



Asphalt anti-rutting agent

With the continuous increase in road traffic volume, especially the increase in heavy-loaded vehicles, the use of high-pressure tires, and the channelization of traffic flow, rutting has become one of the main forms of damage to highway asphalt pavements. Many studies all over the world have shown that the rutting, shifting, and bumping of asphalt mixture pavements are highly correlated with their own modulus, and the modulus of asphalt mixtures is proportional to the anti-rutting ability of asphalt pavements.

Therefore, improving the modulus of asphalt mixtures on pavements is an important means to reduce, delay, and solve the problems of pavement rutting and other diseases, which can extend the maintenance cycle and service life of pavements. Our products in this field improve the modulus of asphalt mixer with high efficiency performance main while they are easy to use.

Scope of applicable roads

- Heavy-loaded channelized traffic roads with severe rutting damage, long steep slope roads, and mountainous and hilly roads with many sharp bends.
- Road sections with large traffic volume and heavy loads.
- Important sections such as expressways, intersections, airport runways, and municipal trunk roads.

Physical properties

Items	Technical indicators			Test methods
	BCA-R3	BCA-R2	BCA-R1	
Appearance	Black solid	Black solid	Black solid	Visual inspection
Density(kg/m3)	910-990	930-1100	-	GB/T13377-1992
Average particle size (mm)	2-4	2-4	≤4	-
Dynamic stability (times /mm)	7000-10000	6000-8000	4000-7000	JGT F40-2004

Product mechanism of action

A. Aggregate viscosity enhancement: The anti-rutting agent is first dry-mixed with the aggregate, partially melted on the aggregate surface to form a film, which improves the adhesion of the aggregate, which is equivalent to pre-modification of the aggregate.

B. Modified asphalt effect: During wet mixing and transportation, the anti-rutting agent partially dissolves or swells in the asphalt to form a cementing effect, thereby achieving the asphalt modification effects such as increasing the softening point, increasing viscosity, and reducing thermal sensitivity. Thus, the anti-permeability and water damage resistance of the asphalt mixture pavement are improved.

C. Fiber reinforcement effect: The microcrystalline area formed by the polymer has considerable stiffness. During the mixing process, part of it is drawn into fibers, and bridged and cross-linked in the aggregate skeleton to form a fiber reinforcement effect.

D. Deformation recovery effect: The elastic component of the anti-rutting agent has the function of elastically recovering the deformed part of the pavement at a higher temperature, thereby reducing the permanent deformation of the formed asphalt pavement.

Product dosage of use

The usual dosage of anti-rutting agent is 0.3%-0.5% of the mineral aggregate weight. Increasing the dosage can further improve the road performance.

Note: The anti-rutting agent is directly added to the mixing pot. It does not change the gradation of the asphalt mixture at any dosage. It only needs to slightly extend the mixing time and adjust the construction temperature (5°C lower than the construction temperature of HH modified asphalt). The mixing, paving, rolling and other processes do not need to be changed.

Product packaging and storage and transportation

The product is packed in bags, with a net weight of 25KG or 500KG per bag (or as required by the customer). The packaging bag shall indicate: manufacturer name and address, product name and model, production date or batch number, etc. The mode of transportation is general cargo transportation.

- ✓ The product should be kept away from sunlight, rain and moisture during storage and transportation.
- ✓ The product should be stored in a dry and ventilated warehouse at room temperature, and fire is strictly prohibited.
- ✓ The validity period of the product is 24 months from the date of production. Products that exceed the validity period can still be used if the technical indicators after testing meet the requirements.

Technical Data

Methods for mixing and molding anti-rutting agent asphalt mixture in the laboratory

Preheat a certain proportion of coarse aggregate to 180-195°C, add it to the laboratory mixing pot, and add the measured anti-rutting agent in proportion. After the coarse aggregate and anti-rutting agent are dry mixed in the mixing pot for 120 seconds, add fine aggregate and filler mineral powder, and then add a certain proportion of matrix asphalt (No. 70 or No. 90) heated to the specified temperature according to the oil-stone ratio, and then wet mix for 180 seconds. Keep the mixed mixture in an oven at 155-170°C for 30 minutes, and then take it out to test the various properties of the mixture according to the current specifications of the Ministry of Transport.

Since the mixing intensity of the laboratory test equipment is much smaller than that of the construction mixing plant, the test mixing time is increased to achieve the same mixing effect as dry mixing for 3-10 seconds and wet mixing for 40 seconds during construction.

Construction process of anti-rutting agent in high modulus asphalt mixture

The construction process and technical requirements of asphalt anti-rutting agent mixture, such as mixing, transportation, paving, rolling, jointing, and construction machinery are basically the same as those of SBS modified asphalt mixture. The differences are as follows:

- (1) Asphalt pavement shall not be constructed when the temperature is below 10°C, or when it is rainy or the road surface is wet.
- (2) The construction temperature outline is shown in the table below.

Item		Construction temperature (°C)	Measurement area
Binder bitumen	Bitumen 60/70	160—170	Asphalt heating tank
	Bitumen 85/100	155—165	
Aggregate heating temperature		180—195	Hot material lifting bucket
Mixture factory temperature		170—185	Material transport vehicle
Mixture maximum temperature (discard temperature)		195	Material transport vehicle
Mixture storage temperature		≥ 170	Material transport vehicle and storage tank
Paving temperature		≥ 155	Paver
Initial compaction temperature		≥ 150	Inside of paver
End of compaction temperature		≥ 120	Inside of paving layer
Pavement temperature when open to traffic		≤ 55	Road surface
When the paving layer is thin or the outside temperature is low, take a high value, otherwise take a low value; when the transportation distance is long and the temperature is low, take a high value, otherwise take a low value.			

Mixing of the mixture

According to the experimentally determined asphalt-to-stone ratio and the optimal amount of anti-rutting agent, add a certain amount of anti-rutting agent to the mixing pot while adding 180-190°C coarse aggregate to the mixing pot, and dry mix it with the coarse aggregate for 3-10 seconds. Use the shear force generated during the aggregate mixing process to make the HH type anti-rutting agent directly thrown into the material evenly dispersed and adhered to the aggregate surface. Then, according to the asphalt-to-stone ratio, add a certain proportion of matrix asphalt (No. 70 or No. 90) heated to the specified temperature, fine aggregate and filler mineral powder, and wet mix for 30-40 seconds (based on the asphalt and direct-throw material being evenly coated), and then obtain a high modulus anti-rutting agent asphalt mixture for paving the road surface.

Transportation of the mixture

The material transport vehicle must be cleaned before and after each use, and a thin layer of isolation agent or anti-adhesive agent to prevent asphalt adhesion should be applied on the car body, but no excess liquid should accumulate on the bottom of the car body. The material transport truck should be covered with tarpaulin to keep warm, prevent rain and pollution. When the material transport truck enters the paving site, the tires must not be stained with dirt or other dirt that may pollute the road surface. Otherwise, a pool should be set up to wash the tires before entering the construction site. The material transport truck must empty the material every time it unloads. If there is any residue, it should be removed in time to prevent hardening.

Spreading of the mixture

Preheat the paving machine ironing plate to above 110°C, and then unload the asphalt mixture into the receiving hopper for paving. The paver must spread slowly, evenly, and continuously without interruption. The speed must not be changed at will or stopped in the middle to improve the flatness and reduce the segregation of the mixture. The paving speed is generally 2-3 meters/min, and the paving temperature is not less than 155°C. During the paving process, the vibrating or tamping hammer compaction device of the ironing plate should be selected with an appropriate vibration frequency and amplitude to improve the initial compaction of the road surface. The widening connection of the ironing plate should be carefully adjusted until there is no obvious segregation of the paved mixture.

Compacting and forming of asphalt mixture

The maximum thickness of the compacted layer of high modulus asphalt mixture should not be greater than 80mm.

Select a reasonable combination of rollers and the steps of initial compaction, re-compacting and final compaction (including forming) to achieve the best compaction effect. Repeated compaction should not be performed under low temperature conditions, which will cause the edges and corners of the stones to be worn and crushed, and damage

the embedding of aggregates. For suspended dense asphalt mixtures, the initial compaction temperature is 150-160°C. The initial compaction is performed with a steel wheel roller, static compaction once, followed by rolling with a rubber wheel roller twice, vibrating with a steel wheel vibrating roller twice, and finally static compaction with a steel wheel roller once. The final compaction temperature is not less than 90°C until the specified compaction degree is reached. The compaction thickness should not be less than 3 times the nominal maximum particle size of the aggregate. The re-compacting of anti-rutting asphalt mixtures should preferably be performed with a heavy-duty tire roller with a total mass greater than 25 tons to increase water tightness.

Method of adding anti-rutting agent to the mixing plant

- Manual metering and feeding
- Automatic weighing and air-feeding equipment

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