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Standard Test Method for Calculating Volume-Temperature Correction For Coal-Tar Pitches[1]

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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.

1.2 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:*

D 70 Test Method for Density of Semi-Solid Bituminous Materials Pyscnometer[2]

D 71 Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method)[3]

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 D 70 or D 71, 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.

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 D 70 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

[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.A0 on Temperature, Density, Physical Properties.

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[2] *Annual Book of ASTM Standards*, Vol 04.03.

[3] *Annual Book of ASTM Standards*, Vol 05.01.