

Dranchuk, Purvis and Robinson's (1971) Z-factor correlation @model = DPR

Implicit Z-factor correlation @model for the natural gas in the wide range of pseudo-reduced temperature $1.0 < T_{pr} \leq 3.0$ and pseudo-reduced pressure $0.2 \leq P_{pr} \leq 30$

and also a specific range of $0.7 < T_{pr} \leq 1.0$ and $P_{pr} < 1.0$:

(1)	$Z = \frac{0.27 P_{pr}}{y T_{pr}}$	(2) $1 + T_1 y + T_2 y^2 + T_3 y^5 + T_4 y^2 (1 + A_8 y^2) \cdot \exp(-A_8 y^2) - \frac{T_5}{y} = 0$								
	(3)	$T_1 = A_1 + \frac{A_2}{T_{pr}} + \frac{A_3}{T_{pr}^3}$	(4)	$T_2 = A_4 + \frac{A_5}{T_{pr}}$	(5)	$T_3 = \frac{A_5 A_6}{T_{pr}}$	(6)	$T_4 = \frac{A_7}{T_{pr}^3}$	(7)	$T_5 = \frac{0.27}{T_p}$

where

Z	Z-factor				
T	fluid temperature	$T_{pr} = T/T_{pc}$	pseudo-reduced temperature (or reduced temperature T_r in case of pure substances)	T_{pc}	pseudo-critical temperature (or critical temperature T_c in case of pure substances)
P	fluid pressure	$P_{pr} = P/P_{pc}$	pseudo-reduced pressure (or reduced pressure P_r in case of pure substances)	P_{pc}	pseudo-critical pressure (or critical pressure P_c in case of pure substances)

and

$A_1 = 0.31506237$	$A_2 = -1.0467099$	$A_3 = -0.57832729$	$A_4 = 0.53530771$
$A_5 = -0.61232032$	$A_6 = -0.10488813$	$A_7 = 0.68157001$	$A_8 = 0.68446549$

See also

[Natural Science / Physics /Thermodynamics / Z-factor / Z-factor Correlations @model](#)

Reference

Dranchuk, P.M., Purvis, R.A., and D.B. Robinson. "Computer Calculation Of Natural Gas Compressibility Factors Using The Standing And Katz Correlation." Paper presented at the Annual Technical Meeting, Edmonton, May 1973. doi: <https://doi.org/10.2118/73-112>

