BITUMEN – SULFUR – POLYETHYLENE IN THE SYSTEM STRUCTURAL OF CHANGES ROAD COATING TO THE STRENGTH IMPACT

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Abstract. This in the article from oil removable bitumen types, classification, basic properties and local secondary raw items based on asphalt and bitumen strength properties improver and suitability the deadline augmentative, import substitution clicker many functional landings working release illuminated.

Keywords: bitumen, penetration, adhesion, viscosity, tar, asphalt, coatings.

Аннотация. В данной статье рассматриваются типы битума, пригодный для использования в нефтеперерабатывающей промышленности, его классификация, основные свойства и местные вторичные сырьевые материалы, а также улучшаются прочностные характеристики битума и его пригодность, а также определяются сроки его использования, импортозамещение и функциональные возможности.

Ключевые слова: битум, проникновение, адгезия, вязкость, смола, асфальт, покрытия.

Annotatsiya. Ushbu maqolada neftdan olinadigan bitumlarning turlari, tasnifi, asosiy xossalari va mahalliy ikkilamchi xom ashyolar asosida asfalt va bitumlarning mustahkamlik xossalarini yaxshilovchi va yaroqlilik muddatini oshiruvchi, import o‘rnini bosuvchi ko‘p funksiyali qo‘ndirmalar ishlab chiqarish yoritilgan.

Kalit so‘zlar: bitum, penetratsiya, adgeziya, qovushqoqlik, smola, asfal’ten, qoplamalar.

INTRODUCTION

Road coatings working on the way out bitumen place is incomparable. Because , such coatings strength and from safety outside biton to the covers relatively 2 2 .5 equal cheap Bitumens dark in color plastic oil products are , they are liquid half hard and hard to types divided , this to the characteristics according to Bitumen all oil products between the most good to viscosity has .

The world bitumen consumption continuous growing is going on. Bitumen consumption in the CIS countries industry and citizenship construction and road under construction If the ratio is approximately 65/35 , then more than 70% of it is spent on road construction and road surface repair in the USA and European

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countries. From a physical and chemical point of view, bitumen is a high-molecular complex colloidal system associated with asphaltenes and oils and low-molecular, resinous medium. Depending on the quantitative ratio of asphaltenes, resins and oils, they can form a solid matrix or separate micelles that absorb and work with resins.

The requirements for the quality of bitumens, especially road bitumens, are generally different. The main purpose of bitumens is to bind mineral materials (gravel - soil), to form a hydrophob from them, and to fill the space between their particles. Therefore, the quality of bitumen determines the strength and durability of asphalt pavements.

In general, road bitumen must meet the following requirements:

1. Maintains its strength when the temperature increases, i.e., is heat-resistant;
2. It retains low elasticity at lower temperatures, that is, it is resistant to freezing;
3. Ability to resist compression, impact, and cracking under the influence of moving traffic;
4. Mineral materials have good adhesion properties on dry and wet surfaces:
5. It must retain its original viscosity and strength over a long period of time.

Bitumen is produced from heavy oil residues by deep concentration (residual) or oxidation (oxidized) methods; it is intended for road construction, roofing, waterproofing and electrical insulation materials, and the preparation of asphalt varnishes and printing inks (Figure 1).

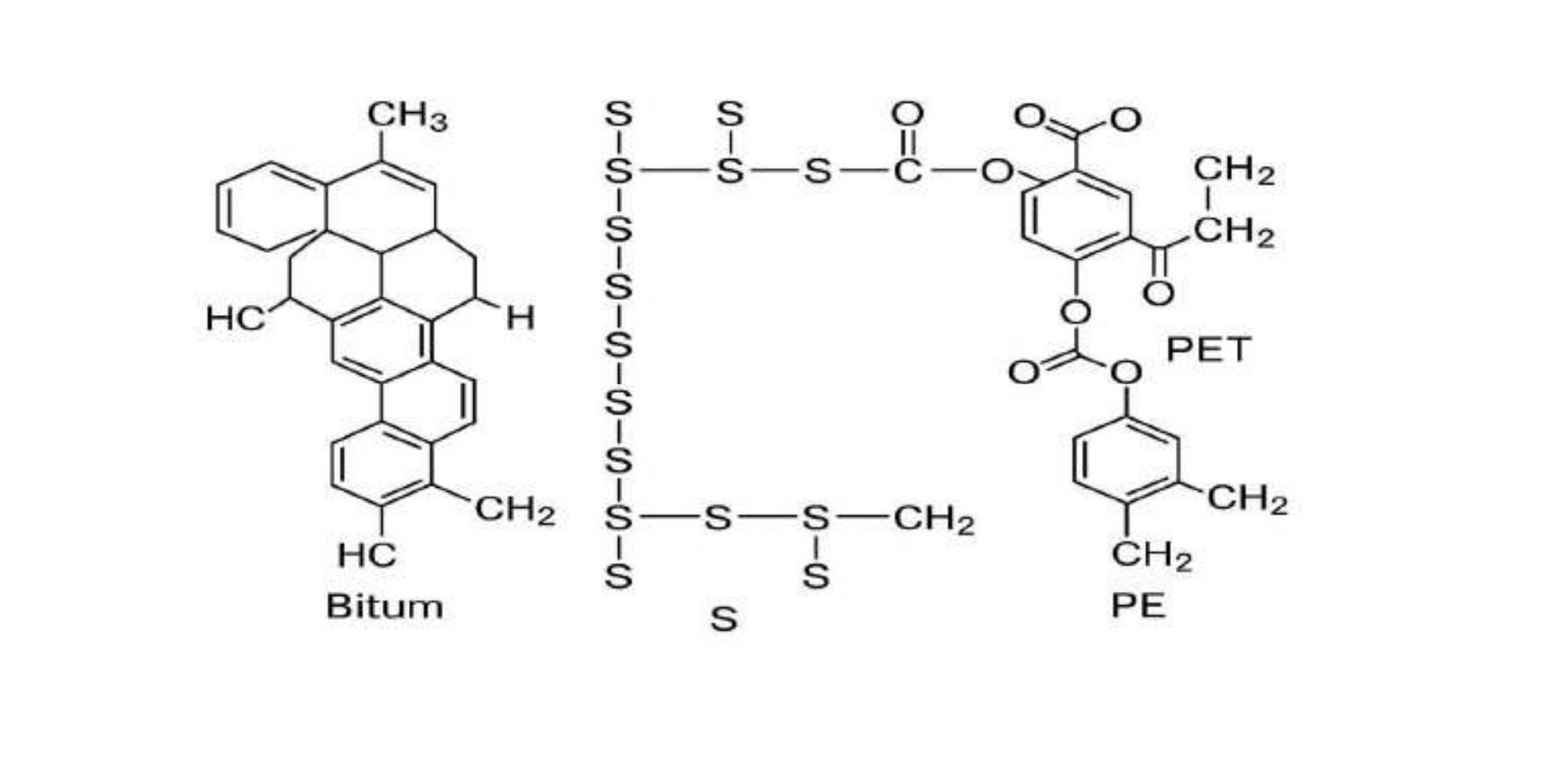


Figure 1. Structural schemes modified of bitumen:

Bitumen is produced in liquid, semi-solid and solid forms. According to its purpose, bitumen is divided into road (viscosity BN, BND, BDU grades and liquid), construction (BN grade), roofing (BNK), insulating (BNI), thin (B and G), high-temperature softening (rubrax) A-30 and A-10. Numerous grades of bitumen differ from each other in softening temperature, thinness, penetration depth of the bitumen, ductility, and adhesion.

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Softening temperature of bitumen This is the temperature at which bitumen transitions from a relatively solid state to a liquid state.

Temperature of sensitivity This is the temperature at which a material breaks down when subjected to a short-term applied load.

The viscosity temperature characterizes the low-temperature properties of bitumen and its linear behavior in the coating: the lower it is, the higher the quality of the bitumen.

The softening temperature for road bitumen is typically between -2 and -30 °C. Construction bitumens are required to be somewhat elastic, but quite hard. During the use of bitumens, under the influence of sunlight, oxygen in the air, sharp changes in high and low temperatures and increased dynamic loads, the operational properties of bitumens are destroyed. In this case, the colloidal structure of bitumens is destroyed, turning into tar and asphaltenes, carbenes and carbides, bitumen loses its original state, becomes brittle and spreads and crumbles (Table 1). In addition, bitumen loses its ability to adhere to gravel, stone and soil. This leads to deterioration of road foundations, insulation of pipelines, etc.

Table-1

Bitumen average faction composition

Fraction , %	Bitumen variety		
	Construction bitumen	Roof coatings	Road coatings
Oil	30 ÷ 70	40 ÷ 60	50 ÷ 70
Resin	20 ÷ 50	20 ÷ 55	20 ÷ 40
Asphalt	15 ÷ 35	2 ÷ 25	10 ÷ 20

Road construction for the purposes of bitumen fast , medium and slowly BG, SG and MG cast iron models is used . From this outside citizenship and industry under construction viscosity improved bitumen BND and oil bitumens BN types need big .

Penetration indirectly bitumen viscosity level describes . That's Nina. to the product sinking indicator defining , product and to this resistance to show represents . Known in mode half liquid and half hard to products Nina's sinking depth with is evaluated .

Bitumen elasticity standard conditions (at 25 ° C) it until it breaks fiber in the form of stretching possible was length with described . Stretchability how much big if bitumen elasticity also that much big will be . High at temperature liquefied hard bitumen for elasticity how much high not (20 − 50 mm), light liquid ones for and it is 300 mm and from it up organization Bitumen elasticity how much big if so , that's it his/her viscosity Good properties (cohesion) will be . Cohesion

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bitumen curtain with mutual glued two standard plastic separated by 25 ° C to take for necessary was from the temperature is determined (in Pa).

Adhesion (adhesion) bitumen curtain and roofing material separate standing on the surface double electricity of the layer harvest to be with Bitumen adhesion components (asphaltene and maltens) of polarity related will be and this substances solutions non-polar in solvents electricity conductivity with The application of bitumen to roofing materials adhesion their phases divorce on the border surface tension is also characterized by and bitumen roofing material separation for expendable work become is considered . In bitumen paraffin existence adhesion reduces , therefore for his/her with a volume of 5% limitation need .

Ready bitumen exploitation characteristics following pointers according to woman is done :

-25 ° C at temperature Nina's sinking depth , $\boldsymbol{mm}$;

— Soft temperature , ° C ;

— $\mathbf{25}$ ° C at temperature ring and balloon method through identifiable elasticity , $\boldsymbol{sm}$;

— Fragility temperature , ° C ;

— $\mathbf{20}$ ° C at temperature cohesion MPa or , kgs /cm2 and adhesion .

Nina's sinking depth and soften temperature bitumen hardness describes , elasticity and elasticity Cohesion that is , thin layered bitumen (test) (time) to rupture test at the time his/her strength invisible if to be mortified temperature and his/her to freeze endurance describes . Adhesion adhesion with mineral – material solid to hide ability , his quality indicates .

Liquid bitumen main from their size one is 5 mm diameter into the hole has viscometer with 60 ° C at temperature identifiable their viscosity become is considered . For example, BG – 40/70; SG – 40/70; MG – 40/70 models bitumen 40 – 70 seconds to viscosity has .

Various in my style bitumen application road coatings construction to the method related to :

Top processing models SG- 25/40; SG – 40/ 20 , SG – 70/130 , SG - 130/200 , MG – 70/130, MG – 130/200, BND – 130/200 ;

Soaking – BND – 130/200, BND – 90/130 models ;

Asphalt in the mixer add SG – 40/70, SG – 70/130, MG – 40/70, MG – 70/130, BND – 60/90, BND – 40/60 models ;

Under construction or in the car mixing – SG – 15/25, SG – 25/40, SG – 40/70, SG – 70/ 130, SG – 130/200, MG – 25/40, MG – 40/70, MG – 70/130 models is applied.

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Bitumen to the composition incoming components amount his/her to the quality impact shows . In bitumen asphalt how much many if so , that 's it hard Resins and bitumen elasticity and cementing characteristics improves . And oil bitumen to freeze from the point of view of message gives .

Bitumen exploitation characteristics his/her chemical to the composition dependency asphaltenes amount tars amount ratio A/S and asphaltene tars the sum of oil to the amount ratio A+S / M size through is described . Heat and on the ice resistant strength high bitumens 23% in content close pitch 15 – 18 % asphaltene and 52 – 54 % close from oil consists of In this case, A /S= 0.5 - 0.6 (A+S)/M=0.8 - 0.9 .

Bitumen aggregiasis characteristics improve for average surface active substances invisible provider landings used as SFM usually synthetic fatty acids driving device cube The remainder (1 -4 %, (mas)) is used .

According to GOST R 52056-2003 working removable polymer sticky bitumen (PYB) promising bitumen materials become calculated , bitumen different polymer materials is entered .

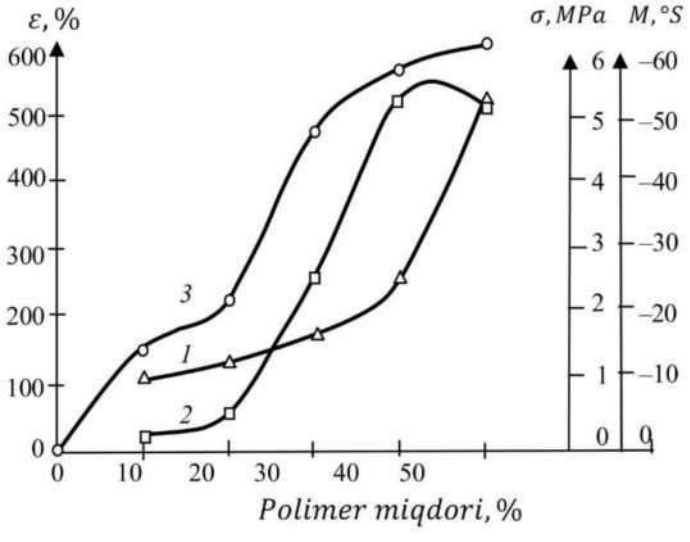


Figure 2. To stretch strength σ (curve 1) of ; relative elongation ε (curve 2) and to freeze endurance *M* (curve 3) of polymer amount (vulcanized BC) dependency graph .

Sulfur reasonable polymer-bitumen combiner modern of roads asphalt concrete of the coating high part of main structural from parts one is , their service to do the term from 3-4 years (traditional road from bitumen in use) up to 7-10 years extends . PBB road surface strength , crack resistance resistance to heat resistance to decay durability , water and to the cold endurance noticeable at the level increases . Polymer-asphalt concrete and traditional asphalt concrete between . The difference to determine opportunity with the help of PBB working issued asphalt of the coating the most clear indicator to the temperature sensitivity is the

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coefficient . In the PBB asphalt temperature to change relatively less sensitive From PBB used without road of construction general price growth of 1% does not exceed . This with together , expenses of the road one how many annual activity during complete is covered .

PYB working release according to of the block technological equipment sulfur tarry compositions to take opportunity gives (enough) energetic processing from given then), their later oxidation current time oil again of work main from problems one was sulfur utilization to do the problem solves . Very promising bitumen materials according to GOST 18659-81 working removable bituminous emulsions is considered . Many industrial developed in countries bituminous emulsions main road construction from materials one become is considered . In France for example , work removable bitumen road from 20% of varieties moreover emulsified .

Table 2

Sulfur oligomers with modified bitumen properties

Indicators	Composition , wt. %			
	5ND 90 /130	60 % (0DSÆM - 70 + o/ tmugugurt - 30) + 40% BND 90	60 % (0DSÆM - 60 + oZtmgugurt — 40) + 40% BND 90	60 % (0DSÆM - 50 + oZtmgugurt - 50) + 40% BND 90
Tk ,°C	45	83	54	52.5
r_m , °5	-25	-24.5	-25	-29.5
n,mm • 0.1 At 25 °5 At 0 °5	128 40	155 40	150 40	127 50
D, cm , at 25 °C	45	27	21.6	23.5
W,%	0.05	0.05	0.05	0.05

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General without bituminous emulsion to the composition the following includes :

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Disperse phase [60-70% (e.g.)] bitumen , modifier , adhesion additive , solvent and liquidizer ;

Dispersion medium [30-40 % (wt)] water emulsifier , acid , sitabilizer .

Bituminous emulsions at least ten two kind of repair-construction in their work application possible .

Recommendation done method functionality , convenience performance , energy minimum necessary resources consumption providing standard to equipment based to be installed design and installation expenses reduces , large capital expenses demand does not . Proposal done of methods economic advantages polymers from waste use through working release expenses to reduce own inside takes .

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