

## **Bitumen**

*Bitumen* is a thermoplastic material and its stiffness is dependent on temperature. The temperature-vs-stiffness relationship of bitumen is dependent on the source of crude oil and the method of refining.

The Bureau of Indian Standards (BIS) introduced paving grade bitumen specifications (IS: 73-1950) for the first time in the year 1950 and classified it on penetration. To improve the quality of Bitumen, BIS revised IS-73-1992 specifications based on Viscosity (Viscosity at 60°C) in July 2006. As per these specifications, there are four grades VG-10, VG-20, VG-30 & VG-40. Therefore, the Penetration grades have been replaced by Viscosity grade Bitumen.

According to viscosity (degree of fluidity) grading, higher the grade, stiffer the Bitumen. Tests are conducted at 60° C and 135° C, which represent the temperature of road surface during summer (hot climate, similar to northern parts of India) and mixing temperature respectively. The penetration at 25° C, which is annual average pavement temperature, is also retained.

### **Different Grades of Bitumen marketed by Indian Oil :**

**VG-10 BITUMEN:** VG-10 is widely used in spraying applications such as surface-dressing and paving in very cold climate in lieu of old 80/100 Penetration grade. It is also used to manufacture Bitumen Emulsion and Modified Bitumen products.

**VG-20 BITUMEN:** VG-20 is used for paving in cold climate & high altitude regions

**VG-30 BITUMEN:** VG-30 is primarily used to construct extra heavy duty Bitumen pavements that need to endure substantial traffic loads. It can be used in lieu of 60/70 Penetration grade.

**VG-40 BITUMEN:** VG-40 is used in highly stressed areas such as intersections, near toll booths and truck parking lots in lieu of old 30/40 Penetration grade. Due to its higher viscosity, stiffer Bitumen mixes can be produced to improve resistance to shoving and other problems associated with higher temperature and heavy traffic loads.

**TABLE: VISCOSITY GRADE (VG) BITUMEN SPECIFICATION AS PER IS 73:2006**

<b>Characteristics</b>	<b>VG-10</b>	<b>VG-20</b>	<b>VG-30</b>	<b>VG-40</b>
Absolute Viscosity, 60°C, poises, min	800	1600	2400	3200
Kinematic Viscosity, 135°C, CST, min	250	300	350	400
Flash point, C, min	220	220	220	220
Solubility in trichloroethylene, %, min	99.0	99.0	99.0	99.0
Penetration at 25°C	80-100	60-80	50-70	40-60
Softening point, C, min	40	45	47	50
Tests on residue from thin film over test / RTFOT:				
i. Viscosity ratio at 60°C, max	4.0	4.0	4.0	4.0
ii. Ductility at 25°C, cm, min, after thin film over test	75	50	40	25