

Memorandum

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To: DISTRICT DIRECTORS
DIVISION CHIEFS, PROJECT DELIVERY

Date: November 30, 2006

From: MARK LEJA - **Original Signed**
Chief
Division of Design

Subject: Design Information Bulletin 86 (DIB 86): Selecting Asphalt Binder Type

This transmittal memorandum provides notice that the above-referenced Design Information Bulletin (DIB) is now available on the web site (<http://www.dot.ca.gov/hq/oppd/dib/dibprg.htm>). This DIB supersedes Index 632.1(b) "Asphalt Binder Type" of the Highway Design Manual.

PURPOSE

This DIB provides guidance on the selection of asphalt binder for projects with flexible pavement.

BACKGROUND

Over the past several years, the Department has been changing its existing grading systems for asphalt binders to the nationally recognized Performance Graded (PG) system. The Department converted its conventional binders from the Aged Residue (AR) systems to the PG system in January 1, 2006. Since we have completed discussions with industry, the Department will now be converting its polymer modified asphalt binders from the Performance Based Asphalt (PBA) system to Performance Graded Polymer Modified (PG-PM) system effective January 1, 2007.

APPLICATION

DIB 86 shall be used in the development of all projects on the State Highway System or funded with state funds. Projects with a bid opening date on or after January 1, 2007 shall use the PG or PG-PM binder grades listed in the table found in DIB 86.

IMPLEMENTATION

Effective immediately all projects, with a bid opening date on or after January 1, 2007, shall conform to the guidance presented in DIB 86. The requirements presented in this DIB will be incorporated into future updates of the Highway Design Manual.

Attachment

c: Deputy District Directors
Deputy District Directors, Project Management
District Material Engineers

DISTRICT DIRECTORS, et al
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bc: MLeja - DOD
TCraggs - DOD
THoover – PSP Mgr
PStolarski – DES METS
BFarnbach – DOD
LFong - DOD
PST Members
OPD Staff

WKFarnbach/dlt/T/Division of Design/DIB 86 Selecting Asphalt Binder Type

DESIGN INFORMATION BULLETIN NUMBER 86

California Department of Transportation
Pavement Standards Team & Division of Design
Office of Pavement Design

SELECTING ASPHALT BINDER TYPE

APPROVED BY

**MARK LEJA
DIVISION CHIEF
DIVISION OF DESIGN**

November 30, 2006

The following supercedes Index 632.1(2) of the Highway Design Manual (HDM).

TOPIC 632-Engineering Criteria

Index 632.1 Engineering Properties

- (2) *Asphalt Binder Type.* Asphalt binders are most commonly characterized by their physical properties. An asphalt binder's physical properties directly relate to field performance. Although asphalt binder viscosity grading is still common, new binder tests and specifications have been developed to more accurately characterize temperature extremes which pavements in the field are expected to withstand. These tests and specifications are specifically designed to address three specific pavement distress modes: permanent deformation (rutting), fatigue cracking, and low temperature cracking.

In the past, the Department has classified unmodified asphalt binder using viscosity grading based on the Aged Residue (AR) System. Beginning January 1, 2006, the Department switched to the nationally recognized Performance Graded (PG) System. For polymer-modified binder, the Department will no longer be using the Performance Based Asphalt (PBA) binder system for projects that are awarded for construction after January 1, 2007. After January 1, 2007 the Department will grade polymer-modified binders as Performance Graded-Polymer Modified (PG-PM) binder.

Performance grading is based on the concept that asphalt binder properties should be related to the conditions under which the binder is used. PG asphalt binders are selected to meet expected climatic conditions as well as traffic speed and volume adjustments. 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 its service temperatures. For example, a binder identified as PG 64-10 must meet performance criteria at an average seven-day maximum pavement temperature of 64°C and also at a minimum pavement temperature of -10°C.

Although more expensive than unmodified binder, using polymer modified binder in hot mixed asphalt (HMA) can provide improved performance and durability for sensitive climate conditions. While unmodified binder is adequate for most applications, improved resistance to rutting, thermal cracking, fatigue damage, stripping, and temperature susceptibility have led polymer modified binders to be substituted for conventional asphalt in many paving and maintenance applications.

Table 632.1 provides the binder grade that is to be used for each climatic region for general application. For HMA, values are given for typical and special conditions. For a few select applications such as dikes and tack coats, PG binder requirements are found in the applicable standard specifications or standard special provisions.

For locations of each pavement climate region see HDM Topic 615 "Climate."

Table 632.1

ASPHALT BINDER GRADE

Binder Climatic Region	Conventional Hot Mixed Asphalt				Rubberized Asphalt
	Dense Graded HMA		Open Graded		Base Stock for Gap and Open Graded
	Typical	Special ¹	Placement Temperature		
			>70°F	<70°F	
South Coast Central Coast Inland Valleys	PG 64-10	PG 70-10 PG 64-28 PM	PG 64-10	PG 58-34 PM	PG 64-16
North Coast	PG 64-16	PG 64-28 PM	PG 64-16	PG 58-34 PM	PG 64-16
Low Mountain South Mountain	PG 64-16	PG 64-28 PM	PG 64-16	PG 58-34 PM	PG 64-16
High Mountain High Desert	PG 64-28	PG 58-34 PM ²	PG 64-28	PG 58-34 PM	PG 58-22
Desert	PG 70-10	PG 64-28 PM	PG 70-10	PG 58-34 PM or PG 64-28PM ³	PG 64-16

Notes:

1. PG 76-22PM may be specified for conventional dense graded hot mixed asphalt for special conditions in all climatic region when specifically requested by the District Materials Engineer.
2. PG 64-28 may be specified when specifically requested by the District Materials Engineer.
3. Consult the District Materials Engineer for which binder grade to use.

Special conditions are defined as those roadways or portion of roadways that need additional attention due to conditions such as:

- Heavy truck/bus traffic (over ten 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.)
- Truck/bus climbing and descending lanes

The final decision as to whether a roadway meets the criteria for special conditions rests with the District. It should be noted that even though special binder grades can help meet the flexible pavement requirements for high truck/bus use areas; they should not be considered as the only measure needed to

meet these special conditions. The District Materials Engineer should be consulted for additional recommendations for these locations.

For more detailed information on PG binder selection, refer to the Department's Pavement website at <http://www.dot.ca.gov/hq/oppd/pavement/pgb.htm> .