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Standard Test Method for Calculating Volume-Temperature Correction For Coal-Tar Pitches¹

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1. Scope

1.1 This test method covers calculation of the amount of expansion or contraction of a volume of liquid coal-tar pitch due to a change of temperature.

2. Referenced Documents

2.1 *ASTM Standards*:²

D70 Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)

D71 Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method)

3. Summary of Test Method

3.1 Different pitches expand or contract at different rates which vary in relation to the relative density of the material. The corresponding values are listed in **Table 1**.

4. Significance and Use

4.1 Coal tar pitch is shipped or stored, or both, at various temperatures, consequently a means is required to correct volume to a specified temperature.

5. Procedure

5.1 Determine the relative density of the pitch at 60/60°F (15.6/15.6°C) in accordance with Test Methods **D70** or **D71**, whichever is most suitable.

5.2 Find the coefficient of expansion per degree Celsius or Fahrenheit for the particular material from **Table 1**.

5.3 Multiply the coefficient by the number of degrees between the standard temperature and the actual temperature of the material as measured.

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.02.0A on Temperature, Density, Physical Properties.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Expansion Coefficient Versus Relative Density

Relative Density at 60/60°F (15.6/15.6°C)	Expansion Coefficient	
	per °F	per °C
1.160	345×10^{-6}	620×10^{-6}
1.170	340	610
1.180	330	600
1.190	325	590
1.200	320	580
1.210	315	570
1.220	310	565
1.230	305	555
1.240	300	545
1.250	295	535
1.260	290	525
1.270	285	520
1.280	280	510
1.290	275	500
1.300	270	490
1.310	265	480
1.320	260	470
1.330	255	460
1.340	250	450

5.4 To the product of 5.3 add 1.000. The result is expansion factor *A*.

5.5 If the temperature of the material as measured is above the standard temperature, *divide* the measured volume by factor *A* (5.4). If the temperature of the material as measured is below the standard temperature, *multiply* the measured volume by factor *A* (5.4).

5.6 *Example*—A tank of pitch contains 95,000 gal at 350°F (177°C). Calculate the volume at 60°F (15.6°C) as follows: The relative density 60/60°F (15.6/15.6°C) according to Test Method **D70** is 1.28.

From **Table 1** the coefficient is 280×10^{-6} per °F.

The temperature difference of $350 - 60 = 290$ °.

$$290 \times 280 \times 10^{-6} = 0.0812$$

$$A = 1.0812$$

The corrected volume is $95,000/1.0812 = 87\,865$ gal at 60°F (15.6°C).

6. Keywords

6.1 coal tar pitch; correction factor; pitch; relative density; volume-temperature correction