N⁰	Indicator name	Unit	Test method	PMB-50/70		
1.	Needle penetration depth at temperature 25°C	0,1 mm	TDS-11501	51-70		
2.	The softening temperature of the ring and ball* is not lower than	°C	TDS-11506	64	68	72
3.	Elasticity at a temperature of 25°C, is not lower than	%	TDS-P 52056		80	
4.	Brittleness temperature* not less	°C	TDS-11507	-22	-20	-18
5.	Flash point* not less	°C	TDS-4333		230	
6.	Strain energy (extensibility) at 10°C	Joule/sm <sup>2</sup>	TDS-11506			
7.	Dynamic viscosity at temperature 135°C, no more	Pas	according to current regulatory documentation		3,5	
8.	Adhesion of binder to the surface of crushed stone from acidic rock (in vigorous boiling mode)**	-	TDS-11508	According to control sample No. 2		
9.	Uniformity	-	TDS- P52056	Uniformly		
Stability when stored for 72 hours at a temperature of 180°C according to current regulatory documentation						
10.	Change in softening temperature, no more	°C	TDS-11506	8		
11.	Change in penetration, no more	0,1 mm	TDS-11501-78	15		
Resistance to aging at a temperature of 163°C according to current regulatory documentation						
12.	Change in mass, no more	%	according to current regulatory documentation		0,5	
13.	Residual penetration. from initial penetration, at a temperature of 25°C, not less	%	TDS-11501	60		
14.	Change in softening temperature, no more	°C	TDS-11506	5		
15.	Elasticity at a temperature of 25°C. no less	%	TDS-P52056		70	

# Indicators of physical and mechanical properties of polymer-modified bitumen

These technical specifications apply to polymer-modified bitumen (PMB), used for the preparation of asphalt concrete mixtures, surface treatments, for the installation of coatings at facilities with increased dynamic loads on roads with heavy traffic, bridges, airfields, etc.

### **1** Technical requirements

1.1 Polymer modified bitumen is manufactured in accordance with the requirements of these technical specifications according to technical documentation approved in the prescribed manner. When producing polymer-modified bitumen, the use of industrial or waste oils is not allowed.

Polymer-modified bitumens are produced using modifying additives Titan HoneyWall and Plastobit 430 in accordance with current regulatory documents.

In the production of polymer-modified bitumen, bitumen grade 60/90 is used according to current regulatory documents.

### 2 Safety requirements

2.1 When applying PMB, workers' protection equipment is used in accordance with TDS-12.4.011.

2.2 When working with PMB, the general safety requirements in accordance with TDS-12.3.002 and fire safety requirements in accordance with TDS-12.1.004, TDS-12.0.004 and TDS-22245 must be observed.

2.3 PMB are flammable substances according to TDS-12.1.044 with a flash point above 230 °C.

2.4 PMBs are low-hazard substances and, in terms of the degree of impact on the human body, are substances of the fourth hazard class in accordance with the standards TDS-12.1.004-91. During production, melting and sampling, the requirements of safety regulations and industrial sanitation must be met in accordance with the "Occupational Safety and Health Rules for the Construction, Repair and Maintenance of Highways"

## **3** Environmental requirements

3.1 When working with polymer-modified bitumen, it is necessary to comply\* with the requirements of GOS 17.2.3.02.

3.2 Equipment used in the production, storage and transportation of polymer-modified bitumen should not allow it to spill or leak.

3.3 When bottling polymer-modified bitumen in a production area, it is necessary to collect the product in a separate container and clean the bottling area; When bottling in an open area, fill the bottling area with sand and then remove and dispose of it.

## 4 Acceptance rules

4.1 Acceptance of PMB is carried out in batches equal to one batch in accordance with the requirements of these technical specifications. A batch is considered to be any quantity of PMB equal to one batch (one transport unit), homogeneous in composition and quality indicators, accompanied by one quality document. 4.2 The sample size of the PMB is determined according to TDS 884.

4.3 Each batch of PMB must be accompanied by a quality document.

4.4 When accepting the finished PMB binder, acceptance and control tests of each batch are carried out to check the quality of the released product with the requirements of these technical specifications. The batch size is equal to one batch (one transport unit) made using the same batches of materials and using the same technology. Methods for quality control of finished products and starting materials used for the preparation of PMB must comply with those specified in Table 1 and in the relevant paragraphs of the text of these technical specifications.

4.5 The batch is accompanied by a quality document. The document must contain:

- name of the manufacturer and/or its trademark;

- brand of binder;

1.4 Labeling, packaging, transportation and storage

1.4.1 Transportation and storage of PMB - according to TDS 965 for viscous road petroleum bitumen.

1.4.2 PMB is transported to the place of use in bitumen trucks, asphalt distributors or heated tanks.

1.4.3 To avoid destruction processes, the temperature of polymer-modified bitumen during transportation and storage should not exceed! 80°C.

1.4.4 Transportation of the binder should be carried out in bitumen thermoses with thermal insulation capable of reducing the temperature of the binder by no more than 5-7°C per day.

When delivering products, each batch is accompanied by a quality document indicating the manufacturer and brand of PMB in accordance with the requirements of these technical specifications.

1.4.5 For each batch of polymer-modified bitumen, the manufacturer issues a quality passport indicating the following characteristics:

- PMB brand;
- designation of these technical conditions;
- name of the manufacturing organization;
- Net weight;
- date, month and year of manufacture;
- batch number;

- standards and test results indicating information on product compliance with the requirements of these technical specifications;

- signature of the person who carried out the control and the head of the laboratory;

- seal of the manufacturer.

### **5** Test methods

5.1 Uniformity according to TDS-P 52056.

- 5.2 Depth of needle penetration at 25°C according to TDS-11501.
- 5.3 Softening temperature for ring and ball according to TDS-11506.
- 5.4 Brittleness temperature according to TDS-11507.
- 5.5 Elasticity at 25 °C according to TDS-P 52056.
- 5.6 Change in softening temperature after aging according to TDS-1 1506.
- 5.7 Elasticity at 25 °C after aging according to TDS-P 52056.

5.8 Strain energy (by elongation), at 10°C according to TDS-11506.

5.9 Adhesion of binder to the surface of crushed stone from acidic rock ~ (in vigorous boiling mode) according to TDS-EN 11508.

5.10 Change in mass after aging according to current regulatory documentation.

5.11 Residual penetration, from initial penetration, at a temperature of 25°C according to TDS-11501.

5.12 Flash point, not lower according to TDS-4333.

5.13 Dynamic viscosity at a temperature of 135 °C according to current regulatory documentation.

5.14 Stability during storage according to current regulatory documentation.

#### 6 Manufacturer's warranty

6.1 The manufacturer guarantees that the quality of the PMB meets the requirements of these technical specifications, subject to the conditions of their transportation and storage.

6.2 PMB binders must be accepted by the technical control of the manufacturer.

6.3 The manufacturer of PMB guarantees compliance of the produced cementitious material with the requirements of the technical specifications of these technical conditions and the terms of the contract, subject to compliance by the consumer enterprise with the conditions of its storage.

6.4 The guaranteed shelf life of the binder in packaging at ambient temperature is 1 year from the date of manufacture.

1.5 The maximum permissible concentration of PMB in the air of the working area is 300 mg/m3; block copolymer of butadiene and styrene of the SBS type, namely a polymer of ethynylbenzene with butadiene 1,3, is 10 mg/m3 (4th hazard class).

1.6 The room in which work with PMB is carried out must be equipped with supply ventilation in accordance with the requirements of TDS-12.4.021.

1.7 If small quantities of PMB catch fire, they should be extinguished with sand, felt felt or a foam fire extinguisher. Developed fires should be extinguished with a foam jet.

1.8 When working with PMB, it is necessary to comply with the requirements of TDS-1