

## **Attachment 1**

### **Division of Design Guidelines Selection of Asphalt Binder Grade**

# SELECTION OF ASPHALT BINDER GRADE

## 1.0 BACKGROUND

Asphalt binders are most commonly characterized by their physical properties. An asphalt binder's physical properties directly describe how it will perform as a constituent in asphalt concrete (AC) pavement. Although asphalt binder viscosity grading is still common, new binder tests and specifications are developed to more accurately characterize asphalt binders for use in AC pavements. These tests and specifications are specifically designed to address AC pavement performance parameters such as rutting, fatigue cracking and thermal cracking.

In the past, Caltrans has classified binder using viscosity grading based on Aged Residue (AR) System. Beginning January 1, 2006, Caltrans will use the Performance Graded (PG) System. For Polymer modified binder, Caltrans has used and will continue to use the Performance Based (PBA) binder system.

Performance grading is based on the idea that asphalt binder properties should be related to the conditions under which it is used. Performance Graded (PG) asphalt binders are selected to meet expected climatic conditions as well as aging considerations with a certain level of reliability. Therefore, the PG system uses a common set of tests to measure physical properties of the binder that can be directly related to field performance of the pavement at extreme temperatures. For example, a binder identified as PG 64-10 must meet performance criteria at an average 7-day maximum pavement design temperature of 64°C and also at a minimum pavement design temperature of -10°C.

Polymer modified binders (PBA) are used wherever extra performance and durability are desired. Improvement in resistance to rutting, thermal cracking, fatigue damage, stripping, and temperature susceptibility have led polymer modified binders to be substituted for asphalt in many paving and maintenance applications. For example, polymer modification is used to concurrently meet the requirements for high temperature resistance to rutting and low temperature resistance to thermal cracking.

## 2.0 PROCEDURES

Table 2.0 provides the binder grade that is to be used for each pavement climatic region. For locations of each pavement climate region see the Pavement Climate Map. A more detailed map can be found on the pavement web site beginning November 15, 2005 at <http://www.dot.ca.gov/hq/oppd/pavement/guidance.htm>.

**Table 2.0 – ASPHALT BINDER GRADE<sup>1</sup>**

<div>Binder</div> <div>Climatic Region</div>	Conventional Asphalt					Rubberized Asphalt	
	Dense Graded			Open Graded		Gap Graded	Open Graded
	Typical	Special					
	PG	PG	PBA	PG	PBA <sup>2</sup>	PG	PG
South Coast Central Coast Inland Valleys	64-10	70-10	6a(mod)	64-10	6a	64-16	64-16
North Coast	64-16	N/A	6a(mod)	64-16	6a	64-16	64-16
Low Mountain South Mountain	64-16	N/A	6a(mod)	64-16	6a	64-16	64-16
High Mountain High Desert	64-28	N/A	6a, 6b	64-28	6a	58-22	58-22
Desert	70-10	N/A	6a(mod) , 7	70-10	6a(mod)	64-16	64-16

Notes:

1. For asphalt concrete dikes use PG 70-10. For tack coats use either 64-10 or 64-16.
2. For low temperature placement.

For conventional Dense Graded Asphalt concrete, values are given for typical and special conditions. Special conditions are defined as those roadways or portion of roadways which meet any of the following criteria:

- Truck/bus traffic (over 10 million ESALs for 20 years)
- Truck/bus stopping areas (parking area, rest area, loading area, etc.)
- Truck/bus stop and go areas (intersections, metered ramps, ramps to and from Truck Scales etc.)

It should be noted that special binder grades may help to meet the requirements for the above criteria. However, there are other provisions that may also be necessary to address the above special conditions. The District Materials Engineer should be consulted for additional recommendations for these locations. Final decision as to whether a roadway meets the criteria for special conditions rests with the District.

For more detailed information on PG binder selection, refer to technical guides available on pavement web site at <http://www.dot.ca.gov/hq/oppd/pavement/guidance.htm>.

### **3.0 COST ESTIMATING**

The use of PG binder should not affect the unit price for asphalt concrete for projects that have not been advertised. Asphalt concrete binders that use PBA binders are typically 20 to 30% more expensive than conventional binders like PG or AR.