

based on the change in volume from 0 F to 91 F. From Table 7, determine $w = 62.5$ lb per cu ft at 0 F, and $w = 60.5$ lb per cu ft at 91 F. From Table 1, Chapter 26, 10,000 ft of 1-in. IPS contains 44.9 gal. Allowing another 15 gal for heat exchanger, headers, etc., assume the system contains 60 gal. Then the expansion would be $60(62.5 - 60.5) = 2.48$ gal.

A quick approximation of required head can be obtained from Fig. 20. At 91 F, the oil has a viscosity of 4.92×10^{-6} ft sq per sec or 35 SSU. Enter Fig. 20 at 35 SSU and rise to the 12 gpm curve, read $h = 12.5$ ft per 100 ft, then $h_t = 12.5 \times \frac{300}{100} = 37.5$ ft, which agrees fairly well with the 37.9 ft obtained by the Equation 23.

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