METHODS OF SAMPLING AND TESTING MT 308-04 TEMPERATURE-VISCOSITY CHARTS FOR USE IN DETERMINING MIXING TEMPERATURES FOR THE VARIOUS GRADES OF ASPHALT CEMENT (Montana Method)

1. Scope:

1.1 Temperature-Viscosity data for the various grades of bituminous materials used in Montana are listed in Tables I and II.

2. Contractor Responsibility:

- 2.1 The contractor will furnish the Project Engineer with data on the temperature-viscosity relationship of each asphalt to be used on the project. The data must cover the recommended temperature range and viscosities at which the asphalt will be used. The Project Manager will use this data to specify the temperature at which the material will be used.
- Note The contractor will furnish the most recent copy of the temperature-viscosity chart available at the time the material is purchased in order to ensure the greatest accuracy.

3. Temperature - Viscosity Data:

- **3.1** An <u>example</u> temperature-viscosity chart is included to illustrate a temperature-viscosity chart used for Materials Bureau <u>design</u> purposes. Temperature-viscosity charts are updated periodically to monitor any changes in temperature-viscosity that may occur.
- Note Asphalt cements (PG grade) for plant mix surfacing contracts have temperature-viscosity requirements issued by the Materials Bureau in the Mix Design memorandum, which govern the contract.
- **3.2** An example form is included to illustrate the documentation of the values that are recommended for mix design and field operations for the contractor and by the asphalt supplier for Polymer Modified Asphalt.

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TABLE I TEMPERATURE VISCOSITY DATA FOR DIFFERENT GRADES OF ASPHALT CEMENT			T,	ABLE II		
			TEMPERATURE VISCOSITY DATA FOR DIFFERENT GRADES OF LIQUID ASPHALT FROM MONTANA REFINERIES			
RE VISCOSITY DATA FOR	Spraying Range 25-100 S.F. Sec. (50-200 Centistokes)					
NEX			MONTANA RE	EFINING COM	PANY	
297-311°F 319-335°F		MC-70 MC-250 MC-800 MC-3000	111-160°F 155-212°F 198-260°F 225-287°F	SC-70 SC-250 SC-800 SC-3000	110-172°F 160-215°F 192-255°F 222-285°F	
CONTINENTAL OIL COMPANY		CENEX				
277-285°F		\wedge	MC, & SC-70 MC, & SC-250 MC, & SC-800	147-	-175°F -225°F -256°F	
BIL COMPANY			MC, & SC-3000		-290°F	
			MC-70 MC-250 MC-800	112- 158- 200-	2 ANY -165°F -215°F -265°F -290°F	
MONTANA REFINING COMPANY						
290-301°F 285-297°F 271-280°F						
	SCOSITY DATA FOR OF ASPHALT CEMENT 50-190 Centistokes) 50-190 Centistokes) 5NEX 310-320°F 297-311°F 319-335°F COLL COMPANY 285-294°F 277-285°F 267-276°F 267-276°F BIL COMPANY 144-149°F °F 150-165°F 155-165°F 155-165°F	SCOSITY DATA FOR OF ASPHALT CEMENT 50-190 Centistokes) 50-190 Centistokes) 5NEX 310-320°F 297-311°F 319-335°F COLL COMPANY 285-294°F 277-285°F 267-276°F 3BL COMPANY 144-149°F °F 150-165°F 155-165°F 155-165°F	SCOSITY DATA FOR OF ASPHALT CEMENT Di 50-190 Centistokes) MC-70 SNEX 310-320°F 297-311°F 319-335°F MC-70 C-250 MC-250 MC-800 MC-3000 L OIL COMPANY 285-294°F 267-276°F BIL COMPANY 144-149°F °F 150-165°F INING COMPANY 290-301°F 285-297°F	SCOSITY DATA FOR OF ASPHALT CEMENT TEMPERATURE DIFFERENT GRAD FROM MONT 50-190 Centistokes) Spraying Ran (50-200 SNEX MONTANA RE 310-320°F MC-70 297-311°F MC-70 319-335°F MC-250 JOL COMPANY 285-294°F 277-285°F MC, & SC-70 267-276°F MC, & SC-250 SIL COMPANY MC-70 144-149°F CONTINENT °F MC-70 150-165°F MC-70 150-165°F MC-3000 INING COMPANY 290-301°F 290-301°F 290-301°F 290-301°F 290-301°F	SCOSITY DATA FOR OF ASPHALT CEMENT TEMPERATURE VISCOSITY D DIFFERENT GRADES OF LIQUID FROM MONTANA REFINE 30-190 Centistokes) Spraying Range 25-100 S.F (50-200 Centistokes) SNEX MONTANA REFINING COM 310-320°F 297-311°F 319-335°F MC-70 111-160°F SC-250 319-335°F SC-70 MC-800 198-260°F SC-800 MC-3000 225-287°F LOIL COMPANY MC-800 285-294°F 267-276°F MC-70 SC-250 MC-800 198-260°F SC-3000 225-287°F MC-70 SC-250 MC-800 198-260°F SC-3000 225-287°F SIL COMPANY CENEX 144-149°F °F °F 150-165°F MC-70 MC-70 MC-800 200 MC-3000 227- INING COMPANY MC-70 290-301°F 285-297°F	

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TABLE I			TABLE II
TEMPERATURE VISCOSITY DATA FOR DIFFERENT GRADES OF ASPHALT CEMENT			TEMPERATURE VISCOSITY DATA FOR DIFFERENT GRADES OF LIQUID ASPHALT FROM MONTANA REFINERIES
Mixing Range (150-190 Centistokes)			Spraying Range 25-100 S.F. Sec. (50-200 Centistokes)
IDAHO ASPHALT			
			MONTANA REFINING COMPANY
	PG 64-22	310-325°F	
	PG 64-28	310-330°F	MC-70 111-160°F SC-70 110-172°F
	PG 64-34	320-330°F	MC-250 155-212°F SC-250 160-215°F
	PG 70-28	320-340°F	MC-800 198-260°F SC-800 192-255°F
			MC-3000 225-287°F SC-3000 222-285°F
		КОСН	
			CENEX
	PG 64-34	300-316°F	
			MC, & SC-70 105-175°F
MOOSE JAW ASPHALT			MC, & SC-250 147-225°F
		_	MC, & SC-800 181-256°F
	PG 58-28	292-299°F	MC, & SC-3000 214-290°F
	PG 64-34	325°338°F	
			CONTINENTAL OIL COMPANY
	MONTANA R	EFINING COMPANY	
			MC-70 112-165°F
	PG 58-28	293-304°F	MC-250 158-215°F
	PG 64-28	295-340°F	MC-800 200-265°F
	PG 70-28-	275-350°F	MC-3000 227-290°F
	E	and a second second south a state second	alte thus temperature viscosity data for the Exxen Company is no longer listed in

NOTE: Exxon Company no longer produces cutback asphalts, thus temperature viscosity data for the Exxon Company is no longer listed in Table II. In addition, Montana Refining Company no longer produces rapid cure (RC) cutback asphalts and thus no RC data for them is provided. Continental Oil no longer produces slow cure (SC) or rapid cure (RC) cutback asphalts and no data for them is provided.

(FOR EXAMPLE ONLY)

As a supplier of polymer modified asphalt for a Montana Department of Transportation project, we request that you provide the following information to the Materials Bureau. A completed form is required for each variety of Polymer asphalt submitted and for each project from which polymer asphalt will be supplied.

Project Termini

- (1) Safety Data Sheets
- (2) Temperature-viscosity chart and/or table for viscosity from 275 degrees F. To 340 degrees F. Or to the maximum mixing temperature of the asphalt.
- (3) Mix Design Temperature Ranges
 - a. Mixing viscosity range <u>290°F 310°F</u>
 - b. Compaction Viscosity Range <u>230°F 290°F</u>
- (4) Field Temperatures (plant mix operational temperatures) That is the temperature maximum <u>310°F</u> degrees F. and the temperature minimum <u>290°F</u> degrees F. of plant mix as it is discharged from the plant.
 - a. Maximum temperature at which roadway compaction may be performed 290°F
 - b. Minimum temperature at which roadway compaction may be performed 230°F

Company providing modified asphalt <u>Montana Refining Company</u>

Individual providing information Alan Hobbs

Address P.O. Box 1243, Great Falls, MT 59403

Phone No. (406)761-4100

Completion of this form provides the documentation of the values that are recommended for mix design and field operations for the contractor and by the asphalt supplier.

Identification of modified asphalt _____

Signature _____ Date _