

Penetration-Graded Asphalt Cement

40/50 · 60/70 · 85/100 · 120/150 · 200/300

In accordance with ASTM D946/D946M — Standard Specification for Penetration-Graded Asphalt Binder

1. Description

Penetration-graded asphalt cement is a black hydrocarbon binder, semi-solid at ambient temperature and liquid above 100 °C, obtained as a residue from the distillation of crude petroleum. Its main component is a complex combination of high-molecular-weight organic compounds, principally hydrocarbons.

Although the applicable standard specifies a range for the penetration parameter alone, PRO-ROAD®'s technical service additionally verifies binder consistency through viscosity and softening-point control, in order to avoid variations in the optimum asphalt content during plant production of the mix.

2. Applications

- Hot mix asphalt (HMA): dense-graded, semi-dense, coarse and gap-graded mixes.
- Single and double surface treatments, hot tack and prime coats.
- Feedstock for the manufacture of asphalt emulsions, cutback asphalts and polymer-modified binders.
- Waterproofing, membranes and bituminous coatings.
- Stabilised bases and hot in-plant recycling of pavements.

3. Specifications

Penetration-graded asphalt cement is supplied in accordance with ASTM D946/D946M, "Standard Specification for Penetration-Graded Asphalt Binder for Use in Pavement Construction", which is the standard in force for this grading system. AASHTO M 20, frequently cited in older specifications, was discontinued by AASHTO in 2009 for lack of use; its differences from ASTM D946 are detailed in the note below the table.

Property	Method	40/50	60/70	85/100	120/150	200/300
Penetration at 25 °C, 100 g, 5 s (0.1 mm)	D5	40–50	60–70	85–100	120–150	200–300
Flash point, Cleveland open cup (°C), min.	D92	230	230	230	220	175
Ductility at 25 °C, 5 cm/min (cm), min.	D113	100	100	100	100	100
Solubility in trichloroethylene (%), min.	D2042	99.0	99.0	99.0	99.0	99.0
Tests on residue from the thin-film oven test (TFOT) — ASTM D1754						
Retained penetration of residue (% of original), min.	D5	55	52	47	42	37
Ductility of residue at 25 °C (cm), min.	D113	—	50	75	100	100

Values from ASTM D946/D946M. Ductility is determined at 25 °C and 5 cm/min; if the result is below 100 cm, the material is accepted where its ductility at 15 °C reaches 100 cm at the same pull rate. The standard specifies no residue ductility for grade 40/50. DIFFERENCES IF THE SPECIFICATION CALLS FOR AASHTO M 20 (discontinued in 2009): retained penetration of the residue becomes 58 / 54 / 50 / 46 / 40 instead of 55 / 52 / 47 / 42 / 37; the minimum flash point is expressed as 232 / 232 / 232 / 218 / 177 °C; no ductility is required on the original binder for grade 200/300; and two requirements not contemplated by ASTM are added: loss on heating in the TFOT (0.8 / 0.8 / 1.0 / 1.3 / 1.5 % max) and the spot test, the latter optional. Please state on the order which of the two standards governs.

4. Storage and transport

Bulk storage shall be in clean tanks to avoid product contamination. The tank must have a heating system distributed along its length and an agitation and/or recirculation system that guarantees thermal homogeneity of the product. Transport from the production plant is carried out hot and in bulk, in tank trucks with adequate heating systems and thermometers located in visible places.

At 130 °C the product behaves as a stable liquid and its road transport presents no risk in transit. It is stable at plant or site working temperature (130 to 170 °C); however, above 230 °C the vapours emitted may ignite in the presence of a flame. Handling the product above 195 °C is not recommended, both because of the risk of toxic vapour emission and because of the loss of its physico-chemical properties.

5. Packaging and logistics

In bulk in heated tank trucks from 9 to 35 t · steel drums of 180–200 kg · Bitubags (thermally lined big bags) of 1,000–1,300 kg · 25 kg block packaging with anti-adhesive film for dry-container export. HS code: 2713.20 (petroleum bitumen).

6. Quality control

Every batch shipped is accompanied by a laboratory-issued quality certificate reporting the tests required by the applicable standard, with traceable batch identification. Additional testing or independent third-party inspection (SGS, Bureau Veritas, Intertek, Cotecna) at origin or destination can be arranged at the customer's request.

Consult the product Safety Data Sheet (SDS) before handling.

The information in this data sheet is offered in good faith, based on PRO-ROAD®'s technical knowledge of its products and on the requirements of the standards cited. It does not constitute a sales specification or a warranty of results. The customer is responsible for verifying the suitability of the product for its intended use, for its correct handling and for its application in accordance with project specifications. Values guaranteed per batch are certified in the corresponding quality certificate.

