

**2008 CANADIAN ASPHALT EXCHANGE PROGRAM**  
**(Asphalt Cement - SHRP Binder Testing Portion)**  
**Schedule of Testing and Handling of Test Materials**

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The package of materials for SHRP binder testing on a PG 58-28 asphalt cement contains three replicate samples of two litres each. Each of the tests specified should be performed on each replicate sample according to the AASHTO or ASTM Standards Method indicated.

Report the results of a single determination only, not the average of two or more except in cases where an average is called for in the method. Each specified test should be made on the three replicates by the same operator. However, it is not necessary that all tests listed be done by the same operator.

Return your completed data collection forms to:

Magdy Beshara, P.Eng.  
Testing Standards Engineer  
Saskatchewan Ministry of Highways & Infrastructure  
Engineering Standards Branch  
1610 Park Street  
Regina, Saskatchewan  
S4N 2G1

Samples have been prepared and shipped by Imperial Oil of Sarnia, Ontario. If you have any questions with respect to the samples, please contact:

Mary Gale  
Imperial Oil, Research Department  
453 Christina Street South  
P.O. Box 3022  
Sarnia, Ontario  
N7T 8C8  
Phone: (519) 339-4831  
Fax: (519) 339-4436  
mary.j.gale@esso.ca

Questions or comments with respect to the Schedule of Testing and Handling of Test Materials or the Data Collection and Submission Form should be directed to:

Magdy Beshara, P.Eng.  
Testing Standards Engineer  
Saskatchewan Ministry of Highways & Infrastructure  
Engineering Standards Branch  
1610 Park Street  
Regina, Saskatchewan  
S4N 2G1  
Phone: (306) 787-4922  
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Directions for the individual tests on each of the three replicates of the asphalt cement samples.

The following tests shall be performed:

**Tests on Original Binder**

1. Rotational Viscosity – ASTM D4402

Determine the viscosity at 135° C using the rotational viscosity apparatus. Report the viscosity to the nearest 0.01 Pa·s.

2. Dynamic Shear Rheometer (DSR) - AASHTO T315

Determine the complex shear modulus ( $G^*$ ) and the phase angle ( $\delta$ ) at 58° C and at 64° C, using a frequency of 10 rad/s, a 25 mm plate, a 1mm gap and the strain or stress values specified in the method. Report  $G^*$  to the nearest 0.01 kPa,  $\delta$  to the nearest 0.1 degree and  $G^*/\sin(\delta)$  to the nearest 0.01 kPa. Also report the testing mode (constant stress or constant strain), the actual stress or strain level used, the test temperature, the DSR manufacturer and model number.

**Tests on TFO or RTFO Residue**

1. Thin-Film Oven Test AASHTO T179 or ASTM D1754: Change in Mass

OR

Rolling Thin-Film Oven Test AASHTO T240 or ASTM D2872: Change in Mass

Weigh the sample and containers to the nearest milligram. Report to the nearest 0.001 percent of the average change in mass of the material in all of the containers if the Thin-Film Oven is used, but only two of the containers if the Rolling Thin-Film Oven is used. Also check the appropriate boxes to indicate the oven used and a mass gain or loss.

2. Dynamic Shear Rheometer (DSR), AASHTO T315

Determine the complex shear modulus ( $G^*$ ) and the phase angle ( $\delta$ ) at 58° C and 64° C, using a frequency of 10 rad/s, a 25 mm plate, a 1 mm gap and the strain or stress values specified in the method. Report  $G^*$  to the nearest 0.01 kPa,  $\delta$  to the nearest 0.1 degree and  $G^*/\sin(\delta)$  to the nearest 0.01 kPa.

**Tests on PAV Residue**

1. Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV), AASHTO R28

Age the asphalt binder at a temperature of 100° C using the pressurized aging vessel.

2. Dynamic Shear Rheometer (DSR), AASHTO T315

Determine the complex shear modulus ( $G^*$ ) and the phase angle ( $\delta$ ) at 19° C and 16° C, using a frequency of 10 rad/s, an 8 mm plate, a 2 mm gap and the strain or stress values specified in the method. Report  $G^*$  to the nearest kPa,  $\delta$  to the nearest 0.1 degree and  $G^* \times \sin(\delta)$  to the nearest kPa.

3. Bending Beam Rheometer (BBR), AASHTO T313

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Determine the flexural creep stiffness at  $-18^{\circ}\text{C}$  and  $-24^{\circ}\text{C}$ . Report the creep stiffness after 60 s in MPa to three significant figures. Report the slope (m) to the nearest 0.001.

4. Direct Tension (DT), AASHTO T314

Determine the failure stress and failure strain at a temperature of  $-18^{\circ}\text{C}$  and  $-24^{\circ}\text{C}$  and a strain rate of 1 mm/min. Report the failure stress to the nearest 0.01 MPa and the failure strain to the nearest 0.01 percent.

**2008 CANADIAN ASPHALT EXCHANGE PROGRAM**  
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**A. PARTICIPANT DOCUMENTATION**

Agency/Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contact Person \_\_\_\_\_

Telephone No. \_\_\_\_\_

Fax No. \_\_\_\_\_

E-mail Address \_\_\_\_\_

**B. SAMPLE DOCUMENTATION**

Date Samples Received \_\_\_\_\_

Date Testing Commenced \_\_\_\_\_

Dated Testing Completed \_\_\_\_\_

**C. PARTICIPANT COMMENTS**

Please provide any comments which may be of value to this or future exchanges:

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**2008 CANADIAN ASPHALT EXCHANGE PROGRAM**  
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**D. TEST RESULTS**

PG 58-28				
TESTS ON ORIGINAL BINDER				
<b>Replicate Number</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<b>Rotational Viscosity at 135°C</b> <small>(Report to the nearest 0.01 Pa-s)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Test No. 1
<b>Manufacturer</b>	<input type="text"/>			
<b>Dynamic Shear at 58 °C, 25 mm plate, 1 mm gap</b>				
<b>Complex Shear Modulus, G*</b> <small>(Report to the nearest 0.01 kPa)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	2
<b>Phase Angle, δ</b> <small>(Report to the nearest 0.1 degree)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	3
<b>G* / sin (δ)</b> <small>(Report to the nearest 0.01 kPa)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	4
<b>Test Temp</b>	<input type="text"/>	<b>(nearest 0.1°C)</b>		
<b>Dynamic Shear at 64 °C, 25 mm plate, 1 mm gap</b>				
<b>Complex Shear Modulus, G*</b> <small>(Report to the nearest 0.01 kPa)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	5
<b>Phase Angle, δ</b> <small>(Report to the nearest 0.1 degree)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	6
<b>G* / sin (δ)</b> <small>(Report to the nearest 0.01 kPa)</small>	<input type="text"/>	<input type="text"/>	<input type="text"/>	7
<b>Test Temp</b>	<input type="text"/>	<b>(nearest 0.1°C)</b>		
<b>Manufacturer</b>	<input type="text"/>			
<b>Model Number</b>	<input type="text"/>			
<b>Constant Stress</b>	<input type="checkbox"/>	or	<b>Constant Strain</b>	<input type="checkbox"/>
<b>Actual Stress</b>	<input type="text"/>	(kPa)	or	<b>Actual Strain</b> <input type="text"/> (% level used)
<b>Equipment Verified using suitable reference fluids?</b>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
<b>Date</b>	<input type="text"/>			
<b>Temp verified using silicon wafer?</b>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
<b>Date</b>	<input type="text"/>			
<b>Agency / Company Name:</b>	<input type="text"/>			

**2008 CANADIAN ASPHALT EXCHANGE PROGRAM**  
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PG 58-28									
TESTS ON THIN-FILM OVEN OR ROLLING THIN-FILM OVEN									
<b>Replicate Number</b>				<input type="text"/>	<input type="text"/>	<input type="text"/>	Test No.		
<b>Change in Mass</b> (Report to the nearest 0.001 percent)				<input type="text"/>	<input type="text"/>	<input type="text"/>	8		
<b>Thin-Film Oven</b> <input type="checkbox"/> <b>or</b> <b>Rolling Thin-Film Oven</b> <input type="checkbox"/>				<b>Loss</b> <input type="checkbox"/>	<b>Loss</b> <input type="checkbox"/>	<b>Loss</b> <input type="checkbox"/>			
				<b>Gain</b> <input type="checkbox"/>	<b>Gain</b> <input type="checkbox"/>	<b>Gain</b> <input type="checkbox"/>			
<b>Dynamic Shear at 58 °C, 25 mm plate, 1 mm gap</b>									
<b>Complex Shear Modulus, G*</b> (Report to the nearest 0.01 kPa)				<input type="text"/>	<input type="text"/>	<input type="text"/>	9		
<b>Phase Angle, δ</b> (Report to the nearest 0.1 degree)				<input type="text"/>	<input type="text"/>	<input type="text"/>	10		
<b>G* / sin (δ)</b> (Report to the nearest 0.01 kPa)				<input type="text"/>	<input type="text"/>	<input type="text"/>	11		
<b>Test Temp</b> <input type="text"/> (nearest 0.1 °C)									
<b>Dynamic Shear at 64 °C, 25 mm plate, 1 mm gap</b>									
<b>Complex Shear Modulus, G*</b> (Report to the nearest 0.01 kPa)				<input type="text"/>	<input type="text"/>	<input type="text"/>	12		
<b>Phase Angle, δ</b> (Report to the nearest 0.1 degree)				<input type="text"/>	<input type="text"/>	<input type="text"/>	13		
<b>G* / sin (δ)</b> (Report to the nearest 0.01 kPa)				<input type="text"/>	<input type="text"/>	<input type="text"/>	14		
<b>Test Temp</b> <input type="text"/> (nearest 0.1 °C)									

**2008 CANADIAN ASPHALT EXCHANGE PROGRAM**  
**(Asphalt Cement - SHRP Binder Testing Portion)**  
**Data Collection and Submission Forms**

PG 58-28			
TESTS ON PAV RESIDUE, PAV AT 100 °C			
<b>Replicate Number</b>	<input type="text"/>	<input type="text"/>	Test No.
<b>Dynamic Shear at 19 °C, 8 mm plate, 2 mm gap</b>			
<b>Complex Shear Modulus, G*</b> <small>(Report to the nearest kPa)</small>	<input type="text"/>	<input type="text"/>	15
<b>Phase Angle, δ</b> <small>(Report to the nearest 0.1 degree)</small>	<input type="text"/>	<input type="text"/>	16
<b>G* × sin (δ)</b> <small>(Report to the nearest kPa)</small>	<input type="text"/>	<input type="text"/>	17
<b>Test Temp</b> <input type="text"/> <small>(nearest 0.1°C)</small>			
<b>Dynamic Shear at 16 °C, 8 mm plate, 2 mm gap</b>			
<b>Complex Shear Modulus, G*</b> <small>(Report to the nearest kPa)</small>	<input type="text"/>	<input type="text"/>	18
<b>Phase Angle, δ</b> <small>(Report to the nearest 0.1 degree)</small>	<input type="text"/>	<input type="text"/>	19
<b>G* × sin (δ)</b> <small>(Report to the nearest kPa)</small>	<input type="text"/>	<input type="text"/>	20
<b>Test Temp</b> <input type="text"/> <small>(nearest 0.1°C)</small>			
<b>BBR Creep Stiffness at -18 °C, 60 s</b> <small>(Report in MPa to 3 Significant Figures)</small>	<input type="text"/>	<input type="text"/>	21
<b>BBR Slope, m, at -18 °C, 60 s</b> <small>(Report to the nearest 0.001)</small>	<input type="text"/>	<input type="text"/>	22
<b>BBR Creep Stiffness at -24 °C, 60 s</b> <small>(Report in MPa to 3 Significant Figures)</small>	<input type="text"/>	<input type="text"/>	23
<b>BBR Slope, m, at -24 °C, 60 s</b> <small>(Report to the nearest 0.001)</small>	<input type="text"/>	<input type="text"/>	24
<b>BBR Manufacturer</b> <input type="text"/>			
<b>Mold Used:</b> Aluminum <input type="checkbox"/> or    Silicone <input type="checkbox"/>			
<b>DT Failure Stress at -18 °C, 1 mm/min</b> <small>(Report to the nearest 0.01 MPa)</small>	<input type="text"/>	<input type="text"/>	25
<b>DT Failure Strain at -18 °C, 1 mm/min</b> <small>(Report to the nearest 0.01 percent)</small>	<input type="text"/>	<input type="text"/>	26
<b>DT Failure Stress at -24 °C, 1 mm/min</b> <small>(Report to the nearest 0.01 MPa)</small>	<input type="text"/>	<input type="text"/>	27
<b>DT Failure Strain at -24 °C, 1 mm/min</b> <small>(Report to the nearest 0.01 percent)</small>	<input type="text"/>	<input type="text"/>	28
<b>DT Manufacturer</b> <input type="text"/>			
<b>Agency / Company Name:</b> <input type="text"/>			