietēšanu regulējošā piedeva tiek pievienota emulsijai sacietēšanu regulējošā materiāla eļļas suspensijas veidā. Izgudrojums attiecas arī uz sacietēšanu regulējošu piedevu, kas satur sacietēšanu regulējošā materiāla suspensiju eļļā. Bitumena emulsiju iegūst, vispirms iegūstot sacietēšanu regulējošā materiāla suspensiju eļļā un tad sajaucot suspensiju ar anjonīta vai katjonīta tipa bitumena emulsiju. Bitumena emulsija var tikt izmantota ceļu būvē, ceļu uzturēšanā, vecu asfalta krājumumu atkārtotā izmantošanā un celtniecības darbos.

PATENTA FORMULA

1. Anjonīta vai katjonīta tipa bitumena emulsija ar sacietēšanu regulējošu piedevu, **atšķirīga ar to**, ka sacietēšanu regulējošā
5 piedeve tiek pievienota emulsijai kā sacietēšanu regulējošās cietās
vielas suspensija eļļā.
2. Bitumena emulsija, saskaņā ar 1. punktu, **atšķirīga ar to**, ka emulsija
10 ir katjonīta tipa.
3. Bitumena emulsija, saskaņā ar 2. punktu, **atšķirīga ar to**, ka cietā
fāze satur kalcija hidroksīdu, kalcija oksīdu, sārmu metāla tetraborātu,
sārmu metāla karbonātu, sārmu metāla metasilikātu, cementu,
15 sulfonēta lignīna sārmu metāla sāli, magnija karbonātu vai magnija
hidroksīdu.
4. Bitumena emulsija, saskaņā ar jebkuru no 1. līdz 3. punktiem,
atšķirīga ar to, ka eļļa ir minerāleļļa, sintētiska eļļa vai augu eļļa.
- 20 5. Bitumena emulsija, saskaņā ar jebkuru no 1. līdz 4. punktiem,
atšķirīga ar to, ka suspensija eļļā tiek pievienota kā emulsija ūdenī.
6. Sacietēšanu regulējošā piedeve izmantošanai bitumena emulsijā,
saskaņā ar jebkuru no 1. līdz 5. punktiem, **atšķirīga ar to**, ka tā satur
25 sacietēšanu regulējošās cietās vielas suspensiju eļļā.
7. Sacietēšanu regulējošā piedeve, saskaņā ar 6. punktu, **atšķirīga ar
to**, ka cietās vielas suspensija eļļā ir emulģēta ūdenī.
- 30 8. Metode bitumena emulsijas, saskaņā ar jebkuru no 1. līdz 5.
punktiem, sagatavošanai, **atšķirīga ar**
- a) sacietēšanu regulējošās cietās vielas suspensijas eļļā
sagatavošanu,
 - b) suspensijas sajaukšanu ar anjonīta vai katjonīta tipa bitumena
35 emulsiju,
suspensiju, ja vēlas, emulģē ūdenī pirms b) stadijas.

9. Bitumena emulsijas, saskaņā ar jebkuru no 1. līdz 5. punktiem, izmantošana ceļu būvē, ceļu uzturēšanā vai vecu asfalta klājumu atkārtotā izmantošanā.
- 5 10. Bitumena emulsijas, saskaņā ar jebkuru no 1. līdz 5. punktiem, izmantošana celtniecības darbos, tādos, kā jumtu pārsegšanā, klāšanā un ūdens necaurlaidīgu pārsegumu klāšanā.

Bitumen emulsion, its preparation and use and breaking additive for use therein

5 The present invention relates to a bitumen emulsion, a process for its preparation, a breaking additive intended for use in the bitumen emulsion and the use of the bitumen emulsion. More specifically, the present invention relates to a bitumen emulsion of an anionic or cationic type having a
10 breaking additive, a breaking additive intended for use in the bitumen emulsion and the use of the bitumen emulsion as a binder in road building, road maintenance, recycling of old asphalt pavings or construction work.

15 A great number of methods for the breaking of bitumen emulsions are known. However, they all suffer from the disadvantage that the breaking occurs immediately. In order to enable the use of bitumen emulsions for e.g. the manufacture of asphalt mixes it will be necessary to achieve a controlled
20 delayed breaking. In this way a very stable bitumen can be used, which gives a good covering of the stone material, which allows mixing and paving as well as compaction without breaking.

25 Once the compaction having been carried out, the emulsion should break as fast as possible in order to avoid breakdown of the traffic. Another reason why a rapid breaking is desired is that cold asphalt mix made with emulsion is sensitive to water (i.e. rain) before the emulsion is broken.

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One way to achieve this is disclosed by European Patent Application No 90850415.2. This method utilizes a breaking additive, which comprises a water-in-oil emulsion, in which an aqueous solution of a neutralizing salt is dispersed in a
35 continuous oil phase. Thus this process is based on the use of water-soluble substances in order to achieve the breaking.

It is an object of the present invention to provide a bitumen emulsion in which it is possible to use solids instead of aqueous solutions, which solids are known per se to break bitumen emulsions. However, bitumen emulsions will break immediately on the addition of such substances thereto. The problem has been to achieve a delayed breaking in order to permit paving and compaction before solidifying.

According to the present invention it has now been found that this problem can be solved by making a suspension of the solid breaking material as a breaking controlling additive which is mixed into the bitumen emulsion just before the wanted moment of breaking. The oil film then delays the contact between the breaking material and the bitumen emulsion.

In accordance with the above the present invention thus relates to a bitumen emulsion of an anionic or cationic type having a breaking additive, which bitumen emulsion is characterized in that the breaking additive has been added to the emulsion in the form of a suspension of a breaking solid in oil.

According to an embodiment of the invention the emulsion is of the cationic type, in which case, for instance, the following alkaline materials can be used as breaking chemicals: Calcium hydroxide, calcium oxide, alkali metal tetraborate, alkali metal carbonate, alkali metal metasilicate, cement (STS cement P), alkali metal salts of sulphonated lignin, magnesium carbonate and magnesium hydroxide.

The term "alkali metal" as used above is intended to denote sodium and potassium, preferably sodium. Examples of a sodium salt of sulphonated lignin is Diwatex 30 from Holmen Kemi.

The period of delay can be varied to some extent by selecting different oils for the suspension. The selection of the oil is of great importance to the stability of the suspension. According to the present invention the oils which are used in this connection can be selected from mineral oils, synthetic oils and vegetable oils.

The principle of allowing the oil film to delay the contact between an emulsion breaking solid and a bitumen emulsion can also be utilized if an emulsion of the suspension in water is made. Hence in accordance with an embodiment of the present invention the suspension of solid in oil is added as an emulsion in water. In this case, however, water-soluble salts cannot be used as breaking chemical since these will leach out through the oil film into the continuous aqueous phase. When such a breaking emulsion is mixed with the bitumen emulsion an immediate breaking is obtained, which is not desirable.

According to another aspect of the invention this relates to an breaking additive for use in a bitumen emulsion according to the invention, which breaking additive is characterized in that it comprises a suspension of a breaking solid in oil.

According to an embodiment of the breaking additive according to the invention the suspension of solid in oil is emulsified in water.

The bitumen emulsion according to the present invention is prepared by a process, which is characterized in the following steps

- a) preparing a suspension of a breaking solid in oil,
 - b) mixing the suspension with a bitumen emulsion of an anionic or cationic type,
- the suspension optionally being emulsified in water before step b).

The invention also relates to the use of a bitumen emulsion according to the invention in road building, road maintenance, recycling of old asphalt pavings or in construction work such as roofing, coating and water-proofing.

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The invention will be further described in the following by means of a number of working examples.

Example 1

10

A suspension consisting of 49% of calcium hydroxide in a naphthenic distillate (viscosity at 40°C 32mm²/s, carbon type analysis C_A=30%, C_N=30%, C_P=45%) is made by dispersing by means of a high speed mixer of the type Ultraturrax®. When
15 2% of the above suspension is added to a bitumen emulsion BE65/5000 (Nynäs Bitumen AB) a well-broken emulsion is obtained in which water has separated within 20 hours.

20

In order to further investigate the effect of the breaking additive a so-called run off and wash off test was performed. The test is carried out in the following way: A certain amount of breaking additive is added to a bitumen emulsion. The emulsion is then mixed with stone material which has become moistened with water. The mixture is mixed for 30
25 seconds and then poured into a funnel having a wire netting at its bottom. Liquid which flows out from the funnel during 30 minutes is collected. The water is evaporated and the residue is reported as "Run off" expressed as percent binding agent calculated on the amount of binding agent added. The
30 mix is left in the funnel for additional 30 minutes, whereafter 200 ml of water is poured over the mass. The water is collected and evaporated. The residue is weighed and reported as "Wash off" in percent of binding agent added.

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2% of the suspension above was added to a bitumen emulsion P91-212-01 (Nynäs Bitumen AB). 500 g of stone material (granite from Farsta; composition 52% 4-8 mm, 13% 2-4 mm and

35% 0-2 mm) were moistened with 20 g of water. 40 g of the above emulsion were added thereto. The mixture was poured into a funnel for measuring of "Run off" and "Wash off" according to the above.

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Results: Run off: 0%, Wash off: 0.8%. The results can be compared with the case when no breaking suspension is added: Run off: 5%, Wash off: 11%.

10 Example 2

A suspension consisting of 38% of sodium metasilicate in a naphthenic distillate (viscosity at 40°C 200 mm²/s, carbon type analysis C_A=25%, C_N=30%, C_P=45%) is made by dispersing
15 by means of a high speed mixer of the type Ultraturrax®.

When 2% of the above suspension are added to a bitumen emulsion BE 65115000 a broken emulsion is obtained, wherein the water has not separated within 24 hours.

20 2% of the above suspension were added to a bitumen emulsion P91-212-01 and tests confirming "Run off" and "Wash off" were carried out in the same way as in Example 1.

Results: Run off: 0%, Wash off: 0%.

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Example 3

A suspension consisting of 68% of cement in a naphthenic distillate (viscosity 32 mm²/s at 40°C) is made by dispersing
30 by means of a high speed mixer of the type Ultraturrax®. The suspension is then emulsified in water. The emulsion has the following composition: 47% of cement suspension, 47% of water, 3% of emulsifier Berol 79 and 3% of emulsifier Berol 540 (both emulsifiers from Berol Nobel AB).

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3,5% of the emulsion above was added to a bitumen emulsion P91-212-01. 40 g of the mixture were added to 500 g of moist

stone material (as in Examples 1 and 2). The mixture was stirred for 30 seconds and poured into a funnel to test "Run off" and "Wash off".

5 Results: Run off: 0%; Wash off: 0.9%.

C L A I M S

1. Bitumen emulsion of an anionic or cationic type having a breaking additive, characterized in that the breaking
5 additive has been added to the emulsion in the form of a suspension of a breaking solid in oil.
2. Bitumen emulsion according to claim 1, characterized in that the emulsion is of the cationic type.
10
3. Bitumen emulsion according to claim 2, characterized in that the solid phase comprises calcium hydroxide, calcium oxide, alkali metal tetra borate, alkali metal carbonate, alkali metal metasilicate, cement, alkali metal salt of
15 sulphonated lignin, magnesium carbonate or magnesium hydroxide.
4. Bitumen emulsion according to any of claims 1-3, characterized in that the oil is a mineral oil, a synthetic oil
20 or a vegetable oil.
5. Bitumen emulsion according to any of claims 1-4, characterized in that the suspension in oil is added as an emulsion in water.
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6. Breaking additive for use in a bitumen emulsion according to any of claims 1-5, characterized in that it comprises a suspension of a breaking solid in oil.
- 30 7. Breaking additive according to claim 6, characterized in that the suspension of solid in oil is emulsified in water.
8. Process for the preparation of a bitumen emulsion according to any of claims 1 to 5, characterized
35 a) in preparing a suspension of a breaking solid in oil,

b) mixing the suspension with a bitumen emulsion of an anionic or cationic type, the suspension optionally being emulsified in water before step b).

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9. The use of a bitumen emulsion according to any of claims 1-5 in road building, road maintenance or recycling of old asphalt pavings.

10 10. The use of a bitumen emulsion according to any of claims 1-5 in construction work such as roofing, coating and water-proofing.

ABSTRACT

A bitumen emulsion of an anionic or cationic type having a breaking additive is disclosed, wherein the breaking additive has been added to the emulsion in the form of a breaking solid in oil. The invention also relates to a breaking additive which comprises a suspension of a breaking solid in oil. The emulsion is prepared by preparing a suspension of a breaking solid in oil and then mixing the suspension with a bitumen emulsion of an anionic or cationic type. The bitumen emulsion can be used in road building, road maintenance, recycling of old asphalt pavings and construction work.