Manual of Petroleum Measurement Standards Chapter 11—Physical Properties Data

Section 2, Part 5—A Simplified Vapor Pressure Correlation for Commercial NGLs

ASTM Technical Publication [Stock No. PETROLTBL-TP15]
GPA Technical Publication TP-15

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Measurement Coordination

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Foreword

The purpose of this procedure is to provide a simplified means of estimating equilibrium vapor pressures of various natural gas liquids (NGLs) from a knowledge of the fluid's relative density (60°F/60°F) and process temperature. The intended application of this procedure is to provide the values of P_e (equilibrium vapor pressure) required to determine the pressure effect contributions to volume correction factors as specified in the American Petroleum Institute *Manual of Petroleum Measurement Standards* (*MPMS*) Chapter 11.1-2004[1] (which superseded Chapter 11.2.1-1984[2]) and Chapter 11.2.2[3]. It is realized that other equations of state are currently in use for specific custody transfer applications and that such methods will continue to be used as acceptable for both buyer and seller.

This procedure is applicable to four major classifications of petroleum fluid mixtures: commercial propanes, commercial butanes, natural gasolines, and light end fluids.The latter consists of EP mixes and high ethane content fluids. It covers the relative density range of 0.350 to 0.675 over a temperature range of –50°F through 140°F. This procedure is an extension of GPA Technical Publication TP-15 (1988)[9]/API *MPMS* Addendum to Chapter 11.2.2-1994[4] to include light end fluids in the relative density range of 0.350 to 0.490.

Variations from the computed vapor pressures to the actual values are to be expected because of the infinite number of possible compositions that can result in the same relative density product. Representative and extreme compositions were selected to develop the correlations, but it is realized that additional streams with compositions from among the infinite potential may well behave differently. This potential for variation is especially true at relative densities in the neighborhood of 0.500. For example, at a relative density of 0.505 the fluid could be propane or Y-grade mix, each having significantly different compositions and vapor pressure behaviors.

As is always the case in correlations published for custody transfer and settlement purposes, additional accuracy may be obtained by developing a modified correlation for certain specific applications if agreed to by all contracting parties. An equation to improve the accuracy of the generalized correlation at 100°F is also included.

It is important to note that the application of the correlations presented in this document to conditions or fluids not specified, will result in untested and unknown results which could contain significant errors.

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