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Tables for the Thermophysical Properties of Ethane

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LIST OF SYMBOLS AND UNITS

Symbol	Description	SI Units (used in text)	REFERENCE
Roman			
A	Molar Helmholtz energy	$J \cdot mol^{-1}$ [a]	eq (4)
B	Second virial coefficient	$dm^3 \cdot mol^{-1}$	table 7
C_i	Coefficients in $\Omega^{(2,2)*}$	-	eq (10), table 8
C_P	Molar isobaric heat capacity	$J \cdot mol^{-1} \cdot K^{-1}$	table 7
C_V	Molar isochoric heat capacity	$J \cdot mol^{-1} \cdot K^{-1}$	table 7
F	Crossover function in λ_{cr}	-	eqs (15,17)
f_{int}, f_i	Contribution from internal modes	-	eqs (11,12), table 8
G	Molar Gibbs energy	$J \cdot mol^{-1}$	table 7
G_i	Coefficients in $\rho_{\sigma L}$	-	eq (2), table 2
g_i	Coefficients in η_{ex}	-	eq (13), table 9
H	Molar enthalpy	$J \cdot mol^{-1}$	tables 1,7
H_i	Coefficients in P_σ	-	eq (1), table 2
J_i	Coefficients in $\rho_{\sigma V}$	-	eq (3), table 2
j_i	Coefficients in λ_{ex}	-	eq (14), table 9
k	Boltzmann constant	$J \cdot K^{-1}$	table 1
M_r	Relative molecular mass	-	table 1
N_A	Avogadro constant	mol^{-1}	table 1
n_i	Coefficients in ϕ^r	-	eq (6), table 4
P	Pressure	MPa	-
Q_i	Coefficients in ϕ^{id}	-	eq (5), table 3
q_D	Wavenumber cutoff	nm^{-1}	eq (17)
R	Gas constant	$J \cdot mol^{-1} \cdot K^{-1}$	table 1
r_i	Exponent of δ	-	eqs (6,13,14), tables 2, 9
S	Molar entropy	$J \cdot mol^{-1} \cdot K^{-1}$	table 7

LIST OF SYMBOLS AND UNITS (CONT'D)

Symbol	Description	SI Units (used in text)	REFERENCE
s_i	Exponent of τ	-	eqs (6,13,14) tables 2, 9
t	Reduced temperature, kT/ϵ	-	eqs (9,10,12)
T	Temperature, IPTS-68	K	-
T^*	Reduced temperature, $(T_c-T)/T_c$	-	eqs (1-3)
U	Molar internal energy	$J \cdot mol^{-1}$	table 7
u	Unified atomic mass unit	kg	table 1
w	Speed of sound	$m \cdot s^{-1}$	table 7
Z	Compressibility factor, $P/RT\rho$	-	eq (3)
Greek			
β	Scaling exponent in $\rho_{\sigma L}, \rho_{\sigma v}$	-	eqs (2,3), table(2)
γ	Potential parameter	-	Ref. [13]
δ	Reduced density, ρ/ρ_c	-	-
ϵ	Scaling exponent in P_σ, $2-\alpha$	-	eq (1),table 2)
ϵ	Energy parameter	J	See ϵ/k
ϵ/k	Energy parameter	K	table(1)
η	Shear viscosity	$\mu Pa \cdot s$	eq (7)
λ	Thermal conductivity	$mW \cdot m^{-1} \cdot K^{-1}$	eq (8)
ξ	Correlation length	nm	eqs (15,16)
ρ	Molar density	$mol \cdot dm^{-3}$	-
σ	Distance parameter	nm	table 1
τ	Reduced inverse temperature, T_c/T	-	-
ϕ	Reduced Helmholtz energy, A/RT	-	eqs (4-6)
$\Omega^{(2,2)*}$	Reduced collision integral	-	eqs (9,10)
Superscripts			
id	Ideal gas contribution		eq (4), table 1
r	Residual contribution		eq (4)

LIST OF SYMBOLS AND UNITS (CONT'D)

Symbol	Description	SI Units (used in text)	REFERENCE
Subscripts			
c	Value at critical point		table 1
cr	Critical contribution		eqs (8,15)
ex	Excess contribution		eqs (7,8,13,14)
t	Value at triple point		table 1
tL,tV	Value at triple point in liquid,vapor		table 1
σ	Value at saturation boundary		eq (1)
σL,σV	Value in saturated liquid, vapor		eqs (2,3)
δ	Partial derivative with respect to δ		tables 5-7
τ	Partial derivative with respect to τ		tables 5-7
0	Value at zero density		eqs (7-9,11)

[a] Throughout this paper, extensive physical quantities are given on a molar basis. The elementary entities are the ethane (C_2H_6) molecules.

TABLES FOR THE THERMOPHYSICAL PROPERTIES OF ETHANE

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The thermophysical properties of ethane are tabulated for a large range of the fluid state based on recently formulated correlations. For the thermodynamic properties, temperatures from 90 to 625 K at pressures less than 70 MPa are included; for the viscosity, the corresponding range is 90-500 K with pressures to 60 MPa; for the thermal conductivity the range is 90-600 K with pressures to 70 MPa. In addition to the tables of properties, algebraic expressions and associated tables of coefficients are given to allow additional property calculations. Graphical comparisons between experimental property determinations and the correlation are also given both for primary data used in the formulation of the correlations and for additional data. A listing of a FORTRAN program for the evaluation of ethane thermophysical properties is included.

Key words:

correlation; density; equation of state; heat capacity; ethane; phase boundary; pressure; speed of sound; thermal conductivity; thermophysical properties; transport properties; virial coefficients; viscosity.

1. INTRODUCTION

We have recently developed correlations for several of the thermophysical properties of ethane [1], including an equation of state analogous to that proposed by Schmidt and Wagner [2], equations for the liquid-vapor phase boundary, and correlations for the fluid viscosity and thermal conductivity. Details of the development and error analysis of the formulations have been presented elsewhere [1]; in this paper, we summarize our equations and present extensive graphical comparisons of the correlations with experimental data and tables of properties based on these correlations. We have also included the listing for a FORTRAN program which can be used interactively to calculate properties of ethane. The correlations are similar in form to those published previously for methane [3], and this report is analogous to the earlier Technical Note on the properties of methane [4]. A separate Internal Report [5] gives a full tabular listing of experimental data considered in the development of the ethane correlations.

The rationale for these new correlations and the present set of tables was discussed in Ref. [1]. Briefly summarized, earlier extensive works include those of Goodwin et al. [6], Sychev et al. [7], and Younglove and Ely [8]. Our correlations account for some new experimental measurements, and more important, the form of the residual Helmholtz free energy correlation, first proposed by Schmidt and Wagner [2], gives an excellent description of the thermodynamic surface and describes the critical region extremely well for a classical equation of state. The new ancillary equations for the phase boundary incorporate the results of lowest order scaling theory, and both viscosity and thermal conductivity correlations improve the description of the fluid properties when compared to previous correlations. Our current description of the enhancement of the thermal conductivity is based on the very recent mode-coupling work of Olchowy and Sengers [9]. The economic importance of ethane, as a major constituent of natural gas, makes the use of improved thermophysical properties correlations especially desireable. Also, the present correlations should prove useful as reference equations for corresponding-states models for mixtures and other pure fluids. These equations, together with the similar study of methane, will assist in the development of corresponding-states formalisms.

The next two sections give the algebraic forms for the fluid property correlations of thermodynamic and transport properties, with brief narrative. The List of Symbols and Units given above is a useful adjunct to the equations, and tables of needed coefficients and constants are interspersed throughout the text. Extensive discussion of the development of the equations and evaluation of fitted coefficients was given in Ref. [1]. Figures which follow, in Appendix A, give the comparisons between the correlations and experimental data; these include both primary data, used in the determination of the coefficients in the equation, and secondary data, which were not explicitly used for any of a number of reasons as discussed in Ref. [1]. The next set of tables, in Appendix B, gives values of the thermophysical properties for convenient values of the temperature, density, or pressure. Finally, this report concludes with a listing of a FORTRAN 77 program, in Appendix C, which allows interactive evaluation of many thermophysical properties for any state point within the range of the correlations.

2. THERMODYNAMIC PROPERTIES AND THEIR ALGEBRAIC REPRESENTATION

2.1 Fixed Point Constants

Values for the critical and triple-point constants, intermolecular potential parameters (for transport properties using the 11-6-8, $\gamma = 3$ potential), reference values for ideal gas properties, and miscellaneous constants are given in table 1. Details of the selection process and quoted uncertainties are given in Ref. [1]. The values of the critical constants, including all the quoted digits and disregarding the associated uncertainties, are needed for evaluating the correlating equations below. The fundamental constants in table 1 agree with the values most recently recommended by CODATA [10].

Table 1. Fixed point constants and other parameters used in the correlations

Triple Point:	T_t = 90.352 ± 0.005 K [a] P_t = 1.130 ± 0.005 Pa ρ_{tL} = 21.667 ± 0.01 mol•dm^{-3} ρ_{tv} = 1.504 ± 0.02 mol•dam^{-3}
Critical Point:	T_c = 305.33 ± 0.04 K [b] P_c = 4.8718 ± 0.005 MPa ρ_c = 6.87 ± 0.1 mol•dm^{-3} Z_c = 0.279 34 ± 0.005
Intermolecular Potential Parameters:	ϵ/k = 245.0 K σ = 0.436 82 nm
Ideal Gas Reference Point Values:	(at 298.15 K and 0.101 325 MPa) S^{id} = 229.12 J•K^{-1}•mol^{-1} H^{id} = 11.874 kJ•mol^{-1}
Miscellaneous:	Relative molecular mass...M_r = 30.070 Universal gas constant...R = 8.314 510 J•mol^{-1}•K^{-1} Boltzmann constant...k = 1.380 658 x 10^{-23} J•K^{-1} Avogadro constant...N_A = 6.022 136 7 x 10^{23} mol^{-1} Unified atomic mass unit..u = 1.660 540 2 x 10^{-27} kg

[a] This corresponds to 90.360 K on ITS-90 scale.
[b] This corresponds to 305.32 K on ITS-90 scale.

2.2 Liquid-Vapor Saturation Boundary

Three ancillary equations for the pressure, liquid density, and vapor density along the two-phase boundary are described in this section. Although the full equation of state can be used with the Maxwell construction method to evaluate these quantities, these equations include theoretically inspired scaling terms and therefore are more accurate in the critical region. The development of the equations was discussed in Ref. [1].

For the saturated vapor pressure P_σ the equation

$$P_\sigma(T) = P_c \exp\left[H_1 T^*/(1-T^*) + H_2 T^* + H_3 T^{*\varepsilon} + H_4 T^{*2} + H_5 T^{*3} \right], \quad (1)$$

where $T^*=(T_c-T)/T_c$, is used. The necessary constants and critical exponent are given in table 2.

The densities of the saturated liquid $\rho_{\sigma L}$ and saturated vapor $\rho_{\sigma v}$ are given by

$$\rho_{\sigma L}(T) = \rho_c \left[1 + \frac{G_1 T^{*\beta} + G_2 T^{*2} + G_3 T^{*3} + G_5 T^{*4}}{1 + G_4 T^{*(1-\beta)}} \right], \quad (2)$$

and

$$\rho_{\sigma v}(T) = \frac{P_\sigma(T)}{R\,T} \left\{ 1 + P_\sigma(T)\tau^8 \frac{Z_c - 1}{P_c} \left[1 + \frac{J_0 T^{*\beta} + J_1 T^{*2\beta} + J_2(T^* + T^{*4}) + J_3 T^{*2}}{1 + J_4 T^*} \right] \right\}^{-1} \quad (3)$$

respectively. In eq (3), $Z_c = P_c/(RT_c\rho_c)$ is the critical compressibility factor given in table 1, $\tau = T_C/T$, and $P_\sigma(T)$ must be evaluated from eq (1). The constants are again found in table 2. Figures A1, A2, and A3 in Appendix A give comparisons between experimental phase boundary measurements and the quantities calculated by eqs (1-3).

Table 2. Coefficients for liquid-vapor boundary correlations

Saturated Vapor Pressure eq (1)	Saturated Liquid Density eq (2)	Saturated Vapor Density eq (3)
ϵ = 1.90	β = 0.355	β = 0.355
H_1 = -7.955 315	G_1 = 1.930 740	J_0 = -0.748 371 9
H_2 = 1.532 827	G_2 = -0.653 985 6	J_1 = -1.372 895
H_3 = 14.780 68	G_3 = 0.814 136 2	J_2 = -1.192 597
H_4 =-13.431 79	G_4 = -0.339 743 0	J_3 = 1.861 505
H_5 = 4.704 891	G_5 = -0.383 814 1	J_4 = 1.313 649

2.3 Ideal Gas Equation

The thermodynamic surface is described by an equation for the molar Helmholtz energy, A. Thus, the important derived properties can be obtained by simple, analytical differentiation. The Helmholtz energy is divided into ideal gas and residual constituents according to

$$A(\rho,T) = A^{id} + A^{r} = RT\phi = RT(\phi^{id} + \phi^{r}). \tag{4}$$

All the derived thermodynamic properties can similarly be divided into ideal and residual contributions as discussed below.

Our ideal gas correlation is based on the spectroscopically derived data of Chao et al. [11]. With the definitions $\delta = \rho/\rho_c$ and $\tau = T_c/T$, the dimensionless ideal gas contribution to the Helmholtz energy is written as

$$\begin{aligned}\phi^{id}(\delta,\tau) &= A^{id} / RT \\ &= Q_1 + \ln\delta + Q_2 \ln\tau + Q_3\,\tau^{-1/3} + \\ &\quad Q_4\,\tau^{-2/3} + Q_5\,\tau^{-1} + Q_6 \ln(1 - e^{Q_7\tau})\end{aligned} \tag{5}$$

with the coefficients Q_i given in table 3. Equation (5) must be evaluated at the experimental density and temperature, although for many thermodynamic properties, there is no density (or pressure) dependence in the required derivatives, as discussed below. The constants in table 3 incorporate integration constants necessary to give the standard values of the entropy and enthalpy reported in table 1. A figure comparing the spectroscopic data and the correlations is given in Appendix A.

Table 3. Coefficients for ideal gas Helmholtz energy, eq (5)

Q_0 = -28.594 991	Q_4 = -3.307 573 5
Q_1 = -23.446 765	Q_5 = -0.559 566 78
Q_2 = 3.815 947 6	Q_6 = 5.072 226 7
Q_3 = 8.602 129 9	Q_7 = -5.507 487 4

2.4 Residual Helmholtz Energy

The residual term in eq (4) for the Helmholtz energy was correlated by a 32-term function introduced by Schmidt and Wagner [2]. The resulting equation of state has been called the SWEOS, and the coefficients for the ethane fluid were obtained by a multiproperty least-squares regression as described in Ref. [1]. Explicitly, we write

$$\phi^r = \sum_{i=1}^{13} n_i \delta^{r_i} \tau^{s_i} + e^{-\delta^2} \sum_{i=14}^{24} n_i \delta^{r_i} \tau^{s_i} + e^{-\delta^4} \sum_{i=25}^{32} n_i \delta^{r_i} \tau^{s_i} \quad (6)$$

with $\delta = \rho/\rho_c$ and $\tau = T_c/T$, as before. The coefficients n_i and the exponents r_i and s_i are given in table 4.

2.5 Derived Property Equations

One can evaluate many of the thermodynamic properties of ethane by taking the appropriate derivatives of the Helmholtz energy as given in eqs (4-6). In tables 5 and 6 we have collected the coefficients necessary to calculate the six lowest order derivatives for the ideal gas and residual contributions to the Helmholtz energy. In our notation, the first isothermal (reduced) density derivative of the (reduced) residual free energy is denoted

$$\phi^r_\delta = \left.\frac{\partial \phi^r(\delta,\tau)}{\partial \delta}\right|_\tau = \frac{\rho_c}{RT} \left.\frac{\partial A^r(\rho,T)}{\partial \rho}\right|_T .$$

and similarly for other derivatives.

Table 4. Exponents and coefficients for the residual Helmholtz energy ϕ^r, eq (6)

	i	r_i	s_i	n_i
$\delta^{r_i} \tau^{s_i}$	1	1	0	0.462 154 305 60
	2	1	1.5	$-0.192\ 369\ 363\ 87 \times 10$
	3	1	2.5	0.398 786 040 03
	4	2	-0.5	$0.160\ 545\ 323\ 72 \times 10^{-1}$
	5	2	1.5	0.128 952 422 19
	6	2	2	$0.354\ 583\ 204\ 91 \times 10^{-1}$
	7	3	0	$0.349\ 278\ 445\ 40 \times 10^{-1}$
	8	3	1	$-0.113\ 061\ 833\ 80 \times 10^{-1}$
	9	3	2.5	$-0.398\ 090\ 327\ 79 \times 10^{-1}$
	10	6	0	$0.830\ 319\ 368\ 34 \times 10^{-3}$
	11	7	2	$0.459\ 215\ 751\ 83 \times 10^{-3}$
	12	7	5	$0.175\ 302\ 879\ 17 \times 10^{-6}$
	13	8	2	$-0.709\ 195\ 161\ 26 \times 10^{-4}$
$e^{-\delta^2} \delta^{r_i} \tau^{s_i}$	14	1	5	-0.234 361 622 49
	15	1	6	$0.845\ 746\ 976\ 45 \times 10^{-1}$
	16	2	3.5	0.148 610 520 10
	17	2	5.5	-0.100 168 578 67
	18	3	3	$-0.592\ 648\ 243\ 88 \times 10^{-1}$
	19	3	7	$-0.412\ 635\ 142\ 17 \times 10^{-1}$
	20	5	6	$0.218\ 551\ 618\ 69 \times 10^{-1}$
	21	6	8.5	$-0.745\ 527\ 209\ 58 \times 10^{-4}$
	22	7	4	$-0.988\ 590\ 855\ 72 \times 10^{-2}$
	23	8	6.5	$0.102\ 084\ 164\ 99 \times 10^{-2}$
	24	10	5.5	$-0.521\ 896\ 558\ 47 \times 10^{-3}$
$e^{-\delta^4} \delta^{r_i} \tau^{s_i}$	25	2	22	$0.985\ 921\ 620\ 30 \times 10^{-4}$
	26	3	11	$0.468\ 651\ 408\ 56 \times 10^{-1}$
	27	3	18	$-0.195\ 580\ 116\ 46 \times 10^{-1}$
	28	4	11	$-0.465\ 571\ 616\ 51 \times 10^{-1}$
	29	4	23	$0.328\ 779\ 053\ 76 \times 10^{-2}$
	30	5	17	0.135 720 901 85
	31	5	18	-0.108 464 714 55
	32	5	23	$-0.675\ 028\ 369\ 03 \times 10^{-2}$

To calculate derivatives of the ideal gas contribution to the free energy, one is guided by the form of eq (5). The left-most column of table 5 lists the factors necessary for the various derivatives, and the remaining columns give the coefficients of these factors directly beneath the heading which indicates the quantity to be calculated. The resulting terms are to be added as in eq (5). The values of the Q_i parameters are obtained from table 3.

Table 5. Ideal gas Helmholtz energy and its derivatives

	ϕ^{id} eq (5)	$\delta\phi^{id}_{\delta}$ (=1)	$\tau\phi^{id}_{\tau}$	$\delta^2\phi^{id}_{\delta\delta}$ (=-1)	$\tau^2\phi^{id}_{\tau\tau}$	$\delta\tau\phi^{id}_{\delta\tau}$ (=0)
1	Q_1	1	Q_2	-1	$-Q_2$	0
$\ln \delta$	1	0	0	0	0	0
$\ln \tau$	Q_2	0	0	0	0	0
$\tau^{-1/3}$	Q_3	0	$-Q_3/3$	0	$4Q_3/9$	0
$\tau^{-2/3}$	Q_4	0	$-2Q_4/3$	0	$10Q_4/9$	0
τ^{-1}	Q_5	0	$-Q_5$	0	$2Q_5$	0
$\ln (1 - e^{Q_7\tau})$	Q_6	0	0	0	0	0
$(e^{-Q_7\tau}-1)^{-1}$	0	0	$-Q_6Q_7\tau$	0	0	0
$e^{Q_7\tau} (e^{Q_7\tau} -1)^{-2}$	0	0	0	0	$-Q_6Q_7^2\tau^2$	0

For derivatives of the residual Helmholtz energy, eq (6) and tables 4 and 6 can be used. As in eq (6), the derivatives are obtained by summing 32 terms of three general types. Each of the terms has factors consisting of powers of the reduced density and temperature with the explicit exponents r_i and s_i and coefficients n_i given for each value of i in table 4. The additional exponential factor, with its argument either the second or fourth power of the density, is indicated in the column heading of table 6 where appropriate. The remaining coefficients relevant to the derivative being calculated are given in the appropriate row in that table.

Table 6. Residual Helmholtz energy and its derivatives

	$n_i \delta^{r_i} \tau^{s_i}$ (i = 1 to 13)	$e^{-\delta^2} n_i \delta^{r_i} \tau^{s_i}$ (i = 14 to 24)	$e^{-\delta^4} n_i \delta^{r_i} \tau^{s_i}$ (i = 25 to 32)
ϕ^r	1	1	1
$\delta\phi^r_\delta$	r_i	$r_i - 2\delta^2$	$r_i - 4\delta^4$
$\tau\phi^r_\tau$	s_i	s_i	s_i
$\delta^2\phi^r_{\delta\delta}$	$r_i(r_i-1)$	$[r_i(r_i-1) -2(2r_i+1)\delta^2 +4\delta^4]$	$[r_i(r_i-1) -4(2r_i+3)\delta^4 +16\delta^8]$
$\tau^2\phi^r_{\tau\tau}$	$s_i(s_i-1)$	$s_i(s_i-1)$	$s_i(s_i-1)$
$\delta\tau\phi^r_{\delta\tau}$	$r_i s_i$	$s_i(r_i-2\delta^2)$	$s_i(r_i-4\delta^4)$

In table 7, the most common thermodynamic properties of interest have been expressed in terms of the reduced derivatives of the Helmholtz energy as discussed above. All nominally extensive quantities (that is, the various thermodynamic potentials and heat capacities) are given per mole. It is straightforward to calculate, by using these tables, the most useful thermodynamic properties of ethane. In Figures A4-9 of Appendix A, we give comparisons of experimental data and correlated values for the PVT surface, second virial coefficient, isochoric heat capacity, isobaric heat capacity, heat capacity of the liquid along the saturation boundary, and speed of sound.

Table 7. Thermodynamic property equations

Pressure:	$P(\rho,T) = \rho RT\ (1 + \delta\phi^r_\delta)$
Internal Energy:	$U(\rho,T) = RT\ (\tau\phi^{id}_\tau + \tau\phi^r_\tau)$
Enthalpy:	$H(\rho,T) = RT\ (1 + \tau\phi^{id}_\tau + \tau\phi^r_\tau + \delta\phi^r_\delta)$
Gibbs Energy:	$G(\rho,T) = RT\ (1 + \phi^{id} + \phi^r + \delta\phi^r_\delta)$
Helmholtz Energy:	$A(\rho,T) = RT\ (\phi^{id} + \phi^r)$
Entropy:	$S(\rho,T) = -R\ (\phi^{id} + \phi^r - \tau\phi^{id}_\tau - \tau\phi^r_\tau)$
Isochoric Heat Capacity:	$C_v(\rho,T) = -R\ (\tau^2\phi^{id}_{\tau\tau} + \tau^2\phi^r_{\tau\tau})$
Isobaric Heat Capacity:	$C_p(\rho,T) = C_v(\rho,T) + R\ \dfrac{(1 + \delta\phi^r_\delta - \delta\tau\phi^r_{\delta\tau})^2}{1 + 2\delta\phi^r_\delta + \delta^2\phi^r_{\delta\delta}}$
Saturated Liquid Heat Capacity:	$C_{\sigma L}(T) = C_v(\rho_{\sigma L},T) - R\ (1 + \delta\phi^r_\delta - \delta\tau\phi^r_{\delta\tau})\ \dfrac{T}{\rho_{\sigma L}}\ \dfrac{d\rho_{\sigma L}}{dT}$
Speed of Sound:	$w^2(\rho,T) = \dfrac{RT}{uN_AM_r}\ \dfrac{C_p(\rho,T)}{C_v(\rho,T)}(1+2\delta\phi^r_\delta+\delta^2\phi^r_{\delta\delta})$
Second Virial Coefficient:	$B(T) = \dfrac{1}{\rho_c}\ \lim_{\delta\to 0}\ \phi^r_\delta$

3. TRANSPORT PROPERTIES AND THEIR ALGEBRAIC REPRESENTATION

The viscosity and thermal conductivity are correlated as the sum of terms representing the temperature dependent dilute gas contribution, a temperature and density dependent excess contribution and, for the thermal conductivity, a contribution from the critical enhancement. The viscosity is given by

$$\eta(\rho,T) = \eta_0(T) + \eta_{ex}(\rho,T), \tag{7}$$

and the expression for thermal conductivity is

$$\lambda(\rho,T) = \lambda_0(T) + \lambda_{ex}(\rho,T) + \lambda_{cr}(\rho,T). \tag{8}$$

These terms are explicitly described in this section.

3.1 Dilute Gas Correlation

Our expression for the dilute gas viscosity is from the Chapman-Enskog theory [12]. Using the appropriate constants from table 1, we find

$$\eta_0(T) = 12.0085 \sqrt{t} \,/\, \Omega^{(2,2)*}(t) \ \mu\text{Pa}\cdot\text{s}, \tag{9}$$

where the reduced temperature $t = kT/\epsilon$. The collision integral $\Omega^{(2,2)*}$ has been approximated for the 11-6-8, $\gamma = 3$ intermolecular potential function [13];

$$\Omega^{(2,2)*} = \left[\sum_{i=1}^{9} C_i \, t^{[(i-1)/3 \, - \, 1]} \right]^{-1} \tag{10}$$

with coefficients C_i listed in table 8. The collision integrals tabulated in Ref. [13] were compared to eq (10) in table A10 of Ref. [4]; experimental values of η_0 are compared to values calculated from eq (9) in Figure A10.

Table 8. Coefficients for dilute gas transport properties

$\Omega^{(2,2)*}$, eq (10)		f_{int}, eq (12)	
c_1	-3.032 813 828 1		
c_2	16.918 880 086	f_1	1.710 414 7
c_3	-37.189 364 917		
c_4	41.288 861 858	f_2	-0.693 648 2
c_5	-24.615 921 140		
c_6	8.948 843 095 9		
c_7	-1.873 924 504 2		
c_8	0.209 661 013 90		
c_9	$-9.657\ 043\ 707\ 4 \times 10^{-3}$		

For the thermal conductivity λ_0 of the dilute gas, we have chosen a modified Eucken model [14] with resulting equation

$$\lambda_0(T) = 0.276\ 505\ \eta_0(T)[\ 3.75 - f_{int}(\tau^2\phi^{id}_{\tau\tau} + 1.5)\ ]\ \mathrm{mW{\cdot}m^{-1}{\cdot}K^{-1}}. \quad (11)$$

In eq (11), f_{int} is the dimensionless function defined by

$$f_{int} = f_1 + (f_2 / t) \quad (12)$$

with the fitted coefficients f also given in table 8, and the viscosity should be expressed in μPa•s, as in eq (9). The quantity $\tau^2\phi^{id}_{\tau\tau}$ in eq (11) can be evaluated from tables 3 and 5. Figure A12 of Appendix A gives comparisons between experimental values for the dilute gas thermal conductivity and values calculated from eq (11).

3.2 Excess Property Correlations

For the excess viscosity, we use the rational polynomial

$$\eta_{ex}(\rho,T) = 15.977 \left[\sum_{i=1}^{9} g_i\ \delta^{r_i}\ \tau^{s_i}\right] \left[1 + \sum_{i=10}^{11} g_i\ \delta^{r_i}\ \tau^{s_i}\right]^{-1} \mu\mathrm{Pa{\cdot}s}, \quad (13)$$

where the exponents r_i and s_i and the dimensionless fitted coefficients g_i are given in table 9. Comparisons between experimental viscosities and viscosities calculated using eq (7) with eqs (9) and (13) are given in Figure A13 of Appendix A.

The excess thermal conductivity λ_{ex} has been correlated to a polynomial in δ and τ;

$$\lambda_{ex}(\rho,T) = 4.417\ 86 \left[\sum_{i=1}^{7} j_i\ \delta^{r_i} \tau^{s_i} \right] \mathrm{mW \cdot m^{-1} \cdot K^{-1}}. \tag{14}$$

The exponents and dimensionless fitting coefficients for eq (14) are included in table 9.

Table 9. Coefficients for excess transport properties

	η_{ex}, eq (13)			λ_{ex}, eq (14)		
i	r_i	s_i	g_i	r_i	s_i	j_i
1	1	0	0.471 770 03	1	0	0.960 843 22
2	1	1	-0.239 503 11	2	0	2.750 023 5
3	2	0	0.398 083 01	3	0	-0.026 609 289
4	2	1	-0.273 433 35	4	0	-0.078 146 729
5	2	1.5	0.351 922 60	5	0	0.218 813 39
6	3	0	-0.211 013 08	1	1.5	2.384 956 3
7	3	2	-0.004 785 79	3	1	-0.751 139 71
8	4	0	0.073 781 29			
9	4	1	-0.030 425 255			
10	1	0	-0.304 352 86			
11	1	1	0.001 215 675			

3.3 Critical Enhancement Correlation

The remaining term in eq (8) is the critical enhancement of the thermal conductivity which is easily observed in a broad region around the critical point. We have correlated this using a simplified mode coupling model developed by Olchowy and Sengers [9]. After evaluating the universal, fluid dependent, and correlated constants, we write

$$\lambda_{cr}(\rho,T) = 1.55 \; \frac{\delta}{\tau} \; \frac{C_P}{\eta \; \xi} \; F(\delta,\tau) \quad \mathrm{mW \cdot m^{-1} \cdot K^{-1}}, \tag{15}$$

where the molar isobaric heat capacity is measured in $\mathrm{J \cdot mol^{-1} \cdot K^{-1}}$, the correlation length, ξ defined below, is in nm, and the viscosity is expressed in μPa•s in eq (15).

The correlation length used in eq (15) is calculated from

$$\xi = 0.428 \; (\delta\tau)^{0.507} \; [(1+2\delta\phi^{r}_{\delta}+\delta^{2}\phi^{r}_{\delta\delta})^{-1} - (1+2\delta\phi^{r}_{\delta}(1/2) + \delta^{2}\phi^{r}_{\delta\delta}(1/2))^{-1}]^{0.507} \; \mathrm{nm}. \tag{16}$$

The dimensionless crossover or damping function in eq (15) is given by

$$F = \frac{2}{\pi} \left[e^{-q_D\xi \; [1+(q_D\xi)^3/(3\delta^2)]^{-1}} - 1 + \frac{C_P-C_V}{C_P} \left(\tan^{-1}(q_D\xi) + \frac{C_V}{C_P-C_V} q_D\xi \right) \right] \tag{17}$$

and $q_D^{-1} = 0.545$ nm is the only adjustable parameter in the theory. Because we are using a classical equation of state to evaluate the heat capacities in eqs (15) and (17) and the derivatives in eq (16), the damping function will not extrapolate well in the asymptotically critical region.

4. SUMMARY OF UNCERTAINTIES ASSOCIATED WITH THE CORRELATIONS

The examination of the deviations of our correlations from experimental data using deviation plots such as included in Appendix A and in Ref. [1], tabular comparisons between the data and the correlations such as in Ref. [5], the assessment of the experiments themselves and their reported accuracies, and comparisons of these correlations with previously published equations have allowed us to estimate the uncertainties associated with the correlations in various regions of the phase diagram. In this section, we will summarize the results of our assessment so that the equations and the tables in Appendix B can be used appropriately; details concerning the establishment of these uncertainties are given in Ref. [1].

4.1 Two-Phase Boundary

First, for the pressure along the liquid-vapor saturation boundary, we have considered the uncertainties of both the triple point and critical point pressures (table 1) and the quality of both the primary and other experimental data. We estimate that either the ancillary eq (1) or the SWEOS will provide values of the saturation pressures accurate within 0.1% above T = 165 K, within 1% between 130 and 165 K, and within 5% for temperatures from the triple point to 130 K where the vapor pressure is less than 0.003 MPa.

The coexistence densities can also be calculated from the ancillary equations, eqs (2) and (3), or using the SWEOS. In the critical region, the ancillary equations express the theoretically described behavior with a critical exponent of 0.355. The SWEOS, while approximating this flattened coexistence dome quite well, approaches the critical point with the mean field exponent of 0.5, and thus cannot accurately describe this region. Both equations are constrained to give the reported critical density at the critical temperature. For the density of the saturated liquid, either the ancillary equation or the value of the density from the

SWEOS can be used with an estimated uncertainty of 0.1% from the triple point to 200 K, of 0.3% from 200 K to 304 K, and about 1.5% between 304 K and the critical point at 305.33 K.

At temperatures below 250 K, the density of the saturated vapor is less than 1 $mol \cdot dm^{-3}$, and direct measurements are sparse and uncertain. In the critical region, there is a large scatter in the data. Our analysis indicates that either the ancillary equation or the SWEOS will generate values for the density of the saturated vapor with uncertainties as follows: from T_t to 130 K, 5%; from 130 to 240 K, 1.5%; from 240 to 303 K, 0.3%; and from 303 to T_c, 5%.

4.2 Ideal Gas Properties

The disagreement between thermodynamic extrapolations of the ideal gas isobaric heat capacity [43] and the spectroscopically derived data [11] has not been satisfactorily resolved. We estimate the uncertainty in the ideal gas correlation as follows: for the enthalpy, 1.5%; for the isobaric heat capacity, 1.5%; and for the entropy, 1.0%; all from the triple-point temperature to 700 K.

4.3 Thermodynamic Properties

In this section, we discuss the uncertainties associated with the full equation of state. We begin with the second virial coefficient and note that there are no data below 150 K. The SWEOS has not been constrained to provide physically reasonable values of B in this region and cannot be used to evaluate the virial series below 150 K. The Boyle temperature of ethane is well above the maximum temperature considered in this study; extrapolation of our SWEOS correlation gives a value near 747 K. Our assessment of the data and correlation leads to an estimate of the uncertainty in second virial coefficients calculated from the SWEOS as follows. At temperatures from 150 to 200 K, there is an uncertainty of

10%; from 200 to 250 K, this decreases to 3%; from 250-500 K, 1%; and from 500 to 600 K, the maximum temperature considered, the estimated uncertainty is 2%.

The PVT surface is considered next, and both the calculation of pressure with temperature and density as independent variables and the calculation of density with temperature and pressure as independent variables are discussed. There are problems when calculating pressures from the SWEOS (or using any equation of state) in regions where the isotherms are very steep (as in a pressure versus density plot in the low temperature liquid region). Also, when the PV isotherms are very flat, in the critical region, it is difficult to calculate accurate fluid densities.

Our examination of both primary and other experimental data, including the experimental technique, reported uncertainty of the data, purity of the fluid ethane, and deviations from the SWEOS and other equations of state, have led us to these guidelines concerning the uncertainty of a PVT surface generated from the SWEOS. For the vapor at temperatures below 250 K, where the vapor pressure is about 1.3 MPa and the vapor density is about 0.8 $mol \cdot dm^{-3}$, calculations of both density and pressure from the SWEOS have uncertainties of about 0.1%. Liquid densities in this temperature range also have uncertainties of 0.1%; the calculation of pressure from a liquid density at these low temperatures is much more difficult. For pressures less than 10 MPa, the percent deviation in pressure may be very large, and it increases near the saturation boundary. Typically, the absolute deviation is within about 1 MPa. For higher pressures, the uncertainty ranges from 5% at temperatures below 200 K down to 1% for temperatures from 200 to 250 K.

Temperatures from 250 K to 300 K are still far enough from the critical point that accurate density calculations from the SWEOS are possible. For the vapor in this range, we estimate an uncertainty of 0.2% for both density and pressure calculations. For the liquid state near the saturation boundary at the lower temperatures of this range, to 265 K, large percentage deviations are possible. For pressures greater than 5 MPa or temperatures from 265 to 300 K, we estimate the uncertainty in the pressure calculation as 3%. Critical phenomena evidently do not lead to

problems for the SWEOS for calculations at subcritical temperatures below 305.3 K: at 305.3 K, the reduced temperature, $(T_C-T)/T_C$, is about 10^{-4}, but the two-phase region excludes densities between about 6.4 and 7.4 $mol \cdot dm^{-3}$, that is, within about 7% of the critical density. For the vapor at temperatures between 300 and 305.3 K, we estimate the uncertainty in both density and pressure calculations as less than 0.5%. For the liquid in this temperature range, uncertainties in both density and pressure calculations are estimated as 0.5% at pressures to 10 MPa, but the density uncertainty drops to 0.1% above 10 MPa.

When conditions are very close to the critical point, that is, with temperatures from 305.3 to 307 K with pressures between 4.6 and 5.2 MPa, the uncertainty in calculated densities may be 5%; the uncertainty in pressure in this region is 0.2%. Outside this critical region, from 305.3 to 315 K, the uncertainty in density is estimated at 0.3% and the uncertainty in pressure is 1% for pressures below 40 MPa and 3% for pressures above 40 MPa. For the higher supercritical temperatures, we estimate the uncertainty in density as 0.2% for pressures below 40 MPa and 0.5% for higher pressures. The pressure uncertainties are 0.5% for pressures below 40 MPa and 3% for higher pressures.

Theoretical and observational evidence indicates a divergence in the isochoric heat capacity described by $C_V \sim (T-T_c)^{-\alpha}$ along the critical isochore; $\alpha \approx 0.11$. This critical exponent is not approximated well by the SWEOS, which gives the classical value, $\alpha = 0$. Calculation of the isochoric heat capacity using the SWEOS is not recommended for temperatures from 305 to 306 K with densities between 5.5 and 8.0 $mol \cdot dm^{-3}$. Uncertainties of 10%, in C_V calculations, are estimated for temperatures from 305 to 307 K with densities between 5 and 8.5 $mol \cdot dm^{-3}$. Outside this general critical region, we estimate the uncertainty in calculation of the isochoric heat capacity as 2.5%.

We estimate the uncertainty in calculations of the isobaric heat capacity from the SWEOS as 1.5% throughout the liquid and vapor states at temperatures below 290 K and in the supercritical region above 320 K. An exception is made for the compressed liquid with densities above 20 $mol \cdot dm^{-3}$, where the uncertainty increases to 4%. At points closer to the

critical point, but outside a region bounded by 305 and 307 K and by 5 and 8.5 mol•dm^{-3}, the uncertainty is 6%. At points within this boundary, we note that C_P as calculated by the classical SWEOS diverges along the critical isochore with the mean field exponent of 1 rather than the observed exponent of about 1.2; in addition, roundoff error causes the finite value of $C_P \approx 4 \times 10^{12}$ J•mol^{-1}•K^{-1} at the critical point. Thus, percent errors can be very large in this region, but physical measurements of these extremely large heat capacities are exceedingly difficult.

We estimate the uncertainty in calculations of the heat capacity of the saturated liquid, $C_{\sigma L}$, from our SWEOS as 3.5% from the triple point to 145 K and 0.6% from 145 to 280 K. Closer to the critical point, the usual problems with the classical equation of state occur; the uncertainty increases to 5% for temperatures from 280 to 303 K. For temperatures between 303 and T_C, very large errors are possible.

It is difficult to correlate the sound speed to within the reported experimental accuracies while obtaining good agreement with other data and using the classical SWEOS formulation. The problems are most serious at high densities and near the critical point. We can summarize our observations by the following guidelines for the use of the SWEOS in calculating the speed of sound in ethane. Below 100 K, in the saturated or compressed liquid, we estimate the uncertainty as 1%. Between 100 and 225 K, the liquid-phase sound speed has an uncertainty of 0.6%. Between 225 K and 290 K and above 310 K, the uncertainty increases to about 1%. Between 290 and 310 K, for densities outside the range 5 to 10 mol•dm^{-3}, a 2% uncertainty is estimated. Closer to the critical point, the uncertainty ranges to 10%; at points between 305 and 306 K, with densities from 5.5 to 8 mol•dm^{-3}, the classical SWEOS cannot be used: rather than vanishing at the critical point, the calculated sound speed is about 181 m•s^{-1}. For the gas below 290 K, we estimate an uncertainty of 0.6%. For pressures above 35 MPa at subcritical temperatures and above 12 MPa for supercritical temperatures, there are no data and we estimate an uncertainty of 2%.

The comparisons with experimental data (and the process of determining the coefficients of the SWEOS), only probe four derivatives of the dimensionless, residual Helmholtz energy, namely ϕ^r_δ, $\phi^r_{\delta\delta}$, $\phi^r_{\tau\tau}$, and $\phi^r_{\delta\tau}$.

While this SWEOS should describe the actual thermodynamic surface quite well, additional uncertainties will enter any calculation which requires other derivatives of ϕ^r or integrals of the Helmholtz function. We hesitate to make any quantitative estimates of the errors involved in calculating any thermodynamic quantities not discussed in this section, but we conjecture that these errors will be comparable to those found with any other precise equation of state for ethane.

4.4 Transport Properties

4.4.1 Viscosity

From the dispersion of the data and correlations, the quoted experimental accuracies associated with the data, and a study of the use of the 11-6-8 intermolecular potential in the Chapman-Enskog dilute gas theory, we estimate that the correlation of eqs (9) and (10) will give dilute gas viscosities for ethane with associated uncertainties of 1% from 300 K to 375 K and 1.5 % above that range. In the region from 250 K to 300 K, the estimated uncertainty is 1.5%. For lower temperatures, data are extremely sparse or nonexistent. We anticipate that the theory, with this potential function, will extrapolate well, but we increase our error estimate to 5% for temperatures from the triple point to 250 K.

We next examine the viscosity of ethane at elevated pressures. From the triple-point temperature to 250 K, we estimate the uncertainty in the correlation for the vapor phase as 5%. We estimate a 2.5% uncertainty for the vapor viscosity at temperatures from 250 K to the critical point. Our correlation does not account for any critical enhancement in the viscosity; therefore, the critical region, 305-306 K and 6-7.5 $mol \cdot dm^{-3}$, should be excluded when making calculations with this viscosity correlation. For the liquid from the triple point to the critical point for pressures from the saturation boundary to 30 MPa, we estimate the uncertainty of the correlation as 2%. For higher pressures, the uncertainty increases to about 5%. We estimate the uncertainty of the viscosity correlation in the

supercritical region as generally 2%. At pressures greater than 50 MPa, the uncertainty increases to 5%, and in the critical region, from 305 to 307 K and 5 to 8.5 mol•dm^{-3} (but excluding the region 305 to 306 K and 6 to 7.5 mol•dm^{-3} as indicated above), the uncertainty is also 5%. The viscosity correlation can have a zero in the denominator, corresponding to a singularity, within the fluid region; this occurs well outside the range of any data and the stated range of the correlation. In addition to the usual warnings concerning extrapolation beyond the range of the correlating equation, any user is cautioned about this singularity, which can be a problem only at pressures exceeding 220 MPa.

4.4.2 Thermal Conductivity

There are few data for the dilute gas thermal conductivity at very low temperatures. At the lowest temperatures, between the triple point and 200 K, where the vapor pressure is about 0.2 MPa, the correlation for the dilute gas thermal conductivity could give errors in excess of 10%. In the range 200 to 350 K, the uncertainty in the correlation is about 3%, and between 350 K and 600 K we estimate the uncertainty as 4%.

We have estimated the uncertainty associated with our correlation for the thermal conductivity of ethane at elevated pressures. In the gas phase, the large uncertainty in the dilute gas contribution dominates at temperatures below 200 K; the uncertainty in the total thermal conductivity is 10% for the gas at these low temperatures. For temperatures from 200 K to T_C, the uncertainty in the gas phase thermal conductivity is about 3%. For the compressed liquid, we estimate uncertainties of 2% to the upper pressure limit of 70 MPa. The asymptotically critical region extending from 305 to 306 K with densities between 6 and 7.5 mol•dm^{-3} can still give large errors; our value of the thermal conductivity at the critical point is about 1.5 kW•m^{-1}•K^{-1}, not infinity. In the more general critical region bounded by 305 and 307 K from 5 to 8.5 mol•dm^{-3}, we estimate the uncertainty as 10%. At supercritical temperatures, the uncertainty is 4% for densities less than 2 mol•dm^{-3} and 2% for higher densities. For temperatures between 307 and 360 K, and densities between 5 and 8.5 mol•dm^{-3}, the critical enhancement contribution remains substantial, and an uncertainty of 5% is estimated.

5. ACKNOWLEDGMENTS

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Appendix A

Comparisons between experimental data and the correlations

This appendix contains graphical and statistical comparisons for the experimental data and correlations used in our study of the thermophysical properties of ethane. We have included both primary data, used to determine the final coefficients in the correlating equations, and other data. The complete set of data has been tabulated in Ref.[5].

The deviation plots are given on a percentage basis according to Dev = 100 (Cal - Exp)/Exp where Cal is the value calculated from the correlation and Exp is the value from experiment. With only a few exceptions, the experimental values for both independent and dependent variables used for these comparisons were taken directly from the cited literature source. Those exceptions include conversion to SI units (and, in a few cases, to IPTS-68), correction of obvious typographical errors, and adjustments as described in the notes. A few data from the cited sources were omitted because the correction for obvious typographical errors was not clear, they lay outside the range of state variables which we considered, or they lay inside the solid, metastable, or two-phase region according to our correlations. These comparisons include some, especially older, data which were not included in the statistical summaries or in the figures of Ref.[1]. The values of the independent variables are indicated on the abcissa and in the figure headings.

Summary statistics are given for each reference and are defined as follows:

$$AAD = \frac{1}{N} \sum_i |Cal_i - Exp_i|,$$

$$\text{BIAS} = \frac{1}{N} \sum_i (\text{Cal}_i - \text{Exp}_i),$$

and

$$\text{RMS} = \left[\frac{1}{N} \sum_i (\text{Cal}_i - \text{Exp}_i)^2 - \text{BIAS}^2 \right]^{1/2}.$$

The quantity N above represents the number of points in the data set, and the summation over the index i is over all N points. These statistics give dimensioned quantities; the analogously defined dimensionless statistics are based on percentage deviations. Thus, AAD-%, BIAS-%, and RMS-% are defined as above, but with the quantity $(\text{Cal}_i - \text{Exp}_i)$ replaced by $100\ (\text{Cal}_i - \text{Exp}_i)/\ \text{Exp}_i$.

For each property illustrated in the figures, we list the references from which primary data were obtained. In some instances, data from a single reference were included in both the primary and secondary (not used to determine the final coefficients in the correlations) categories. In this case, the figure legend indicates "2nd" for the secondary data and a separate entry and different symbol are used for the primary data; also, two sets of statistics are given: for the primary data and for the entire data set. Details concerning data selection were given in Ref. [1]. Only the first author is given in the figure legends and captions; the full bibliographic reference is given in the numbered reference list of Sec. 6.

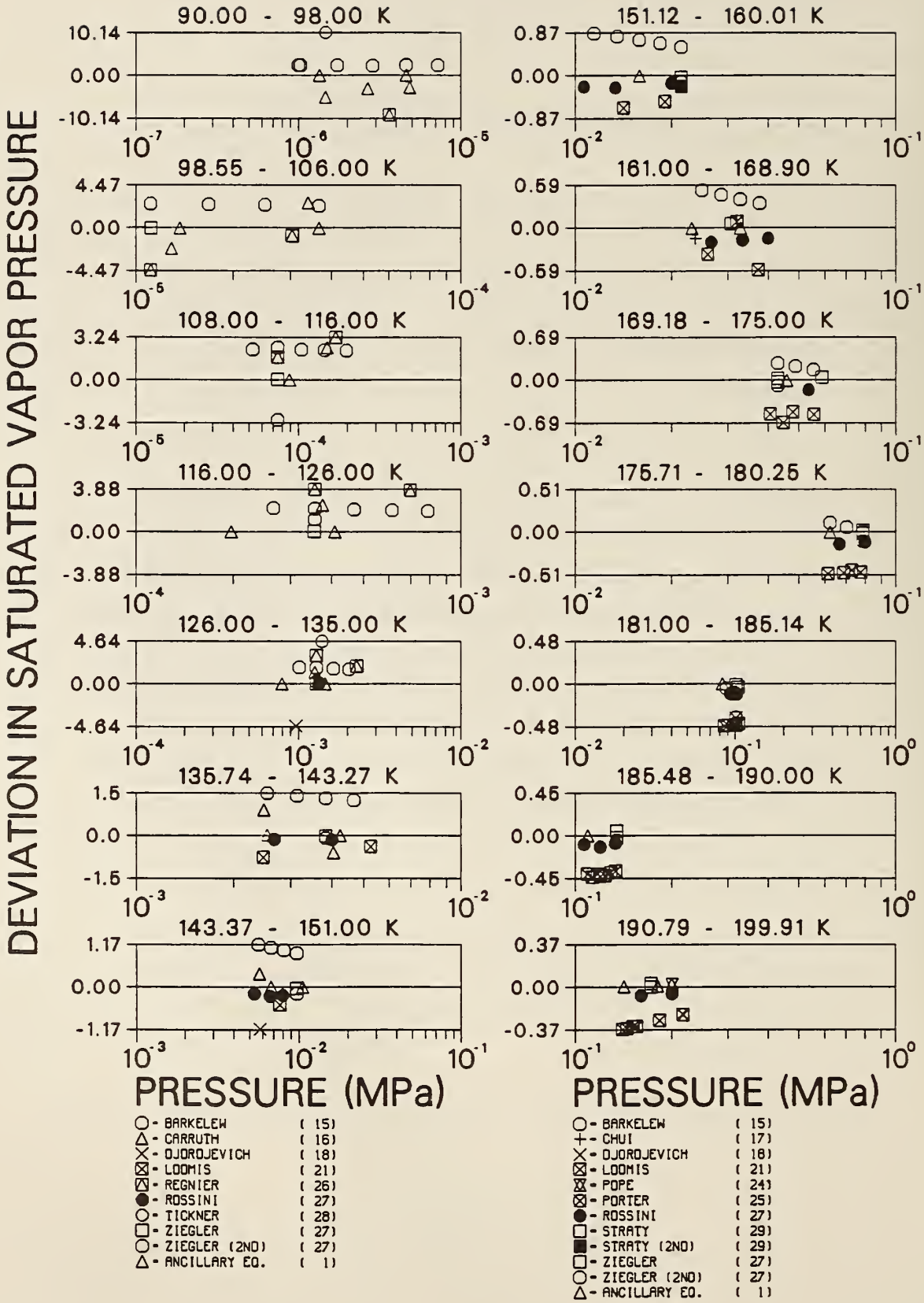

Figure A1. Saturated vapor pressure. (Statistical comparisions begin on page 32.)

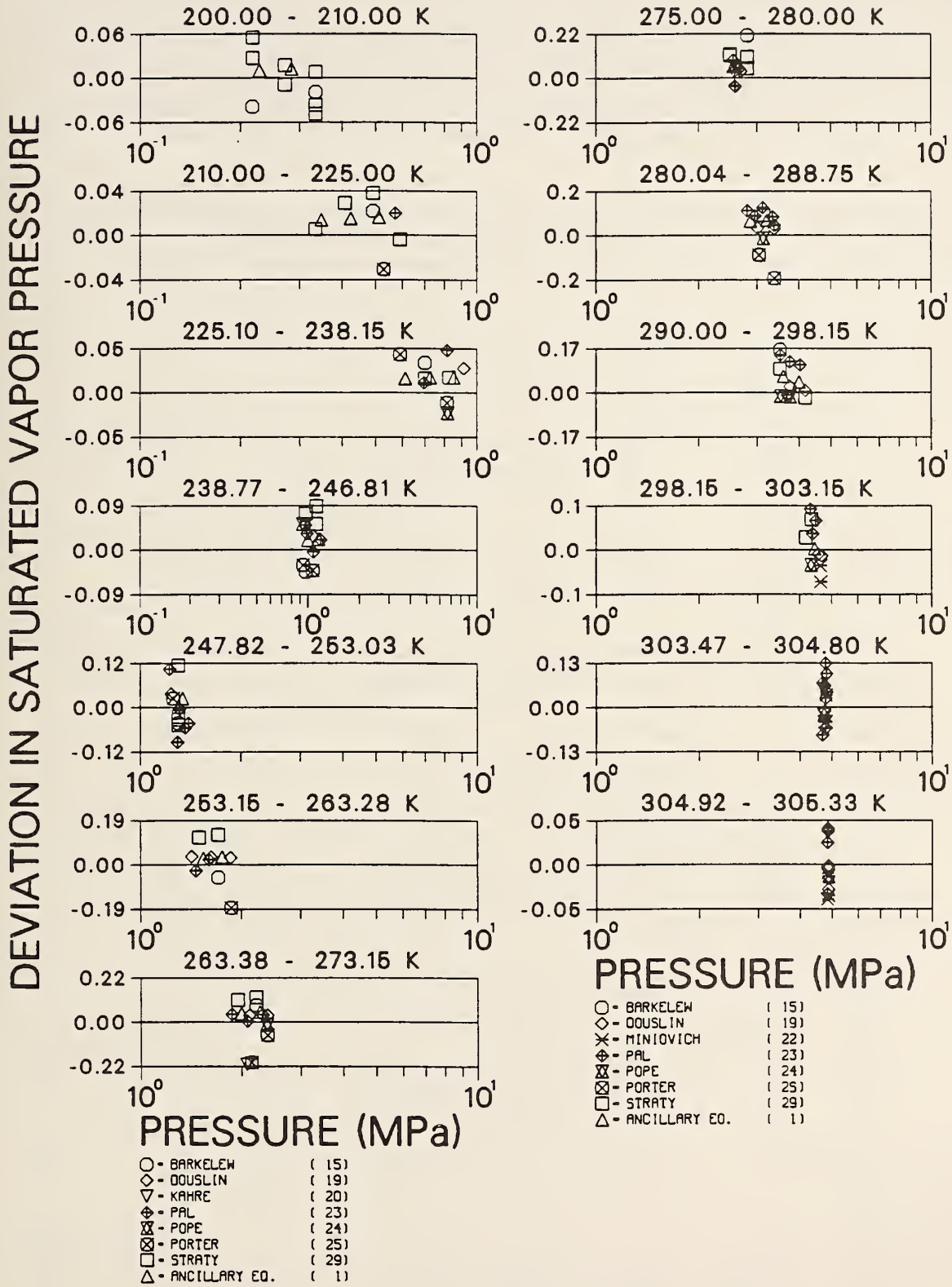

Figure A1. (continued)

Figure A1. Saturated vapor pressure.

The comparisons are based on the Maxwell construction using the full SWEOS. Primary data for the SWEOS were obtained from the ancillary eq (1) and are indicated in the plots. Primary data for eq (1) were obtained from Douslin [19], Pal [23], Pope [24], Straty [29] and Ziegler [27]. Points out of range were from Tickner [28]: 91.35 K, 10.1%; 94.45 K, 19.1%; 98.55 K, 21.9%; 101.85 K, 22.2%; 105.35 K, 21.3%; 110.55 K, 23.1%; 114.65 K, 20.1%.

Statistical comparisons between experimental saturated vapor pressures and the ancillary eq (1) are given first; comparisons between the data and the SWEOS are given next with the suffix "2" on each statistical category.

Data from Barkelew [15]
Number of Points: 20

AAD% = 0.292	BIAS% = -0.127	RMS% = 0.717
AAD2% = 0.300	BIAS2% = -0.111	RMS2% = 0.724

Absolute Deviations:

AAD = 1.101	BIAS = -0.242	RMS = 2.578 kPa
AAD2 = 1.289	BIAS2 = 0.099	RMS2 = 2.870 kPa

Data from Carruth [16]
Number of Points: 6

AAD% = 2.173	BIAS% = -0.351	RMS% = 2.512
AAD2% = 2.177	BIAS2% = -0.352	RMS2% = 2.512

Absolute Deviations:

AAD = 0.009	BIAS = 0.004	RMS = 0.012 kPa
AAD2 = 0.009	BIAS2 = 0.004	RMS2 = 0.012 kPa

Data from Chui [17]
Number of Points: 2

AAD% =36.078	BIAS% =-36.078	RMS% =35.936
AAD2% =36.080	BIAS2% =-36.080	RMS2% =35.932

Absolute Deviations:

AAD = 0.262	BIAS = -0.262	RMS = 0.228 kPa
AAD2 = 0.262	BIAS2 = -0.262	RMS2 = 0.227 kPa

Data from Djordjevich [18]
Number of Points: 6

AAD% = 1.384	BIAS% = -0.615	RMS% = 1.921
AAD2% = 1.385	BIAS2% = -0.604	RMS2% = 1.920

Absolute Deviations:

AAD = 2.400	BIAS = 2.189	RMS = 3.345 kPa
AAD2 = 2.481	BIAS2 = 2.277	RMS2 = 3.484 kPa

Data from Douslin [19]
Number of Points: 18
Weighted Data:
Number of Points: 18

AAD% = 0.013	BIAS% = -0.007	RMS% = 0.016
AAD2% = 0.024	BIAS2% = 0.019	RMS2% = 0.018

Absolute Deviations:

AAD = 0.369	BIAS = -0.279	RMS = 0.464 kPa
AAD2 = 0.567	BIAS2 = 0.361	RMS2 = 0.519 kPa

```
Data from Kahre [20]
Number of Points: 5
 AAD%  = 0.558   BIAS%  =  0.456   RMS%  = 0.402
 AAD2% = 0.587   BIAS2% =  0.503   RMS2% = 0.397
            Absolute Deviations:
 AAD   =19.916   BIAS   = 17.798   RMS  =15.129 kPa
 AAD2  =20.998   BIAS2  = 19.241   RMS2 =15.103 kPa

Data from Loomis [21]
Number of Points: 34
 AAD%  = 0.450   BIAS%  = -0.444   RMS%  = 0.140
 AAD2% = 0.449   BIAS2% = -0.444   RMS2% = 0.141
            Absolute Deviations:
 AAD   = 0.353   BIAS   = -0.351   RMS  = 0.182 kPa
 AAD2  = 0.350   BIAS2  = -0.349   RMS2 = 0.179 kPa

Data from Miniovich [22]
Number of Points: 11
 AAD%  = 0.028   BIAS%  = -0.019   RMS%  = 0.025
 AAD2% = 0.034   BIAS2% = -0.028   RMS2% = 0.026
            Absolute Deviations:
 AAD   = 1.312   BIAS   = -0.908   RMS  = 1.198 kPa
 AAD2  = 1.621   BIAS2  = -1.316   RMS2 = 1.213 kPa

Data from Pal [23]
Number of Points: 50
 AAD%  = 0.066   BIAS%  =  0.001   RMS%  = 0.103
 AAD2% = 0.073   BIAS2% =  0.025   RMS2% = 0.103
            Absolute Deviations:
 AAD   = 1.863   BIAS   =  0.837   RMS  = 2.476 kPa
 AAD2  = 2.076   BIAS2  =  1.385   RMS2 = 2.449 kPa

Weighted Data:
Number of Points: 47
 AAD%  = 0.051   BIAS%  =  0.013   RMS%  = 0.060
 AAD2% = 0.058   BIAS2% =  0.037   RMS2% = 0.058
            Absolute Deviations:
 AAD   = 1.720   BIAS   =  0.778   RMS  = 2.201 kPa
 AAD2  = 1.943   BIAS2  =  1.352   RMS2 = 2.162 kPa

Data from Pope [24]
Number of Points: 11
 AAD%  = 0.115   BIAS%  = -0.007   RMS%  = 0.191
 AAD2% = 0.093   BIAS2% =  0.022   RMS2% = 0.185
            Absolute Deviations:
 AAD   = 1.692   BIAS   = -1.306   RMS  = 1.663 kPa
 AAD2  = 0.981   BIAS2  = -0.554   RMS2 = 1.323 kPa

Weighted Data:
Number of Points: 9
 AAD%  = 0.049   BIAS%  = -0.038   RMS%  = 0.040
 AAD2% = 0.024   BIAS2% = -0.007   RMS2% = 0.026
            Absolute Deviations:
 AAD   = 1.399   BIAS   = -1.322   RMS  = 1.170 kPa
 AAD2  = 0.569   BIAS2  = -0.450   RMS2 = 0.544 kPa
```

```
Data from Porter [25]
Number of Points: 20
 AAD%  = 0.211   BIAS%  = -0.035   RMS%  = 0.259
 AAD2% = 0.198   BIAS2% = -0.007   RMS2% = 0.256
            Absolute Deviations:
 AAD   = 2.808   BIAS   = -1.209   RMS  = 4.114 kPa
 AAD2  = 2.482   BIAS2  = -0.659   RMS2 = 4.015 kPa

Data from Regnier [26]
Number of Points: 9
 AAD%  = 3.563   BIAS%  =  0.337   RMS%  = 4.232
 AAD2% = 3.578   BIAS2% =  0.334   RMS2% = 4.247
            Absolute Deviations:
 AAD   = 0.014   BIAS   =  0.014   RMS  = 0.016 kPa
 AAD2  = 0.014   BIAS2  =  0.014   RMS2 = 0.016 kPa

Data from Rossini (via Ziegler [27])
Number of Points: 22
 AAD%  = 0.147   BIAS%  = -0.142   RMS%  = 0.067
 AAD2% = 0.148   BIAS2% = -0.141   RMS2% = 0.071
            Absolute Deviations:
 AAD   = 0.065   BIAS   = -0.065   RMS  = 0.048 kPa
 AAD2  = 0.064   BIAS2  = -0.064   RMS2 = 0.045 kPa

Data from Tickner [28]
Number of Points: 10
 AAD%  =17.099   BIAS%  = 17.099   RMS%  = 5.890
 AAD2% =17.094   BIAS2% = 17.094   RMS2% = 5.868
            Absolute Deviations:
 AAD   = 0.024   BIAS   =  0.024   RMS  = 0.027 kPa
 AAD2  = 0.024   BIAS2  =  0.024   RMS2 = 0.028 kPa

Data from Straty [29]
Number of Points: 44
 AAD%  = 0.043   BIAS%  =  0.010   RMS%  = 0.056
 AAD2% = 0.055   BIAS2% =  0.031   RMS2% = 0.064
            Absolute Deviations:
 AAD   = 0.526   BIAS   =  0.280   RMS  = 0.791 kPa
 AAD2  = 0.830   BIAS2  =  0.707   RMS2 = 1.158 kPa

Weighted Data:
Number of Points: 43
 AAD%  = 0.039   BIAS%  =  0.016   RMS%  = 0.044
 AAD2% = 0.051   BIAS2% =  0.037   RMS2% = 0.052
            Absolute Deviations:
 AAD   = 0.537   BIAS   =  0.288   RMS  = 0.799 kPa
 AAD2  = 0.848   BIAS2  =  0.724   RMS2 = 1.166 kPa
```

```
Data from Ziegler [27]
These data were adjusted by Goodwin [30].
Number of Points: 10
Weighted Data:
Number of Points: 10
 AAD%  = 0.028   BIAS%  = -0.013   RMS%  = 0.028
 AAD2% = 0.033   BIAS2% = -0.016   RMS2% = 0.034
            Absolute Deviations:
 AAD   = 0.005   BIAS   = -0.005   RMS  = 0.006 kPa
 AAD2  = 0.006   BIAS2  = -0.005   RMS2 = 0.006 kPa

Data from Ziegler (unadj) [27]
Number of Points: 50
 AAD%  = 1.371   BIAS%  =  1.361   RMS%  = 0.889
 AAD2% = 1.372   BIAS2% =  1.362   RMS2% = 0.891
            Absolute Deviations:
 AAD   = 0.049   BIAS   =  0.038   RMS  = 0.057 kPa
 AAD2  = 0.048   BIAS2  =  0.038   RMS2 = 0.056 kPa

Data from ancillary equation [1]
Number of Points: 43
 AAD2% = 0.020   BIAS2% =  0.015   RMS2% = 0.023
            Absolute Deviations:
 AAD2  = 0.321   BIAS2  =  0.321   RMS2 = 0.617 kPa
```

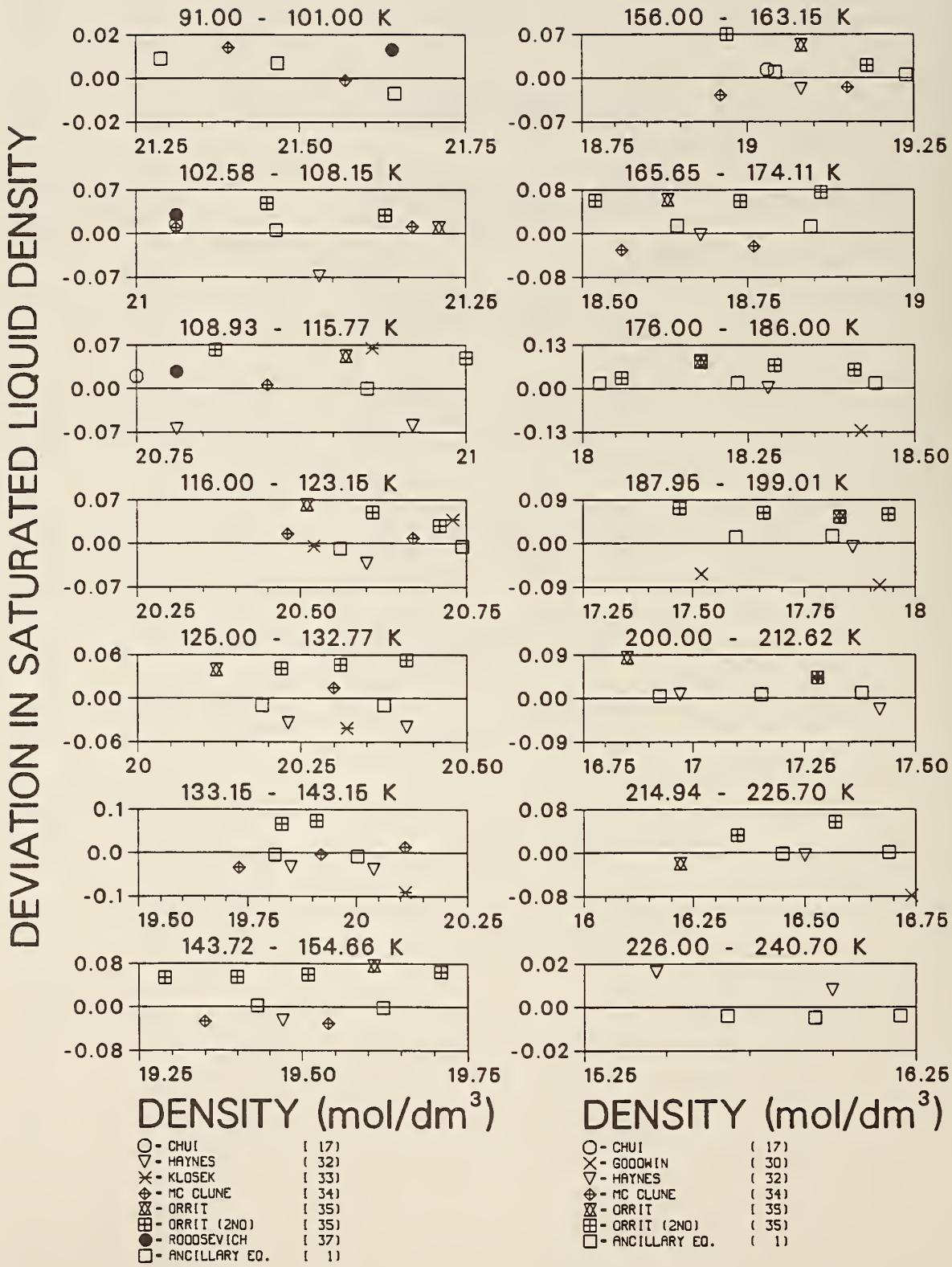

Figure A2. Saturated liquid density. (Statistical comparisions begin on page 38.)

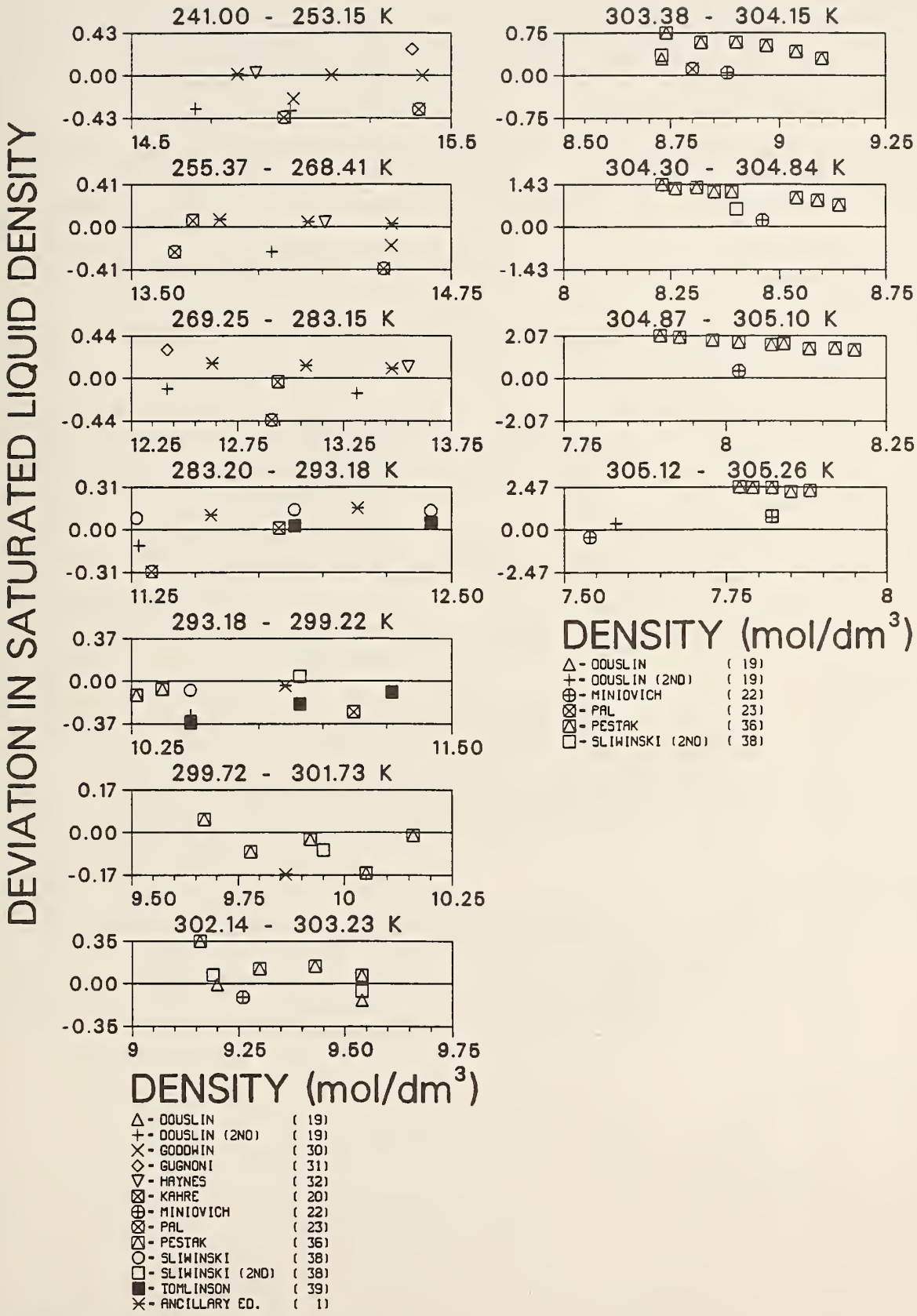

Figure A2. (continued)

Figure A2. Saturated liquid density.

The comparisons are based on the Maxwell construction using the full SWEOS. Primary data for the SWEOS were obtained from the ancillary eq (2) and are indicated in the plots. Primary data for eq (2) were obtained from Douslin [19], Sliwinski [38], Chui [17], Rodosevich [37], Haynes [32], McClune [34], and Orrit [35].

Statistical comparisons between experimental saturated liquid densities and the ancillary eq (2) are given first; comparisons between the data and the SWEOS are given next with the suffix "2" on each statistical category.

Data from Chui [17]
Number of Points: 3
Weighted Data:
Number of Points: 3

AAD%	= 0.013	BIAS%	= 0.013	RMS%	= 0.009
AAD2%	= 0.015	BIAS2%	= 0.015	RMS2%	= 0.003

Absolute Deviations:

AAD	= 0.00	BIAS	= 0.00	RMS	= 0.00 $mol \cdot dm^{-3}$
AAD2	= 0.00	BIAS2	= 0.00	RMS2	= 0.00 $mol \cdot dm^{-3}$

Data from Douslin [19]
Number of Points: 12

AAD%	= 0.201	BIAS%	= -0.201	RMS%	= 0.114
AAD2%	= 0.260	BIAS2%	= -0.032	RMS2%	= 0.313

Absolute Deviations:

AAD	= 0.02	BIAS	= -0.02	RMS	= 0.02 $mol \cdot dm^{-3}$
AAD2	= 0.03	BIAS2	= -0.01	RMS2	= 0.03 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 3

AAD%	= 0.039	BIAS%	= -0.039	RMS%	= 0.007
AAD2%	= 0.145	BIAS2%	= 0.049	RMS2%	= 0.178

Absolute Deviations:

AAD	= 0.00	BIAS	= 0.00	RMS	= 0.00 $mol \cdot dm^{-3}$
AAD2	= 0.01	BIAS2	= 0.00	RMS2	= 0.02 $mol \cdot dm^{-3}$

Data from Goodwin [30]
Number of Points: 12

AAD%	= 0.183	BIAS%	= -0.183	RMS%	= 0.084
AAD2%	= 0.175	BIAS2%	= -0.175	RMS2%	= 0.087

Absolute Deviations:

AAD	= 0.03	BIAS	= -0.03	RMS	= 0.01 $mol \cdot dm^{-3}$
AAD2	= 0.03	BIAS2	= -0.03	RMS2	= 0.01 $mol \cdot dm^{-3}$

Data from Gugnoni [31]
Number of Points: 4

AAD%	= 0.596	BIAS%	= -0.092	RMS%	= 0.762
AAD2%	= 0.621	BIAS2%	= -0.022	RMS2%	= 0.745

Absolute Deviations:

AAD	= 0.08	BIAS	= -0.01	RMS	= 0.11 $mol \cdot dm^{-3}$
AAD2	= 0.09	BIAS2	= 0.00	RMS2	= 0.10 $mol \cdot dm^{-3}$

Data from Haynes [32]
Weighted Data:
Number of Points: 22

AAD%	= 0.028	BIAS%	= -0.023	RMS%	= 0.028
AAD2%	= 0.034	BIAS2%	= -0.014	RMS2%	= 0.041

Absolute Deviations:

AAD	= 0.01	BIAS	= 0.00	RMS	= 0.01 $mol \cdot dm^{-3}$
AAD2	= 0.01	BIAS2	= 0.00	RMS2	= 0.01 $mol \cdot dm^{-3}$

Data from Kahre [20]
Number of Points: 5

AAD%	= 0.224	BIAS%	= -0.224	RMS%	= 0.165
AAD2%	= 0.210	BIAS2%	= -0.181	RMS2%	= 0.270

Absolute Deviations:

AAD	= 0.02	BIAS	= -0.02	RMS	= 0.02 $mol \cdot dm^{-3}$
AAD2	= 0.02	BIAS2	= -0.02	RMS2	= 0.03 $mol \cdot dm^{-3}$

Data from Klosek [33]
Number of Points: 8

AAD%	= 0.084	BIAS%	= 0.055	RMS%	= 0.084
AAD2%	= 0.087	BIAS2%	= 0.053	RMS2%	= 0.090

Absolute Deviations:

AAD	= 0.02	BIAS	= 0.01	RMS	= 0.02 $mol \cdot dm^{-3}$
AAD2	= 0.02	BIAS2	= 0.01	RMS2	= 0.02 $mol \cdot dm^{-3}$

Data from McClune [34]
Number of Points: 17
Weighted Data:
Number of Points: 17

AAD%	= 0.020	BIAS%	= -0.007	RMS%	= 0.023
AAD2%	= 0.017	BIAS2%	= -0.006	RMS2%	= 0.018

Absolute Deviations:

AAD	= 0.00	BIAS	= 0.00	RMS	= 0.00 $mol \cdot dm^{-3}$
AAD2	= 0.00	BIAS2	= 0.00	RMS2	= 0.00 $mol \cdot dm^{-3}$

Data from Miniovich [22]
Number of Points: 5

AAD%	= 0.426	BIAS%	= -0.426	RMS%	= 0.343
AAD2%	= 0.234	BIAS2%	= 0.018	RMS2%	= 0.274

Absolute Deviations:

AAD	= 0.03	BIAS	= -0.03	RMS	= 0.03 $mol \cdot dm^{-3}$
AAD2	= 0.02	BIAS2	= 0.00	RMS2	= 0.02 $mol \cdot dm^{-3}$

Data from Orrit [35]
Number of Points: 46

AAD%	= 0.052	BIAS%	= 0.048	RMS%	= 0.031
AAD2%	= 0.057	BIAS2%	= 0.052	RMS2%	= 0.032

Absolute Deviations:

AAD	= 0.01	BIAS	= 0.01	RMS	= 0.01 $mol \cdot dm^{-3}$
AAD2	= 0.01	BIAS2	= 0.01	RMS2	= 0.01 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 13

AAD%	= 0.051	BIAS%	= 0.035	RMS%	= 0.044
AAD2%	= 0.056	BIAS2%	= 0.038	RMS2%	= 0.047

Absolute Deviations:

AAD	= 0.01	BIAS	= 0.01	RMS	= 0.01 $mol \cdot dm^{-3}$
AAD2	= 0.01	BIAS2	= 0.01	RMS2	= 0.01 $mol \cdot dm^{-3}$

Data from Pal [23]
Number of Points: 11

AAD%	= 0.376	BIAS%	= -0.376	RMS%	= 0.121
AAD2%	= 0.353	BIAS2%	= -0.332	RMS2%	= 0.166

Absolute Deviations:

AAD	= 0.05	BIAS	= -0.05	RMS	= 0.02 $mol \cdot dm^{-3}$
AAD2	= 0.05	BIAS2	= -0.05	RMS2	= 0.02 $mol \cdot dm^{-3}$

Data from Pestak [36]
Number of Points: 39

AAD%	= 0.598	BIAS%	= 0.598	RMS%	= 0.461
AAD2%	= 1.033	BIAS2%	= 1.008	RMS2%	= 0.827

Absolute Deviations:

AAD	= 0.05	BIAS	= 0.05	RMS	= 0.03 $mol \cdot dm^{-3}$
AAD2	= 0.08	BIAS2	= 0.08	RMS2	= 0.06 $mol \cdot dm^{-3}$

Data from Rodosevich [37]
Number of Points: 4
Weighted Data:
Number of Points: 4

AAD%	= 0.030	BIAS%	= 0.030	RMS%	= 0.008
AAD2%	= 0.030	BIAS2%	= 0.030	RMS2%	= 0.014

Absolute Deviations:

AAD	= 0.01	BIAS	= 0.01	RMS	= 0.00 $mol \cdot dm^{-3}$
AAD2	= 0.01	BIAS2	= 0.01	RMS2	= 0.00 $mol \cdot dm^{-3}$

Data from Sliwinski [38]
Number of Points: 11

AAD%	= 0.043	BIAS%	= 0.019	RMS%	= 0.051
AAD2%	= 0.217	BIAS2%	= 0.179	RMS2%	= 0.263

Absolute Deviations:

AAD	= 0.00	BIAS	= 0.00	RMS	= 0.00 $mol \cdot dm^{-3}$
AAD2	= 0.02	BIAS2	= 0.02	RMS2	= 0.02 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 4

AAD%	= 0.024	BIAS%	= 0.011	RMS%	= 0.026
AAD2%	= 0.111	BIAS2%	= 0.071	RMS2%	= 0.090

Absolute Deviations:

AAD	= 0.00	BIAS	= 0.00	RMS	= 0.00 $mol \cdot dm^{-3}$
AAD2	= 0.01	BIAS2	= 0.01	RMS2	= 0.01 $mol \cdot dm^{-3}$

Data from Tomlinson [39]
Number of Points: 7

AAD% = 0.220	BIAS% = -0.220	RMS% = 0.107
AAD2% = 0.251	BIAS2% = -0.230	RMS2% = 0.221

Absolute Deviations:

AAD = 0.02	BIAS = -0.02	RMS = 0.01 $mol \cdot dm^{-3}$
AAD2 = 0.03	BIAS2 = -0.02	RMS2 = 0.02 $mol \cdot dm^{-3}$

Data from ancillary equation [1]
Number of Points: 43

AAD2% = 0.030	BIAS2% = 0.017	RMS2% = 0.052

Absolute Deviations:

AAD2 = 0.004	BIAS2 = 0.002	RMS2 = 0.006 $mol \cdot dm^{-3}$

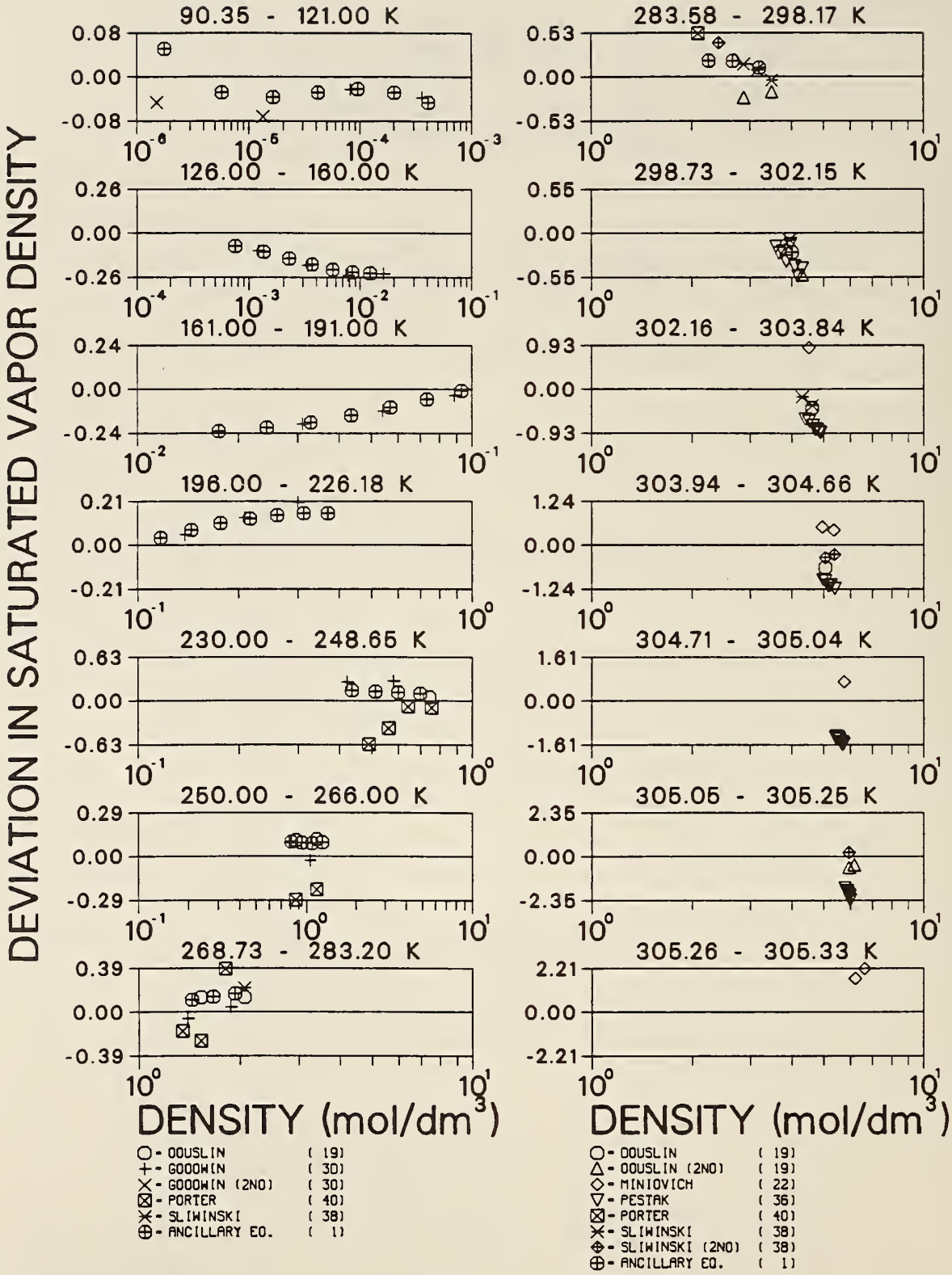

Figure A3. Saturated vapor density. (Statistical comparisions begin on page 43.)

Figure A3. Saturated vapor density.

The comparisons are based on the Maxwell construction using the full SWEOS. Primary data for the SWEOS were obtained from the ancillary eq (3) and are indicated in the plots. Primary data for eq (3) were obtained from Goodwin [30], Douslin [19], and Sliwinski [38].

Statistical comparisons between experimental saturated vapor densities and the ancillary eq (3) are given first; comparisons between the data and the SWEOS are given next with the suffix "2" on each statistical category.

Data from Douslin [19]
Number of Points: 12

AAD% = 0.146	BIAS% = 0.010	RMS% = 0.188
AAD2% = 0.296	BIAS2% = -0.207	RMS2% = 0.291

Absolute Deviations:

AAD = 0.006	BIAS = 0.002	RMS = 0.008 $mol \cdot dm^{-3}$
AAD2 = 0.013	BIAS2 = -0.012	RMS2 = 0.014 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 7

AAD% = 0.084	BIAS% = 0.055	RMS% = 0.106
AAD2% = 0.223	BIAS2% = -0.071	RMS2% = 0.289

Absolute Deviations:

AAD = 0.003	BIAS = 0.003	RMS = 0.005 $mol \cdot dm^{-3}$
AAD2 = 0.008	BIAS2 = -0.006	RMS2 = 0.013 $mol \cdot dm^{-3}$

Data from Goodwin [30]
Number of Points: 20

AAD% = 0.050	BIAS% = -0.015	RMS% = 0.074
AAD2% = 0.124	BIAS2% = -0.016	RMS2% = 0.151

Absolute Deviations:

AAD = 0.000	BIAS = 0.000	RMS = 0.001 $mol \cdot dm^{-3}$
AAD2 = 0.000	BIAS2 = 0.000	RMS2 = 0.001 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 18

AAD% = 0.047	BIAS% = -0.008	RMS% = 0.074
AAD2% = 0.131	BIAS2% = -0.011	RMS2% = 0.158

Absolute Deviations:

AAD = 0.000	BIAS = 0.000	RMS = 0.001 $mol \cdot dm^{-3}$
AAD2 = 0.000	BIAS2 = 0.000	RMS2 = 0.001 $mol \cdot dm^{-3}$

Data from Miniovich [22]
Number of Points: 6

AAD% = 2.115	BIAS% = 2.115	RMS% = 1.138
AAD2% = 1.071	BIAS2% = 1.071	RMS2% = 0.653

Absolute Deviations:

AAD = 0.121	BIAS = 0.121	RMS = 0.079 $mol \cdot dm^{-3}$
AAD2 = 0.061	BIAS2 = 0.061	RMS2 = 0.044 $mol \cdot dm^{-3}$

Data from Pestak [36]
Number of Points: 39

AAD% = 0.437	BIAS% = -0.433	RMS% = 0.391
AAD2% = 1.162	BIAS2% = -1.162	RMS2% = 0.591

Absolute Deviations:

AAD = 0.024	BIAS = -0.024	RMS = 0.024 $mol \cdot dm^{-3}$
AAD2 = 0.064	BIAS2 = -0.064	RMS2 = 0.038 $mol \cdot dm^{-3}$

Data from Porter [40]
Number of Points: 14

AAD% = 0.598	BIAS% = -0.427	RMS% = 0.606
AAD2% = 0.560	BIAS2% = -0.314	RMS2% = 0.642

Absolute Deviations:

AAD = 0.005	BIAS = -0.001	RMS = 0.007 $mol \cdot dm^{-3}$
AAD2 = 0.005	BIAS2 = 0.000	RMS2 = 0.008 $mol \cdot dm^{-3}$

Data from Sliwinski [38]
Number of Points: 11

AAD% = 0.295	BIAS% = 0.276	RMS% = 0.333
AAD2% = 0.210	BIAS2% = -0.018	RMS2% = 0.238

Absolute Deviations:

AAD = 0.015	BIAS = 0.014	RMS = 0.019 $mol \cdot dm^{-3}$
AAD2 = 0.008	BIAS2 = -0.002	RMS2 = 0.010 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 7

AAD% = 0.109	BIAS% = 0.080	RMS% = 0.122
AAD2% = 0.155	BIAS2% = -0.029	RMS2% = 0.180

Absolute Deviations:

AAD = 0.004	BIAS = 0.004	RMS = 0.005 $mol \cdot dm^{-3}$
AAD2 = 0.006	BIAS2 = -0.002	RMS2 = 0.007 $mol \cdot dm^{-3}$

Data from ancillary equation [1]
Number of Points: 43

AAD2% = 0.120	BIAS2% = 0.001	RMS2% = 0.137

Absolute Deviations:

AAD2 = 0.001	BIAS2 = 0.000	RMS2 = 0.002 $mol \cdot dm^{-3}$

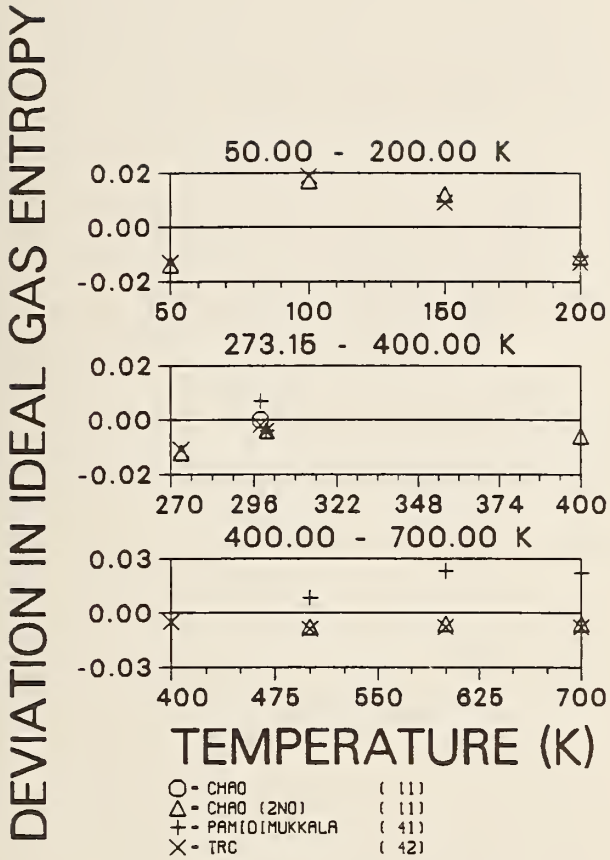

Figure A4A. Ideal gas entropy. (Statistical comparisions begin on page 46.)

Figure A4A. Ideal gas entropy.

The comparisons are based on entropies calculated from eq (5) at 0.101 325 MPa (1 atm). The point from Chao [11] at 298.15 K was used as a primary datum for the ideal gas correlation to fix an integration constant.

Statistical comparisons between tabulated ideal gas entropies and the ideal gas correlation of eq (5) are given.

Data from Chao [11]
Number of Points: 11
AAD% = 0.009 BIAS% = -0.004 RMS% = 0.009
Absolute Deviations:
AAD = 0.019 BIAS = -0.009 RMS = 0.019 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Pamidimukkala [41]
Number of Points: 8
AAD% = 0.020 BIAS% = 0.011 RMS% = 0.025
Absolute Deviations:
AAD = 0.046 BIAS = 0.024 RMS = 0.052 $J \cdot mol^{-1} \cdot K^{-1}$

Data from TRC [42]
Number of Points: 11
AAD% = 0.009 BIAS% = -0.004 RMS% = 0.010
Absolute Deviations:
AAD = 0.020 BIAS = -0.010 RMS = 0.019 $J \cdot mol^{-1} \cdot K^{-1}$

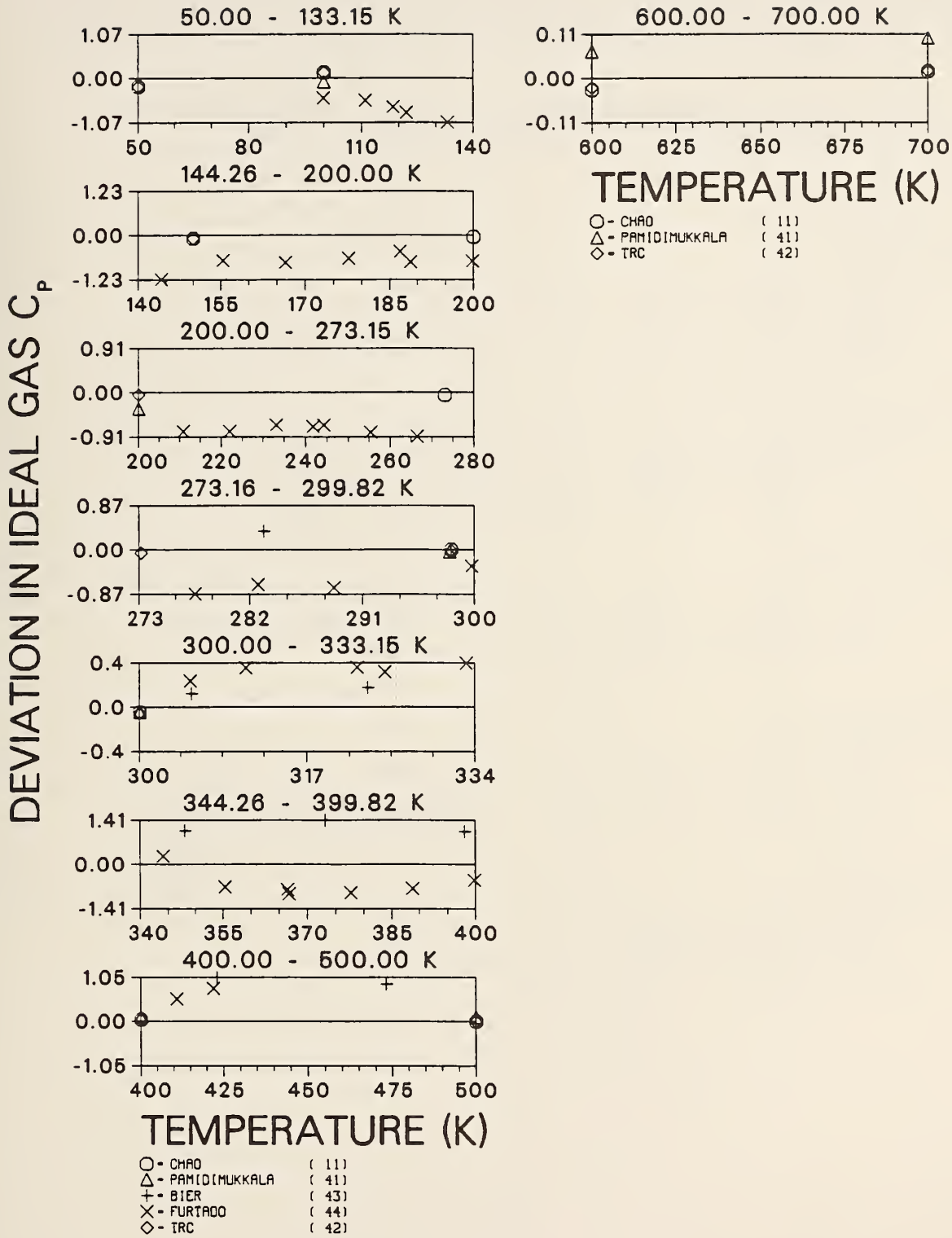

Figure A4B. Ideal gas isobaric heat capacity. (Statistical comparisions begin on page 48.)

Figure A4B. Ideal gas isobaric heat capacity.

The comparisons are based on isobaric heat capacities calculated from eq (5). Primary data for the ideal gas correlation were obtained from Chao [11].

Statistical comparisons between tabulated ideal gas isobaric heat capacities and the ideal gas correlation of eq (5) are given.

Data from Chao [11]
Number of Points: 11
Weighted Data:
Number of Points: 11
AAD% = 0.060 BIAS% = -0.024 RMS% = 0.080
Absolute Deviations:
AAD = 0.026 BIAS = -0.009 RMS = 0.031 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Pamidimukkala [41]
Number of Points: 8
AAD% = 0.111 BIAS% = -0.017 RMS% = 0.140
Absolute Deviations:
AAD = 0.066 BIAS = 0.011 RMS = 0.076 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Bier [43]
Number of Points: 9
AAD% = 0.681 BIAS% = 0.680 RMS% = 0.486
Absolute Deviations:
AAD = 0.431 BIAS = 0.430 RMS = 0.317 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Furtado [44]
Number of Points: 37
AAD% = 0.666 BIAS% = -0.490 RMS% = 0.503
Absolute Deviations:
AAD = 0.327 BIAS = -0.221 RMS = 0.269 $J \cdot mol^{-1} \cdot K^{-1}$

Data from TRC [42]
Number of Points: 11
AAD% = 0.060 BIAS% = -0.025 RMS% = 0.080
Absolute Deviations:
AAD = 0.027 BIAS = -0.010 RMS = 0.031 $J \cdot mol^{-1} \cdot K^{-1}$

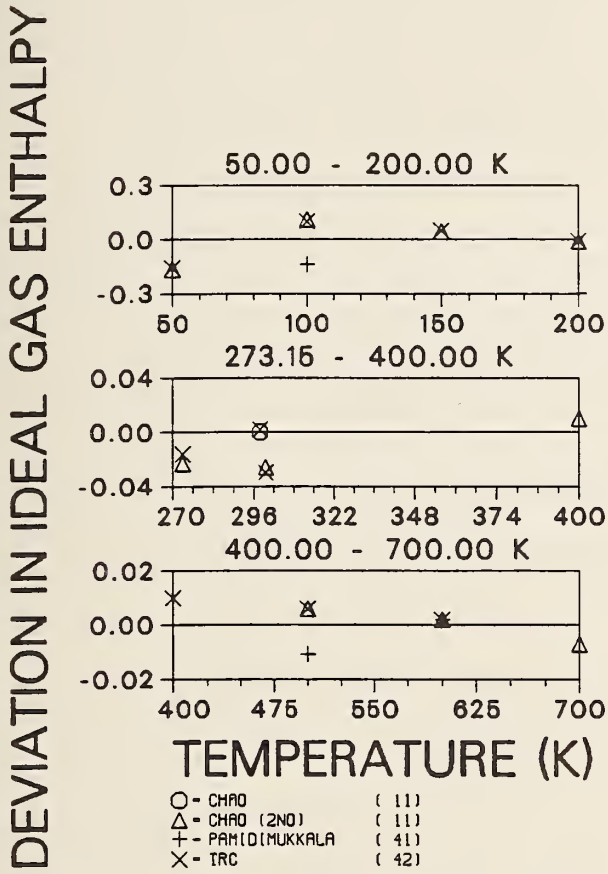

Figure A4C. Ideal gas enthalpy. (Statistical comparisions begin on page 50.)

Figure A4C. Ideal gas enthalpy.

The comparisons are based on enthalpies calculated from eq (5). The point from Chao [11] at 298.15 K was used as a primary datum for the ideal gas correlation to fix an integration constant.

Statistical comparisons between tabulated ideal gas enthalpies and the ideal gas correlation of eq (5) are given.

Data from Chao [11]
Number of Points: 11
AAD% = 0.037 BIAS% = -0.006 RMS% = 0.063
Absolute Deviations:
AAD = 1.999 BIAS = -0.238 RMS = 2.284 $J \cdot mol^{-1}$

Data from Pamidimukkala [41]
Number of Points: 8
AAD% = 0.139 BIAS% = -0.128 RMS% = 0.124
Absolute Deviations:
AAD =16.528 BIAS =-11.933 RMS =16.929 $J \cdot mol^{-1}$

Data from TRC [42]
Number of Points: 11
AAD% = 0.039 BIAS% = 0.001 RMS% = 0.061
Absolute Deviations:
AAD = 3.683 BIAS = 2.162 RMS = 6.607 $J \cdot mol^{-1}$

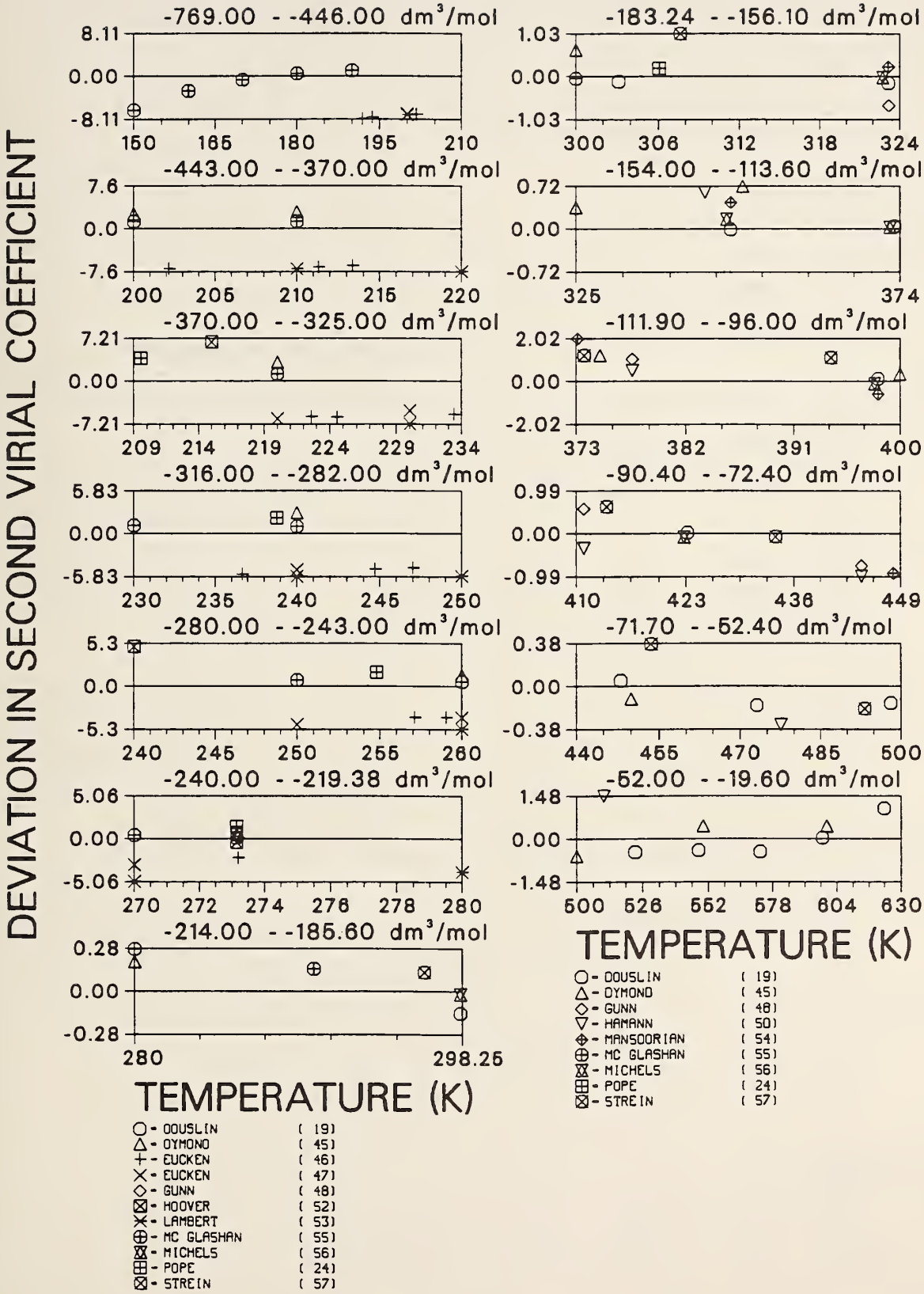

Figure A5. Second virial coefficient. (Statistical comparisions begin on page 52.)

Figure A5. Second virial coefficient.

The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Douslin [19], Mansoorian [54], Michels [56], and Pope [24].

Statistical comparisons between tabulated second virial coefficients and values calculated from the SWEOS are given.

Data from Douslin [19]
Number of Points: 16
Weighted Data:
Number of Points: 16
AAD% = 0.22 BIAS% = -0.04 RMS% = 0.33
Absolute Deviations:
AAD = 0.13 BIAS = 0.04 RMS = 0.16 $cm^3 \cdot mol^{-1}$

Data from Dymond [45]
Number of Points: 15
AAD% = 1.20 BIAS% = 1.10 RMS% = 1.17
Absolute Deviations:
AAD = 3.27 BIAS = -3.22 RMS = 4.27 $cm^3 \cdot mol^{-1}$

Data from Eucken [46]
Number of Points: 15
AAD% = 5.75 BIAS% = -5.75 RMS% = 1.58
Absolute Deviations:
AAD = 21.78 BIAS = 21.78 RMS = 10.23 $cm^3 \cdot mol^{-1}$

Data from Eucken via Tester [47]
Number of Points: 9
AAD% = 4.80 BIAS% = -4.80 RMS% = 1.82
Absolute Deviations:
AAD = 16.54 BIAS = 16.54 RMS = 9.37 $cm^3 \cdot mol^{-1}$

Data from Gunn [48] reported by Huff [49]
Number of Points: 8
AAD% = 1.58 BIAS% = -1.15 RMS% = 2.06
Absolute Deviations:
AAD = 1.22 BIAS = 0.75 RMS = 1.26 $cm^3 \cdot mol^{-1}$

Data from Hamann [50]
Number of Points: 7
AAD% = 1.04 BIAS% = 0.56 RMS% = 1.24
Absolute Deviations:
AAD = 1.18 BIAS = -0.83 RMS = 1.76 $cm^3 \cdot mol^{-1}$

Data from Hoover [52]
Number of Points: 3
AAD% = 3.98 BIAS% = 3.71 RMS% = 2.99
Absolute Deviations:
AAD = 12.35 BIAS = -11.74 RMS = 9.67 $cm^3 \cdot mol^{-1}$

Data from Lambert [53]; reported by Tester [47]
Number of Points: 11
AAD% = 5.70 BIAS% = -5.70 RMS% = 1.38
Absolute Deviations:
AAD = 18.10 BIAS = 18.10 RMS = 8.87 $cm^3 \cdot mol^{-1}$

Data from Mansoorian [54]
Number of Points: 7
Weighted Data:
Number of Points: 7
AAD% = 1.18 BIAS% = -0.41 RMS% = 1.35
Absolute Deviations:
AAD = 1.07 BIAS = 0.16 RMS = 1.28 $cm^3 \cdot mol^{-1}$

Data from McGlashan [55]; reported by Goodwin [30]
Number of Points: 16
AAD% = 1.22 BIAS% = -0.02 RMS% = 1.93
Absolute Deviations:
AAD = 6.57 BIAS = 2.42 RMS = 13.38 $cm^3 \cdot mol^{-1}$

Data from Michels [56]
Number of Points: 7
Weighted Data:
Number of Points: 7
AAD% = 0.13 BIAS% = 0.06 RMS% = 0.19
Absolute Deviations:
AAD = 0.22 BIAS = -0.15 RMS = 0.38 $cm^3 \cdot mol^{-1}$

Data from Pope [24]
Number of Points: 5
Weighted Data:
Number of Points: 5
AAD% = 1.86 BIAS% = 1.86 RMS% = 1.18
Absolute Deviations:
AAD = 5.60 BIAS = -5.60 RMS = 4.65 $cm^3 \cdot mol^{-1}$

Data from Strein [57]
Number of Points: 11
AAD% = 0.93 BIAS% = 0.46 RMS% = 1.07
Absolute Deviations:
AAD = 1.01 BIAS = -0.71 RMS = 1.05 $cm^3 \cdot mol^{-1}$

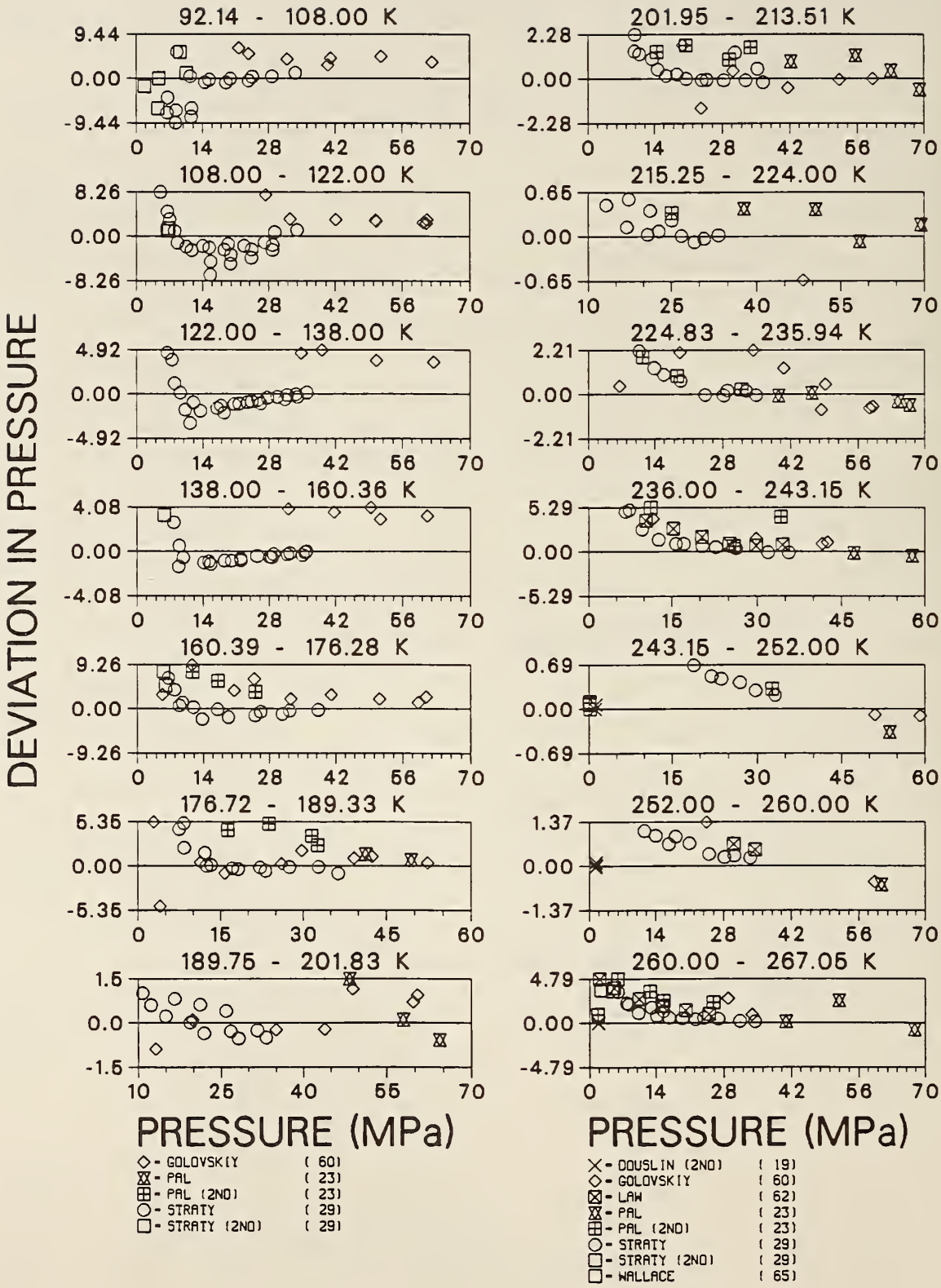

Figure A6A. PVT data--pressure deviations. (Statistical comparisions begin on page 58.)

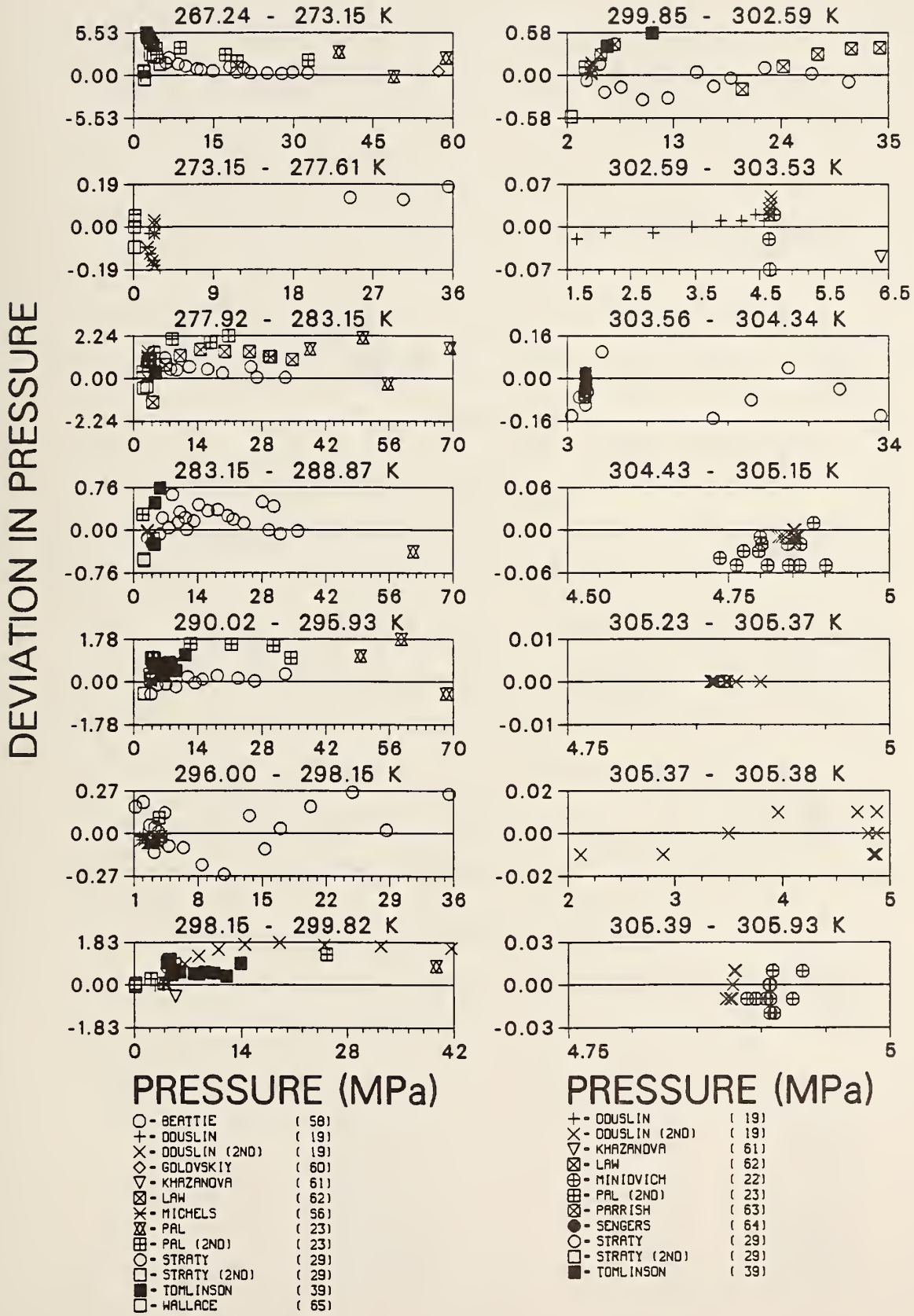

Figure A6A. (continued)

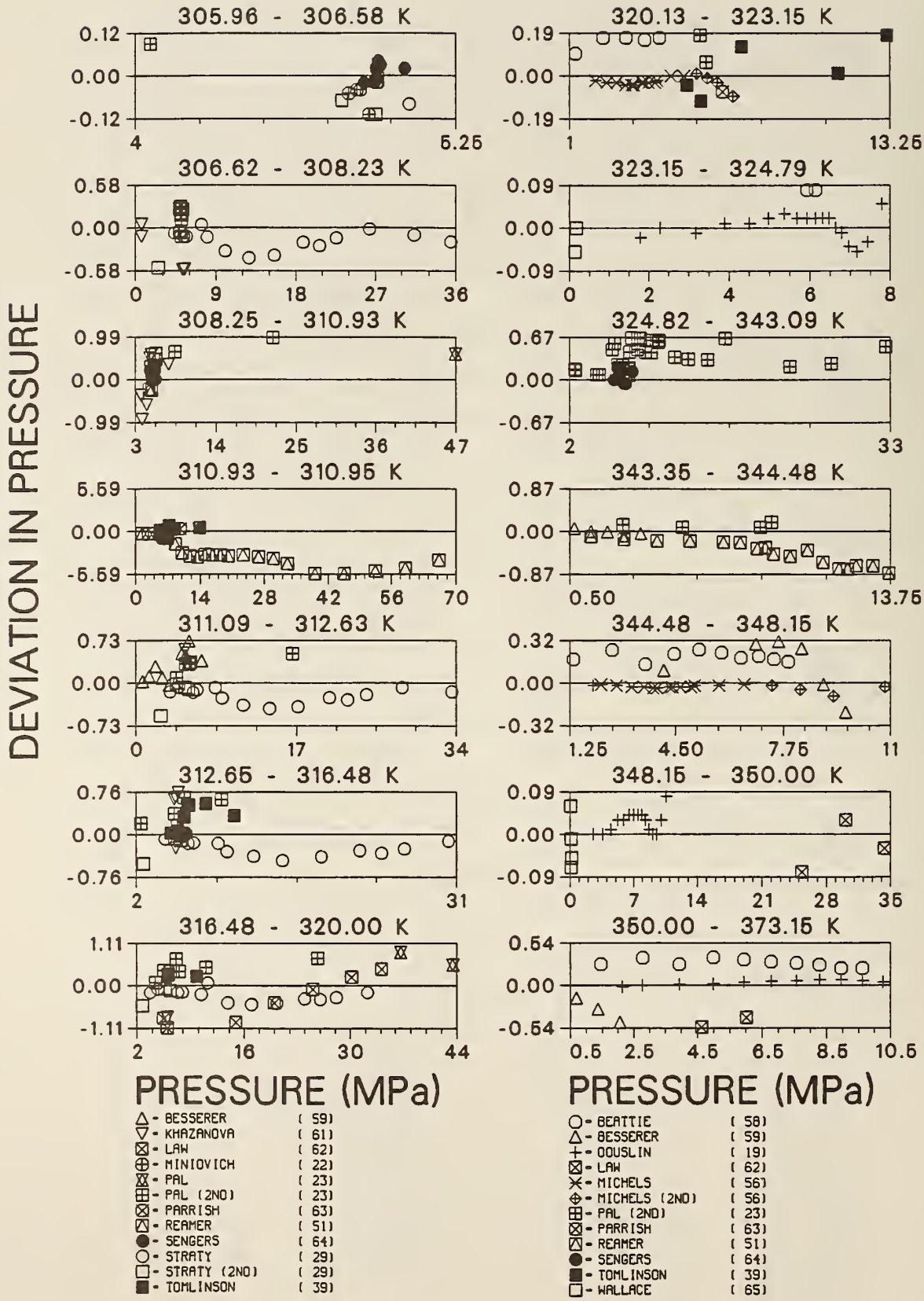

Figure A6A. (continued)

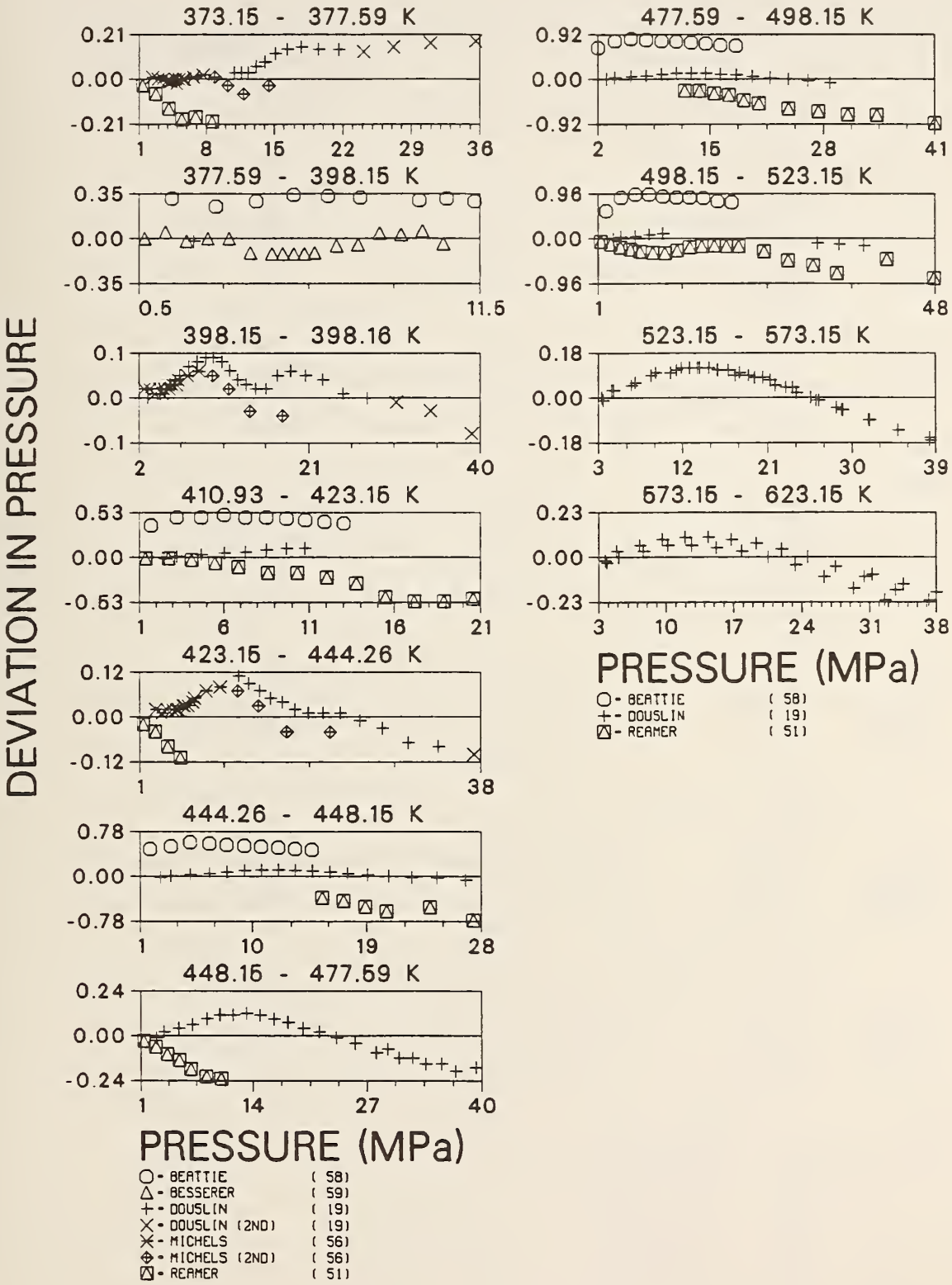

Figure A6A. (continued)

Figure A6A. PVT data--pressure deviations.

The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Douslin [19], Michels [56], Pal [23], Parrish [63], Sengers [64], and Straty [29]. Points out of range were

Author	Temperature, K	Pressure, MPa	Deviation, %
Douslin [19]	243.15	1.31	63
	243.15	1.13	62
	243.15	1.23	62
	263.15	2.06	12
	263.15	1.98	12
	263.15	1.91	12
Golovskiy [60]	92.45	59.52	66
	92.14	12.10	115
	144.57	1.92	89
	162.11	1.93	61
Khazanova [61]	305.56	0.99	8.3
	305.71	0.49	9.8
	306.22	1.85	7.4
	308.32	1.89	7.2
	308.23	1.00	8.4
	308.76	0.50	9.7
Pal [23]	157.20	0.52	186
	168.03	1.00	125
	168.48	1.66	75
	176.72	0.35	228
	177.38	1.23	65
	188.91	0.67	72
	208.45	0.81	161
	209.05	1.41	93
	222.88	0.76	122
	223.26	1.08	87
	223.57	1.35	70
	230.05	0.81	64
	230.29	1.00	52
	240.74	1.01	33
	240.89	1.11	31

Statistical comparisons follow Figure A6B.

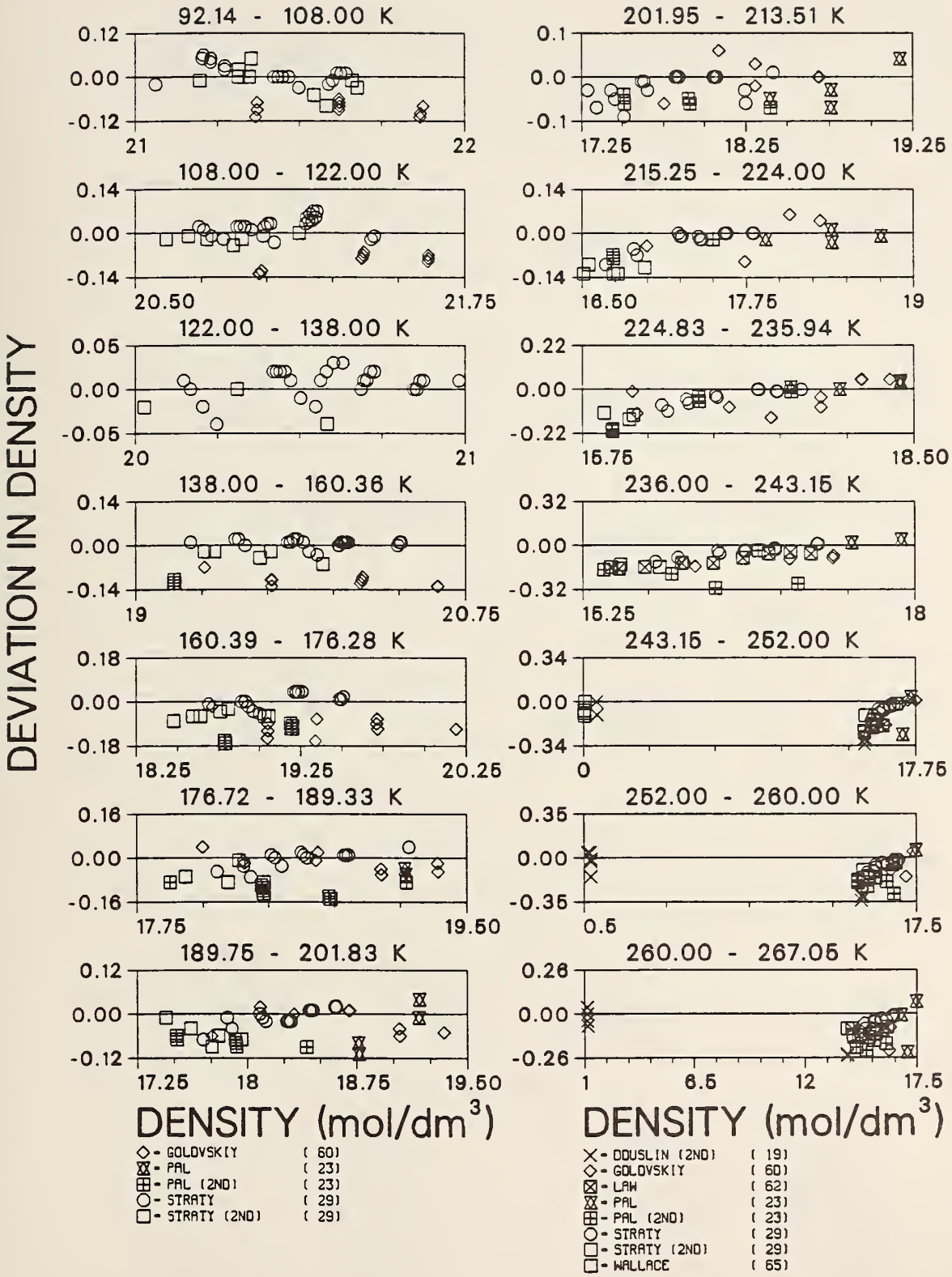

Figure A6B. PVT data--density deviations. (Statistical comparisions begin on page 63.)

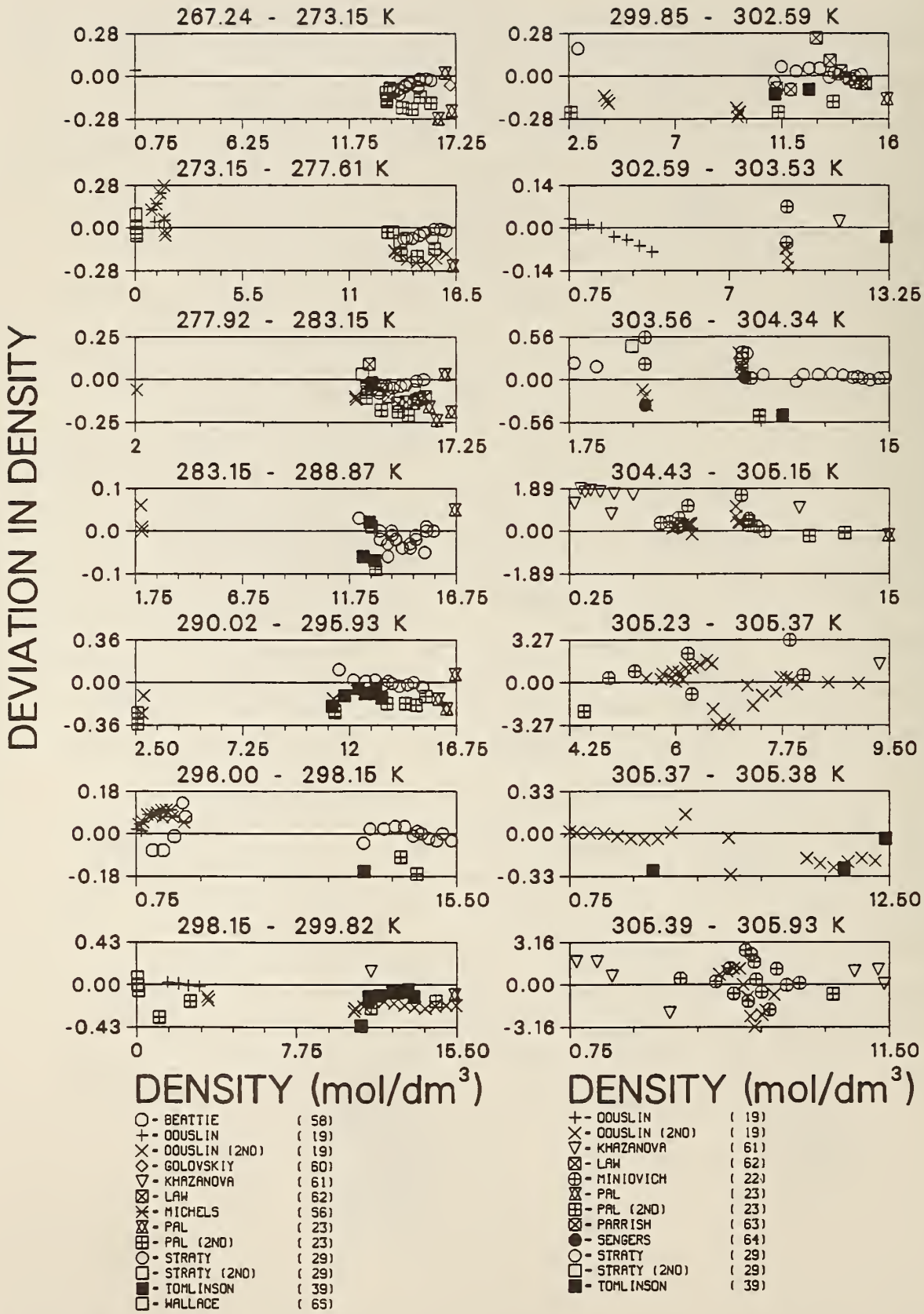

Figure A6B. (continued)

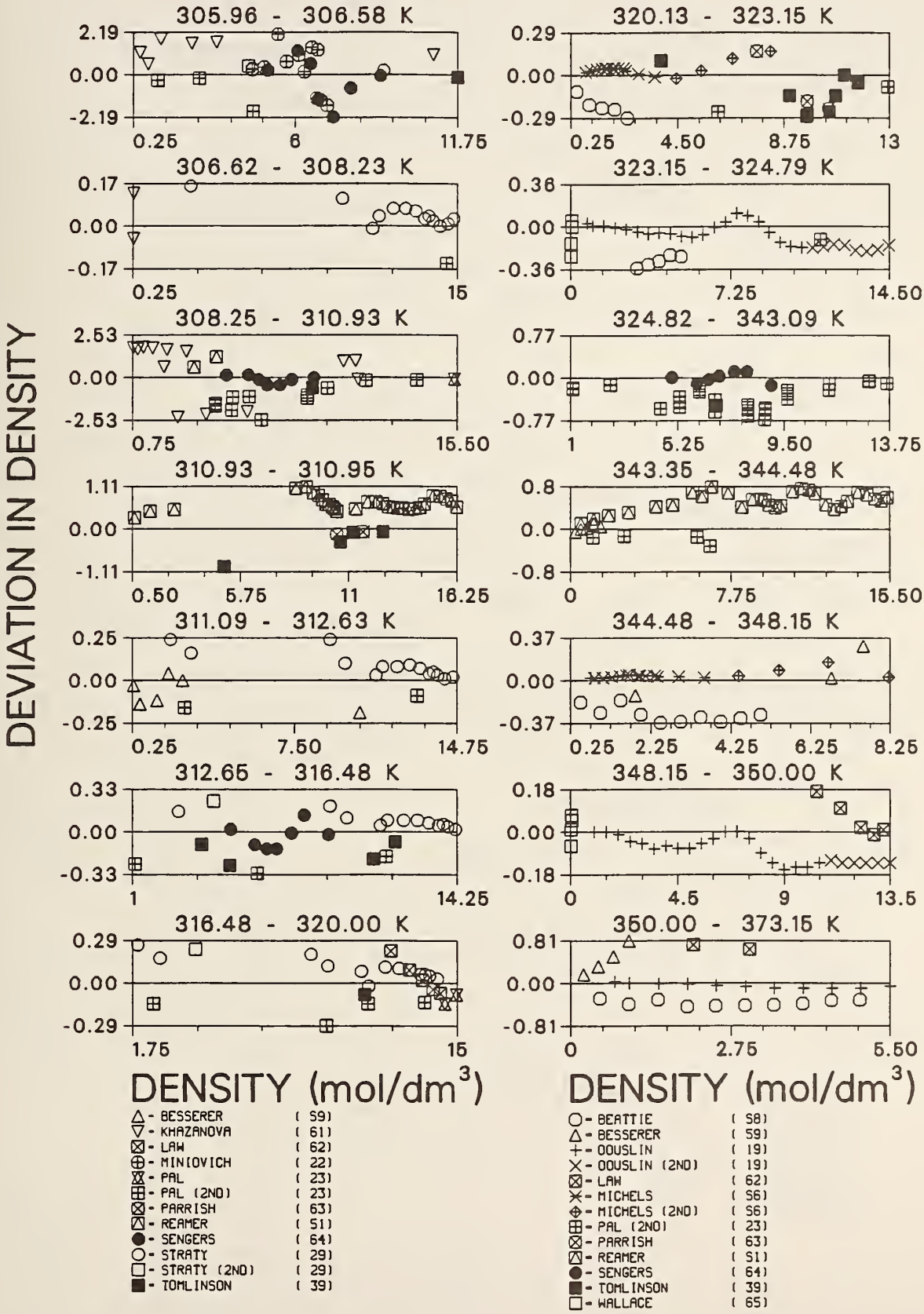

Figure A6B. (continued)

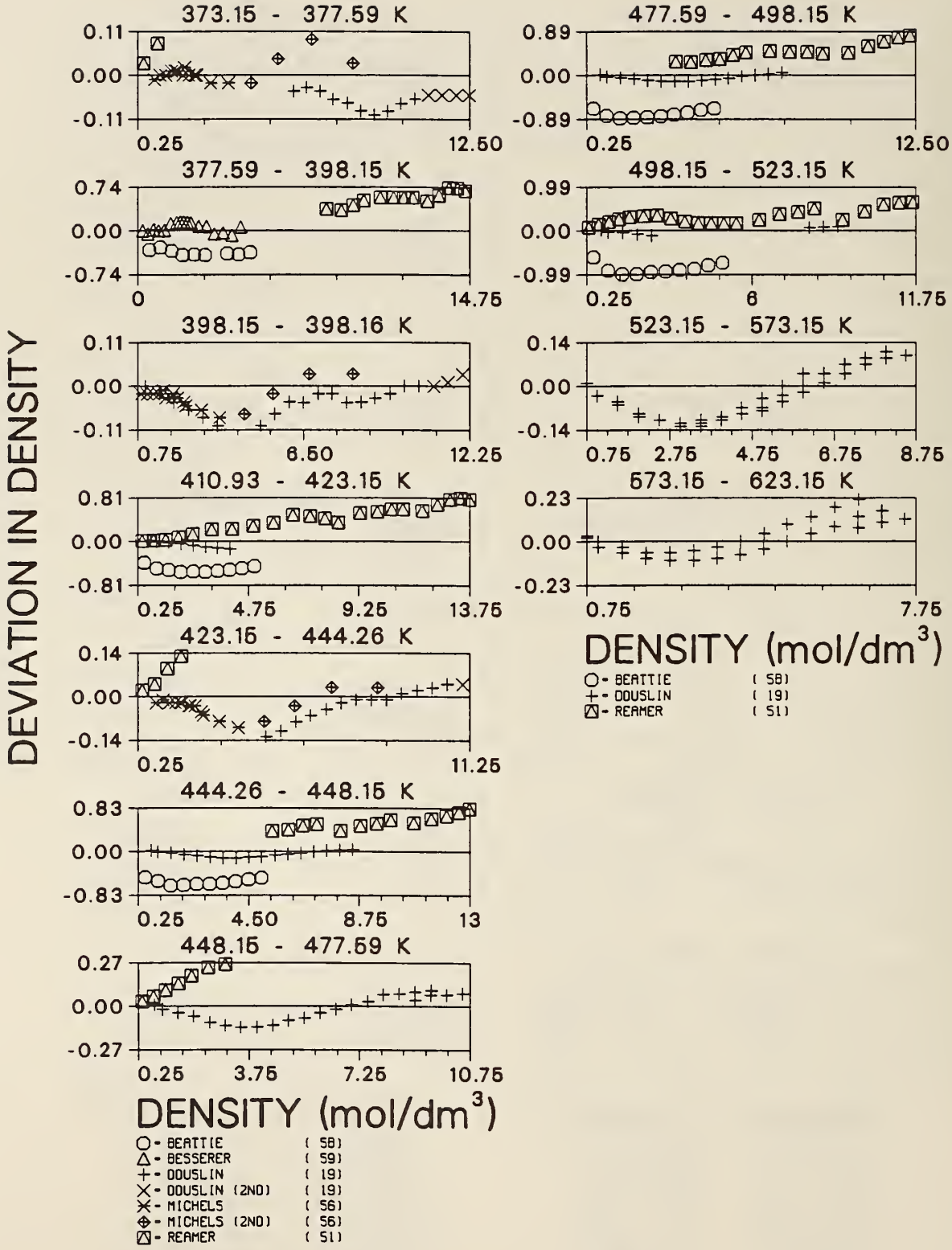

Figure A6B. (continued)

Figure A6B. PVT data--density deviations.

The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Douslin [19], Michels [56], Pal [23], Parrish [63], Sengers [64], and Straty [29]. Points out of range were

Author	Temperature, K	Density, mol•dm^{-3}	Deviation, %
Khazanova [61]	303.25	9.21	6.6
	303.97	0.92	-8.2
	303.16	0.92	-8.1
	303.17	0.46	-8.3
	303.60	0.46	-8.3
	303.56	0.22	-9.5
	303.26	0.22	-9.4
	305.79	5.45	-10.8
	318.01	2.87	-12.4
Law [62]	300.00	10.27	2.8
	320.00	6.78	5.7
Miniovich [22]	305.36	6.70	12.7
	305.38	6.51	15.9
Pal [23]	305.42	6.79	-11.5
	305.74	6.79	-16.1
	305.63	8.10	-24.9

Statistical comparisons between experimental PVT data and the SWEOS correlation. Statistics for the calculation of pressure are given first; comparisons for the calculation of density are given next with the suffix "2" on each statistical category.

Data from Beattie [58]
Number of Points: 96
AAD% = 0.43 BIAS% = 0.43 RMS% = 0.25
AAD2% = 0.49 BIAS2% = -0.49 RMS2% = 0.23
Absolute Deviations:
AAD = 0.04 BIAS = 0.04 RMS = 0.04 MPa
AAD2 = 0.013 BIAS2 = -0.013 RMS2 = 0.009 mol•dm^{-3}

Data from Besserer [59]
Number of Points: 68
AAD% = 0.67 BIAS% = -0.43 RMS% = 1.00
AAD2% = 0.83 BIAS2% = 0.32 RMS2% = 1.37
Absolute Deviations:
AAD = 0.05 BIAS = -0.04 RMS = 0.09 MPa
AAD2 = 0.039 BIAS2 = 0.009 RMS2 = 0.075 mol•dm^{-3}

Data from Douslin [19]
Number of Points: 449
AAD% = 1.10 BIAS% = 1.07 RMS% = 6.20
AAD2% = 0.24 BIAS2% = -0.10 RMS2% = 0.55
Absolute Deviations:
AAD = 0.04 BIAS = 0.03 RMS = 0.12 MPa
AAD2 = 0.017 BIAS2 = -0.008 RMS2 = 0.040 mol•dm^{-3}

Weighted Data:
Number of Points: 257
AAD% = 0.07 BIAS% = 0.02 RMS% = 0.09
AAD2% = 0.06 BIAS2% = -0.03 RMS2% = 0.07
Absolute Deviations:
AAD = 0.01 BIAS = 0.00 RMS = 0.02 MPa
AAD2 = 0.003 BIAS2 = -0.001 RMS2 = 0.005 $mol \cdot dm^{-3}$

Data from Golovskiy [60]
Number of Points: 111
AAD% = 8.88 BIAS% = 8.64 RMS% = 17.72
AAD2% = 0.10 BIAS2% = -0.09 RMS2% = 0.09
Absolute Deviations:
AAD = 1.15 BIAS = 1.09 RMS = 1.68 MPa
AAD2 = 0.019 BIAS2 = -0.017 RMS2 = 0.020 $mol \cdot dm^{-3}$

Data from Khazanova [61]
Number of Points: 86
AAD% = 2.23 BIAS% = 0.55 RMS% = 3.51
AAD2% = 3.02 BIAS2% = -1.05 RMS2% = 4.26
Absolute Deviations:
AAD = 0.06 BIAS = -0.01 RMS = 0.08 MPa
AAD2 = 0.093 BIAS2 = 0.001 RMS2 = 0.170 $mol \cdot dm^{-3}$

Data from Law [62]
Number of Points: 56
AAD% = 2.03 BIAS% = 1.16 RMS% = 4.57
AAD2% = 0.49 BIAS2% = 0.38 RMS2% = 1.08
Absolute Deviations:
AAD = 0.16 BIAS = 0.09 RMS = 0.18 MPa
AAD2 = 0.038 BIAS2 = 0.023 RMS2 = 0.077 $mol \cdot dm^{-3}$

Data from Michels [56]
Number of Points: 101
AAD% = 0.03 BIAS% = -0.01 RMS% = 0.04
AAD2% = 0.05 BIAS2% = 0.02 RMS2% = 0.06
Absolute Deviations:
AAD = 0.00 BIAS = 0.00 RMS = 0.00 MPa
AAD2 = 0.001 BIAS2 = 0.001 RMS2 = 0.002 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 81
AAD% = 0.03 BIAS% = -0.01 RMS% = 0.04
AAD2% = 0.04 BIAS2% = 0.02 RMS2% = 0.06
Absolute Deviations:
AAD = 0.00 BIAS = 0.00 RMS = 0.00 MPa
AAD2 = 0.001 BIAS2 = 0.000 RMS2 = 0.001 $mol \cdot dm^{-3}$

Data from Miniovich [22]
Number of Points: 63
AAD% = 0.03 BIAS% = -0.03 RMS% = 0.03
AAD2% = 1.41 BIAS2% = 1.11 RMS2% = 2.85
Absolute Deviations:
AAD = 0.00 BIAS = 0.00 RMS = 0.00 MPa
AAD2 = 0.093 BIAS2 = 0.072 RMS2 = 0.191 $mol \cdot dm^{-3}$

Data from Pal [23]
Number of Points: 309
AAD% = 8.38 BIAS% = 8.34 RMS% = 24.68
AAD2% = 0.78 BIAS2% = -0.78 RMS2% = 2.32
Absolute Deviations:
AAD = 0.30 BIAS = 0.27 RMS = 0.38 MPa
AAD2 = 0.061 BIAS2 = -0.060 RMS2 = 0.169 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 45
AAD% = 0.96 BIAS% = 0.70 RMS% = 1.05
AAD2% = 0.09 BIAS2% = -0.07 RMS2% = 0.10
Absolute Deviations:
AAD = 0.47 BIAS = 0.30 RMS = 0.51 MPa
AAD2 = 0.015 BIAS2 = -0.011 RMS2 = 0.017 $mol \cdot dm^{-3}$

Data from Parrish [63]
Weighted Data:
Number of Points: 9
AAD% = 0.32 BIAS% = 0.21 RMS% = 0.26
AAD2% = 0.23 BIAS2% = 0.03 RMS2% = 0.35
Absolute Deviations:
AAD = 0.02 BIAS = 0.02 RMS = 0.02 MPa
AAD2 = 0.016 BIAS2 = -0.005 RMS2 = 0.018 $mol \cdot dm^{-3}$

Data from Reamer [51]
Number of Points: 176
AAD% = 1.13 BIAS% = -1.13 RMS% = 1.22
AAD2% = 0.50 BIAS2% = 0.50 RMS2% = 0.40
Absolute Deviations:
AAD = 0.41 BIAS = -0.41 RMS = 0.65 MPa
AAD2 = 0.047 BIAS2 = 0.047 RMS2 = 0.040 $mol \cdot dm^{-3}$

Data from Sengers [64]
Weighted Data:
Number of Points: 30
AAD% = 0.03 BIAS% = 0.01 RMS% = 0.03
AAD2% = 0.30 BIAS2% = -0.12 RMS2% = 0.55
Absolute Deviations:
AAD = 0.00 BIAS = 0.00 RMS = 0.00 MPa
AAD2 = 0.021 BIAS2 = -0.010 RMS2 = 0.039 $mol \cdot dm^{-3}$

Data from Straty [29]
Number of Points: 477

AAD% =	2.73	BIAS% =	1.84	RMS% =	6.23
AAD2% =	0.10	BIAS2% =	0.05	RMS2% =	0.47

Absolute Deviations:

AAD =	0.15	BIAS =	0.04	RMS =	0.25 MPa
AAD2 =	0.009	BIAS2 =	0.000	RMS2 =	0.031 $mol \cdot dm^{-3}$

Weighted Data:
Number of Points: 381

AAD% =	1.07	BIAS% =	0.23	RMS% =	2.07
AAD2% =	0.04	BIAS2% =	0.00	RMS2% =	0.06

Absolute Deviations:

AAD =	0.13	BIAS =	-0.01	RMS =	0.22 MPa
AAD2 =	0.006	BIAS2 =	-0.001	RMS2 =	0.007 $mol \cdot dm^{-3}$

Data from Tomlinson [39]
Number of Points: 61

AAD% =	0.48	BIAS% =	0.47	RMS% =	0.33
AAD2% =	0.51	BIAS2% =	-0.49	RMS2% =	1.61

Absolute Deviations:

AAD =	0.03	BIAS =	0.03	RMS =	0.03 MPa
AAD2 =	0.040	BIAS2 =	-0.039	RMS2 =	0.110 $mol \cdot dm^{-3}$

Data from Wallace [65]
Number of Points: 20

AAD% =	0.06	BIAS% =	0.03	RMS% =	0.08
AAD2% =	0.06	BIAS2% =	-0.03	RMS2% =	0.08

Absolute Deviations:

AAD =	0.00	BIAS =	0.00	RMS =	0.00 MPa
AAD2 =	0.000	BIAS2 =	0.000	RMS2 =	0.000 $mol \cdot dm^{-3}$

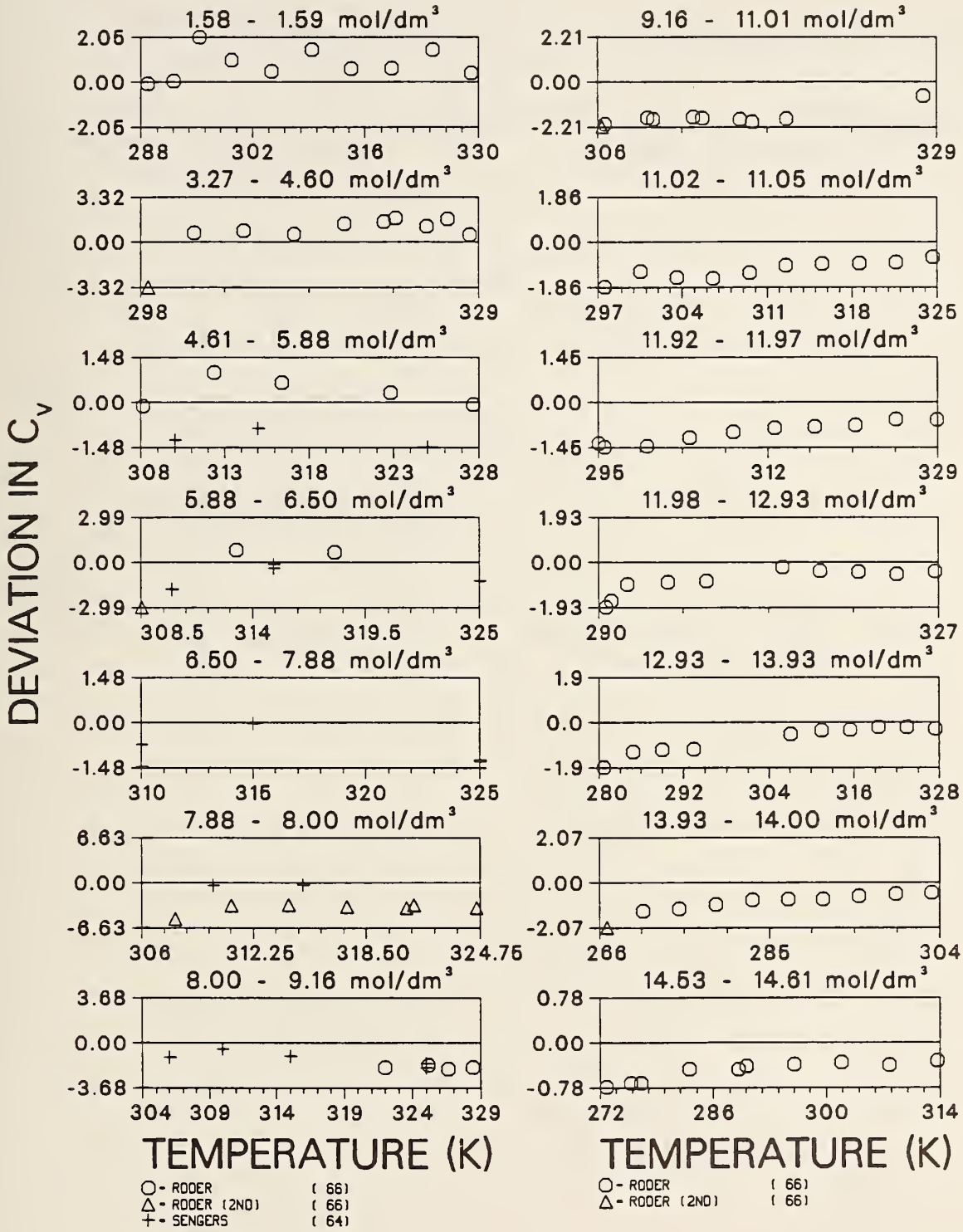

Figure A7. Isochoric molar heat capacity. (Statistical comparisions begin on page 69.)

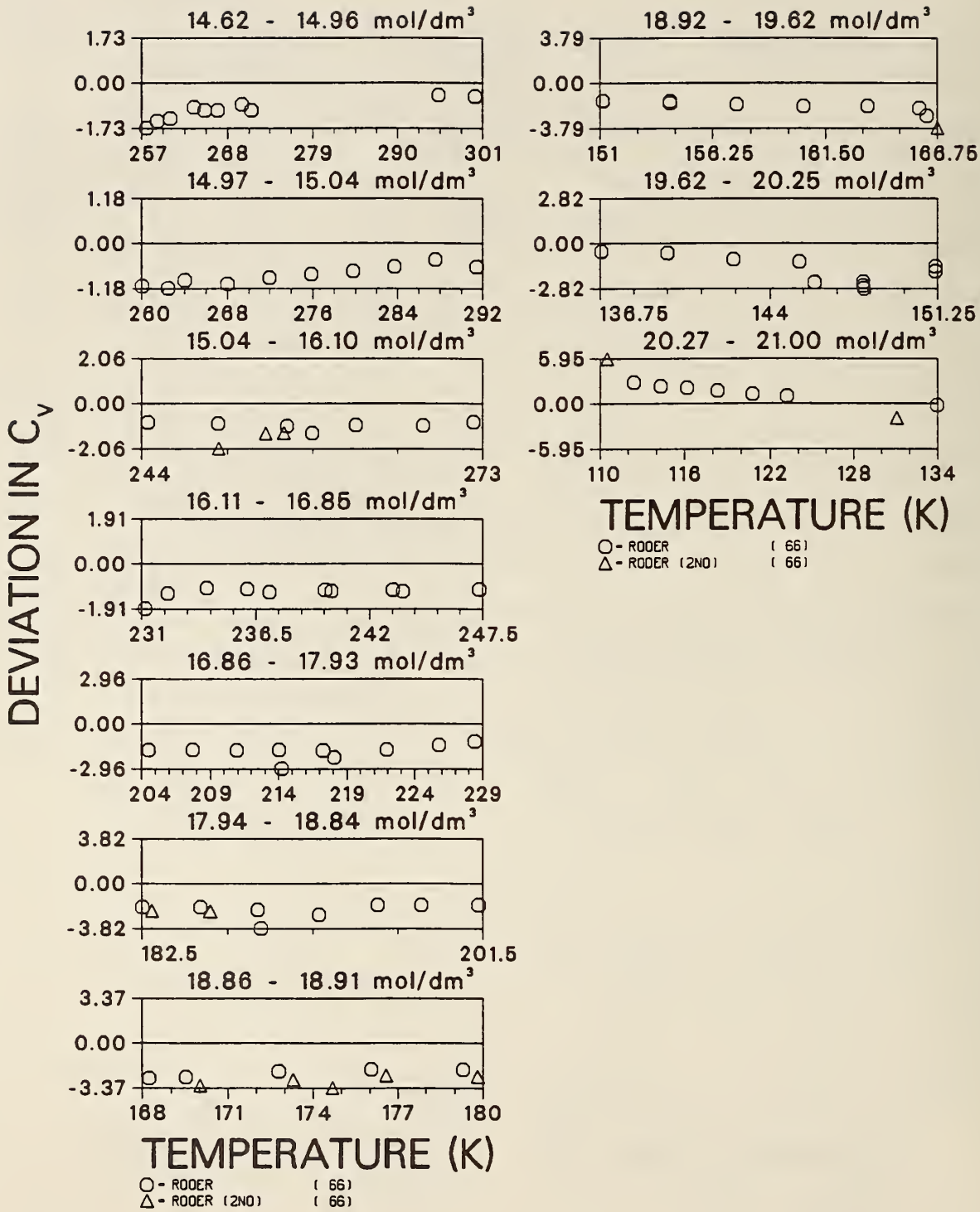

Figure A7. (continued)

Figure A7. Isochoric molar heat capacity.

The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Roder [66] and Sengers [64].

Statistical comparisons between tabulated isochoric molar heat capacities and values calculated from the SWEOS using the reported experimental densities are given.

Data from Roder [66]
Number of Points: 209
AAD% = 1.32 BIAS% = -0.93 RMS% = 1.27
Absolute Deviations:
AAD = 0.66 BIAS = -0.46 RMS = 0.63 $J \cdot mol^{-1} \cdot K^{-1}$

Weighted Data:
Number of Points: 184
AAD% = 1.16 BIAS% = -0.78 RMS% = 1.09
Absolute Deviations:
AAD = 0.56 BIAS = -0.36 RMS = 0.52 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Sengers [64]
Weighted Data:
Number of Points: 30
AAD% = 3.51 BIAS% = -3.51 RMS% = 4.82
Absolute Deviations:
AAD = 2.64 BIAS = -2.64 RMS = 4.01 $J \cdot mol^{-1} \cdot K^{-1}$

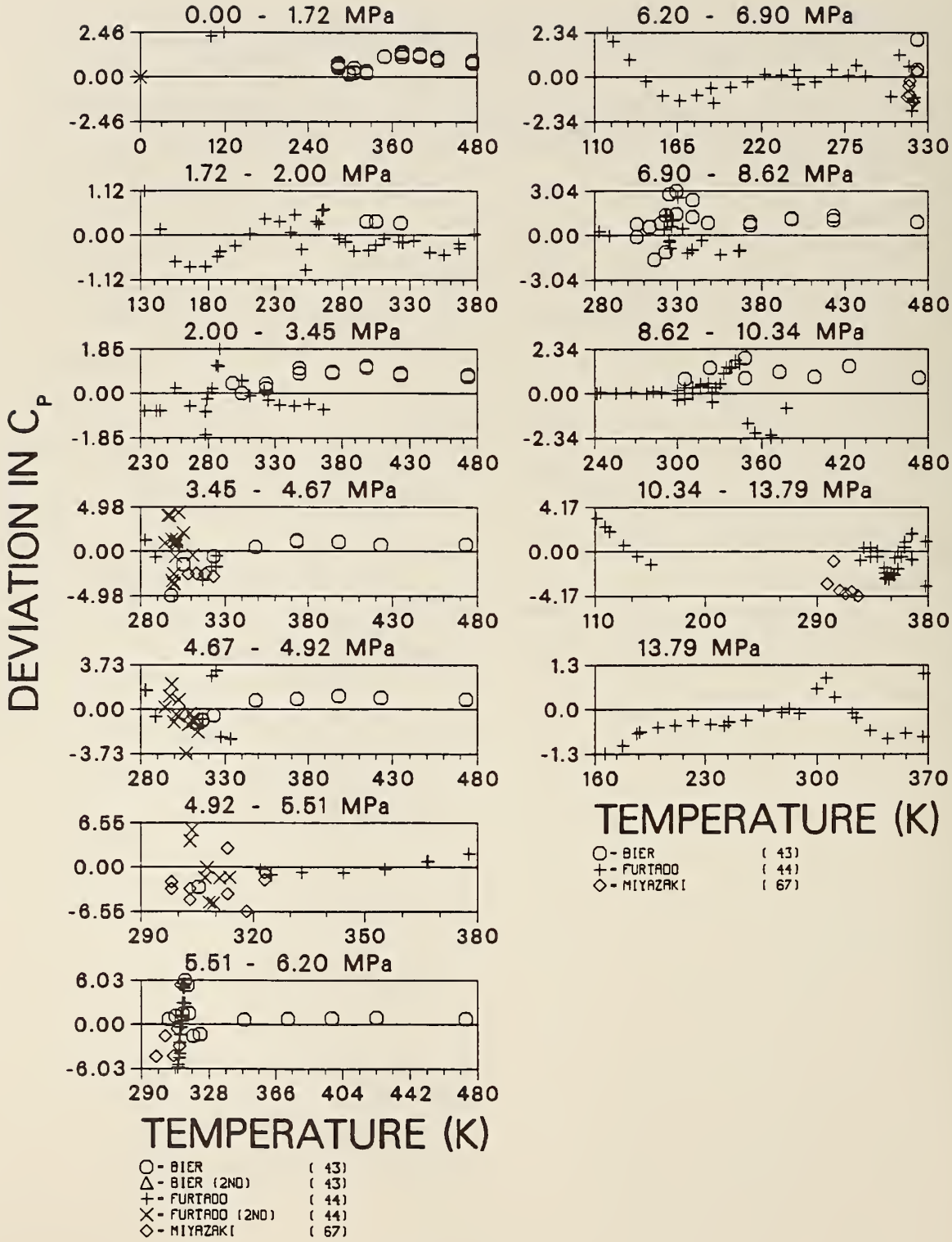

Figure A8. Isobaric molar heat capacity. (Statistical comparisons begin on page 71.)

Figure A8. Isobaric molar heat capacity.

The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Bier [43] and Furtado [44]. Points out of range were

Author	Temperature, K	Pressure, MPa	Deviation, %
Furtado [44]	302.87	4.67	20.3
	303.15	4.67	34.2
	304.26	4.92	-39.2
	304.82	4.92	-34.2
	305.26	4.92	-29.6
	305.26	4.92	-37.4
	306.48	4.92	31.2
	299.82	6.90	8.7
Miyazaki [67]	308.15	5.17	20.7
	307.15	5.17	-15.9
	307.55	5.17	-20.7
	308.55	5.17	46.9
	309.15	5.17	70.6
	313.15	6.20	-10.1

Statistical comparisons between tabulated isobaric molar heat capacities and values calculated from the SWEOS are given.

Data from Bier [43]
Number of Points: 121
AAD% = 1.25 BIAS% = 0.56 RMS% = 2.06
Absolute Deviations:
AAD = 2.29 BIAS = 0.52 RMS = 6.17 $J \cdot mol^{-1} \cdot K^{-1}$

Weighted Data:
Number of Points: 118
AAD% = 1.08 BIAS% = 0.78 RMS% = 1.18
Absolute Deviations:
AAD = 1.72 BIAS = 1.16 RMS = 3.80 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Furtado [44]
Number of Points: 299
AAD% = 2.22 BIAS% = -0.11 RMS% = 5.59
Absolute Deviations:
AAD = 8.32 BIAS = -2.27 RMS = 38.37 $J \cdot mol^{-1} \cdot K^{-1}$

Weighted Data:
Number of Points: 241
AAD% = 1.09 BIAS% = -0.02 RMS% = 1.63
Absolute Deviations:
AAD = 2.19 BIAS = 0.12 RMS = 5.15 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Miyazaki [67]
Number of Points: 45
AAD% = 7.92 BIAS% = -1.39 RMS% = 14.64
Absolute Deviations:
AAD = 46.67 BIAS = 2.97 RMS =107.38 $J \cdot mol^{-1} \cdot K^{-1}$

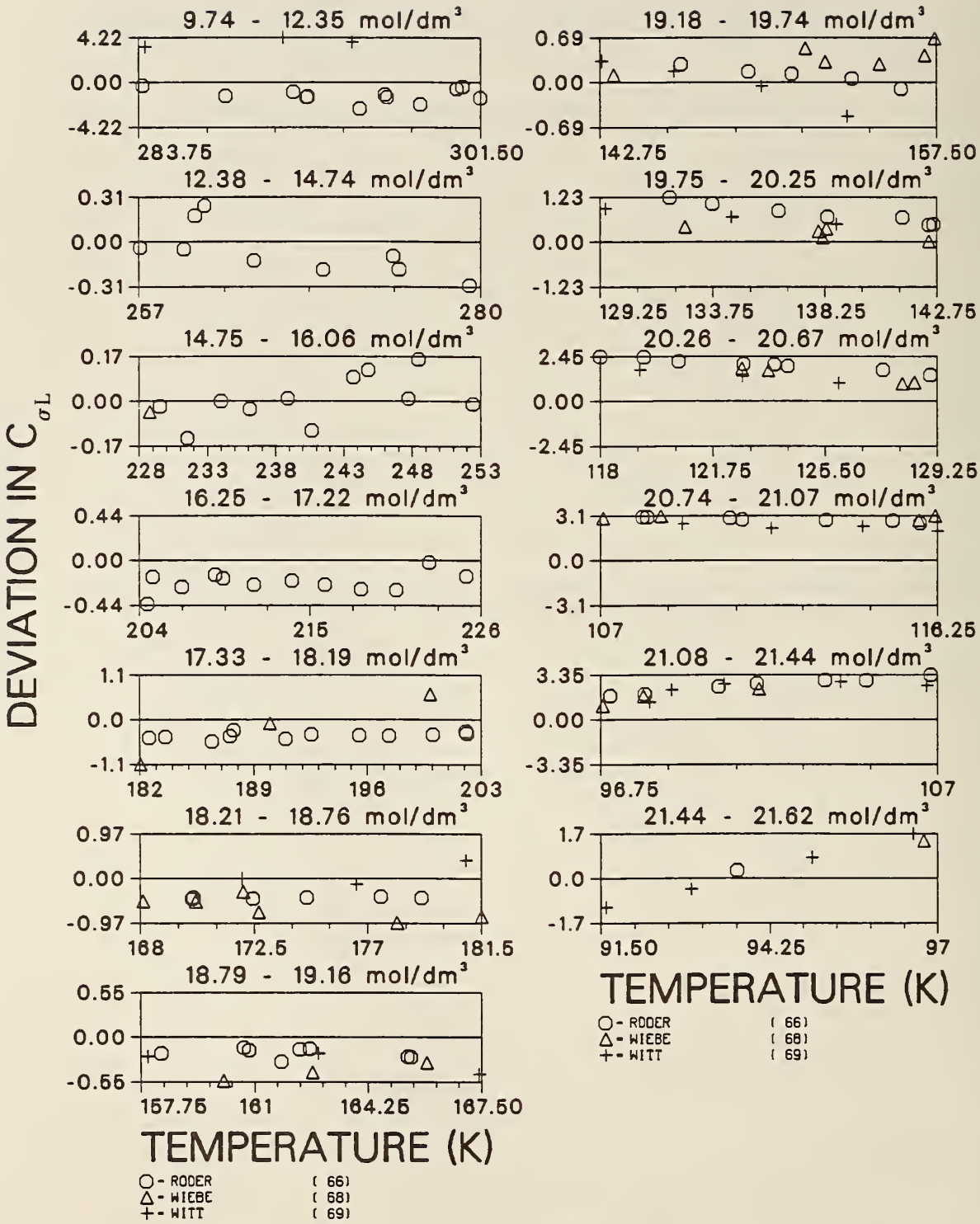

Figure A9. Molar heat capacity of the saturated liquid. (Statistical comparisions begin on page 73.)

Figure A9. Molar heat capacity of the saturated liquid.
The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Roder [66].

Statistical comparisons between tabulated molar heat capacities of the saturated liquid and values calculated from the SWEOS are given.

Data from Roder [66]
Weighted Data:
Number of Points: 106
AAD% = 0.84 BIAS% = 0.31 RMS% = 1.23
Absolute Deviations:
AAD = 0.71 BIAS = 0.09 RMS = 1.08 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Wiebe [68]
Number of Points: 41
AAD% = 0.95 BIAS% = 0.60 RMS% = 1.13
Absolute Deviations:
AAD = 0.67 BIAS = 0.41 RMS = 0.79 $J \cdot mol^{-1} \cdot K^{-1}$

Data from Witt [69]
Number of Points: 39
AAD% = 1.54 BIAS% = 1.38 RMS% = 1.36
Absolute Deviations:
AAD = 1.31 BIAS = 1.20 RMS = 1.40 $J \cdot mol^{-1} \cdot K^{-1}$

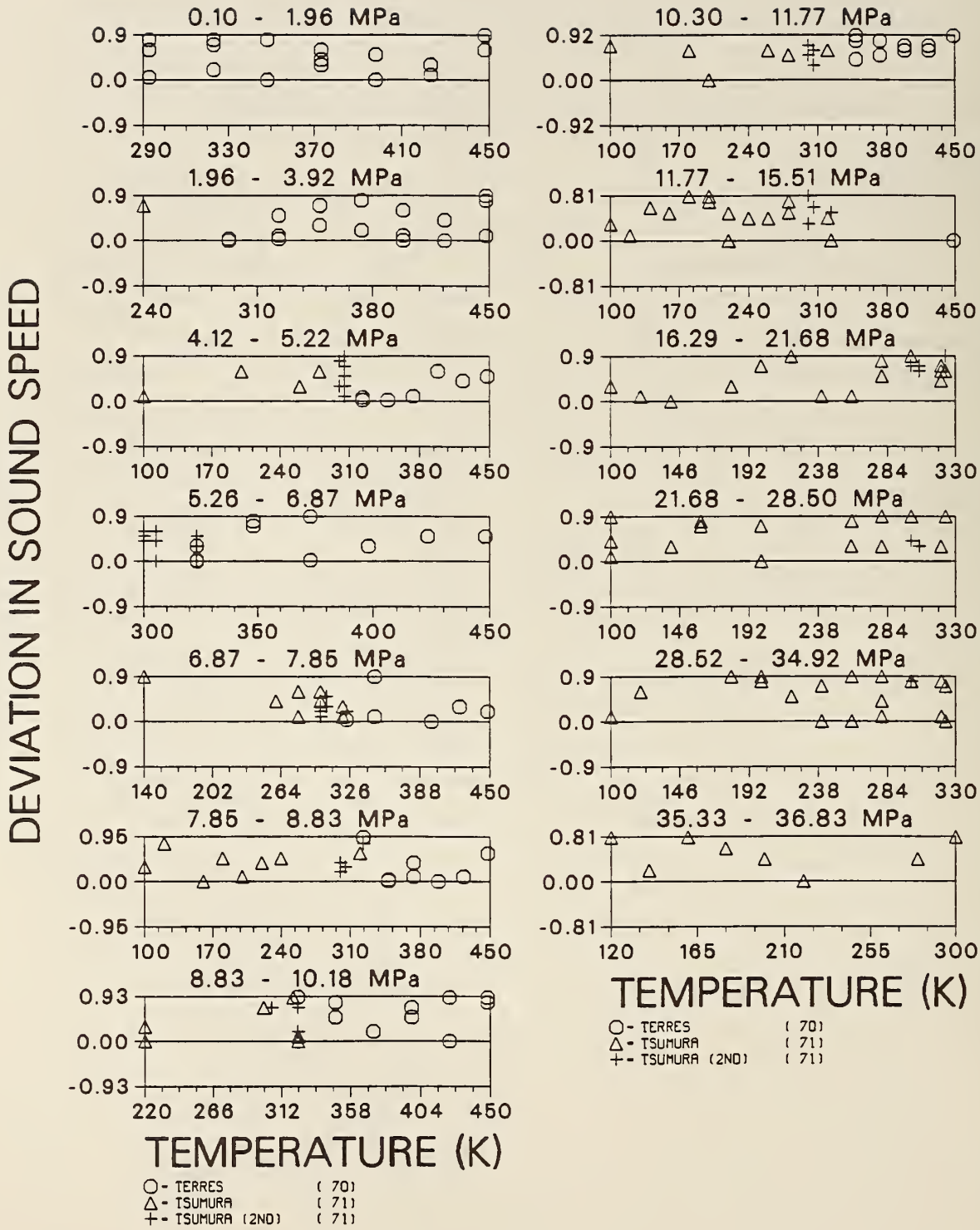

Figure A10. Sound speed in the single-phase fluid. (Statistical comparisions begin on page 75.)

Figure A10. Sound speed in the single-phase fluid.

The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Terres [70] and Tsumura [71].

Statistical comparisons between tabulated sound speeds and values calculated from the SWEOS are given.

Data from Terres [70]
Weighted Data:
Number of Points: 92

AAD%	=	0.79	BIAS%	= -0.40	RMS%	= 1.00
		Absolute Deviations:				
AAD	=	2.35	BIAS	= -1.11	RMS	= 2.98 $m \cdot s^{-1}$

Data from Tsumura [71]
Number of Points: 156

AAD%	=	0.31	BIAS%	= -0.09	RMS%	= 0.36
		Absolute Deviations:				
AAD	=	3.29	BIAS	= -1.13	RMS	= 4.38 $m \cdot s^{-1}$

Weighted Data:
Number of Points: 109

AAD%	=	0.36	BIAS%	= -0.16	RMS%	= 0.38
		Absolute Deviations:				
AAD	=	4.29	BIAS	= -1.70	RMS	= 5.07 $m \cdot s^{-1}$

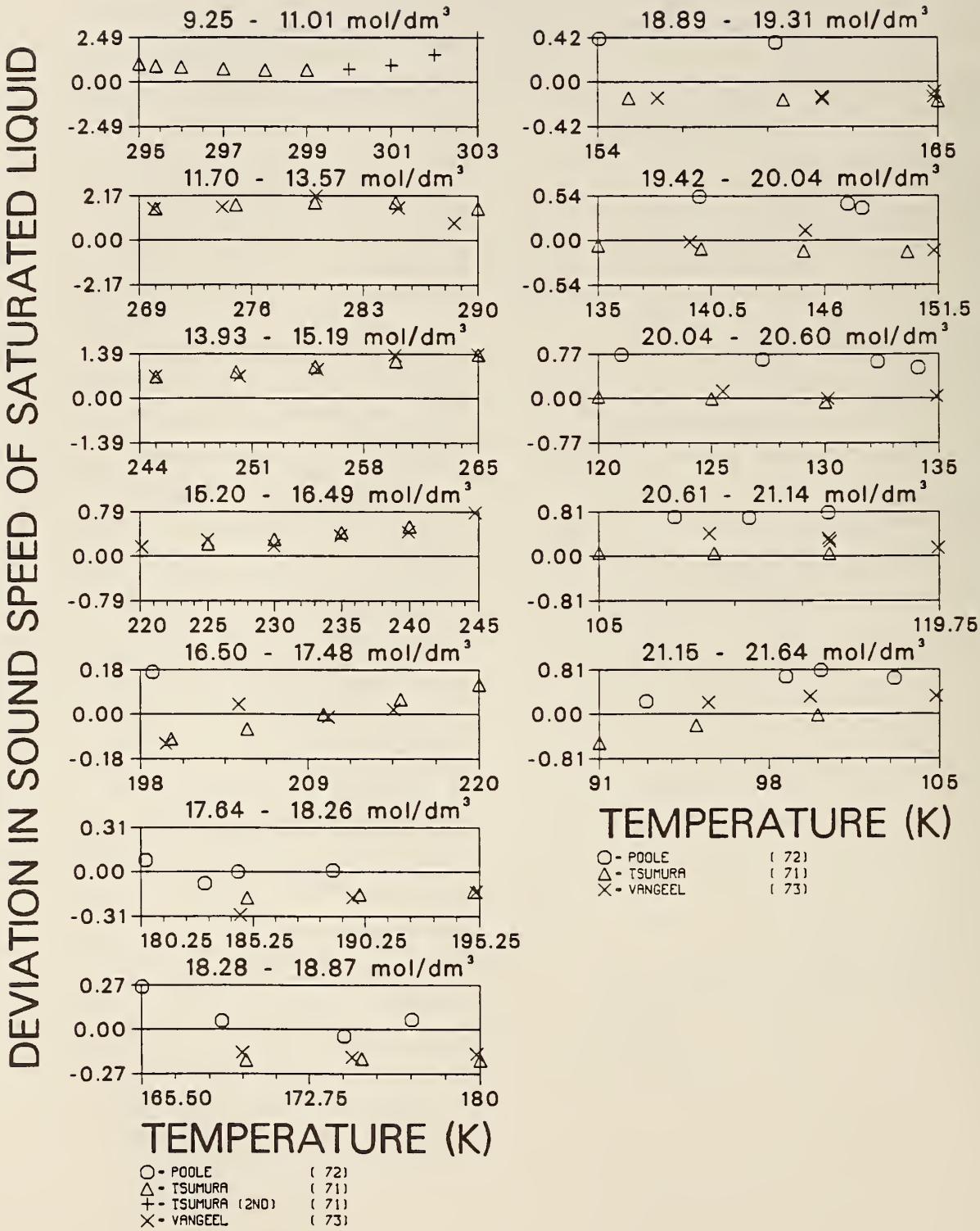

Figure A11. Sound speed in the saturated liquid. (Statistical comparisions begin on page 77.)

Figure A11. Sound speed in the saturated liquid.
The comparisons are based on the SWEOS, using expression from table 7. Primary data for the SWEOS were from Tsumura [71].

Statistical comparisons between tabulated sound speeds and values calculated from the SWEOS are given.

Data from Poole [72]
Number of Points: 25
AAD% = 0.40 BIAS% = 0.39 RMS% = 0.29
Absolute Deviations:
AAD = 7.01 BIAS = 6.88 RMS = 5.39 $m \cdot s^{-1}$

Data from Tsumura [71]
Number of Points: 51
AAD% = 0.56 BIAS% = 0.45 RMS% = 0.70
Absolute Deviations:
AAD = 3.42 BIAS = 1.59 RMS = 4.15 $m \cdot s^{-1}$

Weighted Data:
Number of Points: 47
AAD% = 0.49 BIAS% = 0.37 RMS% = 0.63
Absolute Deviations:
AAD = 3.42 BIAS = 1.43 RMS = 4.26 $m \cdot s^{-1}$

Data from Vangeel [73]
These unpublished data were tabulated in Ref.[6].
Number of Points: 44
AAD% = 0.44 BIAS% = 0.35 RMS% = 0.59
Absolute Deviations:
AAD = 3.86 BIAS = 2.56 RMS = 4.09 $m \cdot s^{-1}$

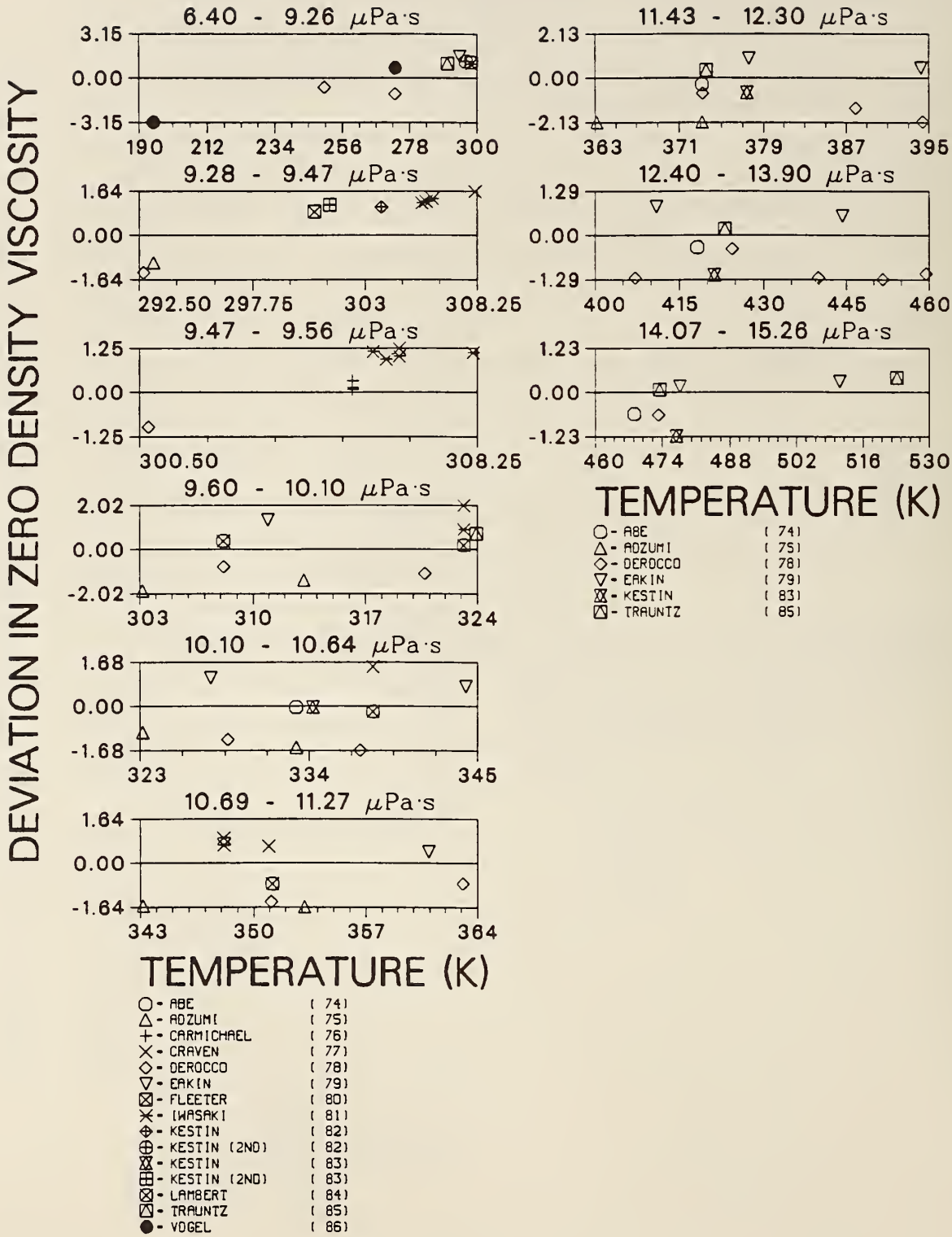

Figure A12. Viscosity at zero density. (Statistical comparisions begin on page 79.)

Figure A12. Viscosity at zero density.

The comparisons are based on eq (9), and data have been adjusted (slightly) to zero density using the correlation of eq (13) as appropriate. Primary data were from Fleeter [80] and Kestin [82,83].

Statistical comparisons between tabulated (adjusted) values of the dilute gas viscosity and values calculated from eq (9) are given.

Data from Abe [74]
Number of Points: 5

AAD%	=	0.49	BIAS%	=	-0.04	RMS%	= 0.61
AAD	=	0.05	BIAS	=	-0.01	RMS	= 0.06 μPa•s

Data from Adzumi [75]
Number of Points: 9

AAD%	=	1.60	BIAS%	=	-1.60	RMS%	= 0.38
AAD	=	0.17	BIAS	=	-0.17	RMS	= 0.05 μPa•s

Data from Carmichael [76]
Number of Points: 3

AAD%	=	0.18	BIAS%	=	0.18	RMS%	= 0.11
AAD	=	0.02	BIAS	=	0.02	RMS	= 0.01 μPa•s

Data from Craven [77]
Number of Points: 4

AAD%	=	1.44	BIAS%	=	1.44	RMS%	= 0.51
AAD	=	0.14	BIAS	=	0.14	RMS	= 0.05 μPa•s

Data from Derocco [78]
Number of Points: 19

AAD%	=	1.12	BIAS%	=	-1.12	RMS%	= 0.40
AAD	=	0.13	BIAS	=	-0.13	RMS	= 0.05 μPa•s

Data from Eakin [79]
Number of Points: 11

AAD%	=	0.77	BIAS%	=	0.77	RMS%	= 0.41
AAD	=	0.08	BIAS	=	0.08	RMS	= 0.04 μPa•s

Data from Fleeter [80]
Weighted Data:
Number of Points: 1

AAD%	=	0.88	BIAS%	=	0.88	RMS%	= 0.00
AAD	=	0.08	BIAS	=	0.08	RMS	= 0.00 μPa•s

Data from Iwasaki [81]
Number of Points: 16

AAD%	=	1.07	BIAS%	=	1.07	RMS%	= 0.17
AAD	=	0.10	BIAS	=	0.10	RMS	= 0.01 μPa•s

Data from Kestin [82]
Number of Points: 2

AAD%	=	1.13	BIAS%	=	1.13	RMS%	= 0.07
AAD	=	0.10	BIAS	=	0.10	RMS	= 0.01 μPa•s

Weighted Data:
Number of Points: 1

AAD%	=	1.05	BIAS%	=	1.05	RMS%	= 0.00
AAD	=	0.10	BIAS	=	0.10	RMS	= 0.00 μPa•s

Data from Kestin [83]
Number of Points: 5

AAD%	=	0.86	BIAS%	=	-0.40	RMS%	= 0.88
AAD	=	0.10	BIAS	=	-0.06	RMS	= 0.10 μPa•s

Weighted Data:
Number of Points: 4

AAD%	=	0.79	BIAS%	=	-0.79	RMS%	= 0.48
AAD	=	0.10	BIAS	=	-0.10	RMS	= 0.07 μPa•s

Data from Lambert [84]
Number of Points: 4

AAD%	=	0.39	BIAS%	=	-0.10	RMS%	= 0.45
AAD	=	0.04	BIAS	=	-0.01	RMS	= 0.05 μPa•s

Data from Trautz [85]
Number of Points: 6

AAD%	=	0.47	BIAS%	=	0.47	RMS%	= 0.32
AAD	=	0.05	BIAS	=	0.05	RMS	= 0.03 μPa•s

Data from Vogel [86]
Number of Points: 2

AAD%	=	1.93	BIAS%	=	-1.21	RMS%	= 1.93
AAD	=	0.13	BIAS	=	-0.07	RMS	= 0.13 μPa•s

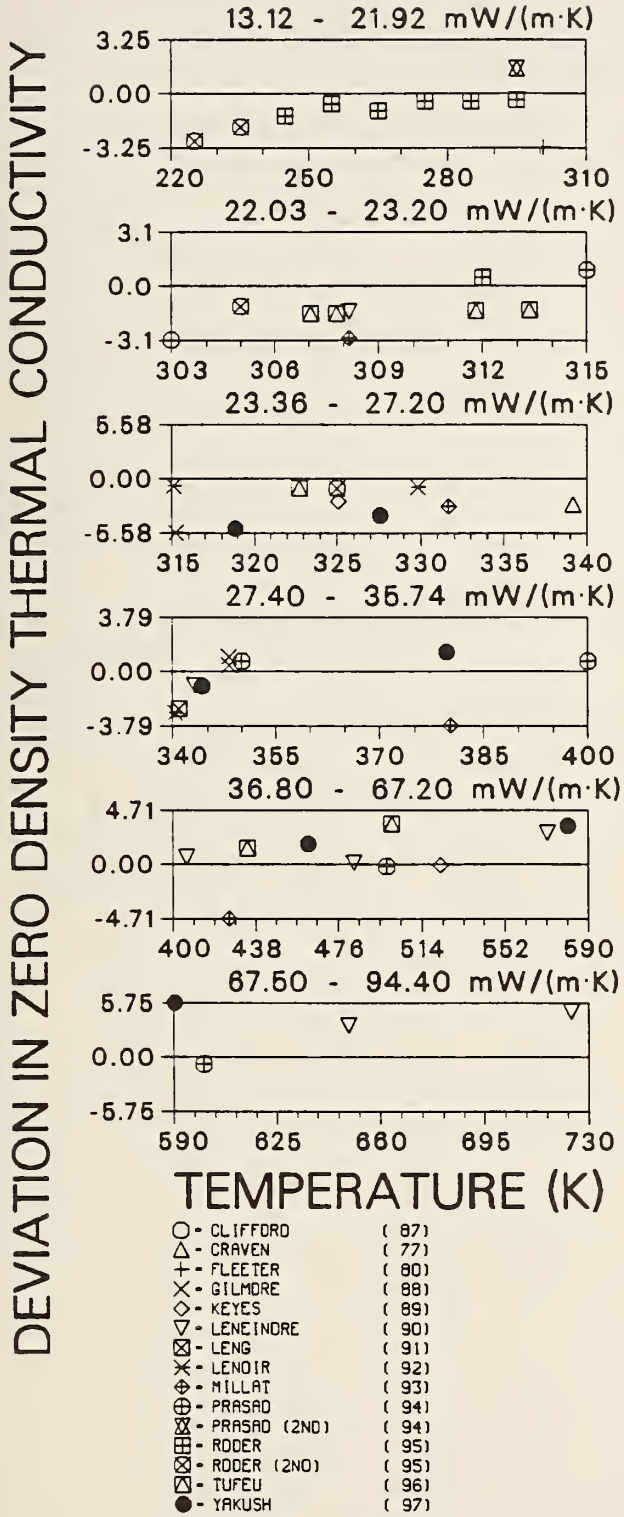

Figure A13. Thermal conductivity at zero density. (Statistical comparisions begin on page 82.)

Figure A13. Thermal conductivity at zero density.

The comparisons are based on eq (11), and data have been adjusted (slightly) to zero density using the correlation of eq (14) as appropriate. Primary data were from Prasad [94] and Roder [95].

Statistical comparisons between tabulated (adjusted) values of the dilute gas viscosity and values calculated from eq (11) are given.

Data from Clifford [87]
Number of Points: 1

AAD%	=	3.09	BIAS%	=	-3.09	RMS%	=	0.00
AAD	=	0.69	BIAS	=	-0.69	RMS	=	0.00 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Craven [77]
Number of Points: 1

AAD%	=	2.66	BIAS%	=	-2.66	RMS%	=	0.00
AAD	=	0.72	BIAS	=	-0.72	RMS	=	0.00 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Fleeter [80]
Number of Points: 1

AAD%	=	3.24	BIAS%	=	-3.24	RMS%	=	0.00
AAD	=	0.71	BIAS	=	-0.71	RMS	=	0.00 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Gilmore [88]
Number of Points: 2

AAD%	=	0.75	BIAS%	=	0.75	RMS%	=	0.31
AAD	=	0.21	BIAS	=	0.21	RMS	=	0.08 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Keyes [89]
Number of Points: 2

AAD%	=	1.21	BIAS%	=	-1.21	RMS%	=	1.13
AAD	=	0.32	BIAS	=	-0.32	RMS	=	0.27 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Le Neindre [90]
Number of Points: 7

AAD%	=	2.02	BIAS%	=	1.32	RMS%	=	2.19
AAD	=	1.43	BIAS	=	1.25	RMS	=	1.73 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Leng [91]
Number of Points: 1

AAD%	=	2.60	BIAS%	=	-2.60	RMS%	=	0.00
AAD	=	0.71	BIAS	=	-0.71	RMS	=	0.00 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Lenoir [92]
Number of Points: 4

AAD%	=	2.52	BIAS%	=	-2.52	RMS%	=	1.96
AAD	=	0.64	BIAS	=	-0.64	RMS	=	0.49 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Millat [93]
Number of Points: 4

AAD%	=	3.57	BIAS%	=	-3.57	RMS%	=	0.75
AAD	=	1.17	BIAS	=	-1.17	RMS	=	0.53 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Prasad [94]
Number of Points: 6

AAD%	=	0.79	BIAS%	=	0.49	RMS%	= 0.73
AAD	=	0.27	BIAS	=	0.06	RMS	= 0.29 $mW \cdot m^{-1} \cdot K^{-1}$

Weighted Data:
Number of Points: 5

AAD%	=	0.65	BIAS%	=	0.29	RMS%	= 0.63
AAD	=	0.26	BIAS	=	0.01	RMS	= 0.30 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Roder [95]
Number of Points: 11

AAD%	=	1.07	BIAS%	=	-0.99	RMS%	= 0.84
AAD	=	0.18	BIAS	=	-0.16	RMS	= 0.12 $mW \cdot m^{-1} \cdot K^{-1}$

Weighted Data:
Number of Points: 7

AAD%	=	0.69	BIAS%	=	-0.55	RMS%	= 0.53
AAD	=	0.12	BIAS	=	-0.09	RMS	= 0.09 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Tufeu [96]
Number of Points: 7

AAD%	=	1.71	BIAS%	=	-0.30	RMS%	= 1.85
AAD	=	0.58	BIAS	=	0.12	RMS	= 0.77 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Yakush [97]
Number of Points: 7

AAD%	=	3.17	BIAS%	=	0.32	RMS%	= 3.59
AAD	=	1.42	BIAS	=	0.69	RMS	= 1.70 $mW \cdot m^{-1} \cdot K^{-1}$

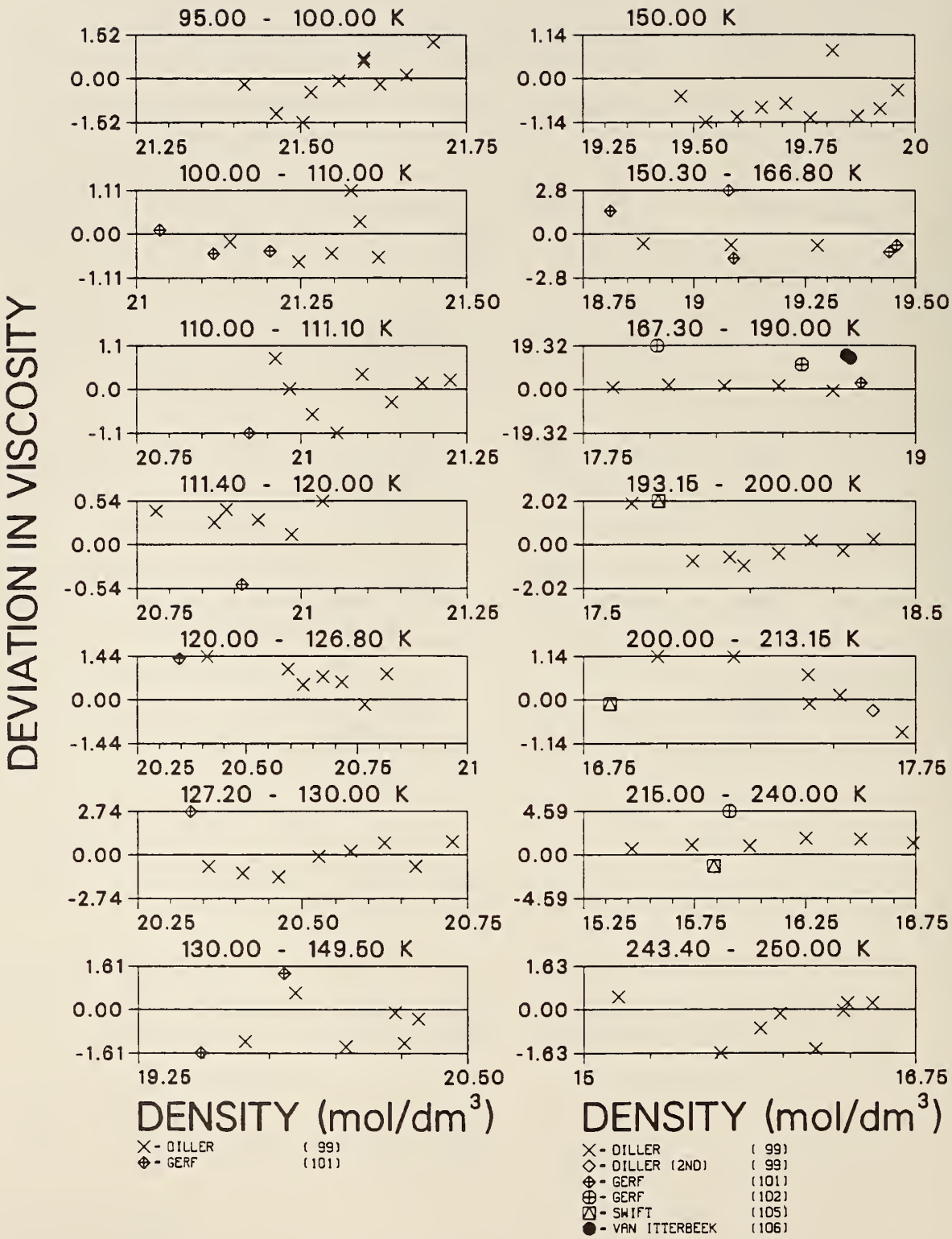

Figure A14. Viscosity at elevated pressures. (Statistical comparisions begin on page 94.)

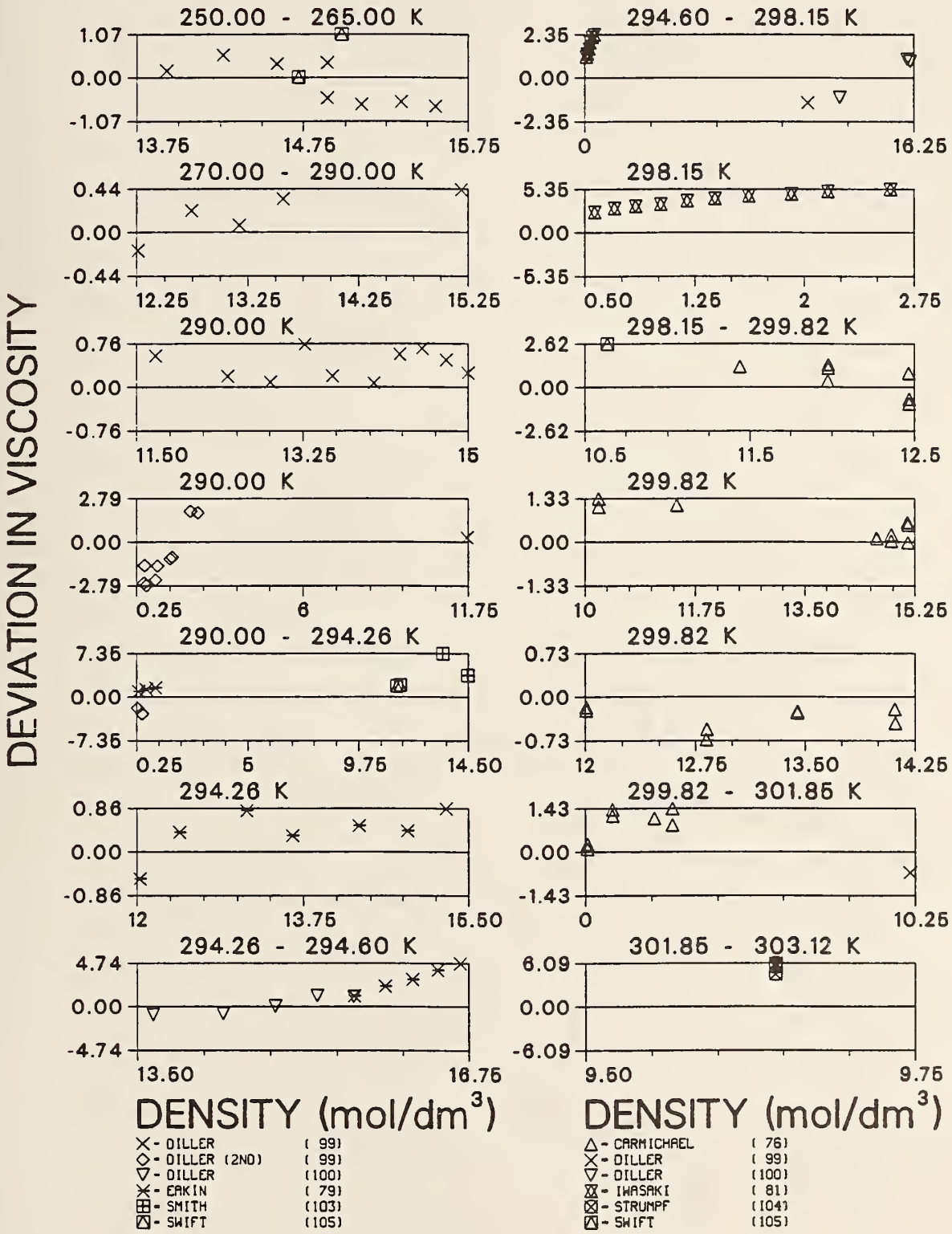

Figure A14. (continued)

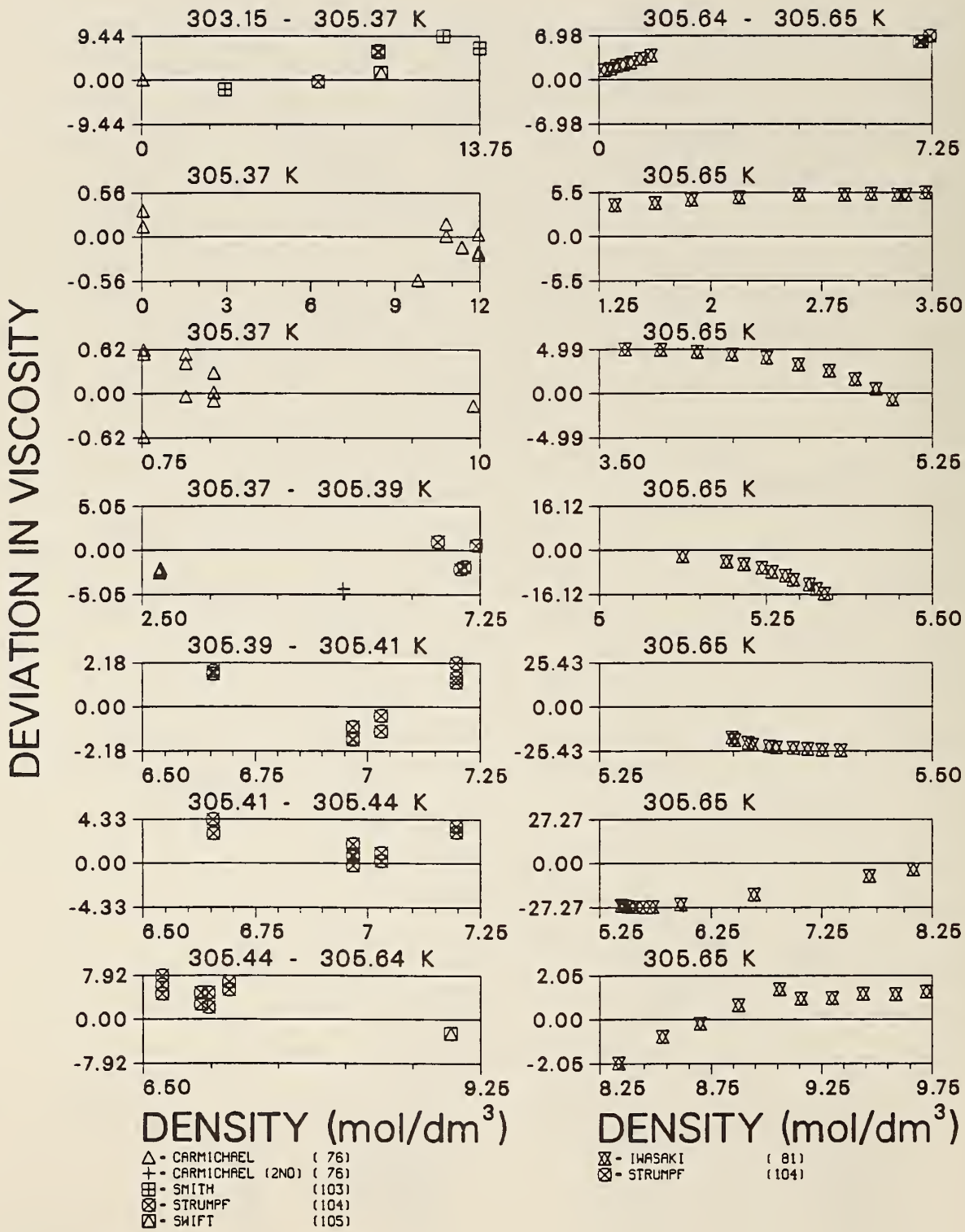

Figure A14. (continued)

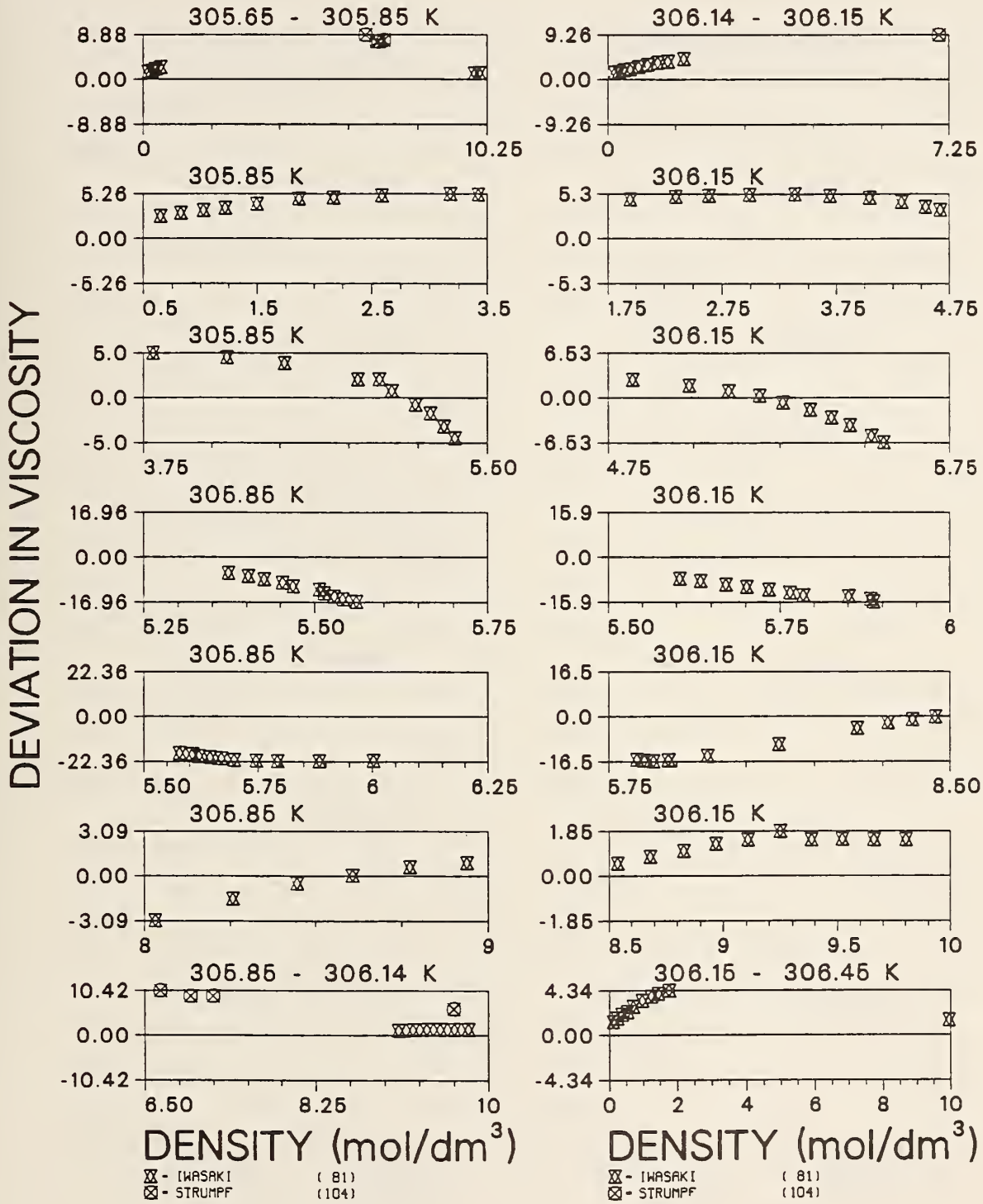

Figure A14. (continued)

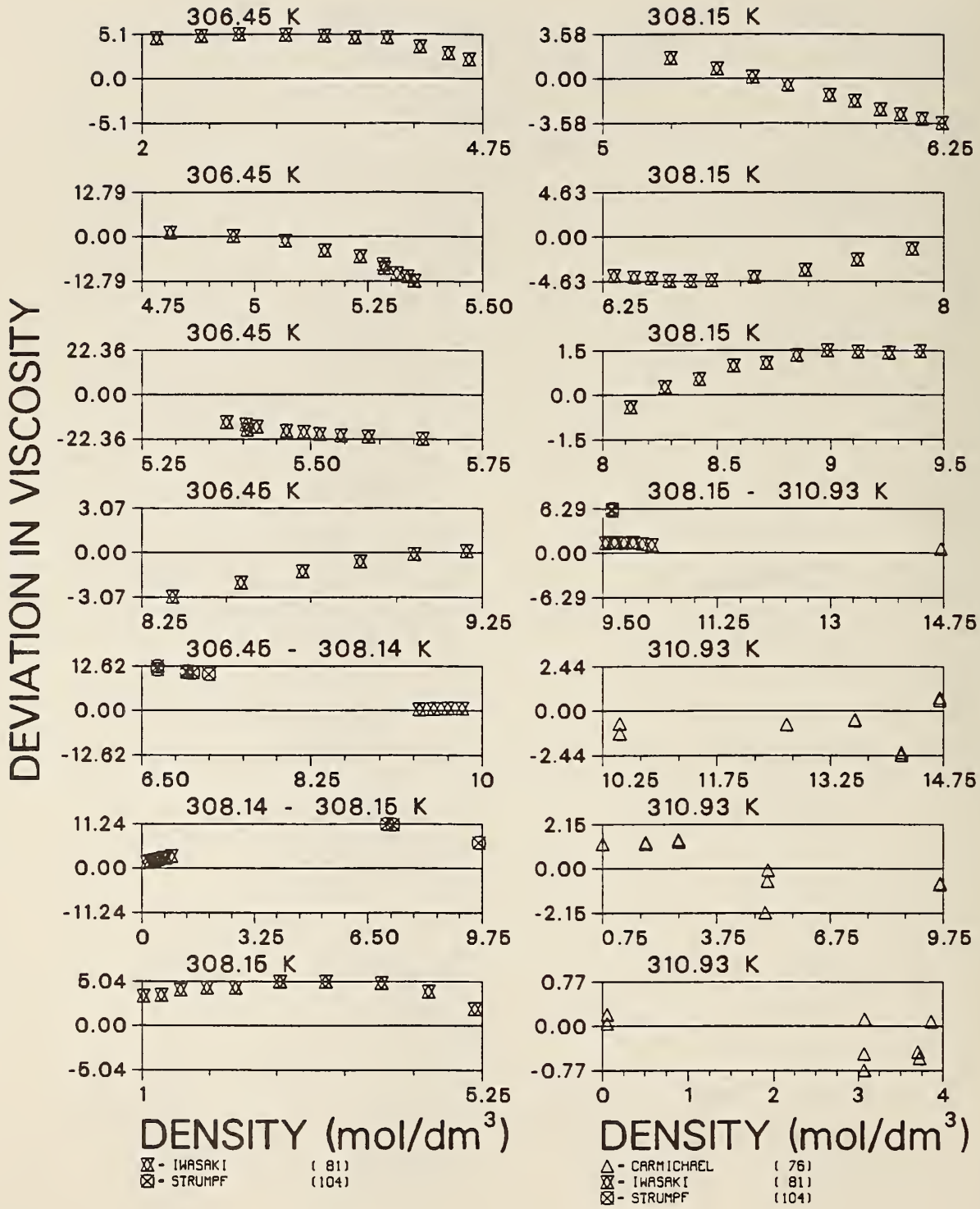

Figure A14. (continued)

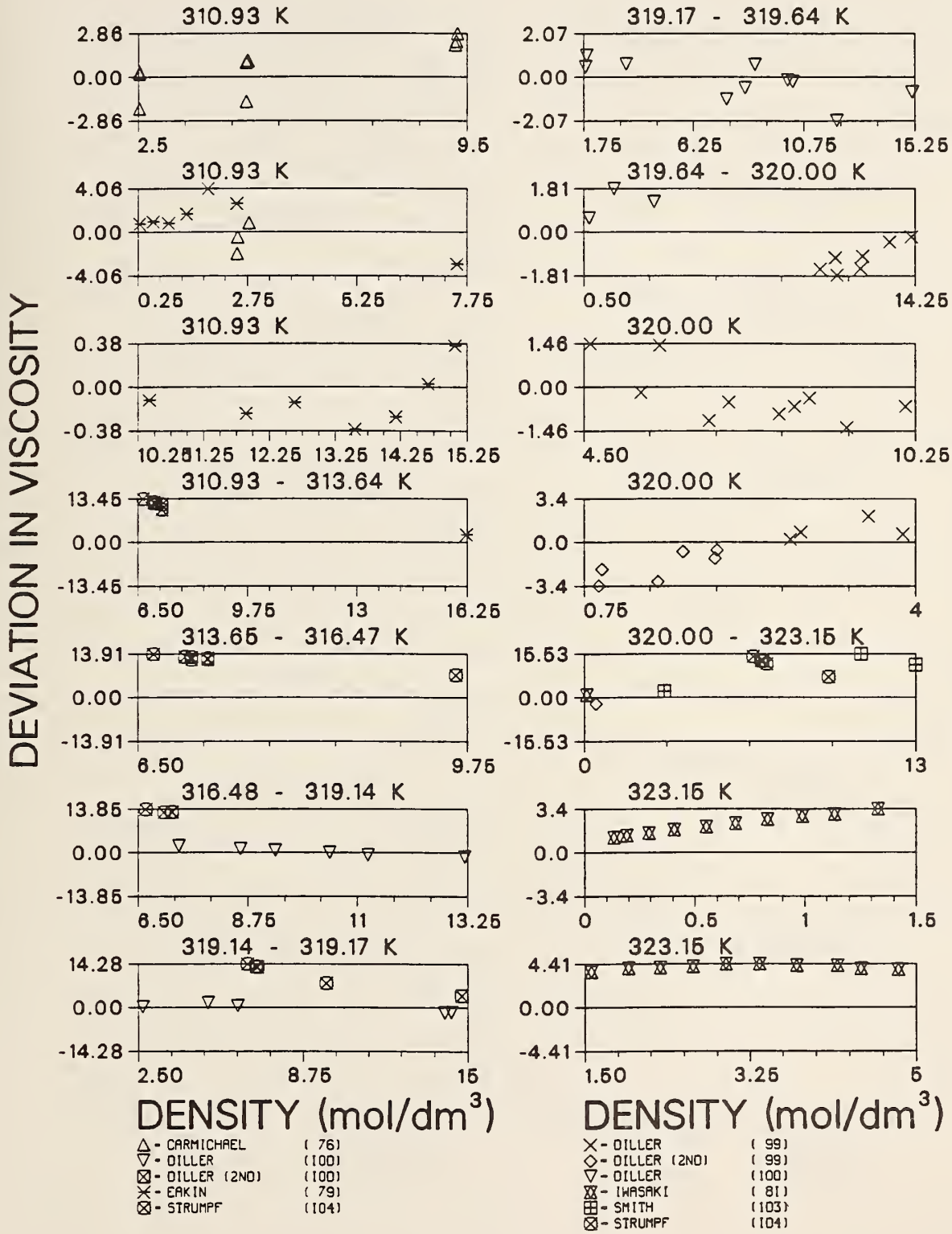

Figure A14. (continued)

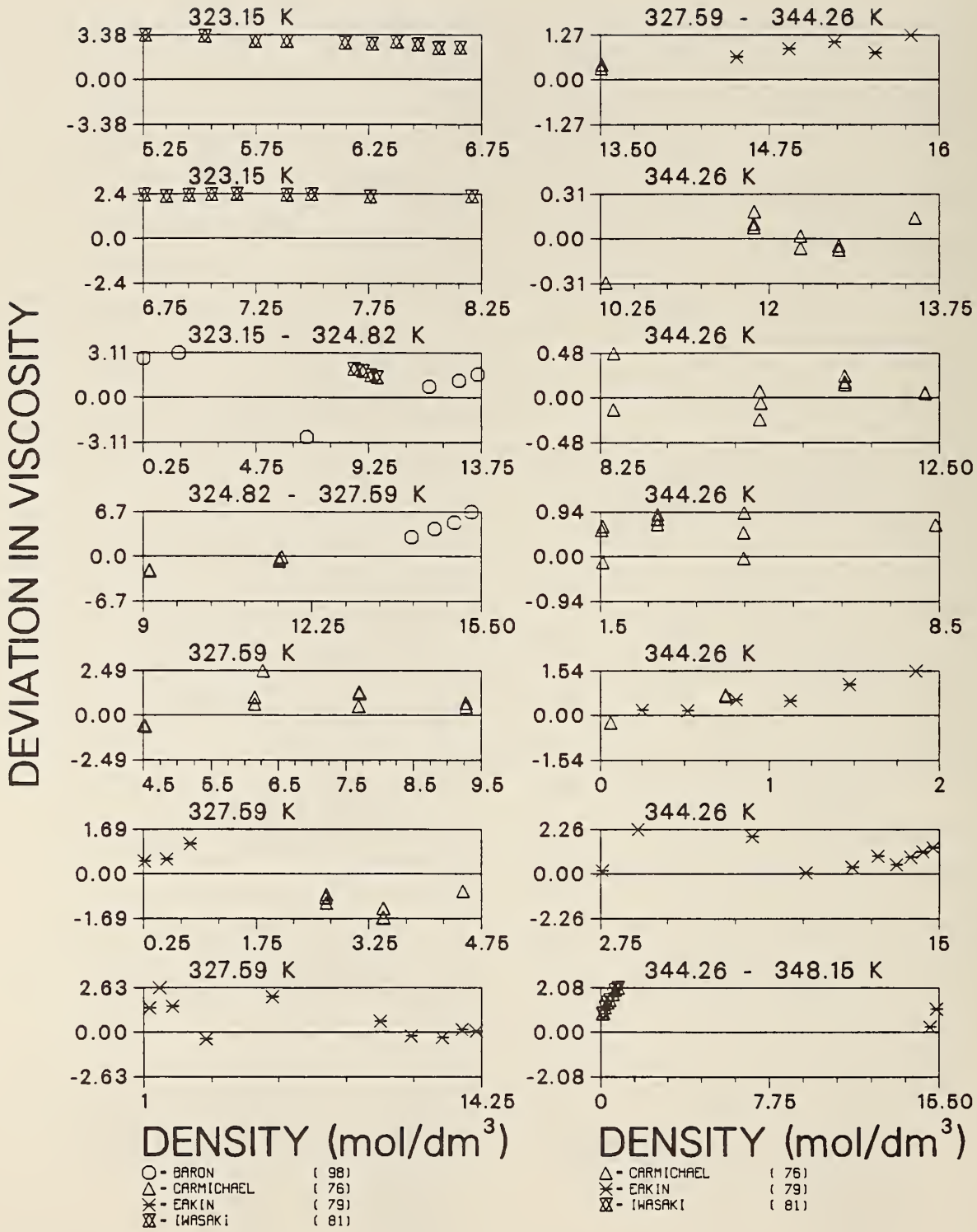

Figure A14. (continued)

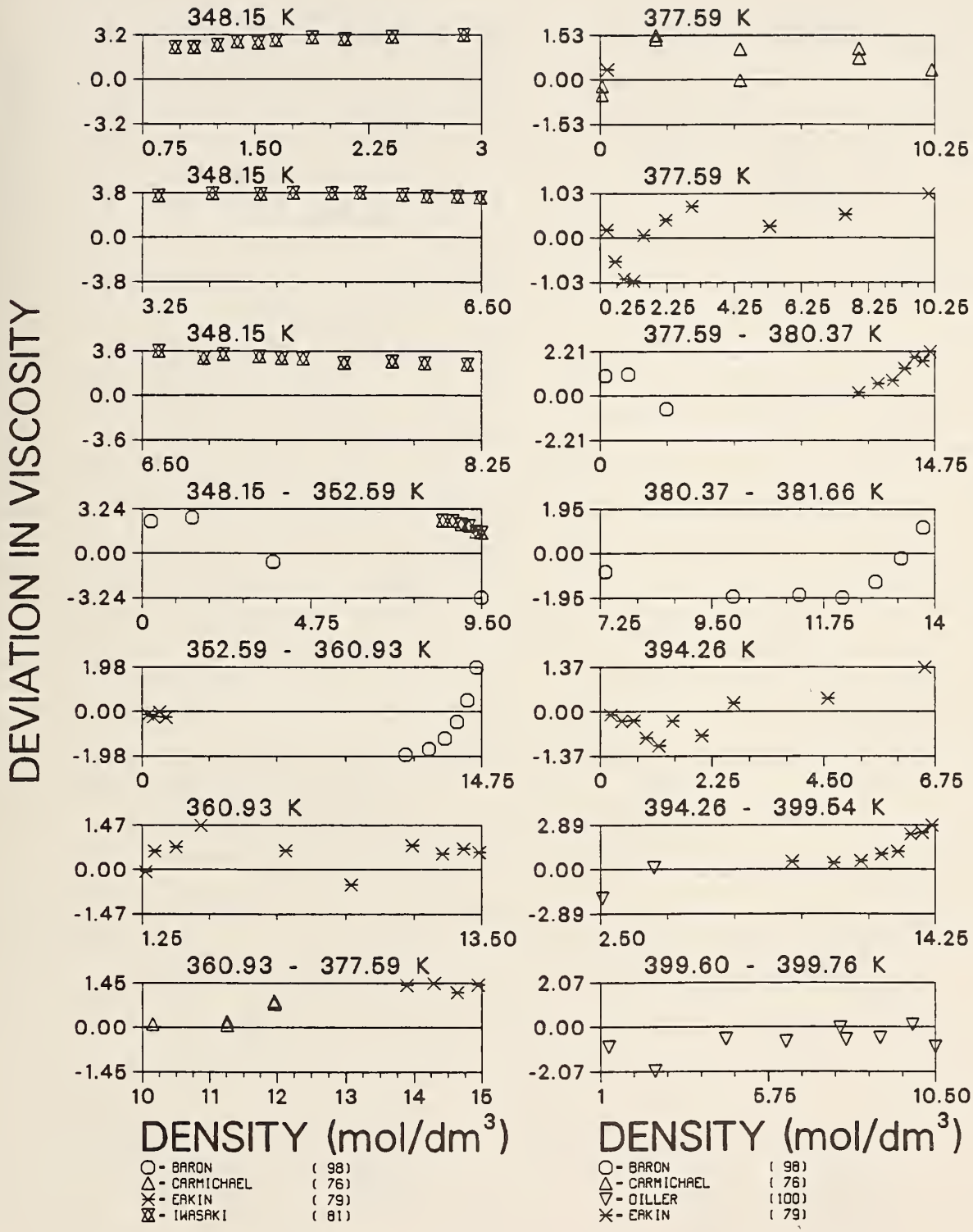

Figure A14. (continued)

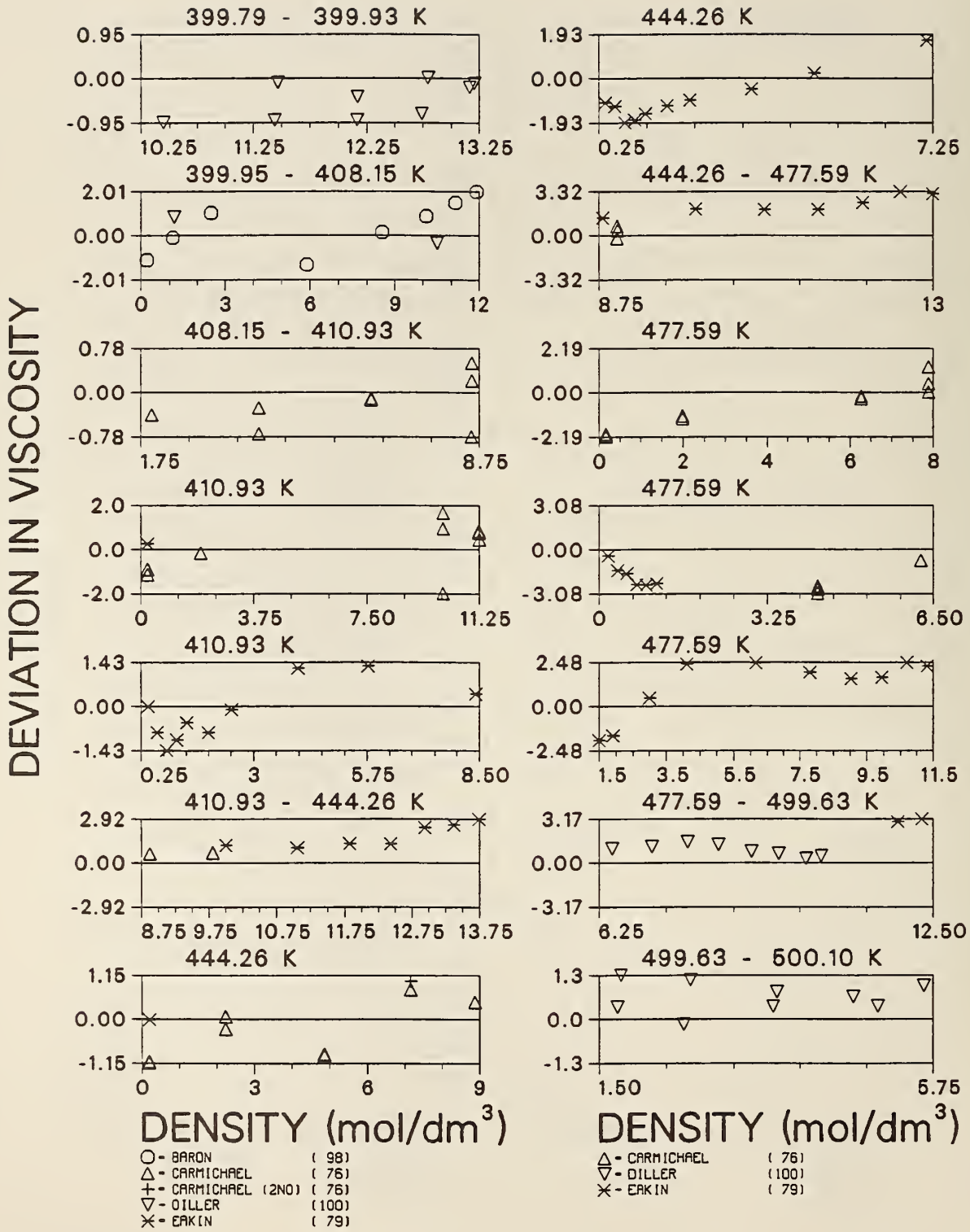

Figure A14. (continued)

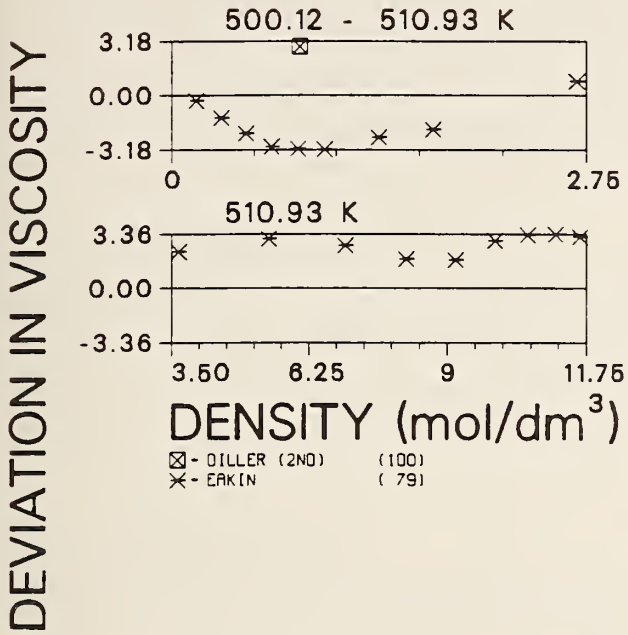

Figure A14. (continued)

Figure A14. Viscosity at elevated pressures.
The comparisons are based on eqs (7), (9), and (13). Primary data were from Carmichael [76] and Diller [99,100].

Statistical comparisons between tabulated values of the viscosity and values calculated from eqs (7), (9), and (13) are given.

Data from Baron [98]
Number of Points: 40
Comparisons based on experimental pressures:

AAD%	=	1.85	BIAS%	=	0.71	RMS%	= 2.19
AAD	=	0.88	BIAS	=	0.44	RMS	= 1.34 μPa•s

Comparisons based on experimental densities:

AAD%	=	1.73	BIAS%	=	0.39	RMS%	= 2.07
AAD	=	0.80	BIAS	=	0.23	RMS	= 1.22 μPa•s

Data from Carmichael [76]
Comparisons based on experimental pressures:
Number of Points: 226

AAD%	=	0.81	BIAS%	=	-0.07	RMS%	= 1.14
AAD	=	0.21	BIAS	=	-0.01	RMS	= 0.31 μPa•s

Weighted Data:
Number of Points: 222

AAD%	=	0.76	BIAS%	=	-0.02	RMS%	= 1.01
AAD	=	0.20	BIAS	=	0.00	RMS	= 0.30 μPa•s

Data from Diller [99]
Number of Points: 164
Comparisons based on experimental pressures:

AAD%	=	0.84	BIAS%	=	-0.17	RMS%	= 1.05
AAD	=	1.84	BIAS	=	0.02	RMS	= 3.40 μPa•s

Comparisons based on experimental densities:

AAD%	=	0.87	BIAS%	=	-0.09	RMS%	= 1.09
AAD	=	1.85	BIAS	=	0.24	RMS	= 3.39 μPa•s

Weighted Data:
Number of Points: 144
Comparisons based on experimental pressures:

AAD%	=	0.69	BIAS%	=	-0.02	RMS%	= 0.84
AAD	=	1.93	BIAS	=	-0.10	RMS	= 3.18 μPa•s

Comparisons based on experimental densities:

AAD%	=	0.73	BIAS%	=	0.06	RMS%	= 0.88
AAD	=	1.94	BIAS	=	0.15	RMS	= 3.20 μPa•s

Data from Diller [100]
Number of Points: 76
Comparisons based on experimental pressures:

AAD%	=	0.96	BIAS%	=	0.11	RMS%	= 1.23
AAD	=	0.34	BIAS	=	0.02	RMS	= 0.53 μPa•s

Comparisons based on experimental densities:

AAD%	=	1.02	BIAS%	=	0.07	RMS%	= 1.30
AAD	=	0.37	BIAS	=	0.00	RMS	= 0.58 μPa•s

Weighted Data:
Number of Points: 72
Comparisons based on experimental pressures:
AAD% = 0.83 BIAS% = 0.03 RMS% = 1.00
AAD = 0.30 BIAS = -0.03 RMS = 0.42 μPa•s
Comparisons based on experimental densities:
AAD% = 0.89 BIAS% = -0.01 RMS% = 1.07
AAD = 0.33 BIAS = -0.04 RMS = 0.46 μPa•s

Data from Eakin [79]
Number of Points: 198
Comparisons based on experimental pressures:
AAD% = 1.33 BIAS% = 0.69 RMS% = 1.61
AAD = 0.53 BIAS = 0.41 RMS = 0.77 μPa•s
Comparisons based on experimental densities:
AAD% = 1.07 BIAS% = 0.41 RMS% = 1.46
AAD = 0.36 BIAS = 0.22 RMS = 0.61 μPa•s

Data from Gerf [101]
Number of Points: 20
Comparisons based on experimental pressures:
AAD% = 2.13 BIAS% = 0.95 RMS% = 2.46
AAD = 10.00 BIAS = 3.29 RMS = 14.03 μPa•s
Comparisons based on experimental densities:
AAD% = 21.17 BIAS% = -18.84 RMS% = 39.44
AAD = 51.25 BIAS = -39.63 RMS = 87.70 μPa•s

Data from Gerf [102]
Number of Points: 11
Comparisons based on experimental pressures:
AAD% = 11.24 BIAS% = 5.34 RMS% = 11.57
AAD = 11.36 BIAS = 7.80 RMS = 11.61 μPa•s
Comparisons based on experimental densities:
AAD% = 11.43 BIAS% = 5.58 RMS% = 11.64
AAD = 11.55 BIAS = 8.03 RMS = 11.69 μPa•s

Data from Iwasaki [81]
Number of Points: 402
Comparisons based on experimental pressures:
AAD% = 5.64 BIAS% = -2.03 RMS% = 8.30
AAD = 1.15 BIAS = -0.60 RMS = 1.84 μPa•s
Comparisons based on experimental densities:
AAD% = 2.42 BIAS% = 2.12 RMS% = 1.89
AAD = 0.40 BIAS = 0.33 RMS = 0.30 μPa•s

Data from Smith [103]
Number of Points: 15
Comparisons based on experimental pressures:
AAD% = 11.40 BIAS% = 11.13 RMS% = 6.39
AAD = 3.74 BIAS = 3.70 RMS = 2.00 μPa•s
Comparisons based on experimental densities:
AAD% = 11.46 BIAS% = 11.23 RMS% = 6.43
AAD = 3.75 BIAS = 3.72 RMS = 2.01 μPa•s

Data from Strumpf [104]
Number of Points: 105
Comparisons based on experimental densities:

AAD%	= 7.35	BIAS%	= 7.15	RMS%	= 4.65	
AAD	= 1.63	BIAS	= 1.59	RMS	= 0.94	μPa•s

Data from Swift [105]
Number of Points: 14
Comparisons based on experimental pressures:

AAD%	= 1.82	BIAS%	= 1.27	RMS%	= 1.67	
AAD	= 1.46	BIAS	= 1.17	RMS	= 1.83	μPa•s

Comparisons based on experimental densities:

AAD%	= 6.62	BIAS%	= -3.31	RMS%	= 18.21	
AAD	= 3.04	BIAS	= -0.06	RMS	= 6.11	μPa•s

Data from Van Itterbeek [106]
Number of Points: 8
Comparisons based on experimental pressures:

AAD%	= 11.52	BIAS%	= 11.52	RMS%	= 3.32	
AAD	= 28.76	BIAS	= 28.76	RMS	= 5.02	μPa•s

Comparisons based on experimental densities:

AAD%	= 10.25	BIAS%	= 10.25	RMS%	= 4.57	
AAD	= 26.05	BIAS	= 26.05	RMS	= 9.47	μPa•s

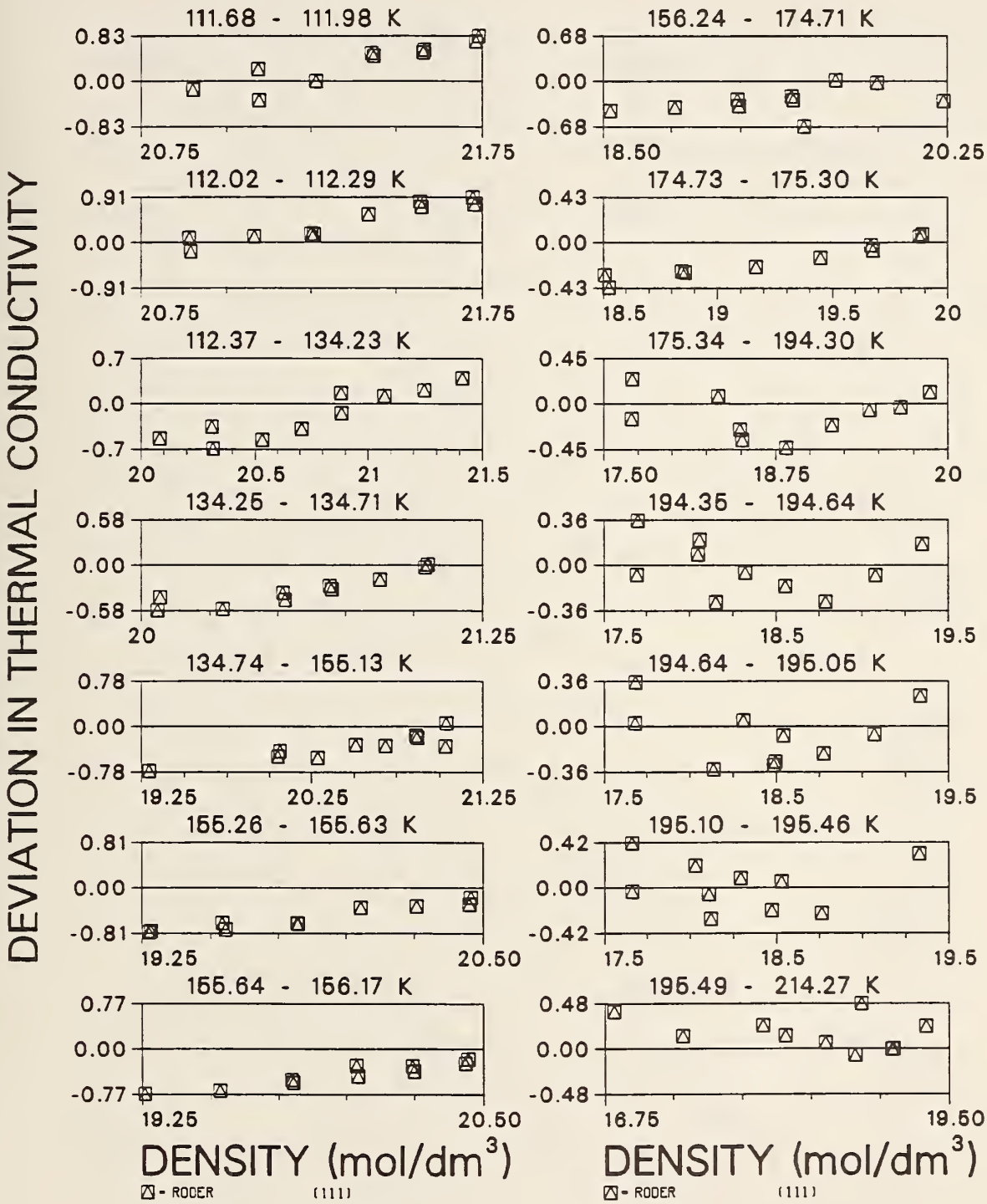

Figure A15. Thermal conductivity at elevated pressures. (Statistical comparisions begin on page 109.)

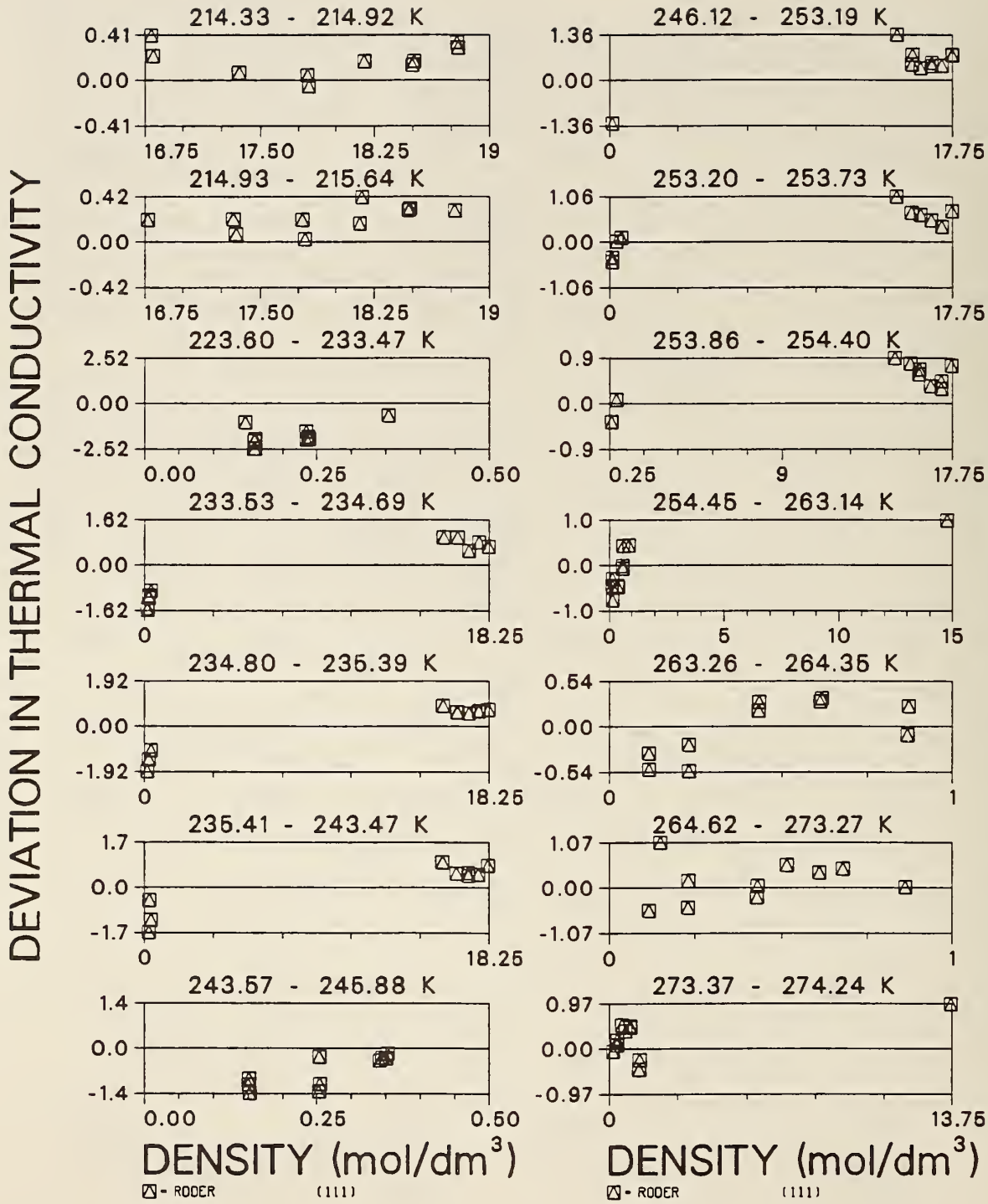

Figure A15. (continued)

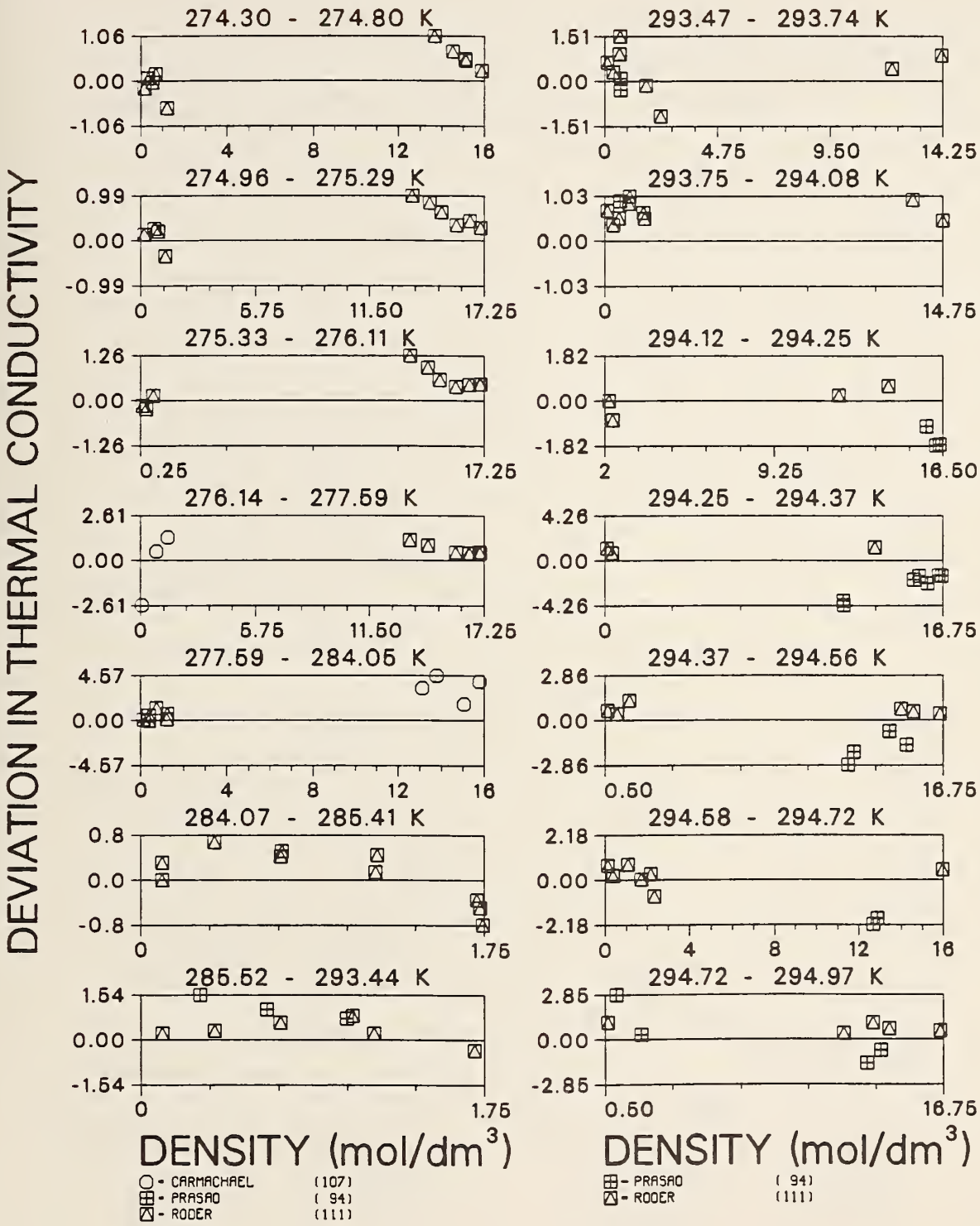

Figure A15. (continued)

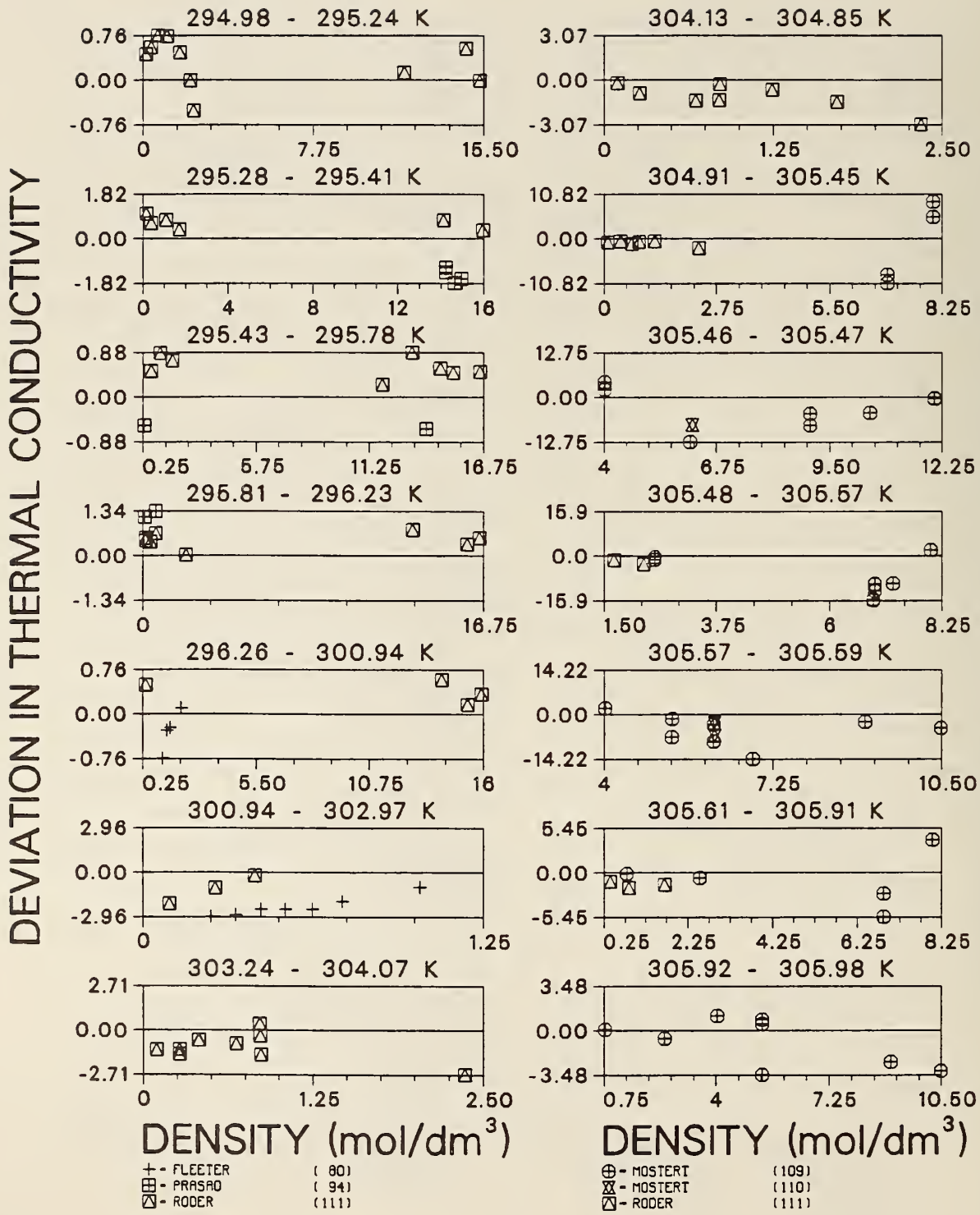

Figure A15. (continued)

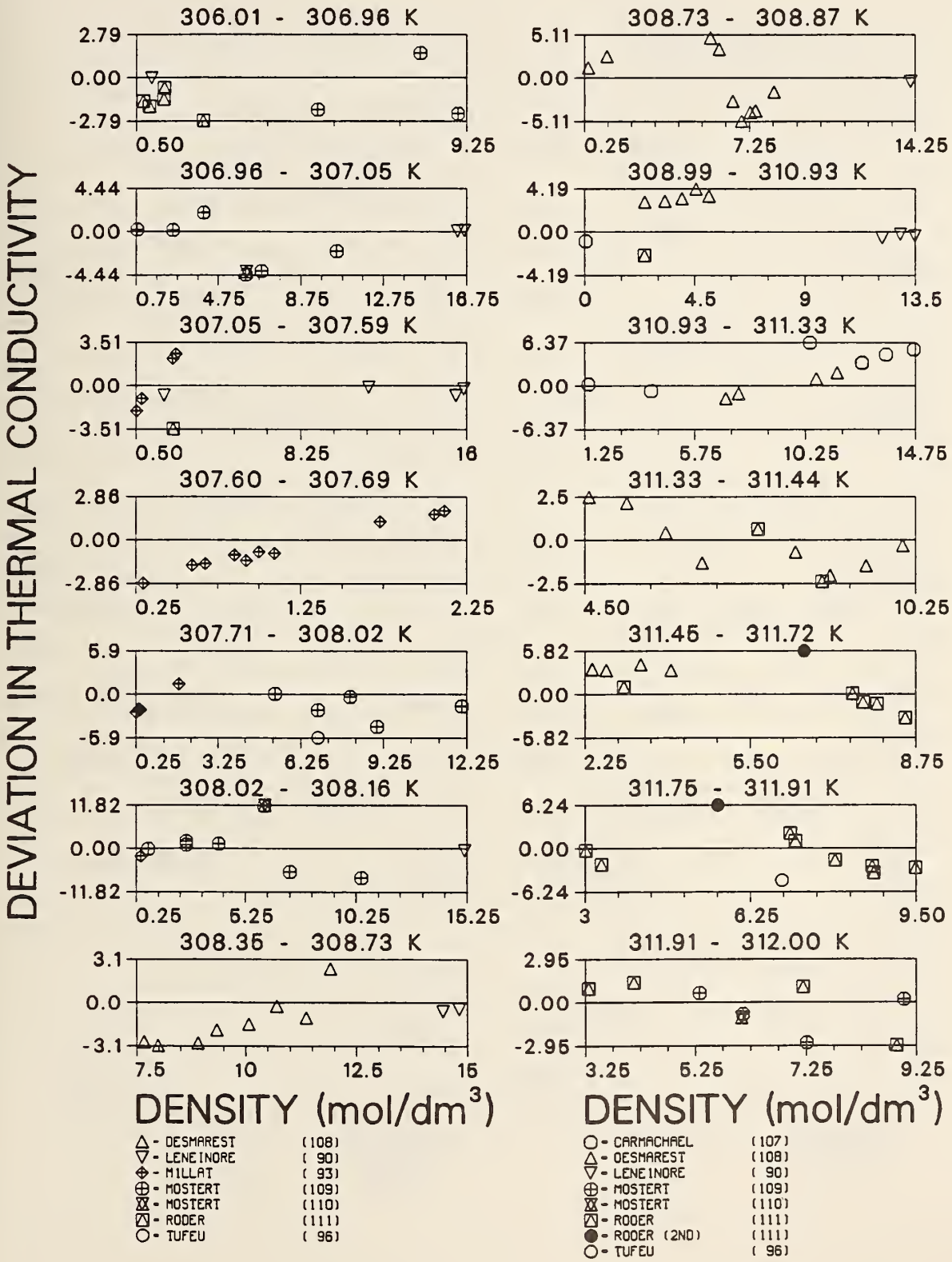

Figure A15. (continued)

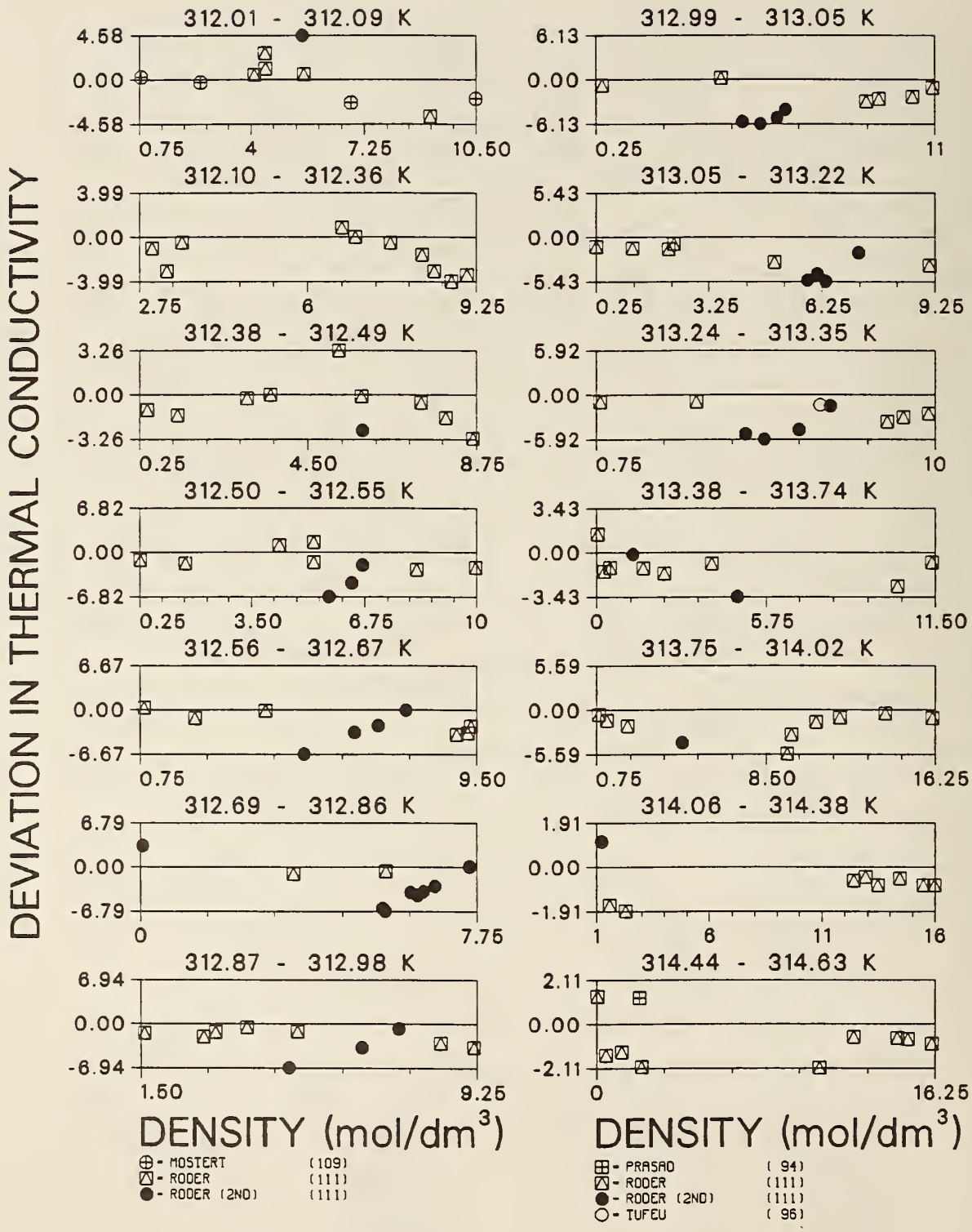

Figure A15. (continued)

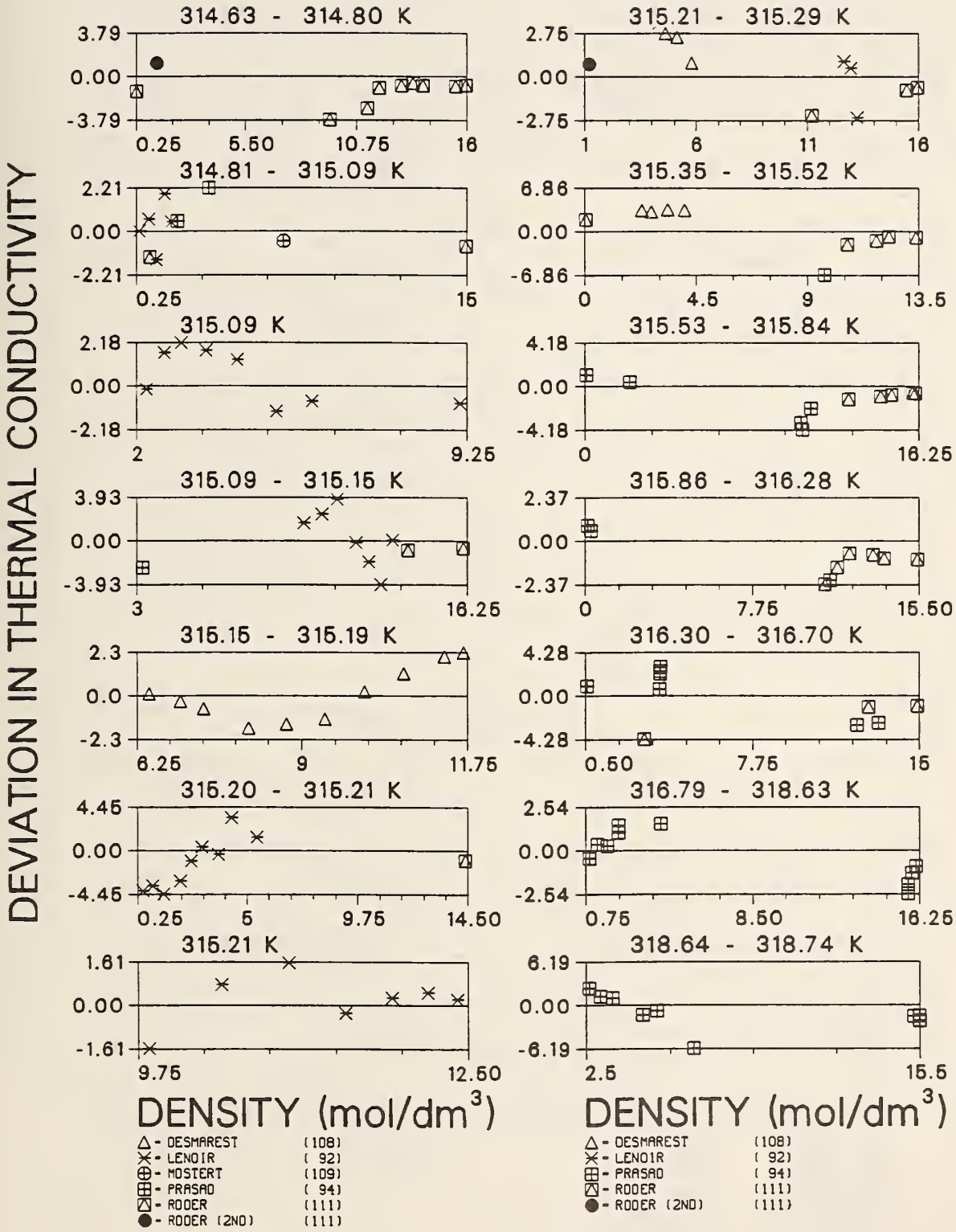

Figure A15. (continued)

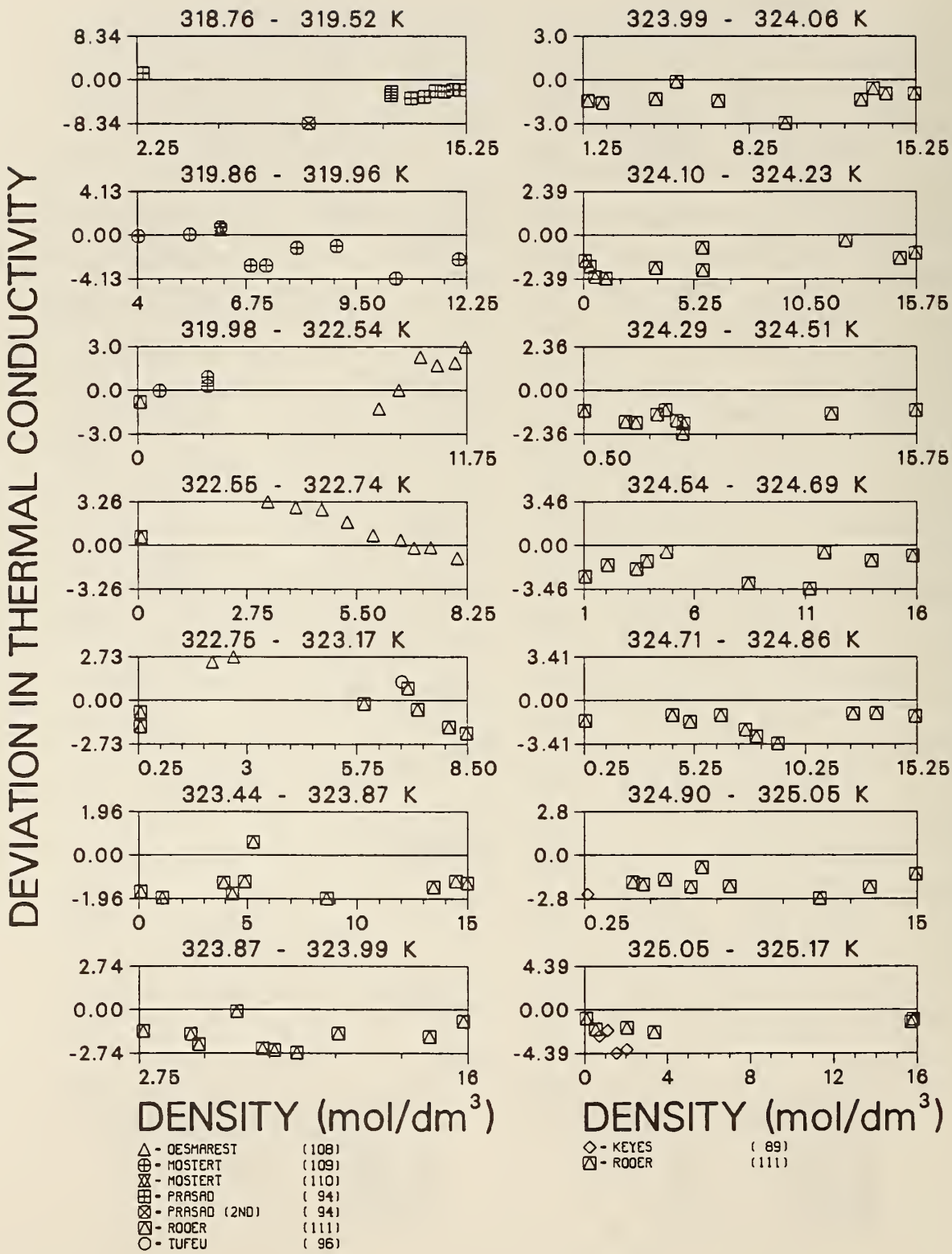

Figure A15. (continued)

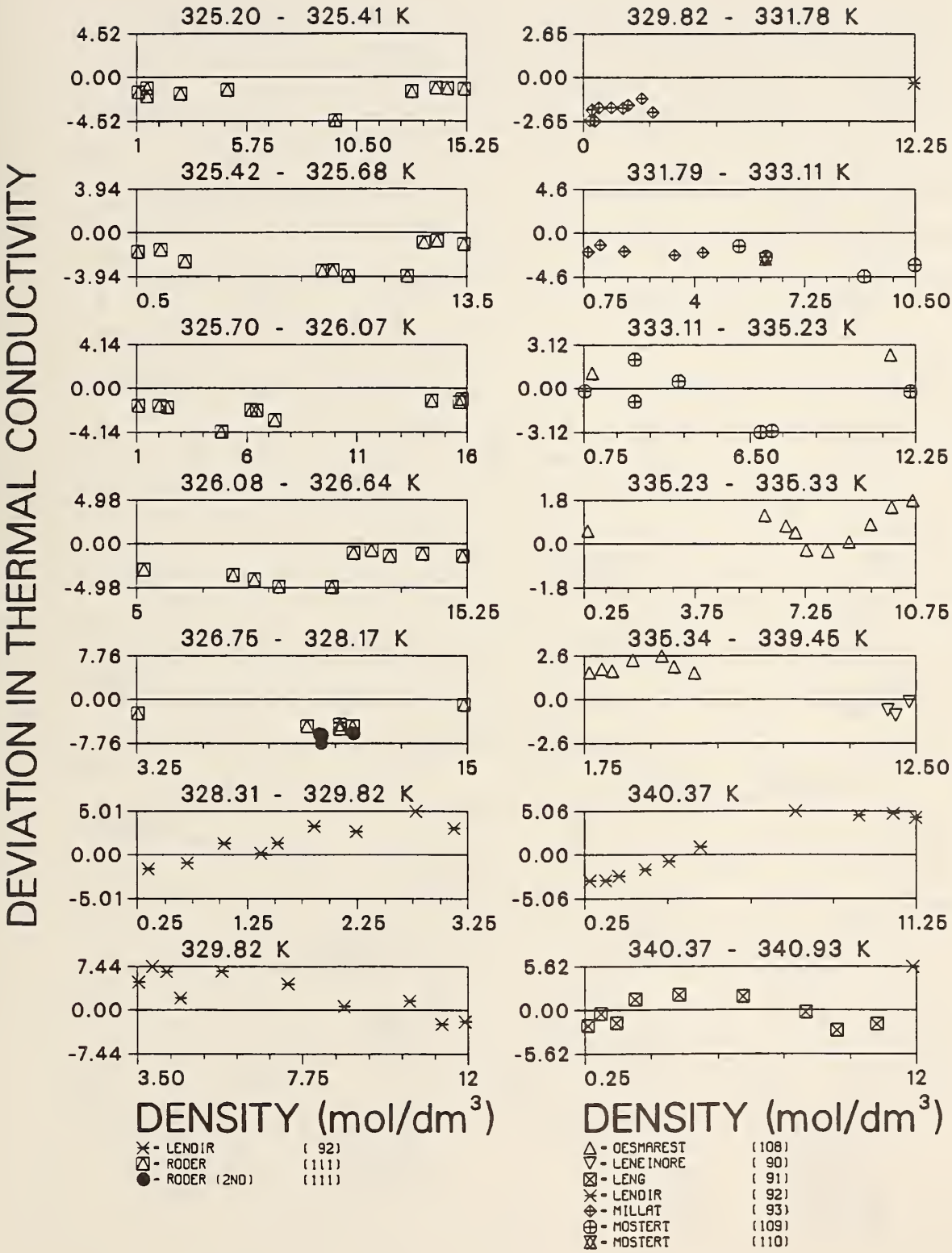

Figure A15. (continued)

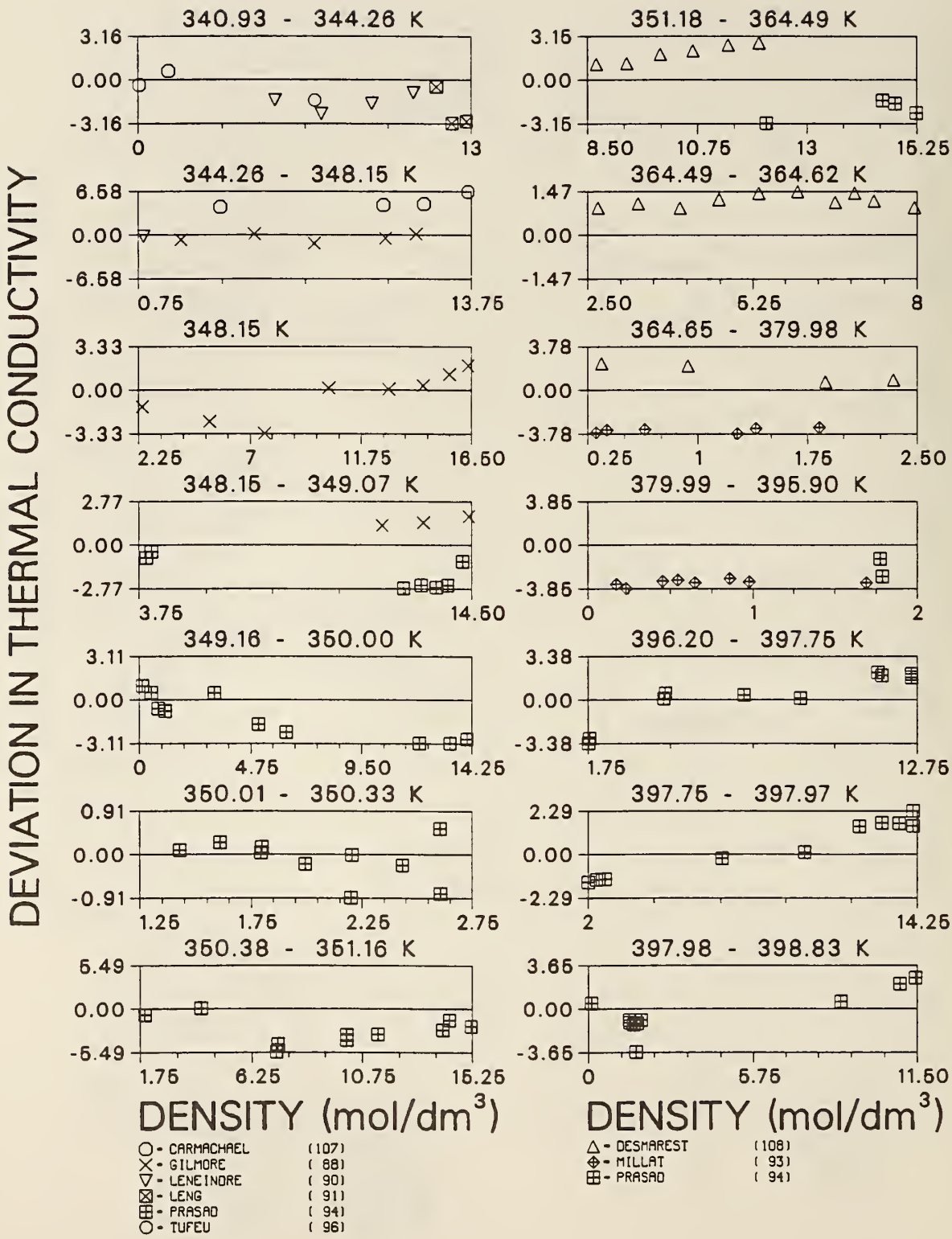

Figure A15. (continued)

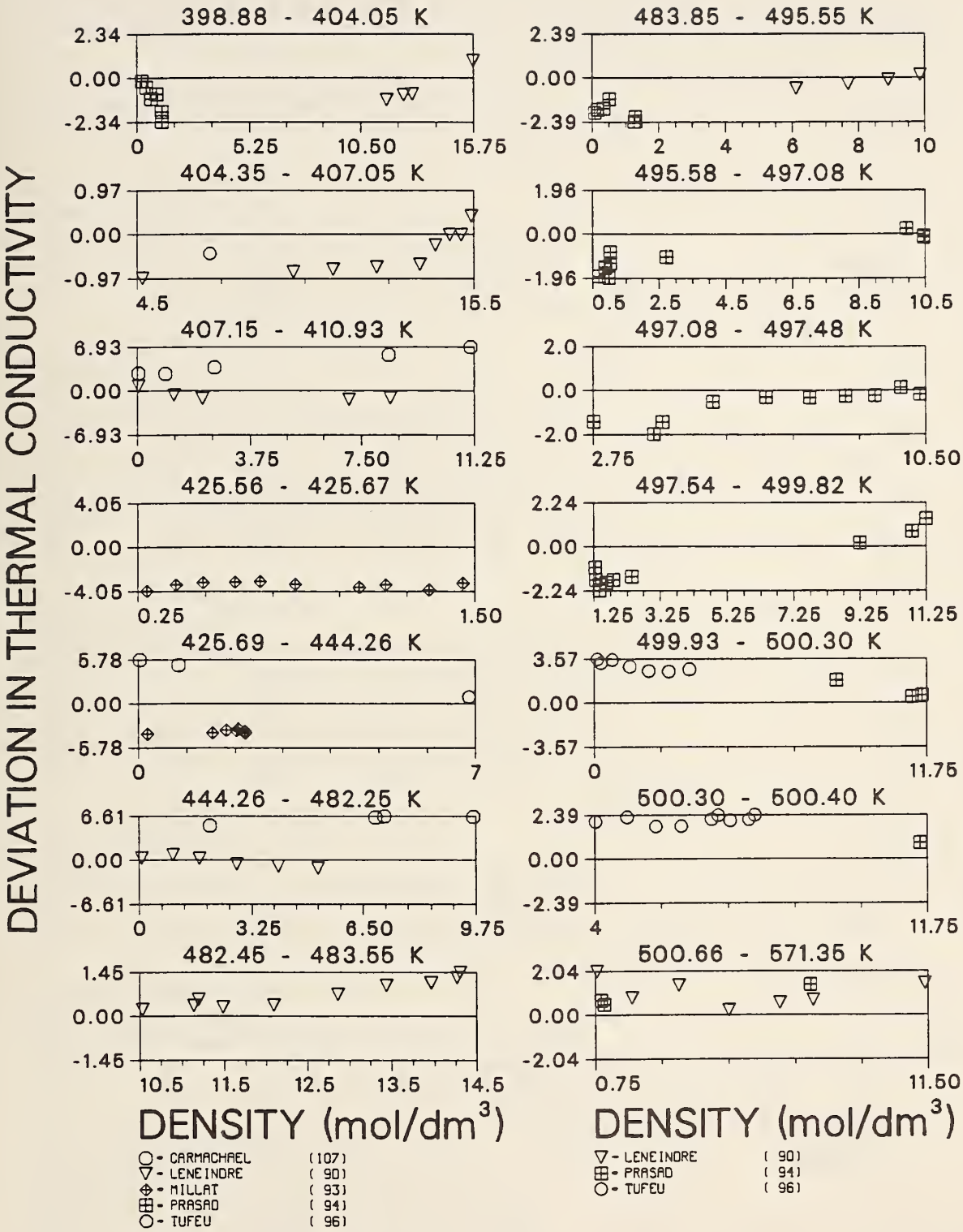

Figure A15. (continued)

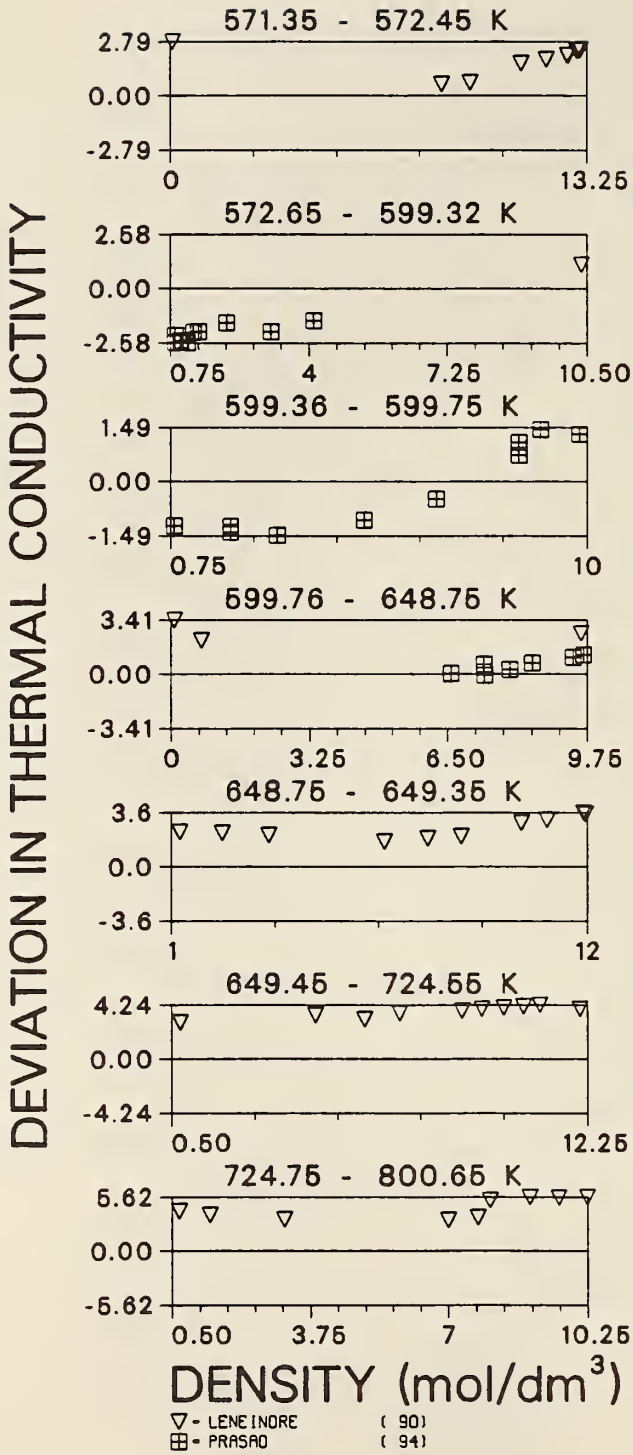

Figure A15. (continued)

Figure A15. Thermal conductivity at elevated pressures.
The comparisons are based on eqs (8), (11), (12), (14) and (15). Primary data were from Desmarest [108], Prasad [94], and Roder [111].

Statistical comparisons between tabulated values of the thermal conductivity and values calculated from eqs (8), (11), (12), (14) and (15) are given.

Data from Carmichael [107]
Number of Points: 31
Comparisons based on experimental pressures:

AAD%	= 3.81	BIAS%	= 3.51	RMS%	= 2.59	
AAD	= 2.59	BIAS	= 2.52	RMS	= 1.99	$mW \cdot m^{-1} \cdot K^{-1}$

Data from Desmarest [108]
Weighted Data:
Number of Points: 111
Comparisons based on experimental pressures:

AAD%	= 1.85	BIAS%	= 0.98	RMS%	= 1.93	
AAD	= 1.03	BIAS	= 0.39	RMS	= 1.22	$mW \cdot m^{-1} \cdot K^{-1}$

Comparisons based on experimental densities:

AAD%	= 1.88	BIAS%	= 1.08	RMS%	= 2.04	
AAD	= 1.05	BIAS	= 0.46	RMS	= 1.28	$mW \cdot m^{-1} \cdot K^{-1}$

Data from Fleeter [80]
Number of Points: 12
Comparisons based on experimental pressures:

AAD%	= 1.60	BIAS%	= -1.59	RMS%	= 1.05	
AAD	= 0.37	BIAS	= -0.37	RMS	= 0.24	$mW \cdot m^{-1} \cdot K^{-1}$

Comparisons based on experimental densities:

AAD%	= 1.68	BIAS%	= -1.68	RMS%	= 0.95	
AAD	= 0.40	BIAS	= -0.40	RMS	= 0.21	$mW \cdot m^{-1} \cdot K^{-1}$

Data from Gilmore [88]
Number of Points: 18
Comparisons based on experimental pressures:

AAD%	= 1.80	BIAS%	= 0.76	RMS%	= 2.74	
AAD	= 2.55	BIAS	= 2.00	RMS	= 5.29	$mW \cdot m^{-1} \cdot K^{-1}$

Data from Keyes [89]
Number of Points: 5
Comparisons based on experimental pressures:

AAD%	= 3.12	BIAS%	= -3.12	RMS%	= 0.89	
AAD	= 0.91	BIAS	= -0.91	RMS	= 0.32	$mW \cdot m^{-1} \cdot K^{-1}$

Data from Le Neindre [90]
Number of Points: 113
Comparisons based on experimental pressures:

AAD%	= 1.63	BIAS%	= 1.07	RMS%	= 1.88	
AAD	= 1.74	BIAS	= 1.34	RMS	= 2.17	$mW \cdot m^{-1} \cdot K^{-1}$

Comparisons based on experimental densities:

AAD%	= 1.82	BIAS%	= 0.09	RMS%	= 3.25	
AAD	= 1.89	BIAS	= 0.22	RMS	= 3.02	$mW \cdot m^{-1} \cdot K^{-1}$

Data from Leng [91]
Number of Points: 12
Comparisons based on experimental pressures:
AAD% = 1.71 BIAS% = -0.87 RMS% = 1.73
AAD = 1.05 BIAS = -0.70 RMS = 1.20 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Lenoir [92]
Number of Points: 75
Comparisons based on experimental pressures:
AAD% = 2.53 BIAS% = 0.26 RMS% = 3.36
AAD = 1.36 BIAS = 0.05 RMS = 2.01 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Millat [93]
These data were not available during the development of the correlations.
Number of Points: 64
Comparisons based on experimental pressures:
AAD% = 2.62 BIAS% = -2.28 RMS% = 1.60
AAD = 0.95 BIAS = -0.85 RMS = 0.65 $mW \cdot m^{-1} \cdot K^{-1}$
Comparisons based on experimental densities:
AAD% = 2.61 BIAS% = -2.24 RMS% = 1.62
AAD = 0.94 BIAS = -0.84 RMS = 0.65 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Mostert [109]
These data were not available during the development of the correlations.
Number of Points: 102
Comparisons based on experimental densities:
AAD% = 3.81 BIAS% = -2.69 RMS% = 4.89
AAD = 4.69 BIAS = -3.95 RMS = 8.15 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Mostert [110]
These data were not available during the development of the correlations.
Number of Points: 9
Comparisons based on experimental pressures:
AAD% = 5.09 BIAS% = -2.36 RMS% = 5.77
AAD = 5.64 BIAS = -3.72 RMS = 6.09 $mW \cdot m^{-1} \cdot K^{-1}$
Comparisons based on experimental densities:
AAD% = 6.55 BIAS% = -3.92 RMS% = 7.00
AAD = 7.79 BIAS = -5.94 RMS = 8.64 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Prasad [94]
Number of Points: 239
Comparisons based on experimental pressures:
AAD% = 1.67 BIAS% = -0.76 RMS% = 2.01
AAD = 1.22 BIAS = -0.74 RMS = 1.43 $mW \cdot m^{-1} \cdot K^{-1}$
Comparisons based on experimental densities:
AAD% = 1.89 BIAS% = -0.58 RMS% = 2.55
AAD = 1.30 BIAS = -0.67 RMS = 1.61 $mW \cdot m^{-1} \cdot K^{-1}$

Weighted Data:
Number of Points: 235
Comparisons based on experimental pressures:
AAD% = 1.58 BIAS% = -0.83 RMS% = 1.75
AAD = 1.19 BIAS = -0.75 RMS = 1.37 $mW \cdot m^{-1} \cdot K^{-1}$
Comparisons based on experimental densities:
AAD% = 1.78 BIAS% = -0.65 RMS% = 2.32
AAD = 1.26 BIAS = -0.68 RMS = 1.54 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Roder [111]
Number of Points: 797
Comparisons based on experimental pressures:

AAD%	=	1.19	BIAS%	=	-0.76	RMS%	= 1.60
AAD	=	0.81	BIAS	=	-0.44	RMS	= 1.13 $mW \cdot m^{-1} \cdot K^{-1}$

Comparisons based on experimental densities:

AAD%	=	1.19	BIAS%	=	-0.69	RMS%	= 1.59
AAD	=	0.84	BIAS	=	-0.40	RMS	= 1.17 $mW \cdot m^{-1} \cdot K^{-1}$

Weighted Data:
Number of Points: 752
Comparisons based on experimental pressures:

AAD%	=	1.01	BIAS%	=	-0.61	RMS%	= 1.25
AAD	=	0.70	BIAS	=	-0.33	RMS	= 0.92 $mW \cdot m^{-1} \cdot K^{-1}$

Comparisons based on experimental densities:

AAD%	=	1.03	BIAS%	=	-0.56	RMS%	= 1.28
AAD	=	0.74	BIAS	=	-0.30	RMS	= 0.99 $mW \cdot m^{-1} \cdot K^{-1}$

Data from Tufeu [96]
Number of Points: 24
Comparisons based on experimental densities:

AAD%	=	2.58	BIAS%	=	0.92	RMS%	= 2.78
AAD	=	1.80	BIAS	=	0.39	RMS	= 2.21 $mW \cdot m^{-1} \cdot K^{-1}$

Appendix B: Tables for the thermophysical properties of ethane

Table B1. Properties of ideal gas at 0.1 MPa and dilute gas transport properties

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
90.352	-14.007	3.042	180.39	35.182	3.04	2.91
91.	-14.130	3.065	180.64	35.216	3.06	2.94
92.	-14.319	3.101	181.03	35.269	3.09	3.00
93.	-14.508	3.136	181.41	35.322	3.12	3.06
94.	-14.698	3.171	181.79	35.375	3.15	3.11
95.	-14.889	3.207	182.16	35.428	3.17	3.17
96.	-15.079	3.242	182.53	35.482	3.20	3.23
97.	-15.270	3.278	182.90	35.535	3.23	3.28
98.	-15.462	3.313	183.27	35.589	3.26	3.34
99.	-15.654	3.349	183.63	35.643	3.29	3.40
100.	-15.846	3.384	183.99	35.698	3.32	3.46
101.	-16.038	3.420	184.34	35.752	3.34	3.51
102.	-16.231	3.456	184.69	35.807	3.37	3.57
103.	-16.424	3.492	185.04	35.861	3.40	3.63
104.	-16.618	3.528	185.39	35.916	3.43	3.69
105.	-16.812	3.564	185.73	35.971	3.46	3.75
106.	-17.006	3.600	186.08	36.027	3.49	3.81
107.	-17.200	3.636	186.41	36.082	3.52	3.86
108.	-17.395	3.672	186.75	36.137	3.55	3.92
109.	-17.590	3.708	187.08	36.193	3.57	3.98
110.	-17.786	3.744	187.41	36.249	3.60	4.04
111.	-17.982	3.780	187.74	36.305	3.63	4.10
112.	-18.178	3.817	188.07	36.361	3.66	4.16
113.	-18.375	3.853	188.39	36.418	3.69	4.22
114.	-18.572	3.890	188.71	36.474	3.72	4.28
115.	-18.769	3.926	189.03	36.531	3.75	4.34
116.	-18.966	3.963	189.35	36.588	3.78	4.41
117.	-19.164	3.999	189.66	36.645	3.81	4.47
118.	-19.362	4.036	189.97	36.702	3.84	4.53
119.	-19.561	4.073	190.28	36.759	3.87	4.59
120.	-19.759	4.109	190.59	36.817	3.90	4.65
121.	-19.958	4.146	190.90	36.874	3.93	4.71
122.	-20.158	4.183	191.20	36.932	3.96	4.78
123.	-20.357	4.220	191.50	36.990	3.99	4.84
124.	-20.557	4.257	191.80	37.048	4.01	4.90
125.	-20.758	4.294	192.10	37.107	4.04	4.96
126.	-20.958	4.331	192.40	37.165	4.07	5.03
127.	-21.159	4.369	192.69	37.224	4.10	5.09
128.	-21.360	4.406	192.98	37.283	4.13	5.15
129.	-21.562	4.443	193.27	37.342	4.16	5.22

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
130.	-21.763	4.480	193.56	37.401	4.19	5.28
131.	-21.965	4.518	193.85	37.460	4.22	5.35
132.	-22.168	4.555	194.13	37.520	4.25	5.41
133.	-22.370	4.593	194.42	37.579	4.28	5.48
134.	-22.573	4.631	194.70	37.639	4.31	5.54
135.	-22.776	4.668	194.98	37.699	4.34	5.61
136.	-22.980	4.706	195.26	37.760	4.37	5.67
137.	-23.184	4.744	195.53	37.820	4.41	5.74
138.	-23.388	4.782	195.81	37.881	4.44	5.81
139.	-23.592	4.820	196.08	37.942	4.47	5.87
140.	-23.796	4.857	196.36	38.003	4.50	5.94
141.	-24.001	4.896	196.63	38.065	4.53	6.01
142.	-24.206	4.934	196.90	38.126	4.56	6.07
143.	-24.412	4.972	197.16	38.188	4.59	6.14
144.	-24.617	5.010	197.43	38.250	4.62	6.21
145.	-24.823	5.048	197.69	38.312	4.65	6.28
146.	-25.029	5.087	197.96	38.375	4.68	6.35
147.	-25.236	5.125	198.22	38.438	4.71	6.42
148.	-25.442	5.163	198.48	38.501	4.74	6.48
149.	-25.649	5.202	198.74	38.564	4.77	6.55
150.	-25.856	5.241	199.00	38.628	4.80	6.62
151.	-26.064	5.279	199.26	38.692	4.83	6.69
152.	-26.271	5.318	199.51	38.756	4.86	6.76
153.	-26.479	5.357	199.77	38.820	4.89	6.83
154.	-26.688	5.396	200.02	38.885	4.92	6.90
155.	-26.896	5.435	200.27	38.950	4.96	6.98
156.	-27.105	5.474	200.52	39.015	4.99	7.05
157.	-27.314	5.513	200.77	39.080	5.02	7.12
158.	-27.523	5.552	201.02	39.146	5.05	7.19
159.	-27.732	5.591	201.27	39.212	5.08	7.26
160.	-27.942	5.630	201.51	39.279	5.11	7.33
161.	-28.152	5.669	201.76	39.345	5.14	7.41
162.	-28.362	5.709	202.00	39.413	5.17	7.48
163.	-28.573	5.748	202.24	39.480	5.20	7.55
164.	-28.783	5.788	202.49	39.548	5.23	7.63
165.	-28.994	5.827	202.73	39.616	5.26	7.70
166.	-29.205	5.867	202.97	39.684	5.30	7.78
167.	-29.417	5.907	203.20	39.753	5.33	7.85
168.	-29.629	5.947	203.44	39.822	5.36	7.92
169.	-29.840	5.986	203.68	39.891	5.39	8.00

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
170.	-30.053	6.026	203.91	39.961	5.42	8.08
171.	-30.265	6.066	204.15	40.031	5.45	8.15
172.	-30.477	6.106	204.38	40.102	5.48	8.23
173.	-30.690	6.146	204.61	40.173	5.51	8.30
174.	-30.903	6.187	204.85	40.244	5.54	8.38
175.	-31.117	6.227	205.08	40.316	5.57	8.46
176.	-31.330	6.267	205.31	40.388	5.61	8.53
177.	-31.544	6.308	205.54	40.460	5.64	8.61
178.	-31.758	6.348	205.76	40.533	5.67	8.69
179.	-31.972	6.389	205.99	40.606	5.70	8.77
180.	-32.186	6.429	206.22	40.680	5.73	8.85
181.	-32.401	6.470	206.44	40.754	5.76	8.92
182.	-32.616	6.511	206.67	40.829	5.79	9.00
183.	-32.831	6.552	206.89	40.903	5.82	9.08
184.	-33.046	6.593	207.12	40.979	5.85	9.16
185.	-33.262	6.634	207.34	41.054	5.89	9.24
186.	-33.478	6.675	207.56	41.131	5.92	9.32
187.	-33.694	6.716	207.78	41.207	5.95	9.40
188.	-33.910	6.757	208.00	41.284	5.98	9.49
189.	-34.126	6.799	208.22	41.362	6.01	9.57
190.	-34.343	6.840	208.44	41.439	6.04	9.65
191.	-34.560	6.882	208.66	41.518	6.07	9.73
192.	-34.777	6.923	208.87	41.597	6.10	9.81
193.	-34.994	6.965	209.09	41.676	6.13	9.90
194.	-35.212	7.006	209.30	41.755	6.17	9.98
195.	-35.429	7.048	209.52	41.836	6.20	10.06
196.	-35.647	7.090	209.73	41.916	6.23	10.15
197.	-35.865	7.132	209.95	41.997	6.26	10.23
198.	-36.084	7.174	210.16	42.079	6.29	10.32
199.	-36.302	7.216	210.37	42.160	6.32	10.40
200.	-36.521	7.258	210.58	42.243	6.35	10.49
201.	-36.740	7.301	210.79	42.326	6.38	10.57
202.	-36.959	7.343	211.00	42.409	6.41	10.66
203.	-37.179	7.386	211.21	42.493	6.45	10.75
204.	-37.398	7.428	211.42	42.577	6.48	10.83
205.	-37.618	7.471	211.63	42.662	6.51	10.92
206.	-37.838	7.513	211.84	42.747	6.54	11.01
207.	-38.059	7.556	212.05	42.833	6.57	11.10
208.	-38.279	7.599	212.25	42.919	6.60	11.18
209.	-38.500	7.642	212.46	43.005	6.63	11.27

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
210.	-38.721	7.685	212.66	43.092	6.66	11.36
211.	-38.942	7.728	212.87	43.180	6.69	11.45
212.	-39.163	7.771	213.07	43.268	6.72	11.54
213.	-39.384	7.815	213.28	43.357	6.76	11.63
214.	-39.606	7.858	213.48	43.445	6.79	11.72
215.	-39.828	7.902	213.68	43.535	6.82	11.81
216.	-40.050	7.945	213.89	43.625	6.85	11.91
217.	-40.272	7.989	214.09	43.715	6.88	12.00
218.	-40.495	8.033	214.29	43.806	6.91	12.09
219.	-40.718	8.076	214.49	43.898	6.94	12.18
220.	-40.941	8.120	214.69	43.989	6.97	12.28
221.	-41.164	8.164	214.89	44.082	7.00	12.37
222.	-41.387	8.209	215.09	44.174	7.03	12.46
223.	-41.611	8.253	215.29	44.268	7.06	12.56
224.	-41.834	8.297	215.49	44.361	7.10	12.65
225.	-42.058	8.342	215.68	44.456	7.13	12.75
226.	-42.282	8.386	215.88	44.550	7.16	12.84
227.	-42.507	8.431	216.08	44.645	7.19	12.94
228.	-42.731	8.475	216.27	44.741	7.22	13.04
229.	-42.956	8.520	216.47	44.837	7.25	13.13
230.	-43.181	8.565	216.67	44.934	7.28	13.23
231.	-43.406	8.610	216.86	45.031	7.31	13.33
232.	-43.631	8.655	217.06	45.128	7.34	13.43
233.	-43.856	8.700	217.25	45.226	7.37	13.52
234.	-44.082	8.745	217.44	45.324	7.40	13.62
235.	-44.308	8.791	217.64	45.423	7.43	13.72
236.	-44.534	8.836	217.83	45.522	7.46	13.82
237.	-44.760	8.882	218.02	45.622	7.50	13.92
238.	-44.987	8.928	218.22	45.722	7.53	14.02
239.	-45.213	8.973	218.41	45.823	7.56	14.12
240.	-45.440	9.019	218.60	45.924	7.59	14.23
241.	-45.667	9.065	218.79	46.026	7.62	14.33
242.	-45.894	9.111	218.98	46.128	7.65	14.43
243.	-46.122	9.157	219.17	46.230	7.68	14.53
244.	-46.349	9.204	219.36	46.333	7.71	14.64
245.	-46.577	9.250	219.55	46.436	7.74	14.74
246.	-46.805	9.297	219.74	46.540	7.77	14.84
247.	-47.033	9.343	219.93	46.644	7.80	14.95
248.	-47.261	9.390	220.12	46.749	7.83	15.05
249.	-47.490	9.437	220.31	46.854	7.86	15.16

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
250.	-47.719	9.484	220.49	46.959	7.89	15.26
251.	-47.948	9.531	220.68	47.065	7.92	15.37
252.	-48.177	9.578	220.87	47.171	7.95	15.48
253.	-48.406	9.625	221.06	47.278	7.98	15.58
254.	-48.635	9.672	221.24	47.385	8.01	15.69
255.	-48.865	9.720	221.43	47.493	8.04	15.80
256.	-49.095	9.767	221.62	47.600	8.07	15.91
257.	-49.325	9.815	221.80	47.709	8.10	16.02
258.	-49.555	9.863	221.99	47.817	8.14	16.13
259.	-49.786	9.911	222.17	47.926	8.17	16.24
260.	-50.016	9.959	222.36	48.036	8.20	16.35
261.	-50.247	10.007	222.54	48.146	8.23	16.46
262.	-50.478	10.055	222.73	48.256	8.26	16.57
263.	-50.709	10.103	222.91	48.367	8.29	16.68
264.	-50.940	10.152	223.09	48.478	8.32	16.79
265.	-51.172	10.200	223.28	48.589	8.35	16.90
266.	-51.403	10.249	223.46	48.701	8.38	17.02
267.	-51.635	10.298	223.64	48.813	8.41	17.13
268.	-51.867	10.346	223.83	48.925	8.44	17.25
269.	-52.100	10.395	224.01	49.038	8.47	17.36
270.	-52.332	10.444	224.19	49.151	8.50	17.47
271.	-52.565	10.494	224.37	49.265	8.53	17.59
272.	-52.797	10.543	224.55	49.379	8.56	17.71
273.	-53.030	10.592	224.74	49.493	8.59	17.82
273.150	-53.065	10.600	224.76	49.510	8.59	17.84
274.	-53.264	10.642	224.92	49.608	8.62	17.94
275.	-53.497	10.692	225.10	49.723	8.65	18.05
276.	-53.730	10.741	225.28	49.838	8.68	18.17
277.	-53.964	10.791	225.46	49.953	8.71	18.29
278.	-54.198	10.841	225.64	50.069	8.74	18.41
279.	-54.432	10.891	225.82	50.185	8.77	18.53
280.	-54.666	10.942	226.00	50.302	8.80	18.65
281.	-54.901	10.992	226.18	50.419	8.83	18.77
282.	-55.135	11.043	226.36	50.536	8.86	18.89
283.	-55.370	11.093	226.54	50.653	8.88	19.01
284.	-55.605	11.144	226.72	50.771	8.91	19.13
285.	-55.840	11.195	226.89	50.889	8.94	19.25
286.	-56.075	11.246	227.07	51.007	8.97	19.37
287.	-56.311	11.297	227.25	51.126	9.00	19.49
288.	-56.546	11.348	227.43	51.245	9.03	19.62

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
289.	-56.782	11.399	227.61	51.364	9.06	19.74
290.	-57.018	11.451	227.79	51.484	9.09	19.86
291.	-57.254	11.502	227.96	51.603	9.12	19.99
292.	-57.491	11.554	228.14	51.723	9.15	20.11
293.	-57.727	11.606	228.32	51.844	9.18	20.24
294.	-57.964	11.657	228.49	51.964	9.21	20.36
295.	-58.201	11.710	228.67	52.085	9.24	20.49
296.	-58.438	11.762	228.85	52.206	9.27	20.62
297.	-58.675	11.814	229.02	52.327	9.30	20.74
298.	-58.913	11.866	229.20	52.449	9.33	20.87
298.150	-58.948	11.874	229.23	52.467	9.33	20.89
299.	-59.150	11.919	229.37	52.571	9.36	21.00
300.	-59.388	11.971	229.55	52.693	9.39	21.13
301.	-59.626	12.024	229.73	52.815	9.42	21.25
302.	-59.864	12.077	229.90	52.938	9.44	21.38
303.	-60.102	12.130	230.08	53.060	9.47	21.51
304.	-60.341	12.183	230.25	53.183	9.50	21.64
305.	-60.580	12.236	230.43	53.307	9.53	21.77
305.330	-60.658	12.254	230.48	53.347	9.54	21.82
306.	-60.818	12.290	230.60	53.430	9.56	21.90
307.	-61.057	12.343	230.78	53.554	9.59	22.04
308.	-61.297	12.397	230.95	53.677	9.62	22.17
309.	-61.536	12.451	231.12	53.801	9.65	22.30
310.	-61.776	12.505	231.30	53.926	9.68	22.43
311.	-62.015	12.559	231.47	54.050	9.71	22.56
312.	-62.255	12.613	231.65	54.175	9.74	22.70
313.	-62.495	12.667	231.82	54.299	9.77	22.83
314.	-62.735	12.721	231.99	54.424	9.79	22.97
315.	-62.976	12.776	232.17	54.549	9.82	23.10
316.	-63.216	12.830	232.34	54.675	9.85	23.24
317.	-63.457	12.885	232.51	54.800	9.88	23.37
318.	-63.698	12.940	232.69	54.926	9.91	23.51
319.	-63.939	12.995	232.86	55.052	9.94	23.64
320.	-64.180	13.050	233.03	55.178	9.97	23.78
321.	-64.422	13.105	233.20	55.304	10.00	23.92
322.	-64.663	13.161	233.37	55.430	10.03	24.05
323.	-64.905	13.216	233.55	55.557	10.05	24.19
324.	-65.147	13.272	233.72	55.683	10.08	24.33
325.	-65.389	13.328	233.89	55.810	10.11	24.47
326.	-65.631	13.383	234.06	55.937	10.14	24.61

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
327.	-65.874	13.439	234.23	56.064	10.17	24.75
328.	-66.117	13.496	234.41	56.191	10.20	24.89
329.	-66.359	13.552	234.58	56.319	10.23	25.03
330.	-66.602	13.608	234.75	56.446	10.25	25.17
331.	-66.845	13.665	234.92	56.574	10.28	25.31
332.	-67.089	13.721	235.09	56.701	10.31	25.45
333.	-67.332	13.778	235.26	56.829	10.34	25.59
334.	-67.576	13.835	235.43	56.957	10.37	25.74
335.	-67.820	13.892	235.60	57.085	10.40	25.88
336.	-68.064	13.949	235.77	57.213	10.43	26.02
337.	-68.308	14.006	235.94	57.341	10.45	26.17
338.	-68.552	14.064	236.11	57.470	10.48	26.31
339.	-68.797	14.121	236.28	57.598	10.51	26.46
340.	-69.042	14.179	236.45	57.727	10.54	26.60
341.	-69.286	14.237	236.62	57.855	10.57	26.75
342.	-69.531	14.295	236.79	57.984	10.60	26.89
343.	-69.777	14.353	236.96	58.113	10.62	27.04
344.	-70.022	14.411	237.13	58.242	10.65	27.18
345.	-70.267	14.469	237.30	58.371	10.68	27.33
346.	-70.513	14.528	237.47	58.500	10.71	27.48
347.	-70.759	14.586	237.64	58.629	10.74	27.63
348.	-71.005	14.645	237.81	58.758	10.76	27.77
349.	-71.251	14.704	237.97	58.887	10.79	27.92
350.	-71.498	14.763	238.14	59.017	10.82	28.07
351.	-71.744	14.822	238.31	59.146	10.85	28.22
352.	-71.991	14.881	238.48	59.276	10.88	28.37
353.	-72.238	14.940	238.65	59.405	10.90	28.52
354.	-72.485	15.000	238.82	59.535	10.93	28.67
355.	-72.732	15.059	238.99	59.664	10.96	28.82
356.	-72.979	15.119	239.15	59.794	10.99	28.97
357.	-73.227	15.179	239.32	59.923	11.02	29.12
358.	-73.475	15.239	239.49	60.053	11.04	29.27
359.	-73.723	15.299	239.66	60.183	11.07	29.43
360.	-73.971	15.359	239.82	60.313	11.10	29.58
361.	-74.219	15.420	239.99	60.443	11.13	29.73
362.	-74.467	15.480	240.16	60.572	11.16	29.88
363.	-74.716	15.541	240.33	60.702	11.18	30.04
364.	-74.965	15.602	240.49	60.832	11.21	30.19
365.	-75.213	15.663	240.66	60.962	11.24	30.34
366.	-75.462	15.724	240.83	61.092	11.27	30.50

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
367.	-75.712	15.785	240.99	61.222	11.29	30.65
368.	-75.961	15.846	241.16	61.352	11.32	30.81
369.	-76.211	15.907	241.33	61.482	11.35	30.97
370.	-76.460	15.969	241.49	61.612	11.38	31.12
371.	-76.710	16.031	241.66	61.742	11.40	31.28
372.	-76.960	16.092	241.83	61.872	11.43	31.43
373.	-77.211	16.154	241.99	62.002	11.46	31.59
374.	-77.461	16.216	242.16	62.132	11.49	31.75
375.	-77.712	16.279	242.33	62.262	11.51	31.91
376.	-77.962	16.341	242.49	62.392	11.54	32.06
377.	-78.213	16.403	242.66	62.523	11.57	32.22
378.	-78.464	16.466	242.82	62.653	11.60	32.38
379.	-78.715	16.529	242.99	62.783	11.62	32.54
380.	-78.967	16.592	243.15	62.913	11.65	32.70
381.	-79.218	16.655	243.32	63.043	11.68	32.86
382.	-79.470	16.718	243.49	63.173	11.71	33.02
383.	-79.722	16.781	243.65	63.302	11.73	33.18
384.	-79.974	16.844	243.82	63.432	11.76	33.34
385.	-80.226	16.908	243.98	63.562	11.79	33.50
386.	-80.479	16.971	244.15	63.692	11.81	33.66
387.	-80.731	17.035	244.31	63.822	11.84	33.82
388.	-80.984	17.099	244.48	63.952	11.87	33.99
389.	-81.237	17.163	244.64	64.082	11.90	34.15
390.	-81.490	17.227	244.81	64.212	11.92	34.31
391.	-81.743	17.292	244.97	64.341	11.95	34.47
392.	-81.996	17.356	245.14	64.471	11.98	34.64
393.	-82.250	17.420	245.30	64.601	12.00	34.80
394.	-82.504	17.485	245.46	64.730	12.03	34.96
395.	-82.757	17.550	245.63	64.860	12.06	35.13
396.	-83.011	17.615	245.79	64.989	12.08	35.29
397.	-83.266	17.680	245.96	65.119	12.11	35.46
398.	-83.520	17.745	246.12	65.248	12.14	35.62
399.	-83.774	17.810	246.28	65.378	12.17	35.79
400.	-84.029	17.876	246.45	65.507	12.19	35.95
405.	-85.305	18.205	247.27	66.153	12.33	36.79
410.	-86.585	18.537	248.08	66.798	12.46	37.63
415.	-87.869	18.873	248.89	67.441	12.59	38.47
420.	-89.157	19.212	249.71	68.082	12.72	39.33
425.	-90.449	19.554	250.52	68.720	12.86	40.19
430.	-91.745	19.899	251.32	69.357	12.99	41.05

Table B1. Properties of ideal gas... (continued)

T	A^{id}	H^{id}	S^{id}	C_p^{id}	η_o	λ_o
K	$kJ \cdot mol^{-1}$	$kJ \cdot mol^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$J \cdot mol^{-1} \cdot K^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
435.	-93.046	20.247	252.13	69.992	13.12	41.93
440.	-94.350	20.599	252.93	70.624	13.25	42.81
445.	-95.658	20.954	253.73	71.254	13.38	43.69
450.	-96.970	21.311	254.53	71.880	13.50	44.58
455.	-98.286	21.672	255.33	72.505	13.63	45.48
460.	-99.607	22.036	256.13	73.126	13.76	46.38
465.	-100.931	22.404	256.92	73.744	13.89	47.29
470.	-102.259	22.774	257.71	74.360	14.01	48.20
475.	-103.591	23.147	258.50	74.972	14.14	49.12
480.	-104.927	23.524	259.29	75.582	14.26	50.04
485.	-106.267	23.903	260.08	76.188	14.39	50.97
490.	-107.611	24.285	260.86	76.791	14.51	51.90
495.	-108.959	24.671	261.64	77.391	14.64	52.84
500.	-110.311	25.059	262.43	77.987	14.76	53.78
505.	-111.666	25.451	263.20	78.580		54.73
510.	-113.026	25.845	263.98	79.170		55.68
515.	-114.389	26.242	264.76	79.757		56.63
520.	-115.757	26.643	265.53	80.340		57.59
525.	-117.128	27.046	266.30	80.920		58.55
530.	-118.503	27.452	267.07	81.496		59.51
535.	-119.882	27.861	267.84	82.070		60.48
540.	-121.264	28.273	268.61	82.639		61.45
545.	-122.651	28.687	269.37	83.206		62.43
550.	-124.041	29.105	270.13	83.769		63.41
555.	-125.435	29.525	270.89	84.329		64.39
560.	-126.833	29.948	271.65	84.885		65.37
565.	-128.235	30.374	272.41	85.438		66.36
570.	-129.641	30.802	273.16	85.988		67.35
575.	-131.050	31.234	273.92	86.535		68.34
580.	-132.463	31.668	274.67	87.078		69.34
585.	-133.880	32.104	275.42	87.618		70.34
590.	-135.300	32.544	276.17	88.155		71.34
595.	-136.724	32.986	276.91	88.689		72.34
600.	-138.152	33.431	277.66	89.220		73.35
605.	-139.584	33.878	278.40	89.747		
610.	-141.020	34.328	279.14	90.272		
615.	-142.459	34.781	279.88	90.793		
620.	-143.902	35.236	280.62	91.311		
625.	-145.348	35.694	281.35	91.827		

Table B2. Properties along saturation boundary

T	P_σ	$\rho_{\sigma L}$	$\rho_{\sigma v}$	$C_{\sigma L}$	$W_{\sigma L}$	$\eta_{\sigma L}$	$\lambda_{\sigma L}$
K	MPa	$mol \cdot dm^{-3}$	$mol \cdot dm^{-3}$	$J \cdot mol^{-1} \cdot K^{-1}$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
90.352	0.11E-05	21.67	0.150E-05	66.86	1995.9	1280.09	255.6
91.	0.13E-05	21.64	0.177E-05	67.23	1992.6	1244.72	255.1
92.	0.17E-05	21.61	0.227E-05	67.74	1987.2	1193.00	254.4
93.	0.22E-05	21.57	0.288E-05	68.19	1981.6	1144.52	253.6
94.	0.28E-05	21.54	0.364E-05	68.59	1975.7	1099.02	252.8
95.	0.36E-05	21.50	0.458E-05	68.94	1969.7	1056.26	252.1
96.	0.46E-05	21.47	0.573E-05	69.24	1963.5	1016.05	251.3
97.	0.58E-05	21.43	0.713E-05	69.50	1957.2	978.18	250.5
98.	0.72E-05	21.39	0.883E-05	69.73	1950.8	942.48	249.7
99.	0.90E-05	21.36	0.109E-04	69.92	1944.3	908.79	248.9
100.	0.11E-04	21.32	0.133E-04	70.09	1937.6	876.96	248.1
101.	0.14E-04	21.29	0.163E-04	70.23	1930.9	846.87	247.3
102.	0.17E-04	21.25	0.198E-04	70.34	1924.2	818.40	246.4
103.	0.21E-04	21.22	0.240E-04	70.43	1917.3	791.42	245.6
104.	0.25E-04	21.18	0.289E-04	70.51	1910.4	765.84	244.7
105.	0.30E-04	21.14	0.347E-04	70.57	1903.5	741.57	243.9
106.	0.37E-04	21.11	0.415E-04	70.61	1896.5	718.52	243.0
107.	0.44E-04	21.07	0.494E-04	70.64	1889.5	696.60	242.2
108.	0.53E-04	21.03	0.586E-04	70.66	1882.4	675.76	241.3
109.	0.63E-04	21.00	0.693E-04	70.68	1875.3	655.91	240.4
110.	0.75E-04	20.96	0.817E-04	70.68	1868.2	637.00	239.5
111.	0.89E-04	20.93	0.959E-04	70.67	1861.1	618.96	238.6
112.	0.10E-03	20.89	0.112E-03	70.66	1853.9	601.75	237.7
113.	0.12E-03	20.85	0.131E-03	70.65	1846.7	585.32	236.8
114.	0.14E-03	20.82	0.152E-03	70.63	1839.5	569.61	235.9
115.	0.17E-03	20.78	0.177E-03	70.60	1832.3	554.60	235.0
116.	0.20E-03	20.74	0.204E-03	70.58	1825.1	540.22	234.1
117.	0.23E-03	20.71	0.236E-03	70.55	1817.8	526.46	233.2
118.	0.27E-03	20.67	0.271E-03	70.52	1810.6	513.27	232.2
119.	0.31E-03	20.63	0.311E-03	70.49	1803.3	500.63	231.3
120.	0.35E-03	20.60	0.356E-03	70.46	1796.0	488.50	230.4
121.	0.41E-03	20.56	0.406E-03	70.42	1788.7	476.85	229.4
122.	0.47E-03	20.52	0.462E-03	70.39	1781.3	465.67	228.5
123.	0.54E-03	20.49	0.524E-03	70.36	1774.0	454.91	227.5
124.	0.61E-03	20.45	0.594E-03	70.33	1766.7	444.57	226.6
125.	0.70E-03	20.41	0.671E-03	70.30	1759.3	434.62	225.6
126.	0.79E-03	20.38	0.756E-03	70.27	1752.0	425.04	224.6
127.	0.90E-03	20.34	0.851E-03	70.25	1744.6	415.81	223.7
128.	0.10E-02	20.30	0.955E-03	70.22	1737.2	406.92	222.7
129.	0.11E-02	20.26	0.107E-02	70.20	1729.8	398.34	221.7

Table B2. Properties along saturation boundary (continued)

T	P_σ	$\rho_{\sigma L}$	$\rho_{\sigma v}$	$C_{\sigma L}$	$W_{\sigma L}$	$\eta_{\sigma L}$	$\lambda_{\sigma L}$
K	MPa	$mol \cdot dm^{-3}$	$mol \cdot dm^{-3}$	$J \cdot mol^{-1} \cdot K^{-1}$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
130.	0.13E-02	20.23	0.120E-02	70.18	1722.4	390.06	220.8
131.	0.15E-02	20.19	0.134E-02	70.16	1715.0	382.07	219.8
132.	0.16E-02	20.15	0.149E-02	70.14	1707.6	374.36	218.8
133.	0.18E-02	20.12	0.165E-02	70.13	1700.2	366.90	217.8
134.	0.20E-02	20.08	0.183E-02	70.12	1692.8	359.69	216.9
135.	0.23E-02	20.04	0.203E-02	70.11	1685.3	352.72	215.9
136.	0.25E-02	20.00	0.225E-02	70.10	1677.9	345.98	214.9
137.	0.28E-02	19.96	0.248E-02	70.09	1670.5	339.44	213.9
138.	0.31E-02	19.93	0.273E-02	70.09	1663.0	333.12	212.9
139.	0.35E-02	19.89	0.301E-02	70.09	1655.5	326.99	211.9
140.	0.38E-02	19.85	0.330E-02	70.10	1648.1	321.05	210.9
141.	0.42E-02	19.81	0.362E-02	70.10	1640.6	315.29	209.9
142.	0.47E-02	19.78	0.397E-02	70.11	1633.2	309.70	209.0
143.	0.51E-02	19.74	0.434E-02	70.12	1625.7	304.27	208.0
144.	0.56E-02	19.70	0.474E-02	70.14	1618.2	299.00	207.0
145.	0.62E-02	19.66	0.516E-02	70.15	1610.7	293.88	206.0
146.	0.68E-02	19.62	0.562E-02	70.17	1603.2	288.91	205.0
147.	0.74E-02	19.59	0.611E-02	70.19	1595.7	284.08	204.0
148.	0.81E-02	19.55	0.664E-02	70.22	1588.2	279.38	203.0
149.	0.89E-02	19.51	0.720E-02	70.24	1580.7	274.80	202.0
150.	0.97E-02	19.47	0.780E-02	70.27	1573.2	270.35	201.0
151.	0.11E-01	19.43	0.844E-02	70.31	1565.7	266.02	200.0
152.	0.11E-01	19.39	0.912E-02	70.34	1558.2	261.80	199.0
153.	0.12E-01	19.35	0.985E-02	70.38	1550.7	257.69	198.0
154.	0.13E-01	19.32	0.011	70.42	1543.2	253.68	197.0
155.	0.15E-01	19.28	0.011	70.46	1535.7	249.77	196.0
156.	0.16E-01	19.24	0.012	70.51	1528.2	245.96	195.0
157.	0.17E-01	19.20	0.013	70.55	1520.6	242.25	194.0
158.	0.18E-01	19.16	0.014	70.60	1513.1	238.62	193.0
159.	0.20E-01	19.12	0.015	70.66	1505.6	235.08	192.0
160.	0.21E-01	19.08	0.016	70.71	1498.1	231.63	191.0
161.	0.23E-01	19.04	0.017	70.77	1490.5	228.25	190.0
162.	0.25E-01	19.00	0.019	70.83	1483.0	224.95	189.0
163.	0.27E-01	18.96	0.020	70.89	1475.5	221.73	188.1
164.	0.29E-01	18.92	0.021	70.95	1467.9	218.58	187.1
165.	0.31E-01	18.88	0.023	71.02	1460.4	215.50	186.1
166.	0.33E-01	18.84	0.024	71.09	1452.8	212.48	185.1
167.	0.35E-01	18.80	0.026	71.16	1445.3	209.53	184.1
168.	0.38E-01	18.76	0.027	71.24	1437.7	206.65	183.1
169.	0.40E-01	18.72	0.029	71.31	1430.2	203.82	182.1

Table B2. Properties along saturation boundary (continued)

T	P_σ	$\rho_{\sigma L}$	$\rho_{\sigma v}$	$C_{\sigma L}$	$W_{\sigma L}$	$\eta_{\sigma L}$	$\lambda_{\sigma L}$
K	MPa	$mol \cdot dm^{-3}$	$mol \cdot dm^{-3}$	$J \cdot mol^{-1} \cdot K^{-1}$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
170.	0.43E-01	18.68	0.031	71.39	1422.6	201.06	181.2
171.	0.46E-01	18.64	0.033	71.47	1415.1	198.35	180.2
172.	0.49E-01	18.60	0.035	71.56	1407.5	195.70	179.2
173.	0.52E-01	18.56	0.037	71.64	1399.9	193.09	178.2
174.	0.55E-01	18.52	0.039	71.73	1392.4	190.55	177.3
175.	0.59E-01	18.48	0.041	71.82	1384.8	188.05	176.3
176.	0.62E-01	18.44	0.044	71.91	1377.2	185.60	175.3
177.	0.66E-01	18.40	0.046	72.01	1369.7	183.19	174.3
178.	0.70E-01	18.36	0.049	72.11	1362.1	180.84	173.4
179.	0.74E-01	18.32	0.051	72.21	1354.5	178.52	172.4
180.	0.79E-01	18.28	0.054	72.31	1346.9	176.25	171.4
181.	0.83E-01	18.24	0.057	72.41	1339.3	174.02	170.5
182.	0.88E-01	18.19	0.060	72.52	1331.7	171.83	169.5
183.	0.93E-01	18.15	0.063	72.63	1324.2	169.68	168.5
184.	0.98E-01	18.11	0.066	72.74	1316.6	167.57	167.6
184.309	0.10	18.10	0.068	72.78	1314.2	166.93	167.3
184.552	0.101352	18.09	0.068	72.80	1312.4	166.42	167.1
185.	0.10	18.07	0.070	72.85	1309.0	165.50	166.6
186.	0.11	18.03	0.073	72.97	1301.4	163.46	165.7
187.	0.12	17.98	0.077	73.09	1293.7	161.45	164.7
188.	0.12	17.94	0.081	73.21	1286.1	159.48	163.8
189.	0.13	17.90	0.085	73.33	1278.5	157.55	162.8
190.	0.13	17.86	0.089	73.46	1270.9	155.64	161.9
191.	0.14	17.81	0.093	73.59	1263.3	153.77	160.9
192.	0.15	17.77	0.098	73.72	1255.6	151.92	160.0
193.	0.16	17.73	0.102	73.85	1248.0	150.11	159.0
194.	0.16	17.69	0.107	73.99	1240.4	148.32	158.1
195.	0.17	17.64	0.112	74.13	1232.7	146.56	157.2
196.	0.18	17.60	0.117	74.27	1225.1	144.83	156.2
197.	0.19	17.55	0.122	74.41	1217.4	143.13	155.3
198.	0.20	17.51	0.127	74.56	1209.7	141.45	154.4
199.	0.21	17.47	0.133	74.71	1202.1	139.80	153.4
200.	0.22	17.42	0.139	74.86	1194.4	138.17	152.5
201.	0.23	17.38	0.145	75.02	1186.7	136.56	151.6
202.	0.24	17.33	0.151	75.17	1179.0	134.98	150.7
203.	0.25	17.29	0.157	75.33	1171.3	133.42	149.8
204.	0.26	17.24	0.164	75.50	1163.6	131.89	148.8
205.	0.27	17.20	0.170	75.66	1155.9	130.37	147.9
206.	0.28	17.15	0.177	75.83	1148.2	128.88	147.0
207.	0.29	17.11	0.185	76.00	1140.4	127.40	146.1

Table B2. Properties along saturation boundary (continued)

T	P_σ	$\rho_{\sigma L}$	$\rho_{\sigma v}$	$C_{\sigma L}$	$W_{\sigma L}$	$\eta_{\sigma L}$	$\lambda_{\sigma L}$
K	MPa	$mol \cdot dm^{-3}$	$mol \cdot dm^{-3}$	$J \cdot mol^{-1} \cdot K^{-1}$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
208.	0.31	17.06	0.192	76.18	1132.7	125.95	145.2
209.	0.32	17.02	0.200	76.35	1125.0	124.51	144.3
210.	0.33	16.97	0.208	76.53	1117.2	123.10	143.4
211.	0.35	16.93	0.216	76.72	1109.4	121.70	142.5
212.	0.36	16.88	0.224	76.90	1101.7	120.32	141.6
213.	0.38	16.83	0.233	77.09	1093.9	118.96	140.7
214.	0.39	16.78	0.241	77.29	1086.1	117.62	139.8
215.	0.41	16.74	0.251	77.49	1078.3	116.29	138.9
216.	0.42	16.69	0.260	77.69	1070.4	114.99	138.0
217.	0.44	16.64	0.270	77.89	1062.6	113.69	137.1
218.	0.46	16.59	0.279	78.10	1054.8	112.41	136.2
219.	0.47	16.55	0.290	78.31	1046.9	111.15	135.4
220.	0.49	16.50	0.300	78.52	1039.0	109.90	134.5
221.	0.51	16.45	0.311	78.74	1031.2	108.67	133.6
222.	0.53	16.40	0.322	78.96	1023.3	107.45	132.7
223.	0.55	16.35	0.333	79.19	1015.4	106.25	131.9
224.	0.57	16.30	0.345	79.42	1007.4	105.06	131.0
225.	0.59	16.25	0.357	79.66	999.5	103.88	130.1
226.	0.61	16.20	0.369	79.90	991.5	102.72	129.3
227.	0.63	16.15	0.382	80.14	983.6	101.57	128.4
228.	0.65	16.10	0.395	80.39	975.6	100.43	127.5
229.	0.68	16.05	0.408	80.64	967.6	99.30	126.7
230.	0.70	16.00	0.422	80.90	959.6	98.19	125.8
231.	0.72	15.95	0.436	81.16	951.5	97.09	125.0
232.	0.75	15.90	0.451	81.43	943.5	96.00	124.1
233.	0.77	15.84	0.465	81.70	935.4	94.92	123.3
234.	0.80	15.79	0.481	81.98	927.3	93.85	122.4
235.	0.83	15.74	0.496	82.26	919.2	92.79	121.6
236.	0.85	15.68	0.512	82.55	911.0	91.74	120.7
237.	0.88	15.63	0.529	82.84	902.9	90.71	119.9
238.	0.91	15.58	0.546	83.14	894.7	89.68	119.0
239.	0.94	15.52	0.563	83.45	886.5	88.66	118.2
240.	0.97	15.47	0.581	83.76	878.3	87.65	117.4
241.	1.00	15.41	0.599	84.08	870.0	86.66	116.5
242.	1.03	15.36	0.618	84.41	861.8	85.67	115.7
243.	1.06	15.30	0.637	84.74	853.5	84.69	114.9
244.	1.09	15.24	0.657	85.08	845.1	83.72	114.1
245.	1.13	15.19	0.677	85.43	836.8	82.75	113.2
246.	1.16	15.13	0.698	85.79	828.4	81.80	112.4
247.	1.19	15.07	0.719	86.15	820.0	80.85	111.6

Table B2. Properties along saturation boundary (continued)

T	P_σ	$\rho_{\sigma L}$	$\rho_{\sigma v}$	$C_{\sigma L}$	$W_{\sigma L}$	$\eta_{\sigma L}$	$\lambda_{\sigma L}$
K	MPa	$mol \cdot dm^{-3}$	$mol \cdot dm^{-3}$	$J \cdot mol^{-1} \cdot K^{-1}$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
248.	1.23	15.01	0.741	86.52	811.6	79.91	110.8
249.	1.26	14.95	0.764	86.90	803.1	78.98	110.0
250.	1.30	14.89	0.787	87.29	794.6	78.06	109.1
251.	1.34	14.83	0.810	87.70	786.1	77.14	108.3
252.	1.38	14.77	0.835	88.11	777.5	76.23	107.5
253.	1.42	14.71	0.859	88.53	768.9	75.33	106.7
254.	1.46	14.65	0.885	88.96	760.3	74.43	105.9
255.	1.50	14.58	0.911	89.40	751.6	73.54	105.1
256.	1.54	14.52	0.938	89.86	742.9	72.66	104.3
257.	1.58	14.46	0.966	90.33	734.1	71.79	103.5
258.	1.62	14.39	0.994	90.81	725.4	70.91	102.7
259.	1.67	14.33	1.023	91.31	716.5	70.05	101.9
260.	1.71	14.26	1.053	91.82	707.7	69.19	101.1
261.	1.76	14.19	1.084	92.34	698.7	68.34	100.3
262.	1.80	14.13	1.116	92.89	689.8	67.49	99.5
263.	1.85	14.06	1.148	93.45	680.8	66.64	98.7
264.	1.90	13.99	1.182	94.03	671.7	65.80	97.9
265.	1.95	13.92	1.216	94.63	662.6	64.97	97.1
266.	2.00	13.85	1.252	95.25	653.4	64.14	96.3
267.	2.05	13.77	1.288	95.89	644.2	63.31	95.5
268.	2.10	13.70	1.325	96.55	634.9	62.48	94.8
269.	2.16	13.63	1.364	97.24	625.6	61.66	94.0
270.	2.21	13.55	1.404	97.96	616.2	60.85	93.2
271.	2.26	13.47	1.445	98.71	606.7	60.03	92.4
272.	2.32	13.40	1.487	99.49	597.2	59.22	91.6
273.	2.38	13.32	1.530	100.30	587.5	58.41	90.8
273.	2.39	13.31	1.537	100.30	587.5	58.41	90.8
274.	2.44	13.24	1.575	101.15	577.9	57.61	90.0
275.	2.49	13.16	1.622	102.04	568.1	56.80	89.3
276.	2.55	13.07	1.670	102.97	558.2	56.00	88.5
277.	2.62	12.99	1.719	103.95	548.3	55.19	87.7
278.	2.68	12.90	1.771	104.98	538.3	54.39	86.9
279.	2.74	12.81	1.824	106.07	528.1	53.59	86.1
280.	2.81	12.72	1.879	107.22	517.9	52.79	85.4
281.	2.87	12.63	1.936	108.44	507.5	51.98	84.6
282.	2.94	12.54	1.995	109.73	497.1	51.18	83.8
283.	3.01	12.44	2.057	111.11	486.5	50.37	83.0
284.	3.07	12.34	2.121	112.58	475.8	49.56	82.2
285.	3.14	12.24	2.187	114.17	465.0	48.75	81.5
286.	3.22	12.13	2.257	115.87	454.0	47.93	80.7

Table B2. Properties along saturation boundary (continued)

T	P_σ	$\rho_{\sigma L}$	$\rho_{\sigma v}$	$C_{\sigma L}$	$W_{\sigma L}$	$\eta_{\sigma L}$	$\lambda_{\sigma L}$
K	MPa	$mol \cdot dm^{-3}$	$mol \cdot dm^{-3}$	$J \cdot mol^{-1} \cdot K^{-1}$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW \cdot m^{-1} \cdot K^{-1}$
287.	3.29	12.03	2.330	117.71	442.9	47.11	79.9
288.	3.36	11.92	2.406	119.72	431.6	46.28	79.1
289.	3.44	11.80	2.486	121.91	420.1	45.44	78.4
290.	3.51	11.68	2.570	124.32	408.5	44.60	77.6
291.	3.59	11.56	2.659	126.99	396.7	43.74	76.8
292.	3.67	11.43	2.753	129.97	384.7	42.87	76.1
293.	3.75	11.30	2.852	133.32	372.5	41.99	75.3
294.	3.83	11.16	2.959	137.15	360.1	41.09	74.6
295.	3.92	11.01	3.072	141.56	347.4	40.17	73.9
296.	4.00	10.85	3.195	146.73	334.4	39.22	73.2
297.	4.09	10.69	3.327	152.89	321.1	38.24	72.6
298.	4.18	10.51	3.472	160.40	307.4	37.22	72.0
298.	4.19	10.48	3.495	160.40	307.4	37.22	72.0
299.	4.27	10.31	3.633	169.81	293.2	36.15	71.6
300.	4.36	10.10	3.813	182.06	278.4	35.01	71.3
301.	4.45	9.86	4.019	198.85	262.9	33.79	71.4
302.	4.54	9.59	4.262	223.66	246.4	32.44	72.0
303.	4.64	9.25	4.562	265.26	228.7	30.89	73.8
304.	4.74	8.82	4.968	354.78	209.4	28.97	79.0
305.	4.84	8.05	5.703	803.05	188.0	25.91	109.2
305.33	4.8718	6.87	6.87				

Table B3. Properties in the single-phase region along isobars

ETHANE ISOBAR AT P = $1.13 \cdot 10^{-6}$ MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
90.352	21.664	0.000	-14.887	76.65	47.02	66.18	1995.0	1277.81	255.5
90.352	0.15E-05	1.000	3.043	275.09	26.86	35.17	180.9	3.04	2.9
95.	0.14E-05	1.000	3.207	276.87	27.11	35.42	185.3	3.17	3.2
100.	0.14E-05	1.000	3.384	278.69	27.38	35.70	189.9	3.32	3.5
105.	0.13E-05	1.000	3.564	280.44	27.66	35.97	194.3	3.46	3.7
110.	0.12E-05	1.000	3.744	282.12	27.93	36.25	198.7	3.60	4.0
115.	0.12E-05	1.000	3.926	283.74	28.22	36.53	202.9	3.75	4.3
120.	0.11E-05	1.000	4.109	285.30	28.50	36.82	207.0	3.90	4.7
125.	0.11E-05	1.000	4.294	286.81	28.79	37.11	211.1	4.04	5.0
130.	0.10E-05	1.000	4.480	288.27	29.09	37.40	215.0	4.19	5.3
135.	0.10E-05	1.000	4.668	289.69	29.38	37.70	218.8	4.34	5.6
140.	0.97E-06	1.000	4.857	291.06	29.69	38.00	222.6	4.50	5.9
145.	0.94E-06	1.000	5.048	292.40	30.00	38.31	226.3	4.65	6.3
150.	0.91E-06	1.000	5.241	293.71	30.31	38.63	229.9	4.80	6.6
155.	0.88E-06	1.000	5.435	294.98	30.64	38.95	233.4	4.96	7.0
160.	0.85E-06	1.000	5.630	296.22	30.96	39.28	236.9	5.11	7.3
165.	0.82E-06	1.000	5.827	297.43	31.30	39.62	240.3	5.26	7.7
170.	0.80E-06	1.000	6.026	298.62	31.65	39.96	243.6	5.42	8.1
175.	0.78E-06	1.000	6.227	299.79	32.00	40.32	246.9	5.57	8.5
180.	0.76E-06	1.000	6.429	300.93	32.37	40.68	250.1	5.73	8.8
185.	0.73E-06	1.000	6.634	302.05	32.74	41.05	253.3	5.89	9.2
190.	0.72E-06	1.000	6.840	303.15	33.12	41.44	256.4	6.04	9.6
195.	0.70E-06	1.000	7.048	304.23	33.52	41.84	259.4	6.20	10.1
200.	0.68E-06	1.000	7.258	305.29	33.93	42.24	262.4	6.35	10.5
205.	0.66E-06	1.000	7.471	306.34	34.35	42.66	265.3	6.51	10.9
210.	0.65E-06	1.000	7.685	307.37	34.78	43.09	268.2	6.66	11.4
215.	0.63E-06	1.000	7.902	308.39	35.22	43.53	271.1	6.82	11.8
220.	0.62E-06	1.000	8.120	309.40	35.67	43.99	273.9	6.97	12.3
225.	0.60E-06	1.000	8.342	310.39	36.14	44.46	276.6	7.13	12.7
230.	0.59E-06	1.000	8.565	311.37	36.62	44.93	279.3	7.28	13.2
235.	0.58E-06	1.000	8.791	312.35	37.11	45.42	282.0	7.43	13.7
240.	0.57E-06	1.000	9.019	313.31	37.61	45.92	284.7	7.59	14.2
245.	0.55E-06	1.000	9.250	314.26	38.12	46.44	287.3	7.74	14.7
250.	0.54E-06	1.000	9.484	315.20	38.64	46.96	289.8	7.89	15.3
255.	0.53E-06	1.000	9.720	316.14	39.18	47.49	292.4	8.04	15.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = $1.13 \cdot 10^{-6}$ MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
260.	0.52E-06	1.000	9.959	317.07	39.72	48.04	294.9	8.20	16.3
265.	0.51E-06	1.000	10.200	317.99	40.27	48.59	297.3	8.35	16.9
270.	0.50E-06	1.000	10.444	318.90	40.84	49.15	299.8	8.50	17.5
275.	0.49E-06	1.000	10.692	319.81	41.41	49.72	302.2	8.65	18.1
280.	0.49E-06	1.000	10.942	320.71	41.99	50.30	304.6	8.80	18.6
285.	0.48E-06	1.000	11.195	321.60	42.57	50.89	306.9	8.94	19.2
290.	0.47E-06	1.000	11.451	322.49	43.17	51.48	309.2	9.09	19.9
295.	0.46E-06	1.000	11.710	323.38	43.77	52.09	311.6	9.24	20.5
300.	0.45E-06	1.000	11.971	324.26	44.38	52.69	313.8	9.39	21.1
310.	0.44E-06	1.000	12.505	326.01	45.61	53.93	318.3	9.68	22.4
320.	0.42E-06	1.000	13.050	327.74	46.86	55.18	322.8	9.97	23.8
330.	0.41E-06	1.000	13.608	329.46	48.13	56.45	327.1	10.25	25.2
340.	0.40E-06	1.000	14.179	331.16	49.41	57.73	331.4	10.54	26.6
350.	0.39E-06	1.000	14.763	332.85	50.70	59.02	335.6	10.82	28.1
360.	0.38E-06	1.000	15.359	334.53	52.00	60.31	339.8	11.10	29.6
370.	0.37E-06	1.000	15.969	336.20	53.30	61.61	343.9	11.38	31.1
380.	0.36E-06	1.000	16.592	337.86	54.60	62.91	348.0	11.65	32.7
390.	0.35E-06	1.000	17.227	339.51	55.90	64.21	352.0	11.92	34.3
400.	0.34E-06	1.000	17.876	341.16	57.19	65.51	355.9	12.19	36.0
410.	0.33E-06	1.000	18.537	342.79	58.48	66.80	359.8	12.46	37.6
420.	0.32E-06	1.000	19.212	344.41	59.77	68.08	363.7	12.72	39.3
430.	0.32E-06	1.000	19.899	346.03	61.04	69.36	367.5	12.99	41.1
440.	0.31E-06	1.000	20.599	347.64	62.31	70.62	371.3	13.25	42.8
450.	0.30E-06	1.000	21.311	349.24	63.57	71.88	375.1	13.50	44.6
460.	0.30E-06	1.000	22.036	350.84	64.81	73.13	378.8	13.76	46.4
470.	0.29E-06	1.000	22.774	352.42	66.05	74.36	382.5	14.01	48.2
480.	0.28E-06	1.000	23.524	354.00	67.27	75.58	386.2	14.26	50.0
490.	0.28E-06	1.000	24.285	355.57	68.48	76.79	389.8	14.51	51.9
500.	0.27E-06	1.000	25.059	357.13	69.67	77.99	393.4	14.76	53.8
520.	0.26E-06	1.000	26.643	360.24	72.03	80.34	400.5		57.6
540.	0.25E-06	1.000	28.273	363.31	74.32	82.64	407.5		61.5
560.	0.24E-06	1.000	29.948	366.36	76.57	84.89	414.3		65.4
580.	0.23E-06	1.000	31.668	369.38	78.76	87.08	421.1		69.3
600.	0.23E-06	1.000	33.431	372.37	80.91	89.22	427.7		73.3
625.	0.22E-06	1.000	35.694	376.06	83.51	91.83	435.9		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0100 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	20.503	0.001	-14.572	80.04	47.93	68.71	1970.2	1057.22	252.1
100.	21.325	0.001	-14.225	83.61	48.15	70.12	1938.3	878.06	248.2
105.	21.144	0.001	-13.873	87.04	47.89	70.70	1903.9	742.13	243.9
110.	20.963	0.001	-13.519	90.34	47.39	70.82	1868.3	637.08	239.5
115.	20.780	0.001	-13.165	93.48	46.78	70.72	1832.1	554.40	235.0
120.	20.596	0.000	-12.812	96.49	46.14	70.52	1795.5	488.19	230.3
125.	20.411	0.000	-12.460	99.36	45.53	70.32	1758.8	434.30	225.5
130.	20.225	0.000	-12.108	102.12	44.97	70.15	1721.9	389.79	220.7
135.	20.039	0.000	-11.758	104.76	44.47	70.05	1684.9	352.52	215.8
140.	19.851	0.000	-11.408	107.31	44.04	70.01	1647.8	320.93	210.9
145.	19.661	0.000	-11.058	109.77	43.68	70.06	1610.6	293.84	206.0
150.	19.470	0.000	-10.707	112.14	43.38	70.18	1573.3	270.37	201.0
150.393	19.455	0.000	-10.679	112.33	43.36	70.20	1570.4	268.66	200.6
150.393	0.0080	0.996	5.261	218.32	27.15	35.03	230.8	4.81	6.7
155.	0.0078	0.995	5.428	219.41	29.06	37.24	233.4	4.96	7.0
160.	0.0076	0.995	5.618	220.62	30.22	38.55	236.5	5.11	7.4
165.	0.0073	0.996	5.813	221.82	30.95	39.34	239.8	5.26	7.7
170.	0.0071	0.996	6.011	223.00	31.49	39.90	243.1	5.42	8.1
175.	0.0069	0.996	6.212	224.17	31.94	40.36	246.4	5.58	8.5
180.	0.0067	0.997	6.414	225.31	32.35	40.77	249.6	5.73	8.9
185.	0.0065	0.997	6.619	226.43	32.75	41.17	252.8	5.89	9.3
190.	0.0063	0.997	6.826	227.53	33.15	41.56	255.9	6.04	9.7
195.	0.0062	0.997	7.035	228.62	33.55	41.96	259.0	6.20	10.1
200.	0.0060	0.997	7.246	229.69	33.96	42.36	262.0	6.35	10.5
205.	0.0059	0.998	7.458	230.74	34.38	42.78	264.9	6.51	10.9
210.	0.0057	0.998	7.673	231.77	34.81	43.20	267.8	6.66	11.4
215.	0.0056	0.998	7.891	232.79	35.25	43.64	270.7	6.82	11.8
220.	0.0055	0.998	8.110	233.80	35.71	44.09	273.5	6.97	12.3
225.	0.0054	0.998	8.331	234.80	36.17	44.55	276.3	7.13	12.8
230.	0.0052	0.998	8.555	235.78	36.65	45.02	279.0	7.28	13.2
235.	0.0051	0.998	8.782	236.76	37.14	45.50	281.7	7.44	13.7
240.	0.0050	0.999	9.010	237.72	37.64	46.00	284.4	7.59	14.2
245.	0.0049	0.999	9.242	238.67	38.15	46.51	287.0	7.74	14.8
250.	0.0048	0.999	9.475	239.62	38.67	47.03	289.6	7.89	15.3
255.	0.0047	0.999	9.712	240.55	39.20	47.55	292.1	8.05	15.8
260.	0.0046	0.999	9.951	241.48	39.74	48.09	294.6	8.20	16.4
265.	0.0045	0.999	10.193	242.40	40.29	48.64	297.1	8.35	16.9
270.	0.0045	0.999	10.437	243.32	40.85	49.20	299.6	8.50	17.5
275.	0.0044	0.999	10.685	244.23	41.42	49.77	302.0	8.65	18.1
280.	0.0043	0.999	10.935	245.13	42.00	50.35	304.4	8.80	18.7

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0100 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0042	0.999	11.188	246.02	42.59	50.93	306.7	8.95	19.3
290.	0.0042	0.999	11.445	246.92	43.18	51.52	309.1	9.09	19.9
295.	0.0041	0.999	11.704	247.80	43.78	52.12	311.4	9.24	20.5
300.	0.0040	0.999	11.966	248.68	44.39	52.73	313.7	9.39	21.1
310.	0.0039	0.999	12.499	250.43	45.62	53.96	318.2	9.68	22.4
320.	0.0038	0.999	13.045	252.16	46.87	55.21	322.6	9.97	23.8
330.	0.0036	0.999	13.603	253.88	48.14	56.47	327.0	10.26	25.2
340.	0.0035	0.000	14.175	255.59	49.42	57.75	331.3	10.54	26.6
350.	0.0034	0.000	14.758	257.28	50.71	59.04	335.5	10.82	28.1
360.	0.0033	0.000	15.355	258.96	52.00	60.33	339.7	11.10	29.6
370.	0.0033	0.000	15.965	260.63	53.30	61.63	343.8	11.38	31.1
380.	0.0032	0.000	16.588	262.29	54.60	62.93	347.9	11.65	32.7
390.	0.0031	1.000	17.224	263.94	55.90	64.23	351.9	11.92	34.3
400.	0.0030	1.000	17.873	265.59	57.20	65.52	355.9	12.19	36.0
410.	0.0029	1.000	18.534	267.22	58.49	66.81	359.8	12.46	37.6
420.	0.0029	1.000	19.209	268.85	59.77	68.09	363.7	12.73	39.3
430.	0.0028	1.000	19.896	270.46	61.05	69.37	367.5	12.99	41.1
440.	0.0027	1.000	20.596	272.07	62.31	70.64	371.3	13.25	42.8
450.	0.0027	1.000	21.309	273.67	63.57	71.89	375.1	13.51	44.6
460.	0.0026	1.000	22.034	275.27	64.81	73.14	378.8	13.76	46.4
470.	0.0026	1.000	22.771	276.85	66.05	74.37	382.5	14.01	48.2
480.	0.0025	1.000	23.521	278.43	67.27	75.59	386.1	14.27	50.0
490.	0.0025	1.000	24.283	280.00	68.48	76.80	389.8	14.51	51.9
500.	0.0024	1.000	25.057	281.57	69.67	78.00	393.4	14.76	53.8
520.	0.0023	1.000	26.641	284.67	72.03	80.35	400.4		57.6
540.	0.0022	1.000	28.271	287.75	74.33	82.65	407.4		61.5
560.	0.0021	1.000	29.946	290.79	76.57	84.89	414.3		65.4
580.	0.0021	1.000	31.666	293.81	78.76	87.08	421.1		69.3
600.	0.0020	1.000	33.429	296.80	80.91	89.23	427.7		73.4
625.	0.0019	1.000	35.693	300.50	83.51	91.83	435.9		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0250 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.503	0.001	-14.572	80.04	47.93	68.71	1970.3	1057.35	252.1
100.	21.325	0.001	-14.224	83.61	48.15	70.11	1938.4	878.16	248.2
105.	21.145	0.001	-13.872	87.04	47.89	70.70	1904.0	742.22	243.9
110.	20.963	0.001	-13.518	90.34	47.39	70.82	1868.4	637.15	239.5
115.	20.780	0.001	-13.164	93.48	46.78	70.72	1832.2	554.46	235.0
120.	20.596	0.001	-12.811	96.49	46.14	70.52	1795.6	488.24	230.3
125.	20.411	0.001	-12.459	99.36	45.53	70.32	1758.9	434.34	225.6
130.	20.226	0.001	-12.108	102.12	44.97	70.15	1722.0	389.83	220.7
135.	20.039	0.001	-11.757	104.76	44.47	70.05	1685.0	352.56	215.8
140.	19.851	0.001	-11.407	107.31	44.04	70.01	1647.9	320.96	210.9
145.	19.662	0.001	-11.057	109.77	43.68	70.06	1610.7	293.87	206.0
150.	19.471	0.001	-10.707	112.14	43.38	70.18	1573.4	270.40	201.0
155.	19.278	0.001	-10.355	114.45	43.14	70.38	1536.0	249.86	196.0
160.	19.083	0.001	-10.003	116.69	42.95	70.65	1498.5	231.74	191.1
162.094	19.001	0.001	-9.854	117.61	42.88	70.79	1482.8	224.77	189.0
162.094	0.0187	0.990	5.694	213.53	27.90	35.99	238.1	5.18	7.6
165.	0.0184	0.990	5.801	214.18	29.22	37.50	239.6	5.27	7.8
170.	0.0179	0.990	5.992	215.33	30.66	39.12	242.5	5.42	8.2
175.	0.0173	0.991	6.191	216.47	31.55	40.09	245.7	5.58	8.5
180.	0.0168	0.991	6.393	217.61	32.18	40.74	248.9	5.73	8.9
185.	0.0164	0.992	6.598	218.74	32.69	41.26	252.0	5.89	9.3
190.	0.0159	0.993	6.805	219.84	33.15	41.70	255.2	6.04	9.7
195.	0.0155	0.993	7.015	220.93	33.58	42.12	258.3	6.20	10.1
200.	0.0151	0.994	7.227	222.00	34.00	42.53	261.3	6.36	10.5
205.	0.0148	0.994	7.440	223.06	34.43	42.95	264.3	6.51	11.0
210.	0.0144	0.995	7.656	224.10	34.86	43.37	267.3	6.67	11.4
215.	0.0141	0.995	7.874	225.12	35.30	43.79	270.2	6.82	11.9
220.	0.0137	0.995	8.094	226.14	35.76	44.23	273.0	6.98	12.3
225.	0.0134	0.996	8.316	227.13	36.22	44.69	275.8	7.13	12.8
230.	0.0131	0.996	8.541	228.12	36.69	45.15	278.6	7.29	13.3
235.	0.0128	0.996	8.768	229.10	37.18	45.62	281.3	7.44	13.8
240.	0.0126	0.996	8.997	230.06	37.67	46.11	284.0	7.59	14.3
245.	0.0123	0.997	9.229	231.02	38.18	46.61	286.6	7.75	14.8
250.	0.0121	0.997	9.463	231.97	38.70	47.13	289.2	7.90	15.3
255.	0.0118	0.997	9.700	232.90	39.23	47.65	291.8	8.05	15.8
260.	0.0116	0.997	9.940	233.84	39.77	48.18	294.3	8.20	16.4
265.	0.0114	0.997	10.182	234.76	40.32	48.73	296.8	8.35	16.9
270.	0.0112	0.997	10.427	235.67	40.88	49.28	299.2	8.50	17.5
275.	0.0110	0.998	10.675	236.58	41.45	49.84	301.7	8.65	18.1
280.	0.0108	0.998	10.925	237.49	42.02	50.42	304.1	8.80	18.7

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0250 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0106	0.998	11.179	238.38	42.61	51.00	306.5	8.95	19.3
290.	0.0104	0.998	11.435	239.28	43.20	51.59	308.8	9.10	19.9
295.	0.0102	0.998	11.695	240.16	43.80	52.18	311.1	9.24	20.5
300.	0.0100	0.998	11.957	241.05	44.41	52.78	313.4	9.39	21.1
310.	0.0097	0.998	12.491	242.80	45.63	54.01	318.0	9.68	22.5
320.	0.0094	0.998	13.037	244.53	46.88	55.25	322.4	9.97	23.8
330.	0.0091	0.999	13.596	246.25	48.15	56.51	326.8	10.26	25.2
340.	0.0089	0.999	14.168	247.96	49.43	57.79	331.1	10.54	26.6
350.	0.0086	0.999	14.752	249.65	50.72	59.07	335.4	10.83	28.1
360.	0.0084	0.999	15.349	251.33	52.01	60.36	339.5	11.11	29.6
370.	0.0081	0.999	15.959	253.00	53.31	61.66	343.7	11.38	31.1
380.	0.0079	0.999	16.582	254.66	54.61	62.96	347.7	11.66	32.7
390.	0.0077	0.999	17.219	256.32	55.91	64.25	351.8	11.93	34.3
400.	0.0075	0.999	17.868	257.96	57.20	65.55	355.7	12.20	36.0
410.	0.0073	0.999	18.529	259.59	58.49	66.83	359.7	12.46	37.6
420.	0.0072	0.999	19.204	261.22	59.77	68.11	363.6	12.73	39.3
430.	0.0070	0.999	19.892	262.84	61.05	69.39	367.4	12.99	41.1
440.	0.0068	0.999	20.592	264.45	62.32	70.65	371.2	13.25	42.8
450.	0.0067	1.000	21.305	266.05	63.57	71.91	375.0	13.51	44.6
460.	0.0065	1.000	22.030	267.64	64.82	73.15	378.7	13.76	46.4
470.	0.0064	1.000	22.768	269.23	66.05	74.38	382.4	14.02	48.2
480.	0.0063	1.000	23.518	270.81	67.27	75.60	386.1	14.27	50.1
490.	0.0061	1.000	24.280	272.38	68.48	76.81	389.7	14.52	51.9
500.	0.0060	1.000	25.054	273.94	69.68	78.01	393.3	14.76	53.8
520.	0.0058	1.000	26.638	277.05	72.03	80.36	400.4		57.6
540.	0.0056	1.000	28.268	280.13	74.33	82.66	407.4		61.5
560.	0.0054	1.000	29.944	283.17	76.57	84.90	414.3		65.4
580.	0.0052	1.000	31.664	286.19	78.77	87.09	421.0		69.3
600.	0.0050	1.000	33.427	289.18	80.91	89.23	427.7		73.4
625.	0.0048	1.000	35.690	292.87	83.51	91.84	435.9		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.503	0.003	-14.571	80.04	47.93	68.71	1970.4	1057.57	252.1
100.	21.325	0.003	-14.223	83.60	48.15	70.11	1938.5	878.34	248.2
105.	21.145	0.003	-13.871	87.04	47.89	70.70	1904.1	742.36	244.0
110.	20.963	0.003	-13.517	90.33	47.39	70.82	1868.5	637.27	239.6
115.	20.780	0.003	-13.163	93.48	46.78	70.72	1832.3	554.56	235.0
120.	20.596	0.002	-12.810	96.49	46.14	70.52	1795.7	488.32	230.3
125.	20.412	0.002	-12.458	99.36	45.53	70.32	1759.0	434.41	225.6
130.	20.226	0.002	-12.107	102.11	44.97	70.15	1722.1	389.89	220.7
135.	20.039	0.002	-11.756	104.76	44.48	70.04	1685.1	352.61	215.8
140.	19.851	0.002	-11.406	107.31	44.05	70.01	1648.0	321.01	210.9
145.	19.662	0.002	-11.056	109.76	43.68	70.06	1610.8	293.92	206.0
150.	19.471	0.002	-10.706	112.14	43.38	70.18	1573.5	270.44	201.0
155.	19.278	0.002	-10.354	114.45	43.14	70.38	1536.2	249.91	196.1
160.	19.083	0.002	-10.002	116.68	42.95	70.65	1498.7	231.78	191.1
165.	18.886	0.002	-9.648	118.86	42.81	70.99	1461.1	215.66	186.1
170.	18.687	0.002	-9.292	120.99	42.71	71.40	1423.3	201.22	181.2
172.410	18.589	0.002	-9.119	121.99	42.68	71.62	1405.1	194.77	178.9
172.410	0.0355	0.981	6.063	210.05	29.12	37.58	243.5	5.50	8.4
175.	0.0350	0.982	6.162	210.62	30.17	38.77	244.8	5.58	8.6
180.	0.0340	0.983	6.360	211.74	31.54	40.27	247.8	5.74	9.0
185.	0.0330	0.984	6.563	212.85	32.41	41.19	250.9	5.89	9.4
190.	0.0321	0.985	6.771	213.96	33.05	41.84	254.0	6.05	9.8
195.	0.0313	0.986	6.982	215.05	33.58	42.35	257.2	6.20	10.2
200.	0.0305	0.987	7.194	216.13	34.05	42.80	260.3	6.36	10.6
205.	0.0297	0.988	7.410	217.19	34.50	43.22	263.3	6.52	11.0
210.	0.0290	0.989	7.627	218.24	34.94	43.64	266.3	6.67	11.5
215.	0.0283	0.990	7.846	219.27	35.38	44.05	269.3	6.83	11.9
220.	0.0276	0.990	8.067	220.29	35.84	44.48	272.1	6.98	12.4
225.	0.0270	0.991	8.291	221.30	36.29	44.92	275.0	7.14	12.8
230.	0.0264	0.992	8.516	222.29	36.76	45.37	277.8	7.29	13.3
235.	0.0258	0.992	8.744	223.27	37.25	45.83	280.6	7.44	13.8
240.	0.0252	0.993	8.975	224.24	37.74	46.31	283.3	7.60	14.3
245.	0.0247	0.993	9.208	225.20	38.24	46.79	285.9	7.75	14.8
250.	0.0242	0.994	9.443	226.15	38.76	47.29	288.6	7.90	15.3
255.	0.0237	0.994	9.680	227.09	39.28	47.81	291.1	8.05	15.9
260.	0.0233	0.994	9.921	228.02	39.82	48.33	293.7	8.21	16.4
265.	0.0228	0.995	10.164	228.95	40.36	48.87	296.2	8.36	17.0
270.	0.0224	0.995	10.409	229.87	40.92	49.41	298.7	8.51	17.5
275.	0.0220	0.995	10.658	230.78	41.49	49.97	301.2	8.66	18.1
280.	0.0216	0.995	10.909	231.68	42.06	50.53	303.6	8.81	18.7

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0212	0.996	11.163	232.58	42.64	51.11	306.0	8.95	19.3
290.	0.0208	0.996	11.420	233.48	43.23	51.69	308.4	9.10	19.9
295.	0.0205	0.996	11.680	234.37	43.83	52.28	310.7	9.25	20.5
300.	0.0201	0.996	11.943	235.25	44.43	52.88	313.0	9.40	21.2
310.	0.0195	0.997	12.478	237.00	45.66	54.09	317.6	9.69	22.5
320.	0.0188	0.997	13.025	238.74	46.90	55.33	322.1	9.98	23.8
330.	0.0183	0.997	13.584	240.46	48.17	56.58	326.5	10.26	25.2
340.	0.0177	0.998	14.157	242.17	49.44	57.85	330.8	10.55	26.6
350.	0.0172	0.998	14.741	243.86	50.73	59.13	335.1	10.83	28.1
360.	0.0167	0.998	15.339	245.55	52.02	60.42	339.3	11.11	29.6
370.	0.0163	0.998	15.950	247.22	53.32	61.71	343.4	11.39	31.1
380.	0.0159	0.998	16.573	248.88	54.62	63.00	347.5	11.66	32.7
390.	0.0154	0.998	17.210	250.54	55.92	64.29	351.6	11.93	34.3
400.	0.0151	0.999	17.859	252.18	57.21	65.58	355.6	12.20	36.0
410.	0.0147	0.999	18.521	253.82	58.50	66.87	359.5	12.47	37.6
420.	0.0143	0.999	19.197	255.44	59.78	68.15	363.4	12.73	39.3
430.	0.0140	0.999	19.884	257.06	61.06	69.42	367.3	13.00	41.1
440.	0.0137	0.999	20.585	258.67	62.32	70.68	371.1	13.26	42.8
450.	0.0134	0.999	21.298	260.27	63.58	71.94	374.9	13.51	44.6
460.	0.0131	0.999	22.024	261.87	64.82	73.18	378.6	13.77	46.4
470.	0.0128	0.999	22.762	263.46	66.05	74.41	382.3	14.02	48.2
480.	0.0125	0.999	23.512	265.04	67.28	75.63	386.0	14.27	50.1
490.	0.0123	0.999	24.274	266.61	68.48	76.83	389.6	14.52	51.9
500.	0.0120	0.999	25.048	268.17	69.68	78.03	393.2	14.77	53.8
520.	0.0116	0.999	26.633	271.28	72.03	80.38	400.3		57.6
540.	0.0111	1.000	28.263	274.36	74.33	82.67	407.3		61.5
560.	0.0107	1.000	29.939	277.40	76.58	84.92	414.2		65.4
580.	0.0104	1.000	31.659	280.42	78.77	87.11	421.0		69.4
600.	0.0100	1.000	33.423	283.41	80.91	89.25	427.7		73.4
625.	0.0096	1.000	35.687	287.11	83.52	91.85	435.9		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0750 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.504	0.004	-14.570	80.04	47.93	68.71	1970.5	1057.80	252.1
100.	21.326	0.004	-14.222	83.60	48.15	70.11	1938.6	878.51	248.2
105.	21.145	0.004	-13.870	87.04	47.89	70.69	1904.2	742.50	244.0
110.	20.963	0.004	-13.516	90.33	47.39	70.82	1868.6	637.38	239.6
115.	20.780	0.004	-13.162	93.48	46.78	70.71	1832.4	554.65	235.0
120.	20.597	0.004	-12.809	96.48	46.15	70.52	1795.8	488.40	230.3
125.	20.412	0.004	-12.457	99.36	45.53	70.31	1759.1	434.49	225.6
130.	20.226	0.003	-12.106	102.11	44.97	70.15	1722.2	389.96	220.7
135.	20.040	0.003	-11.755	104.76	44.48	70.04	1685.2	352.67	215.9
140.	19.852	0.003	-11.405	107.30	44.05	70.01	1648.1	321.07	210.9
145.	19.663	0.003	-11.055	109.76	43.68	70.06	1611.0	293.97	206.0
150.	19.472	0.003	-10.705	112.14	43.38	70.18	1573.7	270.49	201.0
155.	19.279	0.003	-10.353	114.44	43.14	70.38	1536.3	249.95	196.1
160.	19.084	0.003	-10.001	116.68	42.95	70.65	1498.8	231.83	191.1
165.	18.887	0.003	-9.647	118.86	42.81	70.99	1461.2	215.70	186.2
170.	18.687	0.003	-9.291	120.99	42.72	71.40	1423.5	201.26	181.3
175.	18.485	0.003	-8.933	123.06	42.66	71.87	1385.7	188.22	176.4
179.155	18.314	0.003	-8.633	124.75	42.65	72.32	1354.1	178.31	172.3
179.155	0.0517	0.974	6.296	208.08	30.13	38.95	246.5	5.71	9.0
180.	0.0514	0.974	6.329	208.27	30.46	39.32	246.9	5.74	9.1
185.	0.0500	0.976	6.530	209.37	31.92	40.90	249.8	5.89	9.4
190.	0.0486	0.978	6.737	210.47	32.85	41.86	252.9	6.05	9.8
195.	0.0472	0.979	6.948	211.57	33.52	42.52	256.0	6.21	10.2
200.	0.0460	0.981	7.162	212.65	34.06	43.04	259.2	6.36	10.7
205.	0.0448	0.982	7.379	213.72	34.55	43.49	262.3	6.52	11.1
210.	0.0437	0.983	7.597	214.78	35.01	43.91	265.3	6.68	11.5
215.	0.0426	0.985	7.818	215.81	35.46	44.32	268.3	6.83	12.0
220.	0.0416	0.986	8.040	216.84	35.91	44.73	271.3	6.99	12.4
225.	0.0406	0.987	8.265	217.85	36.37	45.16	274.2	7.14	12.9
230.	0.0397	0.987	8.492	218.84	36.84	45.59	277.0	7.30	13.3
235.	0.0388	0.988	8.721	219.83	37.31	46.04	279.8	7.45	13.8
240.	0.0380	0.989	8.952	220.80	37.80	46.50	282.6	7.60	14.3
245.	0.0372	0.990	9.186	221.77	38.30	46.98	285.3	7.76	14.8
250.	0.0364	0.990	9.422	222.72	38.81	47.47	287.9	7.91	15.4
255.	0.0357	0.991	9.661	223.67	39.33	47.97	290.5	8.06	15.9
260.	0.0350	0.991	9.902	224.60	39.87	48.48	293.1	8.21	16.4
265.	0.0343	0.992	10.145	225.53	40.41	49.01	295.7	8.36	17.0
270.	0.0337	0.992	10.392	226.45	40.96	49.54	298.2	8.51	17.6
275.	0.0330	0.993	10.641	227.37	41.52	50.09	300.7	8.66	18.1
280.	0.0324	0.993	10.893	228.27	42.10	50.65	303.1	8.81	18.7

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.0750 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0319	0.994	11.147	229.17	42.68	51.22	305.5	8.96	19.3
290.	0.0313	0.994	11.405	230.07	43.26	51.79	307.9	9.11	19.9
295.	0.0308	0.994	11.665	230.96	43.86	52.38	310.3	9.26	20.6
300.	0.0302	0.994	11.929	231.85	44.46	52.97	312.6	9.40	21.2
310.	0.0292	0.995	12.464	233.60	45.68	54.17	317.2	9.69	22.5
320.	0.0283	0.995	13.012	235.34	46.93	55.40	321.7	9.98	23.8
330.	0.0274	0.996	13.573	237.07	48.19	56.65	326.2	10.27	25.2
340.	0.0266	0.996	14.145	238.78	49.46	57.91	330.5	10.55	26.7
350.	0.0259	0.997	14.731	240.47	50.74	59.19	334.8	10.84	28.1
360.	0.0251	0.997	15.329	242.16	52.04	60.47	339.1	11.12	29.6
370.	0.0244	0.997	15.940	243.83	53.33	61.76	343.2	11.39	31.2
380.	0.0238	0.997	16.564	245.50	54.63	63.04	347.3	11.67	32.7
390.	0.0232	0.998	17.201	247.15	55.92	64.33	351.4	11.94	34.3
400.	0.0226	0.998	17.851	248.80	57.22	65.62	355.4	12.21	36.0
410.	0.0220	0.998	18.514	250.43	58.51	66.90	359.3	12.47	37.7
420.	0.0215	0.998	19.189	252.06	59.79	68.18	363.2	12.74	39.4
430.	0.0210	0.998	19.877	253.68	61.06	69.45	367.1	13.00	41.1
440.	0.0205	0.998	20.578	255.29	62.33	70.71	370.9	13.26	42.8
450.	0.0201	0.999	21.291	256.89	63.58	71.96	374.7	13.52	44.6
460.	0.0196	0.999	22.017	258.49	64.83	73.20	378.5	13.77	46.4
470.	0.0192	0.999	22.755	260.08	66.06	74.43	382.2	14.03	48.2
480.	0.0188	0.999	23.506	261.66	67.28	75.65	385.9	14.28	50.1
490.	0.0184	0.999	24.268	263.23	68.49	76.86	389.5	14.53	51.9
500.	0.0181	0.999	25.043	264.79	69.68	78.05	393.1	14.77	53.8
520.	0.0174	0.999	26.627	267.90	72.04	80.40	400.3		57.6
540.	0.0167	0.999	28.258	270.98	74.33	82.69	407.3		61.5
560.	0.0161	0.999	29.935	274.02	76.58	84.93	414.2		65.4
580.	0.0156	1.000	31.655	277.04	78.77	87.12	421.0		69.4
600.	0.0150	1.000	33.419	280.03	80.91	89.26	427.6		73.4
625.	0.0144	1.000	35.683	283.73	83.52	91.86	435.9		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.1000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.504	0.006	-14.569	80.04	47.93	68.71	1970.6	1058.02	252.2
100.	21.326	0.006	-14.221	83.60	48.15	70.11	1938.7	878.69	248.2
105.	21.146	0.005	-13.869	87.04	47.90	70.69	1904.3	742.64	244.0
110.	20.964	0.005	-13.515	90.33	47.39	70.82	1868.7	637.50	239.6
115.	20.781	0.005	-13.161	93.48	46.78	70.71	1832.5	554.75	235.0
120.	20.597	0.005	-12.808	96.48	46.15	70.52	1796.0	488.49	230.4
125.	20.412	0.005	-12.456	99.36	45.54	70.31	1759.2	434.56	225.6
130.	20.227	0.005	-12.105	102.11	44.98	70.15	1722.3	390.02	220.8
135.	20.040	0.004	-11.755	104.76	44.48	70.04	1685.4	352.73	215.9
140.	19.852	0.004	-11.404	107.30	44.05	70.01	1648.3	321.12	211.0
145.	19.663	0.004	-11.054	109.76	43.68	70.05	1611.1	294.02	206.0
150.	19.472	0.004	-10.704	112.14	43.38	70.18	1573.8	270.54	201.1
155.	19.279	0.004	-10.352	114.44	43.14	70.37	1536.5	250.00	196.1
160.	19.085	0.004	-10.000	116.68	42.95	70.65	1499.0	231.87	191.1
165.	18.888	0.004	-9.646	118.86	42.81	70.99	1461.4	215.75	186.2
170.	18.688	0.004	-9.290	120.98	42.72	71.40	1423.7	201.30	181.3
175.	18.486	0.004	-8.932	123.06	42.67	71.87	1385.9	188.26	176.4
180.	18.280	0.004	-8.571	125.09	42.65	72.41	1347.8	176.42	171.5
184.309	18.100	0.004	-8.258	126.81	42.67	72.93	1315.0	167.06	167.4
184.309	0.0675	0.967	6.470	206.72	30.99	40.15	248.5	5.88	9.5
185.	0.0672	0.968	6.498	206.87	31.23	40.41	248.8	5.90	9.5
190.	0.0653	0.970	6.704	207.97	32.55	41.80	251.8	6.06	9.9
195.	0.0634	0.972	6.915	209.06	33.41	42.66	254.9	6.21	10.3
200.	0.0617	0.974	7.130	210.15	34.06	43.27	258.1	6.37	10.7
205.	0.0601	0.976	7.347	211.23	34.59	43.75	261.2	6.52	11.1
210.	0.0586	0.978	7.567	212.29	35.08	44.18	264.3	6.68	11.6
215.	0.0571	0.979	7.789	213.33	35.54	44.59	267.4	6.84	12.0
220.	0.0557	0.981	8.013	214.36	35.99	44.99	270.4	6.99	12.5
225.	0.0544	0.982	8.239	215.38	36.45	45.40	273.3	7.15	12.9
230.	0.0532	0.983	8.467	216.38	36.91	45.82	276.2	7.30	13.4
235.	0.0520	0.984	8.697	217.37	37.38	46.25	279.1	7.45	13.9
240.	0.0509	0.985	8.930	218.35	37.87	46.70	281.8	7.61	14.4
245.	0.0498	0.986	9.164	219.32	38.36	47.16	284.6	7.76	14.9
250.	0.0487	0.987	9.401	220.27	38.87	47.64	287.3	7.91	15.4
255.	0.0477	0.988	9.641	221.22	39.39	48.13	289.9	8.07	15.9
260.	0.0468	0.989	9.883	222.16	39.92	48.63	292.5	8.22	16.5
265.	0.0459	0.989	10.127	223.09	40.46	49.15	295.1	8.37	17.0
270.	0.0450	0.990	10.374	224.02	41.00	49.68	297.7	8.52	17.6
275.	0.0442	0.990	10.624	224.93	41.56	50.22	300.2	8.67	18.2
280.	0.0434	0.991	10.876	225.84	42.13	50.77	302.6	8.82	18.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.1000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0426	0.991	11.132	226.75	42.71	51.33	305.1	8.97	19.3
290.	0.0418	0.992	11.390	227.64	43.29	51.90	307.5	9.11	20.0
295.	0.0411	0.992	11.651	228.53	43.89	52.48	309.9	9.26	20.6
300.	0.0404	0.993	11.914	229.42	44.49	53.06	312.2	9.41	21.2
310.	0.0391	0.993	12.451	231.18	45.71	54.26	316.9	9.70	22.5
320.	0.0378	0.994	13.000	232.92	46.95	55.48	321.4	9.99	23.9
330.	0.0366	0.995	13.561	234.65	48.20	56.72	325.9	10.28	25.2
340.	0.0356	0.995	14.134	236.36	49.48	57.97	330.3	10.56	26.7
350.	0.0345	0.995	14.720	238.06	50.76	59.24	334.6	10.84	28.1
360.	0.0335	0.996	15.319	239.75	52.05	60.52	338.8	11.12	29.6
370.	0.0326	0.996	15.931	241.42	53.34	61.80	343.0	11.40	31.2
380.	0.0318	0.997	16.555	243.09	54.64	63.09	347.1	11.67	32.8
390.	0.0309	0.997	17.192	244.74	55.93	64.38	351.2	11.94	34.4
400.	0.0302	0.997	17.843	246.39	57.23	65.66	355.2	12.21	36.0
410.	0.0294	0.997	18.506	248.03	58.51	66.94	359.2	12.48	37.7
420.	0.0287	0.998	19.181	249.65	59.79	68.21	363.1	12.74	39.4
430.	0.0280	0.998	19.870	251.27	61.07	69.48	367.0	13.01	41.1
440.	0.0274	0.998	20.571	252.89	62.33	70.74	370.8	13.27	42.8
450.	0.0268	0.998	21.285	254.49	63.59	71.99	374.6	13.52	44.6
460.	0.0262	0.998	22.011	256.09	64.83	73.23	378.4	13.78	46.4
470.	0.0256	0.998	22.749	257.67	66.06	74.46	382.1	14.03	48.2
480.	0.0251	0.999	23.500	259.25	67.28	75.67	385.8	14.28	50.1
490.	0.0246	0.999	24.263	260.83	68.49	76.88	389.4	14.53	51.9
500.	0.0241	0.999	25.037	262.39	69.69	78.07	393.1	14.78	53.8
520.	0.0232	0.999	26.622	265.50	72.04	80.41	400.2		57.6
540.	0.0223	0.999	28.254	268.58	74.34	82.71	407.2		61.5
560.	0.0215	0.999	29.930	271.63	76.58	84.95	414.1		65.4
580.	0.0207	0.999	31.651	274.65	78.77	87.14	420.9		69.4
600.	0.0201	1.000	33.415	277.64	80.91	89.27	427.6		73.4
625.	0.0193	1.000	35.680	281.33	83.52	91.87	435.8		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.101 325 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.504	0.006	-14.569	80.03	47.93	68.71	1970.6	1058.03	252.2
100.	21.326	0.006	-14.221	83.60	48.15	70.11	1938.7	878.69	248.2
105.	21.146	0.005	-13.869	87.04	47.90	70.69	1904.3	742.64	244.0
110.	20.964	0.005	-13.515	90.33	47.39	70.82	1868.7	637.50	239.6
115.	20.781	0.005	-13.161	93.48	46.78	70.71	1832.5	554.76	235.0
120.	20.597	0.005	-12.808	96.48	46.15	70.52	1796.0	488.49	230.4
125.	20.412	0.005	-12.456	99.36	45.54	70.31	1759.2	434.57	225.6
130.	20.227	0.005	-12.105	102.11	44.98	70.15	1722.4	390.03	220.8
135.	20.040	0.005	-11.755	104.76	44.48	70.04	1685.4	352.74	215.9
140.	19.852	0.004	-11.404	107.30	44.05	70.01	1648.3	321.13	211.0
145.	19.663	0.004	-11.054	109.76	43.68	70.05	1611.1	294.02	206.0
150.	19.472	0.004	-10.704	112.14	43.38	70.18	1573.8	270.54	201.1
155.	19.279	0.004	-10.352	114.44	43.14	70.37	1536.5	250.00	196.1
160.	19.085	0.004	-10.000	116.68	42.95	70.65	1499.0	231.87	191.1
165.	18.888	0.004	-9.646	118.86	42.81	70.99	1461.4	215.75	186.2
170.	18.688	0.004	-9.290	120.98	42.72	71.40	1423.7	201.30	181.3
175.	18.486	0.004	-8.932	123.06	42.67	71.87	1385.9	188.26	176.4
180.	18.280	0.004	-8.571	125.09	42.65	72.41	1347.9	176.43	171.5
184.552	18.090	0.004	-8.240	126.91	42.67	72.96	1313.1	166.55	167.1
184.552	0.0683	0.967	6.478	206.66	31.03	40.21	248.6	5.88	9.5
185.	0.0681	0.967	6.496	206.75	31.19	40.38	248.8	5.90	9.5
190.	0.0662	0.969	6.702	207.85	32.53	41.79	251.8	6.06	9.9
195.	0.0643	0.972	6.913	208.95	33.41	42.67	254.9	6.21	10.3
200.	0.0626	0.974	7.128	210.04	34.06	43.28	258.0	6.37	10.7
205.	0.0609	0.976	7.346	211.11	34.60	43.77	261.2	6.52	11.1
210.	0.0594	0.977	7.566	212.17	35.08	44.19	264.3	6.68	11.6
215.	0.0579	0.979	7.788	213.22	35.54	44.60	267.3	6.84	12.0
220.	0.0565	0.980	8.012	214.25	36.00	45.00	270.3	6.99	12.5
225.	0.0552	0.982	8.238	215.26	36.45	45.41	273.3	7.15	12.9
230.	0.0539	0.983	8.466	216.27	36.92	45.83	276.2	7.30	13.4
235.	0.0527	0.984	8.696	217.26	37.39	46.27	279.0	7.45	13.9
240.	0.0515	0.985	8.928	218.23	37.87	46.71	281.8	7.61	14.4
245.	0.0504	0.986	9.163	219.20	38.37	47.17	284.5	7.76	14.9
250.	0.0494	0.987	9.400	220.16	38.87	47.65	287.2	7.91	15.4
255.	0.0484	0.988	9.640	221.11	39.39	48.14	289.9	8.07	15.9
260.	0.0474	0.988	9.882	222.05	39.92	48.64	292.5	8.22	16.5
265.	0.0465	0.989	10.126	222.98	40.46	49.16	295.1	8.37	17.0
270.	0.0456	0.990	10.373	223.90	41.01	49.69	297.6	8.52	17.6
275.	0.0448	0.990	10.623	224.82	41.57	50.22	300.1	8.67	18.2
280.	0.0439	0.991	10.875	225.73	42.13	50.77	302.6	8.82	18.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.101 325 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0431	0.991	11.131	226.63	42.71	51.33	305.0	8.97	19.4
290.	0.0424	0.992	11.389	227.53	43.30	51.90	307.5	9.11	20.0
295.	0.0416	0.992	11.650	228.42	43.89	52.48	309.8	9.26	20.6
300.	0.0409	0.993	11.914	229.31	44.49	53.07	312.2	9.41	21.2
310.	0.0396	0.993	12.450	231.07	45.71	54.26	316.8	9.70	22.5
320.	0.0383	0.994	12.999	232.81	46.95	55.48	321.4	9.99	23.9
330.	0.0371	0.994	13.560	234.54	48.21	56.72	325.9	10.28	25.2
340.	0.0360	0.995	14.133	236.25	49.48	57.98	330.2	10.56	26.7
350.	0.0350	0.995	14.720	237.95	50.76	59.25	334.5	10.84	28.1
360.	0.0340	0.996	15.318	239.64	52.05	60.52	338.8	11.12	29.6
370.	0.0331	0.996	15.930	241.31	53.34	61.81	343.0	11.40	31.2
380.	0.0322	0.997	16.555	242.98	54.64	63.09	347.1	11.67	32.8
390.	0.0313	0.997	17.192	244.63	55.93	64.38	351.2	11.94	34.4
400.	0.0306	0.997	17.842	246.28	57.23	65.66	355.2	12.21	36.0
410.	0.0298	0.997	18.505	247.92	58.51	66.94	359.2	12.48	37.7
420.	0.0291	0.998	19.181	249.54	59.80	68.22	363.1	12.74	39.4
430.	0.0284	0.998	19.869	251.16	61.07	69.48	367.0	13.01	41.1
440.	0.0278	0.998	20.571	252.78	62.33	70.74	370.8	13.27	42.8
450.	0.0271	0.998	21.284	254.38	63.59	71.99	374.6	13.52	44.6
460.	0.0265	0.998	22.010	255.98	64.83	73.23	378.4	13.78	46.4
470.	0.0260	0.998	22.749	257.56	66.06	74.46	382.1	14.03	48.2
480.	0.0254	0.999	23.499	259.14	67.28	75.68	385.8	14.28	50.1
490.	0.0249	0.999	24.262	260.72	68.49	76.88	389.4	14.53	51.9
500.	0.0244	0.999	25.037	262.28	69.69	78.07	393.1	14.78	53.8
520.	0.0235	0.999	26.622	265.39	72.04	80.42	400.2		57.6
540.	0.0226	0.999	28.253	268.47	74.34	82.71	407.2		61.5
560.	0.0218	0.999	29.930	271.52	76.58	84.95	414.1		65.4
580.	0.0210	0.999	31.651	274.54	78.77	87.14	420.9		69.4
600.	0.0203	1.000	33.415	277.53	80.91	89.27	427.6		73.4
625.	0.0195	1.000	35.680	281.22	83.52	91.87	435.8		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.1500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.505	0.009	-14.567	80.03	47.93	68.70	1970.8	1058.47	252.2
100.	21.327	0.008	-14.219	83.60	48.15	70.11	1938.9	879.03	248.2
105.	21.146	0.008	-13.867	87.03	47.90	70.69	1904.5	742.91	244.0
110.	20.965	0.008	-13.513	90.33	47.39	70.82	1868.9	637.73	239.6
115.	20.782	0.008	-13.159	93.47	46.78	70.71	1832.7	554.95	235.1
120.	20.598	0.007	-12.806	96.48	46.15	70.52	1796.2	488.65	230.4
125.	20.413	0.007	-12.454	99.35	45.54	70.31	1759.5	434.71	225.6
130.	20.228	0.007	-12.103	102.11	44.98	70.14	1722.6	390.15	220.8
135.	20.041	0.007	-11.753	104.75	44.48	70.04	1685.6	352.85	215.9
140.	19.853	0.006	-11.403	107.30	44.05	70.00	1648.5	321.23	211.0
145.	19.664	0.006	-11.053	109.75	43.69	70.05	1611.4	294.12	206.0
150.	19.473	0.006	-10.702	112.13	43.38	70.17	1574.1	270.63	201.1
155.	19.281	0.006	-10.351	114.43	43.14	70.37	1536.8	250.09	196.1
160.	19.086	0.006	-9.998	116.67	42.95	70.64	1499.3	231.95	191.2
165.	18.889	0.006	-9.644	118.85	42.81	70.98	1461.7	215.83	186.2
170.	18.689	0.006	-9.288	120.98	42.72	71.39	1424.1	201.37	181.3
175.	18.487	0.006	-8.930	123.05	42.67	71.86	1386.2	188.33	176.4
180.	18.282	0.005	-8.570	125.08	42.65	72.40	1348.2	176.50	171.6
185.	18.073	0.005	-8.206	127.08	42.68	73.01	1310.1	165.69	166.7
190.	17.860	0.005	-7.839	129.03	42.73	73.68	1271.7	155.77	162.0
192.154	17.767	0.005	-7.680	129.86	42.77	74.00	1255.1	151.74	159.9
192.154	0.0983	0.956	6.726	204.83	32.41	42.20	251.0	6.13	10.2
195.	0.0966	0.957	6.847	205.46	33.11	42.89	252.8	6.22	10.4
200.	0.0939	0.961	7.063	206.56	34.00	43.73	255.9	6.38	10.8
205.	0.0913	0.964	7.284	207.65	34.66	44.30	259.2	6.53	11.2
210.	0.0889	0.966	7.506	208.72	35.20	44.75	262.3	6.69	11.7
215.	0.0866	0.969	7.731	209.78	35.69	45.15	265.5	6.85	12.1
220.	0.0845	0.971	7.958	210.82	36.15	45.53	268.6	7.00	12.5
225.	0.0824	0.973	8.186	211.85	36.60	45.91	271.6	7.16	13.0
230.	0.0805	0.975	8.417	212.86	37.06	46.30	274.6	7.31	13.5
235.	0.0786	0.976	8.649	213.86	37.53	46.70	277.5	7.46	14.0
240.	0.0769	0.978	8.884	214.85	38.00	47.12	280.4	7.62	14.4
245.	0.0752	0.979	9.120	215.82	38.49	47.55	283.2	7.77	14.9
250.	0.0736	0.980	9.359	216.79	38.99	48.00	286.0	7.92	15.5
255.	0.0721	0.982	9.600	217.74	39.49	48.47	288.7	8.08	16.0
260.	0.0706	0.983	9.844	218.69	40.02	48.95	291.4	8.23	16.5
265.	0.0692	0.984	10.090	219.63	40.55	49.44	294.0	8.38	17.1
270.	0.0679	0.985	10.338	220.55	41.09	49.95	296.6	8.53	17.6
275.	0.0666	0.985	10.590	221.48	41.64	50.47	299.1	8.68	18.2
280.	0.0653	0.986	10.843	222.39	42.21	51.01	301.7	8.83	18.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.1500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0641	0.987	11.100	223.30	42.78	51.56	304.1	8.98	19.4
290.	0.0630	0.988	11.359	224.20	43.36	52.11	306.6	9.13	20.0
295.	0.0619	0.988	11.621	225.09	43.95	52.68	309.0	9.27	20.6
300.	0.0608	0.989	11.886	225.99	44.54	53.25	311.4	9.42	21.3
310.	0.0588	0.990	12.424	227.75	45.75	54.43	316.1	9.71	22.6
320.	0.0569	0.991	12.974	229.50	46.99	55.63	320.7	10.00	23.9
330.	0.0551	0.992	13.537	231.23	48.24	56.86	325.2	10.29	25.3
340.	0.0535	0.993	14.111	232.94	49.51	58.10	329.7	10.57	26.7
350.	0.0519	0.993	14.699	234.65	50.79	59.36	334.0	10.85	28.2
360.	0.0504	0.994	15.299	236.34	52.07	60.63	338.3	11.13	29.7
370.	0.0490	0.994	15.911	238.01	53.37	61.90	342.5	11.41	31.2
380.	0.0477	0.995	16.537	239.68	54.66	63.18	346.7	11.68	32.8
390.	0.0465	0.995	17.175	241.34	55.95	64.46	350.8	11.95	34.4
400.	0.0453	0.996	17.826	242.99	57.24	65.74	354.8	12.22	36.0
410.	0.0442	0.996	18.490	244.63	58.53	67.01	358.8	12.49	37.7
420.	0.0431	0.996	19.166	246.26	59.81	68.28	362.8	12.75	39.4
430.	0.0421	0.997	19.855	247.88	61.08	69.54	366.7	13.02	41.1
440.	0.0411	0.997	20.557	249.49	62.34	70.80	370.6	13.28	42.9
450.	0.0402	0.997	21.271	251.10	63.60	72.05	374.4	13.53	44.6
460.	0.0393	0.997	21.998	252.69	64.84	73.28	378.2	13.79	46.4
470.	0.0385	0.998	22.737	254.28	66.07	74.51	381.9	14.04	48.3
480.	0.0377	0.998	23.488	255.86	67.29	75.72	385.6	14.29	50.1
490.	0.0369	0.998	24.251	257.44	68.50	76.92	389.3	14.54	52.0
500.	0.0361	0.998	25.026	259.00	69.70	78.11	392.9	14.79	53.8
520.	0.0347	0.998	26.612	262.11	72.05	80.45	400.1		57.6
540.	0.0335	0.999	28.244	265.19	74.34	82.74	407.1		61.5
560.	0.0323	0.999	29.921	268.24	76.59	84.98	414.0		65.4
580.	0.0311	0.999	31.643	271.26	78.78	87.16	420.9		69.4
600.	0.0301	0.999	33.408	274.25	80.92	89.30	427.6		73.4
625.	0.0289	0.999	35.673	277.95	83.52	91.90	435.8		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.2000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.505	0.012	-14.565	80.03	47.93	68.70	1971.0	1058.91	252.2
100.	21.327	0.011	-14.217	83.59	48.15	70.11	1939.2	879.38	248.2
105.	21.147	0.011	-13.865	87.03	47.90	70.69	1904.8	743.19	244.0
110.	20.965	0.010	-13.511	90.32	47.40	70.81	1869.2	637.96	239.6
115.	20.782	0.010	-13.157	93.47	46.79	70.71	1833.0	555.14	235.1
120.	20.599	0.010	-12.804	96.47	46.15	70.51	1796.4	488.82	230.4
125.	20.414	0.009	-12.452	99.35	45.54	70.31	1759.7	434.86	225.7
130.	20.229	0.009	-12.101	102.10	44.98	70.14	1722.8	390.29	220.8
135.	20.042	0.009	-11.751	104.75	44.48	70.03	1685.9	352.97	215.9
140.	19.854	0.009	-11.401	107.29	44.05	70.00	1648.8	321.34	211.0
145.	19.665	0.008	-11.051	109.75	43.69	70.05	1611.7	294.22	206.1
150.	19.474	0.008	-10.700	112.13	43.39	70.17	1574.4	270.73	201.1
155.	19.282	0.008	-10.349	114.43	43.14	70.36	1537.1	250.17	196.2
160.	19.087	0.008	-9.996	116.67	42.95	70.63	1499.6	232.04	191.2
165.	18.890	0.008	-9.642	118.85	42.82	70.97	1462.1	215.91	186.3
170.	18.691	0.008	-9.287	120.97	42.72	71.38	1424.4	201.45	181.4
175.	18.488	0.007	-8.928	123.05	42.67	71.85	1386.6	188.41	176.5
180.	18.283	0.007	-8.568	125.08	42.66	72.39	1348.6	176.57	171.6
185.	18.074	0.007	-8.204	127.07	42.68	73.00	1310.5	165.76	166.8
190.	17.862	0.007	-7.838	129.03	42.74	73.67	1272.1	155.84	162.0
195.	17.645	0.007	-7.468	130.95	42.82	74.42	1233.5	146.69	157.3
198.179	17.505	0.007	-7.230	132.16	42.90	74.93	1208.9	141.23	154.3
198.179	0.1284	0.945	6.914	203.53	33.56	43.93	252.6	6.33	10.8
200.	0.1271	0.947	6.994	203.93	33.94	44.26	253.7	6.39	11.0
205.	0.1234	0.951	7.218	205.03	34.73	44.92	257.0	6.54	11.4
210.	0.1200	0.954	7.443	206.12	35.34	45.39	260.3	6.70	11.8
215.	0.1168	0.958	7.671	207.19	35.85	45.77	263.6	6.86	12.2
220.	0.1138	0.961	7.901	208.25	36.32	46.11	266.8	7.01	12.6
225.	0.1110	0.963	8.132	209.29	36.77	46.45	269.9	7.17	13.1
230.	0.1083	0.966	8.366	210.32	37.22	46.80	273.0	7.32	13.6
235.	0.1057	0.968	8.600	211.33	37.68	47.17	276.0	7.48	14.0
240.	0.1033	0.970	8.837	212.32	38.14	47.55	278.9	7.63	14.5
245.	0.1010	0.972	9.076	213.31	38.62	47.95	281.8	7.78	15.0
250.	0.0988	0.974	9.317	214.28	39.10	48.37	284.7	7.94	15.5
255.	0.0967	0.975	9.560	215.24	39.61	48.81	287.4	8.09	16.1
260.	0.0947	0.977	9.805	216.19	40.12	49.27	290.2	8.24	16.6
265.	0.0928	0.978	10.052	217.14	40.64	49.75	292.9	8.39	17.1
270.	0.0910	0.979	10.302	218.07	41.18	50.23	295.5	8.54	17.7
275.	0.0892	0.981	10.555	219.00	41.72	50.74	298.1	8.69	18.3
280.	0.0875	0.982	10.810	219.92	42.28	51.26	300.7	8.84	18.9

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.2000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.0859	0.983	11.067	220.83	42.85	51.79	303.2	8.99	19.5
290.	0.0843	0.983	11.328	221.73	43.42	52.33	305.7	9.14	20.1
295.	0.0828	0.984	11.591	222.63	44.01	52.88	308.2	9.28	20.7
300.	0.0814	0.985	11.857	223.53	44.60	53.45	310.6	9.43	21.3
310.	0.0786	0.987	12.397	225.30	45.80	54.60	315.4	9.72	22.6
320.	0.0761	0.988	12.949	227.05	47.03	55.79	320.0	10.01	23.9
330.	0.0737	0.989	13.513	228.79	48.28	57.00	324.6	10.30	25.3
340.	0.0715	0.990	14.089	230.51	49.54	58.23	329.1	10.58	26.7
350.	0.0694	0.991	14.677	232.21	50.82	59.47	333.5	10.86	28.2
360.	0.0674	0.992	15.278	233.90	52.10	60.73	337.8	11.14	29.7
370.	0.0655	0.992	15.892	235.59	53.39	62.00	342.1	11.42	31.2
380.	0.0637	0.993	16.518	237.26	54.68	63.27	346.3	11.69	32.8
390.	0.0621	0.994	17.157	238.92	55.97	64.54	350.4	11.96	34.4
400.	0.0605	0.994	17.809	240.57	57.26	65.81	354.5	12.23	36.1
410.	0.0590	0.995	18.474	242.21	58.54	67.08	358.5	12.50	37.7
420.	0.0576	0.995	19.151	243.84	59.82	68.35	362.5	12.76	39.4
430.	0.0562	0.996	19.841	245.46	61.09	69.61	366.4	13.03	41.1
440.	0.0549	0.996	20.543	247.08	62.36	70.86	370.3	13.29	42.9
450.	0.0537	0.996	21.258	248.68	63.61	72.10	374.1	13.54	44.7
460.	0.0525	0.997	21.985	250.28	64.85	73.33	377.9	13.80	46.5
470.	0.0513	0.997	22.724	251.87	66.08	74.56	381.7	14.05	48.3
480.	0.0503	0.997	23.476	253.45	67.30	75.77	385.4	14.30	50.1
490.	0.0492	0.997	24.240	255.03	68.51	76.97	389.1	14.55	52.0
500.	0.0482	0.998	25.015	256.59	69.70	78.15	392.7	14.80	53.8
520.	0.0464	0.998	26.602	259.71	72.05	80.49	399.9		57.6
540.	0.0446	0.998	28.235	262.79	74.35	82.78	407.0		61.5
560.	0.0430	0.999	29.912	265.84	76.59	85.01	414.0		65.4
580.	0.0415	0.999	31.635	268.86	78.78	87.19	420.8		69.4
600.	0.0401	0.999	33.400	271.85	80.92	89.32	427.5		73.4
625.	0.0385	0.999	35.666	275.55	83.53	91.92	435.8		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.2500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.506	0.015	-14.563	80.02	47.93	68.70	1971.2	1059.36	252.2
100.	21.328	0.014	-14.216	83.59	48.15	70.10	1939.4	879.73	248.3
105.	21.148	0.014	-13.863	87.02	47.90	70.69	1905.0	743.47	244.1
110.	20.966	0.013	-13.509	90.32	47.40	70.81	1869.4	638.19	239.7
115.	20.783	0.013	-13.156	93.46	46.79	70.71	1833.2	555.34	235.1
120.	20.599	0.012	-12.802	96.47	46.15	70.51	1796.7	488.99	230.4
125.	20.415	0.012	-12.450	99.34	45.54	70.31	1759.9	435.00	225.7
130.	20.229	0.011	-12.099	102.10	44.98	70.14	1723.1	390.42	220.9
135.	20.043	0.011	-11.749	104.74	44.48	70.03	1686.1	353.09	216.0
140.	19.855	0.011	-11.399	107.29	44.05	70.00	1649.1	321.45	211.1
145.	19.666	0.011	-11.049	109.74	43.69	70.04	1611.9	294.32	206.1
150.	19.475	0.010	-10.698	112.12	43.39	70.16	1574.7	270.82	201.2
155.	19.283	0.010	-10.347	114.42	43.15	70.36	1537.4	250.26	196.2
160.	19.088	0.010	-9.995	116.66	42.96	70.63	1500.0	232.12	191.2
165.	18.891	0.010	-9.641	118.84	42.82	70.97	1462.4	215.99	186.3
170.	18.692	0.009	-9.285	120.96	42.72	71.37	1424.8	201.53	181.4
175.	18.490	0.009	-8.927	123.04	42.67	71.85	1387.0	188.49	176.5
180.	18.285	0.009	-8.566	125.07	42.66	72.39	1349.0	176.65	171.7
185.	18.076	0.009	-8.203	127.06	42.68	72.99	1310.9	165.83	166.8
190.	17.864	0.009	-7.836	129.02	42.74	73.66	1272.6	155.91	162.0
195.	17.647	0.009	-7.466	130.94	42.83	74.40	1234.0	146.76	157.3
200.	17.426	0.009	-7.092	132.84	42.94	75.22	1195.2	138.28	152.6
203.144	17.285	0.009	-6.855	134.01	43.03	75.78	1170.6	133.25	149.7
203.144	0.1583	0.935	7.064	202.53	34.54	45.46	253.6	6.50	11.3
205.	0.1565	0.937	7.149	202.95	34.85	45.68	254.8	6.55	11.5
210.	0.1520	0.942	7.378	204.05	35.51	46.12	258.2	6.71	11.9
215.	0.1478	0.946	7.610	205.14	36.03	46.46	261.6	6.87	12.3
220.	0.1438	0.950	7.843	206.21	36.50	46.75	264.9	7.02	12.7
225.	0.1401	0.954	8.077	207.27	36.95	47.04	268.1	7.18	13.2
230.	0.1366	0.957	8.313	208.30	37.39	47.34	271.3	7.33	13.6
235.	0.1333	0.960	8.551	209.33	37.83	47.66	274.4	7.49	14.1
240.	0.1302	0.962	8.790	210.33	38.28	48.01	277.4	7.64	14.6
245.	0.1272	0.965	9.031	211.33	38.75	48.37	280.4	7.79	15.1
250.	0.1244	0.967	9.274	212.31	39.23	48.76	283.3	7.95	15.6
255.	0.1217	0.969	9.518	213.28	39.72	49.18	286.2	8.10	16.1
260.	0.1191	0.971	9.765	214.24	40.22	49.61	289.0	8.25	16.7
265.	0.1167	0.973	10.015	215.18	40.74	50.06	291.7	8.40	17.2
270.	0.1143	0.974	10.266	216.12	41.27	50.53	294.4	8.55	17.8
275.	0.1121	0.976	10.520	217.06	41.81	51.01	297.1	8.70	18.3
280.	0.1099	0.977	10.776	217.98	42.36	51.51	299.7	8.85	18.9

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.2500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.1079	0.978	11.035	218.90	42.92	52.03	302.3	9.00	19.5
290.	0.1059	0.979	11.296	219.81	43.49	52.56	304.8	9.15	20.1
295.	0.1040	0.980	11.561	220.71	44.07	53.10	307.3	9.30	20.7
300.	0.1021	0.981	11.827	221.61	44.65	53.65	309.8	9.44	21.4
310.	0.0986	0.983	12.370	223.38	45.85	54.78	314.6	9.73	22.6
320.	0.0954	0.985	12.923	225.14	47.07	55.95	319.3	10.02	24.0
330.	0.0924	0.986	13.489	226.88	48.32	57.14	324.0	10.31	25.4
340.	0.0896	0.988	14.066	228.60	49.57	58.36	328.5	10.59	26.8
350.	0.0869	0.989	14.656	230.31	50.85	59.59	332.9	10.87	28.2
360.	0.0844	0.990	15.258	232.01	52.13	60.84	337.3	11.15	29.7
370.	0.0820	0.991	15.873	233.69	53.41	62.10	341.6	11.43	31.3
380.	0.0798	0.991	16.500	235.37	54.70	63.36	345.8	11.70	32.8
390.	0.0777	0.992	17.140	237.03	55.99	64.63	350.0	11.98	34.4
400.	0.0757	0.993	17.792	238.68	57.28	65.89	354.1	12.24	36.1
410.	0.0738	0.993	18.458	240.32	58.56	67.16	358.2	12.51	37.7
420.	0.0720	0.994	19.136	241.96	59.84	68.42	362.2	12.77	39.4
430.	0.0703	0.994	19.826	243.58	61.11	69.67	366.1	13.04	41.2
440.	0.0687	0.995	20.529	245.20	62.37	70.92	370.0	13.30	42.9
450.	0.0671	0.995	21.244	246.81	63.62	72.16	373.9	13.55	44.7
460.	0.0657	0.996	21.972	248.40	64.86	73.39	377.7	13.81	46.5
470.	0.0642	0.996	22.712	250.00	66.09	74.61	381.5	14.06	48.3
480.	0.0629	0.996	23.464	251.58	67.31	75.81	385.2	14.31	50.1
490.	0.0616	0.997	24.228	253.15	68.52	77.01	388.9	14.56	52.0
500.	0.0603	0.997	25.004	254.72	69.71	78.20	392.6	14.81	53.9
520.	0.0580	0.997	26.592	257.84	72.06	80.53	399.8		57.7
540.	0.0558	0.998	28.225	260.92	74.35	82.81	406.9		61.5
560.	0.0538	0.998	29.904	263.97	76.60	85.04	413.9		65.4
580.	0.0519	0.998	31.626	266.99	78.79	87.22	420.7		69.4
600.	0.0502	0.999	33.392	269.98	80.93	89.35	427.5		73.4
625.	0.0482	0.999	35.658	273.69	83.53	91.95	435.7		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.3000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.506	0.018	-14.561	80.02	47.93	68.70	1971.5	1059.81	252.2
100.	21.329	0.017	-14.214	83.58	48.15	70.10	1939.6	880.08	248.3
105.	21.148	0.016	-13.861	87.02	47.90	70.68	1905.2	743.75	244.1
110.	20.967	0.016	-13.507	90.31	47.40	70.81	1869.6	638.42	239.7
115.	20.784	0.015	-13.154	93.46	46.79	70.70	1833.4	555.53	235.1
120.	20.600	0.015	-12.801	96.46	46.15	70.51	1796.9	489.16	230.5
125.	20.416	0.014	-12.449	99.34	45.54	70.30	1760.2	435.15	225.7
130.	20.230	0.014	-12.097	102.09	44.98	70.13	1723.3	390.55	220.9
135.	20.044	0.013	-11.747	104.74	44.49	70.03	1686.4	353.21	216.0
140.	19.856	0.013	-11.397	107.28	44.06	69.99	1649.4	321.56	211.1
145.	19.667	0.013	-11.047	109.74	43.69	70.04	1612.2	294.43	206.1
150.	19.477	0.012	-10.697	112.12	43.39	70.16	1575.0	270.92	201.2
155.	19.284	0.012	-10.345	114.42	43.15	70.35	1537.7	250.35	196.2
160.	19.090	0.012	-9.993	116.66	42.96	70.62	1500.3	232.21	191.3
165.	18.893	0.012	-9.639	118.83	42.82	70.96	1462.8	216.07	186.3
170.	18.693	0.011	-9.283	120.96	42.73	71.37	1425.1	201.61	181.4
175.	18.491	0.011	-8.925	123.03	42.68	71.84	1387.3	188.56	176.6
180.	18.286	0.011	-8.565	125.07	42.66	72.38	1349.4	176.72	171.7
185.	18.078	0.011	-8.201	127.06	42.68	72.98	1311.3	165.91	166.9
190.	17.865	0.011	-7.835	129.01	42.74	73.65	1273.0	155.98	162.1
195.	17.649	0.010	-7.465	130.93	42.83	74.39	1234.5	146.83	157.3
200.	17.428	0.010	-7.091	132.83	42.95	75.21	1195.7	138.35	152.6
205.	17.202	0.010	-6.712	134.70	43.09	76.11	1156.5	130.45	148.0
207.404	17.092	0.010	-6.529	135.59	43.17	76.57	1137.6	126.85	145.8
207.404	0.1878	0.926	7.188	201.72	35.40	46.84	254.2	6.64	11.8
210.	0.1849	0.929	7.310	202.31	35.73	47.01	256.0	6.72	12.0
215.	0.1795	0.935	7.546	203.42	36.26	47.25	259.5	6.88	12.4
220.	0.1745	0.940	7.783	204.51	36.71	47.47	262.9	7.04	12.8
225.	0.1699	0.944	8.021	205.58	37.14	47.69	266.3	7.19	13.3
230.	0.1655	0.948	8.260	206.63	37.57	47.93	269.6	7.35	13.7
235.	0.1614	0.951	8.500	207.66	38.00	48.19	272.8	7.50	14.2
240.	0.1575	0.955	8.742	208.68	38.44	48.49	275.9	7.65	14.7
245.	0.1538	0.957	8.985	209.68	38.89	48.82	279.0	7.81	15.2
250.	0.1503	0.960	9.230	210.67	39.35	49.17	282.0	7.96	15.7
255.	0.1470	0.963	9.477	211.65	39.83	49.55	284.9	8.11	16.2
260.	0.1438	0.965	9.725	212.61	40.33	49.95	287.8	8.26	16.7
265.	0.1408	0.967	9.976	213.57	40.84	50.38	290.6	8.41	17.3
270.	0.1379	0.969	10.229	214.52	41.36	50.83	293.3	8.56	17.8
275.	0.1352	0.971	10.485	215.45	41.89	51.29	296.0	8.71	18.4
280.	0.1326	0.972	10.742	216.38	42.43	51.77	298.7	8.86	19.0

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.3000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.1300	0.974	11.002	217.30	42.99	52.27	301.3	9.01	19.6
290.	0.1276	0.975	11.265	218.22	43.55	52.78	303.9	9.16	20.2
295.	0.1253	0.976	11.530	219.12	44.13	53.31	306.4	9.31	20.8
300.	0.1230	0.978	11.798	220.02	44.71	53.85	308.9	9.45	21.4
310.	0.1188	0.980	12.342	221.81	45.90	54.96	313.9	9.75	22.7
320.	0.1148	0.982	12.897	223.57	47.12	56.11	318.7	10.03	24.0
330.	0.1112	0.983	13.464	225.31	48.35	57.29	323.3	10.32	25.4
340.	0.1077	0.985	14.043	227.04	49.61	58.49	327.9	10.61	26.8
350.	0.1045	0.986	14.634	228.75	50.87	59.71	332.4	10.89	28.3
360.	0.1015	0.988	15.237	230.45	52.15	60.95	336.8	11.17	29.8
370.	0.0986	0.989	15.853	232.14	53.43	62.20	341.2	11.44	31.3
380.	0.0959	0.990	16.481	233.82	54.72	63.45	345.4	11.71	32.9
390.	0.0934	0.990	17.122	235.48	56.01	64.71	349.6	11.99	34.5
400.	0.0910	0.991	17.776	237.14	57.29	65.97	353.8	12.25	36.1
410.	0.0887	0.992	18.442	238.78	58.57	67.23	357.8	12.52	37.8
420.	0.0865	0.993	19.120	240.41	59.85	68.48	361.9	12.79	39.5
430.	0.0845	0.993	19.811	242.04	61.12	69.73	365.8	13.05	41.2
440.	0.0825	0.994	20.515	243.66	62.38	70.98	369.8	13.31	42.9
450.	0.0806	0.994	21.231	245.27	63.63	72.21	373.6	13.56	44.7
460.	0.0788	0.995	21.959	246.87	64.87	73.44	377.5	13.82	46.5
470.	0.0771	0.995	22.700	248.46	66.10	74.65	381.3	14.07	48.3
480.	0.0755	0.996	23.452	250.04	67.32	75.86	385.0	14.32	50.2
490.	0.0739	0.996	24.217	251.62	68.52	77.05	388.7	14.57	52.0
500.	0.0724	0.996	24.993	253.19	69.72	78.24	392.4	14.81	53.9
520.	0.0696	0.997	26.581	256.30	72.07	80.57	399.7		57.7
540.	0.0670	0.997	28.215	259.39	74.36	82.84	406.8		61.5
560.	0.0646	0.998	29.895	262.44	76.60	85.07	413.8		65.5
580.	0.0623	0.998	31.618	265.46	78.79	87.25	420.7		69.4
600.	0.0602	0.999	33.384	268.46	80.93	89.38	427.4		73.4
625.	0.0578	0.999	35.651	272.16	83.54	91.97	435.7		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.3500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.507	0.021	-14.559	80.02	47.93	68.69	1971.7	1060.26	252.3
100.	21.329	0.020	-14.212	83.58	48.15	70.10	1939.8	880.43	248.3
105.	21.149	0.019	-13.859	87.02	47.90	70.68	1905.4	744.03	244.1
110.	20.967	0.018	-13.506	90.31	47.40	70.81	1869.8	638.65	239.7
115.	20.785	0.018	-13.152	93.45	46.79	70.70	1833.6	555.72	235.2
120.	20.601	0.017	-12.799	96.46	46.16	70.51	1797.1	489.33	230.5
125.	20.417	0.016	-12.447	99.33	45.55	70.30	1760.4	435.30	225.7
130.	20.231	0.016	-12.096	102.09	44.99	70.13	1723.6	390.68	220.9
135.	20.045	0.016	-11.745	104.73	44.49	70.02	1686.7	353.33	216.0
140.	19.857	0.015	-11.395	107.28	44.06	69.99	1649.6	321.67	211.1
145.	19.668	0.015	-11.045	109.73	43.69	70.03	1612.5	294.53	206.2
150.	19.478	0.014	-10.695	112.11	43.39	70.15	1575.3	271.01	201.2
155.	19.285	0.014	-10.344	114.41	43.15	70.35	1538.0	250.44	196.3
160.	19.091	0.014	-9.991	116.65	42.96	70.62	1500.6	232.29	191.3
165.	18.894	0.014	-9.637	118.83	42.82	70.96	1463.1	216.15	186.4
170.	18.695	0.013	-9.281	120.95	42.73	71.36	1425.5	201.69	181.5
175.	18.493	0.013	-8.924	123.03	42.68	71.83	1387.7	188.64	176.6
180.	18.288	0.013	-8.563	125.06	42.66	72.37	1349.8	176.79	171.7
185.	18.079	0.013	-8.200	127.05	42.69	72.97	1311.7	165.98	166.9
190.	17.867	0.012	-7.833	129.01	42.74	73.64	1273.4	156.05	162.1
195.	17.651	0.012	-7.463	130.93	42.83	74.38	1234.9	146.90	157.4
200.	17.430	0.012	-7.089	132.82	42.95	75.19	1196.1	138.42	152.7
205.	17.204	0.012	-6.711	134.69	43.10	76.09	1157.0	130.52	148.0
210.	16.973	0.012	-6.328	136.53	43.27	77.08	1117.6	123.14	143.4
211.158	16.918	0.012	-6.239	136.96	43.32	77.32	1108.4	121.50	142.4
211.158	0.2172	0.918	7.294	201.05	36.16	48.12	254.6	6.77	12.2
215.	0.2122	0.923	7.479	201.92	36.54	48.19	257.4	6.89	12.5
220.	0.2060	0.929	7.721	203.03	36.96	48.28	261.0	7.05	13.0
225.	0.2003	0.934	7.962	204.11	37.37	48.40	264.4	7.20	13.4
230.	0.1950	0.939	8.205	205.18	37.77	48.56	267.8	7.36	13.8
235.	0.1900	0.943	8.448	206.23	38.17	48.76	271.1	7.51	14.3
240.	0.1853	0.947	8.692	207.25	38.60	49.01	274.4	7.67	14.8
245.	0.1809	0.950	8.938	208.27	39.03	49.29	277.5	7.82	15.3
250.	0.1767	0.953	9.185	209.27	39.49	49.60	280.6	7.97	15.8
255.	0.1727	0.956	9.434	210.25	39.95	49.94	283.6	8.12	16.3
260.	0.1689	0.959	9.685	211.23	40.44	50.32	286.5	8.28	16.8
265.	0.1653	0.961	9.937	212.19	40.94	50.71	289.4	8.43	17.3
270.	0.1618	0.963	10.192	213.14	41.45	51.14	292.2	8.58	17.9
275.	0.1585	0.965	10.449	214.08	41.98	51.58	295.0	8.73	18.5
280.	0.1554	0.967	10.708	215.02	42.51	52.04	297.7	8.88	19.0

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.3500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.1524	0.969	10.969	215.94	43.06	52.52	300.4	9.02	19.6
290.	0.1495	0.971	11.233	216.86	43.62	53.02	303.0	9.17	20.2
295.	0.1467	0.972	11.499	217.77	44.19	53.53	305.6	9.32	20.8
300.	0.1441	0.974	11.768	218.67	44.77	54.06	308.1	9.47	21.5
310.	0.1391	0.976	12.314	220.46	45.95	55.14	313.1	9.76	22.7
320.	0.1344	0.979	12.871	222.23	47.16	56.27	318.0	10.05	24.1
330.	0.1301	0.981	13.440	223.98	48.39	57.43	322.7	10.33	25.4
340.	0.1260	0.982	14.020	225.71	49.64	58.62	327.3	10.62	26.8
350.	0.1222	0.984	14.612	227.43	50.90	59.83	331.9	10.90	28.3
360.	0.1187	0.985	15.217	229.13	52.18	61.06	336.3	11.18	29.8
370.	0.1153	0.987	15.834	230.82	53.46	62.30	340.7	11.45	31.3
380.	0.1121	0.988	16.463	232.50	54.74	63.54	345.0	11.73	32.9
390.	0.1091	0.989	17.105	234.17	56.03	64.80	349.2	12.00	34.5
400.	0.1063	0.990	17.759	235.82	57.31	66.05	353.4	12.27	36.1
410.	0.1036	0.991	18.426	237.47	58.59	67.30	357.5	12.53	37.8
420.	0.1011	0.991	19.105	239.11	59.86	68.55	361.6	12.80	39.5
430.	0.0987	0.992	19.797	240.73	61.13	69.80	365.6	13.06	41.2
440.	0.0964	0.993	20.501	242.35	62.39	71.04	369.5	13.32	43.0
450.	0.0942	0.993	21.217	243.96	63.64	72.27	373.4	13.57	44.7
460.	0.0921	0.994	21.946	245.57	64.88	73.49	377.3	13.83	46.5
470.	0.0901	0.994	22.687	247.16	66.11	74.70	381.1	14.08	48.3
480.	0.0882	0.995	23.440	248.74	67.33	75.91	384.8	14.33	50.2
490.	0.0863	0.995	24.205	250.32	68.53	77.10	388.6	14.58	52.0
500.	0.0846	0.996	24.982	251.89	69.73	78.28	392.3	14.82	53.9
520.	0.0812	0.996	26.571	255.01	72.07	80.60	399.5		57.7
540.	0.0782	0.997	28.206	258.09	74.37	82.88	406.7		61.6
560.	0.0754	0.997	29.886	261.15	76.61	85.10	413.7		65.5
580.	0.0727	0.998	31.610	264.17	78.80	87.28	420.6		69.4
600.	0.0703	0.998	33.377	267.17	80.94	89.40	427.4		73.4
625.	0.0674	0.999	35.644	270.87	83.54	91.99	435.7		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.4000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.508	0.024	-14.557	80.01	47.93	68.69	1971.9	1060.70	252.3
100.	21.330	0.023	-14.210	83.58	48.15	70.10	1940.0	880.77	248.3
105.	21.150	0.022	-13.857	87.01	47.90	70.68	1905.6	744.31	244.1
110.	20.968	0.021	-13.504	90.30	47.40	70.81	1870.1	638.88	239.7
115.	20.785	0.020	-13.150	93.45	46.79	70.70	1833.9	555.92	235.2
120.	20.602	0.019	-12.797	96.46	46.16	70.50	1797.4	489.49	230.5
125.	20.417	0.019	-12.445	99.33	45.55	70.30	1760.7	435.45	225.8
130.	20.232	0.018	-12.094	102.08	44.99	70.13	1723.9	390.81	220.9
135.	20.046	0.018	-11.743	104.73	44.49	70.02	1686.9	353.45	216.1
140.	19.858	0.017	-11.393	107.27	44.06	69.99	1649.9	321.78	211.2
145.	19.669	0.017	-11.043	109.73	43.70	70.03	1612.8	294.63	206.2
150.	19.479	0.016	-10.693	112.11	43.40	70.15	1575.6	271.11	201.3
155.	19.286	0.016	-10.342	114.41	43.15	70.34	1538.3	250.53	196.3
160.	19.092	0.016	-9.989	116.65	42.96	70.61	1500.9	232.38	191.4
165.	18.895	0.015	-9.635	118.82	42.83	70.95	1463.4	216.23	186.4
170.	18.696	0.015	-9.280	120.95	42.73	71.35	1425.8	201.76	181.5
175.	18.494	0.015	-8.922	123.02	42.68	71.82	1388.1	188.71	176.6
180.	18.289	0.015	-8.561	125.05	42.67	72.36	1350.2	176.87	171.8
185.	18.081	0.014	-8.198	127.04	42.69	72.96	1312.1	166.05	167.0
190.	17.869	0.014	-7.832	129.00	42.75	73.63	1273.9	156.12	162.2
195.	17.653	0.014	-7.462	130.92	42.83	74.37	1235.4	146.97	157.4
200.	17.432	0.014	-7.088	132.81	42.95	75.18	1196.6	138.48	152.7
205.	17.207	0.014	-6.710	134.68	43.10	76.08	1157.6	130.59	148.1
210.	16.975	0.013	-6.327	136.53	43.27	77.06	1118.1	123.21	143.5
214.528	16.760	0.013	-5.976	138.18	43.46	78.04	1082.0	116.93	139.3
214.528	0.2465	0.910	7.387	200.47	36.85	49.33	254.8	6.89	12.6
215.	0.2458	0.910	7.410	200.58	36.89	49.31	255.2	6.91	12.7
220.	0.2384	0.917	7.656	201.71	37.26	49.22	258.9	7.06	13.1
225.	0.2315	0.924	7.902	202.82	37.62	49.20	262.5	7.22	13.5
230.	0.2251	0.929	8.148	203.90	37.99	49.26	266.0	7.37	13.9
235.	0.2192	0.934	8.395	204.96	38.37	49.38	269.5	7.53	14.4
240.	0.2136	0.938	8.642	206.00	38.77	49.56	272.8	7.68	14.9
245.	0.2083	0.942	8.891	207.02	39.19	49.78	276.0	7.83	15.3
250.	0.2034	0.946	9.140	208.03	39.62	50.05	279.2	7.99	15.8
255.	0.1987	0.949	9.391	209.03	40.08	50.35	282.3	8.14	16.3
260.	0.1942	0.953	9.644	210.01	40.55	50.69	285.3	8.29	16.9
265.	0.1900	0.955	9.898	210.98	41.04	51.06	288.2	8.44	17.4
270.	0.1860	0.958	10.154	211.93	41.54	51.46	291.1	8.59	18.0
275.	0.1822	0.960	10.413	212.88	42.06	51.88	293.9	8.74	18.5
280.	0.1785	0.963	10.673	213.82	42.59	52.32	296.7	8.89	19.1

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.4000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.1750	0.965	10.936	214.75	43.14	52.78	299.4	9.04	19.7
290.	0.1716	0.967	11.201	215.67	43.69	53.26	302.1	9.19	20.3
295.	0.1684	0.968	11.469	216.59	44.25	53.76	304.7	9.33	20.9
300.	0.1653	0.970	11.739	217.50	44.83	54.27	307.3	9.48	21.5
310.	0.1595	0.973	12.287	219.29	46.00	55.33	312.3	9.77	22.8
320.	0.1541	0.976	12.845	221.07	47.20	56.44	317.3	10.06	24.1
330.	0.1491	0.978	13.415	222.82	48.43	57.58	322.1	10.35	25.5
340.	0.1444	0.980	13.997	224.56	49.67	58.76	326.7	10.63	26.9
350.	0.1400	0.982	14.591	226.28	50.93	59.95	331.3	10.91	28.3
360.	0.1359	0.983	15.196	227.98	52.20	61.17	335.8	11.19	29.8
370.	0.1320	0.985	15.814	229.68	53.48	62.40	340.2	11.46	31.4
380.	0.1284	0.986	16.444	231.36	54.76	63.64	344.6	11.74	32.9
390.	0.1249	0.987	17.087	233.03	56.05	64.88	348.8	12.01	34.5
400.	0.1217	0.988	17.742	234.68	57.33	66.13	353.0	12.28	36.2
410.	0.1186	0.989	18.410	236.33	58.61	67.38	357.2	12.54	37.8
420.	0.1157	0.990	19.090	237.97	59.88	68.62	361.2	12.81	39.5
430.	0.1129	0.991	19.782	239.60	61.14	69.86	365.3	13.07	41.2
440.	0.1102	0.992	20.487	241.22	62.40	71.10	369.2	13.33	43.0
450.	0.1077	0.992	21.204	242.83	63.65	72.32	373.2	13.58	44.7
460.	0.1053	0.993	21.933	244.43	64.89	73.54	377.0	13.84	46.5
470.	0.1030	0.994	22.675	246.03	66.12	74.75	380.9	14.09	48.4
480.	0.1008	0.994	23.428	247.62	67.34	75.95	384.7	14.34	50.2
490.	0.0987	0.995	24.194	249.19	68.54	77.14	388.4	14.59	52.0
500.	0.0967	0.995	24.971	250.76	69.73	78.32	392.1	14.83	53.9
520.	0.0929	0.996	26.561	253.88	72.08	80.64	399.4		57.7
540.	0.0894	0.997	28.196	256.97	74.37	82.91	406.6		61.6
560.	0.0862	0.997	29.877	260.02	76.61	85.13	413.6		65.5
580.	0.0831	0.998	31.601	263.05	78.80	87.31	420.5		69.4
600.	0.0803	0.998	33.369	266.04	80.94	89.43	427.3		73.4
625.	0.0771	0.999	35.637	269.75	83.54	92.02	435.6		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.4500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.508	0.026	-14.555	80.01	47.93	68.69	1972.1	1061.15	252.3
100.	21.331	0.025	-14.208	83.57	48.15	70.09	1940.2	881.12	248.4
105.	21.150	0.024	-13.856	87.01	47.90	70.68	1905.9	744.59	244.2
110.	20.969	0.023	-13.502	90.30	47.40	70.80	1870.3	639.11	239.8
115.	20.786	0.023	-13.148	93.45	46.79	70.70	1834.1	556.11	235.2
120.	20.603	0.022	-12.795	96.45	46.16	70.50	1797.6	489.66	230.5
125.	20.418	0.021	-12.443	99.32	45.55	70.30	1760.9	435.59	225.8
130.	20.233	0.021	-12.092	102.08	44.99	70.13	1724.1	390.95	221.0
135.	20.047	0.020	-11.741	104.72	44.49	70.02	1687.2	353.57	216.1
140.	19.859	0.019	-11.392	107.27	44.06	69.98	1650.2	321.89	211.2
145.	19.670	0.019	-11.042	109.72	43.70	70.03	1613.1	294.73	206.2
150.	19.480	0.019	-10.691	112.10	43.40	70.15	1575.9	271.20	201.3
155.	19.287	0.018	-10.340	114.40	43.16	70.34	1538.6	250.62	196.3
160.	19.093	0.018	-9.988	116.64	42.97	70.61	1501.2	232.46	191.4
165.	18.897	0.017	-9.634	118.82	42.83	70.94	1463.8	216.31	186.5
170.	18.698	0.017	-9.278	120.94	42.73	71.35	1426.2	201.84	181.6
175.	18.496	0.017	-8.920	123.02	42.68	71.82	1388.4	188.79	176.7
180.	18.291	0.016	-8.560	125.05	42.67	72.35	1350.6	176.94	171.8
185.	18.083	0.016	-8.197	127.04	42.69	72.95	1312.5	166.12	167.0
190.	17.871	0.016	-7.830	128.99	42.75	73.62	1274.3	156.19	162.2
195.	17.655	0.016	-7.460	130.91	42.84	74.35	1235.8	147.04	157.5
200.	17.434	0.016	-7.087	132.81	42.95	75.17	1197.1	138.55	152.8
205.	17.209	0.015	-6.708	134.67	43.10	76.06	1158.1	130.66	148.1
210.	16.978	0.015	-6.326	136.52	43.28	77.04	1118.7	123.28	143.5
215.	16.740	0.015	-5.938	138.34	43.48	78.13	1078.8	116.36	139.0
217.598	16.614	0.015	-5.734	139.28	43.59	78.74	1057.9	112.93	136.6
217.598	0.2758	0.902	7.468	199.96	37.49	50.46	254.9	7.00	13.0
220.	0.2716	0.906	7.589	200.51	37.62	50.31	256.8	7.08	13.2
225.	0.2635	0.913	7.840	201.64	37.92	50.11	260.6	7.23	13.6
230.	0.2559	0.919	8.091	202.74	38.23	50.03	264.2	7.39	14.0
235.	0.2490	0.925	8.341	203.82	38.58	50.05	267.8	7.54	14.5
240.	0.2424	0.930	8.591	204.87	38.95	50.15	271.2	7.69	15.0
245.	0.2363	0.935	8.842	205.91	39.35	50.31	274.5	7.85	15.4
250.	0.2305	0.939	9.094	206.93	39.77	50.52	277.8	8.00	15.9
255.	0.2251	0.943	9.348	207.93	40.21	50.78	280.9	8.15	16.4
260.	0.2200	0.946	9.602	208.92	40.67	51.08	284.0	8.30	16.9
265.	0.2151	0.950	9.858	209.89	41.15	51.42	287.0	8.45	17.5
270.	0.2104	0.953	10.116	210.86	41.64	51.79	290.0	8.60	18.0
275.	0.2060	0.955	10.376	211.81	42.15	52.18	292.8	8.75	18.6
280.	0.2018	0.958	10.638	212.76	42.67	52.60	295.7	8.90	19.1

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.4500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.1978	0.960	10.902	213.69	43.21	53.04	298.4	9.05	19.7
290.	0.1939	0.962	11.169	214.62	43.76	53.50	301.1	9.20	20.3
295.	0.1903	0.964	11.438	215.54	44.32	53.99	303.8	9.35	20.9
300.	0.1867	0.966	11.709	216.45	44.89	54.48	306.4	9.49	21.6
310.	0.1801	0.970	12.259	218.25	46.05	55.52	311.6	9.78	22.8
320.	0.1739	0.972	12.819	220.03	47.25	56.61	316.6	10.07	24.1
330.	0.1682	0.975	13.391	221.79	48.47	57.73	321.4	10.36	25.5
340.	0.1629	0.977	13.974	223.53	49.71	58.89	326.2	10.64	26.9
350.	0.1579	0.979	14.569	225.25	50.96	60.08	330.8	10.92	28.4
360.	0.1532	0.981	15.176	226.96	52.23	61.28	335.3	11.20	29.9
370.	0.1488	0.983	15.795	228.66	53.50	62.50	339.8	11.48	31.4
380.	0.1447	0.984	16.426	230.34	54.78	63.73	344.1	11.75	33.0
390.	0.1408	0.986	17.069	232.01	56.06	64.97	348.4	12.02	34.6
400.	0.1371	0.987	17.725	233.67	57.34	66.21	352.7	12.29	36.2
410.	0.1336	0.988	18.393	235.32	58.62	67.45	356.8	12.55	37.8
420.	0.1303	0.989	19.074	236.96	59.89	68.69	360.9	12.82	39.5
430.	0.1271	0.990	19.767	238.60	61.16	69.93	365.0	13.08	41.3
440.	0.1242	0.991	20.473	240.22	62.42	71.16	369.0	13.34	43.0
450.	0.1213	0.991	21.190	241.83	63.66	72.38	372.9	13.59	44.8
460.	0.1186	0.992	21.920	243.43	64.90	73.60	376.8	13.85	46.6
470.	0.1160	0.993	22.662	245.03	66.13	74.80	380.7	14.10	48.4
480.	0.1135	0.993	23.416	246.62	67.35	76.00	384.5	14.35	50.2
490.	0.1111	0.994	24.182	248.20	68.55	77.19	388.2	14.60	52.1
500.	0.1089	0.994	24.960	249.77	69.74	78.36	392.0	14.84	53.9
520.	0.1046	0.995	26.551	252.89	72.09	80.68	399.3		57.7
540.	0.1006	0.996	28.187	255.97	74.38	82.95	406.5		61.6
560.	0.0970	0.997	29.868	259.03	76.62	85.17	413.5		65.5
580.	0.0936	0.997	31.593	262.06	78.81	87.34	420.4		69.5
600.	0.0904	0.998	33.361	265.05	80.94	89.46	427.3		73.5
625.	0.0867	0.998	35.630	268.76	83.55	92.04	435.6		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.5000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.509	0.029	-14.553	80.00	47.93	68.68	1972.3	1061.60	252.3
100.	21.331	0.028	-14.206	83.57	48.15	70.09	1940.5	881.47	248.4
105.	21.151	0.027	-13.854	87.00	47.91	70.68	1906.1	744.87	244.2
110.	20.970	0.026	-13.500	90.30	47.41	70.80	1870.5	639.34	239.8
115.	20.787	0.025	-13.146	93.44	46.80	70.70	1834.3	556.31	235.2
120.	20.603	0.024	-12.793	96.45	46.16	70.50	1797.8	489.83	230.6
125.	20.419	0.024	-12.441	99.32	45.55	70.29	1761.2	435.74	225.8
130.	20.234	0.023	-12.090	102.07	44.99	70.12	1724.4	391.08	221.0
135.	20.048	0.022	-11.740	104.72	44.50	70.01	1687.4	353.69	216.1
140.	19.860	0.022	-11.390	107.26	44.07	69.98	1650.4	322.00	211.2
145.	19.671	0.021	-11.040	109.72	43.70	70.02	1613.4	294.83	206.3
150.	19.481	0.021	-10.689	112.10	43.40	70.14	1576.2	271.30	201.3
155.	19.289	0.020	-10.338	114.40	43.16	70.34	1538.9	250.71	196.4
160.	19.094	0.020	-9.986	116.64	42.97	70.60	1501.6	232.55	191.4
165.	18.898	0.019	-9.632	118.81	42.83	70.94	1464.1	216.39	186.5
170.	18.699	0.019	-9.276	120.94	42.74	71.34	1426.5	201.92	181.6
175.	18.497	0.019	-8.919	123.01	42.69	71.81	1388.8	188.86	176.7
180.	18.292	0.018	-8.558	125.04	42.67	72.34	1351.0	177.01	171.9
185.	18.084	0.018	-8.195	127.03	42.69	72.94	1312.9	166.19	167.0
190.	17.873	0.018	-7.829	128.99	42.75	73.61	1274.7	156.26	162.3
195.	17.657	0.017	-7.459	130.91	42.84	74.34	1236.3	147.11	157.5
200.	17.436	0.017	-7.085	132.80	42.96	75.15	1197.6	138.62	152.8
205.	17.211	0.017	-6.707	134.67	43.10	76.04	1158.6	130.73	148.2
210.	16.980	0.017	-6.325	136.51	43.28	77.02	1119.2	123.35	143.6
215.	16.743	0.017	-5.937	138.33	43.48	78.11	1079.4	116.43	139.0
220.	16.499	0.017	-5.543	140.14	43.71	79.31	1039.1	109.91	134.5
220.423	16.478	0.017	-5.510	140.30	43.73	79.42	1035.6	109.37	134.1
220.423	0.3050	0.895	7.541	199.50	38.08	51.55	254.9	7.10	13.4
225.	0.2963	0.902	7.776	200.56	38.26	51.15	258.5	7.25	13.7
230.	0.2875	0.909	8.031	201.68	38.51	50.89	262.3	7.40	14.2
235.	0.2794	0.916	8.285	202.77	38.81	50.78	266.0	7.55	14.6
240.	0.2718	0.922	8.539	203.84	39.15	50.78	269.5	7.71	15.0
245.	0.2648	0.927	8.793	204.89	39.52	50.87	273.0	7.86	15.5
250.	0.2582	0.932	9.048	205.92	39.92	51.02	276.3	8.01	16.0
255.	0.2519	0.936	9.303	206.93	40.34	51.23	279.6	8.17	16.5
260.	0.2460	0.940	9.560	207.93	40.79	51.49	282.7	8.32	17.0
265.	0.2405	0.944	9.818	208.91	41.26	51.79	285.8	8.47	17.5
270.	0.2352	0.947	10.078	209.88	41.74	52.13	288.8	8.62	18.1
275.	0.2302	0.950	10.340	210.84	42.24	52.50	291.7	8.77	18.6
280.	0.2254	0.953	10.603	211.79	42.76	52.89	294.6	8.92	19.2

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.5000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.2208	0.956	10.869	212.73	43.29	53.31	297.4	9.06	19.8
290.	0.2165	0.958	11.136	213.66	43.83	53.76	300.2	9.21	20.4
295.	0.2123	0.960	11.406	214.59	44.38	54.22	302.9	9.36	21.0
300.	0.2083	0.962	11.678	215.50	44.95	54.70	305.6	9.50	21.6
310.	0.2008	0.966	12.231	217.31	46.10	55.71	310.8	9.80	22.9
320.	0.1939	0.969	12.793	219.10	47.29	56.78	315.9	10.08	24.2
330.	0.1874	0.972	13.366	220.86	48.51	57.89	320.8	10.37	25.6
340.	0.1814	0.975	13.951	222.61	49.74	59.03	325.6	10.65	27.0
350.	0.1758	0.977	14.547	224.33	50.99	60.20	330.2	10.93	28.4
360.	0.1706	0.979	15.155	226.05	52.26	61.40	334.8	11.21	29.9
370.	0.1657	0.981	15.775	227.75	53.53	62.61	339.3	11.49	31.4
380.	0.1610	0.983	16.407	229.43	54.80	63.83	343.7	11.76	33.0
390.	0.1567	0.984	17.051	231.11	56.08	65.06	348.1	12.03	34.6
400.	0.1526	0.985	17.708	232.77	57.36	66.29	352.3	12.30	36.2
410.	0.1487	0.987	18.377	234.42	58.64	67.53	356.5	12.56	37.9
420.	0.1450	0.988	19.059	236.06	59.91	68.76	360.6	12.83	39.6
430.	0.1414	0.989	19.752	237.69	61.17	69.99	364.7	13.09	41.3
440.	0.1381	0.990	20.459	239.32	62.43	71.22	368.7	13.35	43.0
450.	0.1349	0.991	21.177	240.93	63.67	72.44	372.7	13.60	44.8
460.	0.1319	0.991	21.907	242.54	64.91	73.65	376.6	13.86	46.6
470.	0.1290	0.992	22.650	244.13	66.14	74.85	380.5	14.11	48.4
480.	0.1262	0.993	23.404	245.72	67.35	76.05	384.3	14.36	50.2
490.	0.1236	0.993	24.171	247.30	68.56	77.23	388.1	14.61	52.1
500.	0.1210	0.994	24.949	248.87	69.75	78.41	391.8	14.85	54.0
520.	0.1163	0.995	26.540	252.00	72.09	80.72	399.2		57.7
540.	0.1118	0.996	28.177	255.08	74.38	82.98	406.4		61.6
560.	0.1078	0.996	29.859	258.14	76.62	85.20	413.4		65.5
580.	0.1040	0.997	31.585	261.17	78.81	87.36	420.4		69.5
600.	0.1005	0.998	33.353	264.17	80.95	89.48	427.2		73.5
625.	0.0964	0.998	35.623	267.87	83.55	92.06	435.6		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.5500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.510	0.032	-14.551	80.00	47.93	68.68	1972.6	1062.05	252.4
100.	21.332	0.031	-14.204	83.56	48.15	70.09	1940.7	881.82	248.4
105.	21.152	0.030	-13.852	87.00	47.91	70.67	1906.3	745.15	244.2
110.	20.970	0.029	-13.498	90.29	47.41	70.80	1870.7	639.57	239.8
115.	20.788	0.028	-13.144	93.44	46.80	70.69	1834.6	556.50	235.3
120.	20.604	0.027	-12.791	96.44	46.16	70.50	1798.1	490.00	230.6
125.	20.420	0.026	-12.439	99.32	45.55	70.29	1761.4	435.89	225.9
130.	20.235	0.025	-12.088	102.07	45.00	70.12	1724.6	391.21	221.0
135.	20.048	0.024	-11.738	104.71	44.50	70.01	1687.7	353.81	216.2
140.	19.861	0.024	-11.388	107.26	44.07	69.98	1650.7	322.11	211.3
145.	19.672	0.023	-11.038	109.71	43.70	70.02	1613.6	294.93	206.3
150.	19.482	0.023	-10.688	112.09	43.40	70.14	1576.5	271.39	201.4
155.	19.290	0.022	-10.336	114.39	43.16	70.33	1539.2	250.80	196.4
160.	19.096	0.022	-9.984	116.63	42.97	70.60	1501.9	232.63	191.5
165.	18.899	0.021	-9.630	118.81	42.83	70.93	1464.4	216.48	186.5
170.	18.700	0.021	-9.275	120.93	42.74	71.33	1426.9	202.00	181.6
175.	18.499	0.020	-8.917	123.00	42.69	71.80	1389.2	188.94	176.8
180.	18.294	0.020	-8.557	125.03	42.67	72.33	1351.4	177.09	171.9
185.	18.086	0.020	-8.193	127.02	42.70	72.93	1313.4	166.27	167.1
190.	17.874	0.019	-7.827	128.98	42.75	73.59	1275.2	156.33	162.3
195.	17.659	0.019	-7.457	130.90	42.84	74.33	1236.8	147.18	157.6
200.	17.438	0.019	-7.084	132.79	42.96	75.14	1198.1	138.69	152.9
205.	17.213	0.019	-6.706	134.66	43.11	76.03	1159.1	130.79	148.2
210.	16.982	0.019	-6.323	136.50	43.28	77.01	1119.7	123.42	143.6
215.	16.745	0.018	-5.936	138.33	43.48	78.09	1080.0	116.50	139.1
220.	16.501	0.018	-5.542	140.13	43.71	79.29	1039.7	109.98	134.5
223.045	16.349	0.018	-5.300	141.23	43.87	80.08	1014.9	106.18	131.8
223.045	0.3343	0.887	7.606	199.09	38.62	52.60	254.8	7.20	13.7
225.	0.3300	0.891	7.709	199.55	38.66	52.34	256.4	7.26	13.9
230.	0.3198	0.899	7.969	200.70	38.83	51.85	260.4	7.42	14.3
235.	0.3105	0.907	8.228	201.81	39.07	51.58	264.2	7.57	14.7
240.	0.3018	0.913	8.485	202.89	39.36	51.47	267.9	7.72	15.1
245.	0.2938	0.919	8.743	203.95	39.70	51.46	271.4	7.88	15.6
250.	0.2862	0.924	9.000	204.99	40.08	51.55	274.9	8.03	16.1
255.	0.2792	0.929	9.258	206.02	40.48	51.71	278.2	8.18	16.6
260.	0.2725	0.934	9.517	207.02	40.91	51.92	281.4	8.33	17.1
265.	0.2662	0.938	9.778	208.01	41.37	52.18	284.6	8.48	17.6
270.	0.2602	0.941	10.039	208.99	41.84	52.48	287.6	8.63	18.2
275.	0.2546	0.945	10.302	209.96	42.33	52.82	290.6	8.78	18.7
280.	0.2492	0.948	10.567	210.91	42.84	53.19	293.6	8.93	19.3

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.5500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.2441	0.951	10.834	211.86	43.36	53.59	296.5	9.08	19.8
290.	0.2392	0.954	11.103	212.79	43.90	54.02	299.3	9.23	20.4
295.	0.2345	0.956	11.375	213.72	44.45	54.46	302.0	9.37	21.0
300.	0.2301	0.958	11.648	214.64	45.01	54.93	304.7	9.52	21.7
310.	0.2217	0.963	12.202	216.46	46.15	55.91	310.0	9.81	22.9
320.	0.2139	0.966	12.766	218.25	47.34	56.95	315.1	10.10	24.2
330.	0.2068	0.969	13.341	220.02	48.55	58.04	320.1	10.38	25.6
340.	0.2001	0.972	13.927	221.77	49.78	59.17	325.0	10.67	27.0
350.	0.1939	0.975	14.525	223.50	51.02	60.33	329.7	10.95	28.4
360.	0.1881	0.977	15.134	225.21	52.28	61.51	334.3	11.22	29.9
370.	0.1826	0.979	15.755	226.92	53.55	62.71	338.9	11.50	31.5
380.	0.1775	0.981	16.388	228.60	54.83	63.92	343.3	11.77	33.0
390.	0.1726	0.983	17.034	230.28	56.10	65.14	347.7	12.04	34.6
400.	0.1681	0.984	17.691	231.95	57.38	66.37	352.0	12.31	36.2
410.	0.1637	0.985	18.361	233.60	58.65	67.60	356.2	12.58	37.9
420.	0.1596	0.987	19.043	235.24	59.92	68.83	360.3	12.84	39.6
430.	0.1558	0.988	19.738	236.88	61.18	70.06	364.4	13.10	41.3
440.	0.1521	0.989	20.444	238.50	62.44	71.28	368.5	13.36	43.0
450.	0.1485	0.990	21.163	240.12	63.69	72.50	372.4	13.61	44.8
460.	0.1452	0.990	21.894	241.72	64.92	73.70	376.4	13.87	46.6
470.	0.1420	0.991	22.637	243.32	66.15	74.91	380.3	14.12	48.4
480.	0.1389	0.992	23.392	244.91	67.36	76.10	384.1	14.37	50.2
490.	0.1360	0.993	24.159	246.49	68.57	77.28	387.9	14.62	52.1
500.	0.1332	0.993	24.938	248.07	69.76	78.45	391.6	14.86	54.0
520.	0.1279	0.994	26.530	251.19	72.10	80.76	399.0		57.8
540.	0.1231	0.995	28.168	254.28	74.39	83.02	406.3		61.6
560.	0.1186	0.996	29.850	257.34	76.63	85.23	413.4		65.5
580.	0.1144	0.997	31.577	260.37	78.82	87.39	420.3		69.5
600.	0.1105	0.997	33.346	263.36	80.95	89.51	427.2		73.5
625.	0.1061	0.998	35.616	267.07	83.56	92.09	435.5		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.6000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.510	0.035	-14.549	80.00	47.93	68.68	1972.8	1062.50	252.4
100.	21.333	0.034	-14.202	83.56	48.16	70.09	1940.9	882.17	248.4
105.	21.152	0.032	-13.850	87.00	47.91	70.67	1906.5	745.43	244.2
110.	20.971	0.031	-13.496	90.29	47.41	70.80	1870.9	639.80	239.8
115.	20.788	0.030	-13.142	93.43	46.80	70.69	1834.8	556.70	235.3
120.	20.605	0.029	-12.789	96.44	46.17	70.49	1798.3	490.17	230.6
125.	20.421	0.028	-12.437	99.31	45.56	70.29	1761.6	436.04	225.9
130.	20.236	0.027	-12.086	102.06	45.00	70.12	1724.9	391.34	221.1
135.	20.049	0.027	-11.736	104.71	44.50	70.01	1688.0	353.93	216.2
140.	19.862	0.026	-11.386	107.25	44.07	69.97	1651.0	322.22	211.3
145.	19.673	0.025	-11.036	109.71	43.71	70.01	1613.9	295.03	206.3
150.	19.483	0.025	-10.686	112.09	43.41	70.13	1576.8	271.49	201.4
155.	19.291	0.024	-10.335	114.39	43.16	70.33	1539.5	250.89	196.5
160.	19.097	0.024	-9.982	116.62	42.97	70.59	1502.2	232.72	191.5
165.	18.900	0.023	-9.629	118.80	42.84	70.93	1464.8	216.56	186.6
170.	18.702	0.023	-9.273	120.92	42.74	71.33	1427.2	202.08	181.7
175.	18.500	0.022	-8.915	123.00	42.69	71.79	1389.6	189.02	176.8
180.	18.296	0.022	-8.555	125.03	42.68	72.32	1351.7	177.16	171.9
185.	18.088	0.022	-8.192	127.02	42.70	72.92	1313.8	166.34	167.1
190.	17.876	0.021	-7.826	128.97	42.76	73.58	1275.6	156.40	162.4
195.	17.660	0.021	-7.456	130.89	42.84	74.32	1237.2	147.25	157.6
200.	17.440	0.021	-7.082	132.78	42.96	75.12	1198.6	138.76	152.9
205.	17.215	0.020	-6.705	134.65	43.11	76.01	1159.6	130.86	148.3
210.	16.985	0.020	-6.322	136.49	43.28	76.99	1120.3	123.48	143.7
215.	16.748	0.020	-5.934	138.32	43.49	78.07	1080.6	116.56	139.1
220.	16.504	0.020	-5.541	140.13	43.72	79.26	1040.3	110.05	134.6
225.	16.252	0.020	-5.142	141.92	43.97	80.59	999.5	103.88	130.1
225.497	16.227	0.020	-5.102	142.10	44.00	80.74	995.4	103.29	129.7
225.497	0.3636	0.880	7.666	198.72	39.14	53.62	254.7	7.29	14.0
230.	0.3530	0.889	7.905	199.77	39.19	52.94	258.4	7.43	14.4
235.	0.3423	0.897	8.169	200.90	39.35	52.47	262.4	7.59	14.8
240.	0.3324	0.904	8.431	202.01	39.59	52.21	266.2	7.74	15.2
245.	0.3233	0.911	8.691	203.08	39.90	52.10	269.8	7.89	15.7
250.	0.3148	0.917	8.952	204.13	40.24	52.11	273.4	8.04	16.2
255.	0.3068	0.922	9.213	205.17	40.63	52.20	276.8	8.20	16.7
260.	0.2993	0.927	9.474	206.18	41.04	52.36	280.1	8.35	17.2
265.	0.2923	0.932	9.736	207.18	41.48	52.58	283.3	8.50	17.7
270.	0.2856	0.936	10.000	208.17	41.95	52.85	286.5	8.65	18.2
275.	0.2793	0.940	10.265	209.14	42.43	53.16	289.5	8.80	18.8
280.	0.2733	0.943	10.531	210.10	42.93	53.50	292.5	8.94	19.3

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.6000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.2676	0.946	10.800	211.05	43.44	53.88	295.5	9.09	19.9
290.	0.2622	0.949	11.070	211.99	43.97	54.28	298.3	9.24	20.5
295.	0.2570	0.952	11.343	212.92	44.51	54.71	301.1	9.39	21.1
300.	0.2520	0.954	11.617	213.85	45.07	55.16	303.9	9.53	21.7
310.	0.2427	0.959	12.174	215.67	46.21	56.11	309.2	9.82	23.0
320.	0.2341	0.963	12.740	217.47	47.38	57.13	314.4	10.11	24.3
330.	0.2262	0.967	13.316	219.24	48.58	58.20	319.5	10.40	25.6
340.	0.2189	0.970	13.904	220.99	49.81	59.31	324.4	10.68	27.0
350.	0.2120	0.973	14.503	222.73	51.05	60.46	329.2	10.96	28.5
360.	0.2056	0.975	15.113	224.45	52.31	61.63	333.8	11.24	30.0
370.	0.1996	0.977	15.735	226.15	53.58	62.82	338.4	11.51	31.5
380.	0.1939	0.979	16.370	227.85	54.85	64.02	342.9	11.78	33.0
390.	0.1886	0.981	17.016	229.52	56.12	65.23	347.3	12.05	34.6
400.	0.1836	0.983	17.674	231.19	57.40	66.45	351.6	12.32	36.3
410.	0.1789	0.984	18.345	232.85	58.67	67.68	355.8	12.59	37.9
420.	0.1744	0.985	19.028	234.49	59.93	68.90	360.0	12.85	39.6
430.	0.1701	0.987	19.723	236.13	61.20	70.12	364.1	13.11	41.3
440.	0.1661	0.988	20.430	237.75	62.45	71.34	368.2	13.37	43.1
450.	0.1622	0.989	21.150	239.37	63.70	72.55	372.2	13.63	44.8
460.	0.1585	0.990	21.881	240.98	64.93	73.76	376.2	13.88	46.6
470.	0.1550	0.990	22.625	242.58	66.16	74.96	380.1	14.13	48.4
480.	0.1517	0.991	23.380	244.17	67.37	76.14	383.9	14.38	50.3
490.	0.1485	0.992	24.148	245.75	68.57	77.32	387.7	14.63	52.1
500.	0.1454	0.993	24.927	247.32	69.76	78.49	391.5	14.87	54.0
520.	0.1396	0.994	26.520	250.45	72.11	80.79	398.9		57.8
540.	0.1343	0.995	28.158	253.54	74.40	83.05	406.2		61.6
560.	0.1294	0.996	29.842	256.60	76.63	85.26	413.3		65.5
580.	0.1249	0.996	31.568	259.63	78.82	87.42	420.2		69.5
600.	0.1206	0.997	33.338	262.63	80.96	89.53	427.1		73.5
625.	0.1157	0.998	35.609	266.34	83.56	92.11	435.5		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.6500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.511	0.038	-14.547	79.99	47.93	68.67	1973.0	1062.95	252.4
100.	21.333	0.037	-14.200	83.56	48.16	70.09	1941.1	882.52	248.5
105.	21.153	0.035	-13.848	86.99	47.91	70.67	1906.7	745.71	244.3
110.	20.972	0.034	-13.494	90.28	47.41	70.80	1871.2	640.04	239.9
115.	20.789	0.033	-13.140	93.43	46.80	70.69	1835.0	556.89	235.3
120.	20.606	0.032	-12.787	96.43	46.17	70.49	1798.5	490.34	230.7
125.	20.422	0.031	-12.435	99.31	45.56	70.29	1761.9	436.19	225.9
130.	20.236	0.030	-12.084	102.06	45.00	70.11	1725.1	391.47	221.1
135.	20.050	0.029	-11.734	104.70	44.50	70.01	1688.2	354.05	216.2
140.	19.863	0.028	-11.384	107.25	44.07	69.97	1651.3	322.33	211.3
145.	19.674	0.027	-11.034	109.70	43.71	70.01	1614.2	295.14	206.4
150.	19.484	0.027	-10.684	112.08	43.41	70.13	1577.1	271.58	201.4
155.	19.292	0.026	-10.333	114.38	43.16	70.32	1539.8	250.98	196.5
160.	19.098	0.026	-9.981	116.62	42.98	70.59	1502.5	232.80	191.5
165.	18.902	0.025	-9.627	118.80	42.84	70.92	1465.1	216.64	186.6
170.	18.703	0.025	-9.271	120.92	42.74	71.32	1427.6	202.16	181.7
175.	18.502	0.024	-8.914	122.99	42.69	71.79	1389.9	189.09	176.8
180.	18.297	0.024	-8.553	125.02	42.68	72.32	1352.1	177.23	172.0
185.	18.089	0.023	-8.190	127.01	42.70	72.91	1314.2	166.41	167.2
190.	17.878	0.023	-7.824	128.97	42.76	73.57	1276.0	156.48	162.4
195.	17.662	0.023	-7.454	130.89	42.85	74.30	1237.7	147.31	157.7
200.	17.442	0.022	-7.081	132.78	42.96	75.11	1199.0	138.83	153.0
205.	17.217	0.022	-6.703	134.64	43.11	75.99	1160.1	130.93	148.3
210.	16.987	0.022	-6.321	136.48	43.29	76.97	1120.8	123.55	143.7
215.	16.750	0.022	-5.933	138.31	43.49	78.05	1081.1	116.63	139.2
220.	16.507	0.022	-5.540	140.12	43.72	79.24	1041.0	110.11	134.7
225.	16.255	0.021	-5.141	141.91	43.97	80.57	1000.2	103.95	130.2
227.802	16.111	0.021	-4.914	142.91	44.13	81.38	977.0	100.64	127.7
227.802	0.3930	0.873	7.720	198.37	39.63	54.62	254.4	7.38	14.3
230.	0.3871	0.878	7.839	198.90	39.61	54.17	256.3	7.45	14.5
235.	0.3749	0.887	8.108	200.05	39.67	53.45	260.5	7.60	14.9
240.	0.3637	0.896	8.374	201.17	39.85	53.02	264.4	7.76	15.4
245.	0.3534	0.903	8.639	202.26	40.11	52.79	268.2	7.91	15.8
250.	0.3439	0.909	8.902	203.33	40.42	52.71	271.8	8.06	16.3
255.	0.3349	0.915	9.166	204.37	40.78	52.73	275.4	8.21	16.8
260.	0.3266	0.921	9.430	205.40	41.18	52.83	278.8	8.36	17.3
265.	0.3187	0.926	9.694	206.41	41.60	53.00	282.1	8.51	17.8
270.	0.3113	0.930	9.960	207.40	42.05	53.23	285.3	8.66	18.3
275.	0.3043	0.934	10.227	208.38	42.52	53.51	288.4	8.81	18.8
280.	0.2977	0.938	10.495	209.34	43.01	53.82	291.5	8.96	19.4

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.6500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.2913	0.942	10.765	210.30	43.52	54.17	294.5	9.11	20.0
290.	0.2853	0.945	11.037	211.25	44.04	54.55	297.4	9.25	20.6
295.	0.2796	0.948	11.311	212.18	44.58	54.96	300.2	9.40	21.2
300.	0.2741	0.951	11.587	213.11	45.13	55.39	303.0	9.55	21.8
310.	0.2639	0.956	12.145	214.94	46.26	56.32	308.5	9.84	23.0
320.	0.2545	0.960	12.713	216.74	47.43	57.31	313.7	10.12	24.3
330.	0.2458	0.964	13.291	218.52	48.62	58.36	318.8	10.41	25.7
340.	0.2377	0.967	13.881	220.28	49.84	59.46	323.8	10.69	27.1
350.	0.2302	0.970	14.481	222.02	51.08	60.59	328.6	10.97	28.5
360.	0.2232	0.973	15.092	223.74	52.34	61.74	333.3	11.25	30.0
370.	0.2167	0.975	15.716	225.45	53.60	62.92	337.9	11.52	31.5
380.	0.2105	0.977	16.351	227.15	54.87	64.12	342.5	11.80	33.1
390.	0.2047	0.979	16.998	228.83	56.14	65.32	346.9	12.07	34.7
400.	0.1992	0.981	17.657	230.50	57.41	66.54	351.2	12.33	36.3
410.	0.1940	0.983	18.329	232.15	58.68	67.75	355.5	12.60	38.0
420.	0.1891	0.984	19.012	233.80	59.95	68.97	359.7	12.86	39.6
430.	0.1845	0.985	19.708	235.44	61.21	70.19	363.9	13.12	41.3
440.	0.1801	0.987	20.416	237.07	62.46	71.40	367.9	13.38	43.1
450.	0.1759	0.988	21.136	238.68	63.71	72.61	372.0	13.64	44.9
460.	0.1719	0.989	21.868	240.29	64.94	73.81	375.9	13.89	46.6
470.	0.1681	0.990	22.612	241.89	66.17	75.01	379.9	14.14	48.5
480.	0.1644	0.990	23.368	243.48	67.38	76.19	383.7	14.39	50.3
490.	0.1610	0.991	24.136	245.07	68.58	77.37	387.5	14.64	52.1
500.	0.1576	0.992	24.916	246.64	69.77	78.53	391.3	14.88	54.0
520.	0.1514	0.993	26.510	249.77	72.11	80.83	398.8		57.8
540.	0.1456	0.994	28.149	252.86	74.40	83.09	406.0		61.6
560.	0.1403	0.995	29.833	255.92	76.64	85.29	413.2		65.6
580.	0.1353	0.996	31.560	258.95	78.83	87.45	420.2		69.5
600.	0.1307	0.997	33.330	261.95	80.96	89.56	427.1		73.5
625.	0.1254	0.998	35.602	265.66	83.56	92.14	435.5		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.7000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.511	0.041	-14.545	79.99	47.93	68.67	1973.2	1063.40	252.4
100.	21.334	0.039	-14.198	83.55	48.16	70.08	1941.3	882.87	248.5
105.	21.154	0.038	-13.846	86.99	47.91	70.67	1907.0	745.99	244.3
110.	20.972	0.036	-13.492	90.28	47.41	70.79	1871.4	640.27	239.9
115.	20.790	0.035	-13.138	93.42	46.80	70.69	1835.2	557.09	235.3
120.	20.606	0.034	-12.785	96.43	46.17	70.49	1798.8	490.50	230.7
125.	20.422	0.033	-12.433	99.30	45.56	70.28	1762.1	436.33	225.9
130.	20.237	0.032	-12.082	102.06	45.00	70.11	1725.4	391.61	221.1
135.	20.051	0.031	-11.732	104.70	44.51	70.00	1688.5	354.17	216.3
140.	19.864	0.030	-11.382	107.24	44.08	69.97	1651.5	322.44	211.3
145.	19.675	0.030	-11.032	109.70	43.71	70.01	1614.5	295.24	206.4
150.	19.485	0.029	-10.682	112.08	43.41	70.12	1577.4	271.68	201.5
155.	19.293	0.028	-10.331	114.38	43.17	70.32	1540.1	251.07	196.5
160.	19.099	0.028	-9.979	116.61	42.98	70.58	1502.8	232.89	191.6
165.	18.903	0.027	-9.625	118.79	42.84	70.91	1465.4	216.72	186.6
170.	18.704	0.026	-9.270	120.91	42.75	71.31	1427.9	202.23	181.7
175.	18.503	0.026	-8.912	122.99	42.69	71.78	1390.3	189.17	176.9
180.	18.299	0.026	-8.552	125.02	42.68	72.31	1352.5	177.31	172.0
185.	18.091	0.025	-8.189	127.01	42.70	72.90	1314.6	166.48	167.2
190.	17.880	0.025	-7.823	128.96	42.76	73.56	1276.5	156.55	162.4
195.	17.664	0.024	-7.453	130.88	42.85	74.29	1238.1	147.38	157.7
200.	17.444	0.024	-7.080	132.77	42.97	75.10	1199.5	138.90	153.0
205.	17.220	0.024	-6.702	134.63	43.11	75.98	1160.6	131.00	148.4
210.	16.989	0.024	-6.320	136.48	43.29	76.95	1121.4	123.62	143.8
215.	16.753	0.023	-5.932	138.30	43.49	78.02	1081.7	116.70	139.2
220.	16.510	0.023	-5.539	140.11	43.72	79.21	1041.6	110.18	134.7
225.	16.258	0.023	-5.140	141.90	43.98	80.54	1000.8	104.02	130.2
229.980	15.999	0.023	-4.735	143.68	44.26	82.02	959.5	98.20	125.8
229.980	0.4224	0.867	7.769	198.05	40.09	55.59	254.1	7.47	14.7
230.	0.4223	0.867	7.770	198.06	40.09	55.58	254.2	7.47	14.7
235.	0.4084	0.877	8.045	199.24	40.03	54.55	258.5	7.62	15.0
240.	0.3958	0.886	8.316	200.38	40.13	53.91	262.6	7.77	15.5
245.	0.3842	0.894	8.585	201.49	40.33	53.54	266.5	7.92	15.9
250.	0.3735	0.902	8.852	202.57	40.61	53.34	270.3	8.08	16.4
255.	0.3635	0.908	9.119	203.62	40.94	53.28	273.9	8.23	16.8
260.	0.3542	0.914	9.385	204.66	41.32	53.32	277.4	8.38	17.3
265.	0.3455	0.919	9.652	205.68	41.73	53.44	280.8	8.53	17.8
270.	0.3373	0.924	9.920	206.68	42.16	53.63	284.1	8.68	18.4
275.	0.3296	0.929	10.188	207.66	42.62	53.87	287.3	8.83	18.9
280.	0.3223	0.933	10.458	208.64	43.10	54.15	290.4	8.97	19.5

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.7000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.3153	0.937	10.730	209.60	43.60	54.47	293.4	9.12	20.0
290.	0.3087	0.940	11.003	210.55	44.12	54.83	296.4	9.27	20.6
295.	0.3025	0.944	11.278	211.49	44.65	55.22	299.3	9.41	21.2
300.	0.2965	0.947	11.555	212.42	45.19	55.63	302.2	9.56	21.8
310.	0.2853	0.952	12.116	214.26	46.31	56.53	307.7	9.85	23.1
320.	0.2750	0.957	12.686	216.07	47.47	57.50	313.0	10.14	24.4
330.	0.2655	0.961	13.266	217.85	48.66	58.53	318.2	10.42	25.7
340.	0.2567	0.965	13.857	219.62	49.88	59.60	323.2	10.70	27.1
350.	0.2485	0.968	14.458	221.36	51.11	60.72	328.1	10.98	28.6
360.	0.2409	0.971	15.071	223.09	52.36	61.86	332.8	11.26	30.0
370.	0.2338	0.973	15.696	224.80	53.62	63.03	337.5	11.54	31.6
380.	0.2271	0.976	16.332	226.49	54.89	64.22	342.0	11.81	33.1
390.	0.2208	0.978	16.980	228.18	56.16	65.41	346.5	12.08	34.7
400.	0.2149	0.980	17.640	229.85	57.43	66.62	350.9	12.34	36.3
410.	0.2092	0.981	18.313	231.51	58.70	67.83	355.2	12.61	38.0
420.	0.2039	0.983	18.997	233.16	59.96	69.04	359.4	12.87	39.7
430.	0.1989	0.984	19.693	234.80	61.22	70.25	363.6	13.13	41.4
440.	0.1941	0.986	20.402	236.43	62.47	71.46	367.7	13.39	43.1
450.	0.1896	0.987	21.123	238.05	63.72	72.67	371.7	13.65	44.9
460.	0.1853	0.988	21.855	239.66	64.95	73.87	375.7	13.90	46.7
470.	0.1812	0.989	22.600	241.26	66.18	75.06	379.6	14.15	48.5
480.	0.1772	0.990	23.356	242.85	67.39	76.24	383.5	14.40	50.3
490.	0.1734	0.991	24.125	244.43	68.59	77.41	387.4	14.65	52.2
500.	0.1698	0.991	24.905	246.01	69.78	78.58	391.2	14.89	54.0
520.	0.1631	0.993	26.499	249.14	72.12	80.87	398.6		57.8
540.	0.1569	0.994	28.139	252.23	74.41	83.12	405.9		61.7
560.	0.1511	0.995	29.824	255.29	76.65	85.32	413.1		65.6
580.	0.1458	0.996	31.552	258.33	78.83	87.48	420.1		69.5
600.	0.1408	0.997	33.323	261.33	80.97	89.59	427.0		73.5
625.	0.1350	0.997	35.595	265.04	83.57	92.16	435.5		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.7500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.512	0.044	-14.543	79.99	47.93	68.67	1973.4	1063.85	252.4
100.	21.334	0.042	-14.196	83.55	48.16	70.08	1941.5	883.22	248.5
105.	21.154	0.041	-13.844	86.98	47.91	70.67	1907.2	746.27	244.3
110.	20.973	0.039	-13.490	90.28	47.41	70.79	1871.6	640.50	239.9
115.	20.791	0.038	-13.136	93.42	46.81	70.69	1835.5	557.29	235.4
120.	20.607	0.036	-12.783	96.43	46.17	70.49	1799.0	490.67	230.7
125.	20.423	0.035	-12.431	99.30	45.56	70.28	1762.4	436.48	226.0
130.	20.238	0.034	-12.081	102.05	45.00	70.11	1725.6	391.74	221.2
135.	20.052	0.033	-11.730	104.69	44.51	70.00	1688.7	354.29	216.3
140.	19.865	0.032	-11.380	107.24	44.08	69.96	1651.8	322.55	211.4
145.	19.676	0.032	-11.031	109.70	43.71	70.00	1614.8	295.34	206.4
150.	19.486	0.031	-10.680	112.07	43.41	70.12	1577.6	271.77	201.5
155.	19.294	0.030	-10.329	114.37	43.17	70.31	1540.5	251.16	196.6
160.	19.100	0.030	-9.977	116.61	42.98	70.57	1503.2	232.97	191.6
165.	18.904	0.029	-9.623	118.79	42.84	70.91	1465.8	216.80	186.7
170.	18.706	0.028	-9.268	120.91	42.75	71.31	1428.3	202.31	181.8
175.	18.504	0.028	-8.910	122.98	42.70	71.77	1390.7	189.24	176.9
180.	18.300	0.027	-8.550	125.01	42.68	72.30	1352.9	177.38	172.1
185.	18.093	0.027	-8.187	127.00	42.71	72.89	1315.0	166.55	167.3
190.	17.881	0.027	-7.821	128.95	42.76	73.55	1276.9	156.62	162.5
195.	17.666	0.026	-7.451	130.87	42.85	74.28	1238.6	147.45	157.8
200.	17.446	0.026	-7.078	132.76	42.97	75.08	1200.0	138.96	153.1
205.	17.222	0.026	-6.701	134.63	43.12	75.96	1161.1	131.07	148.4
210.	16.992	0.025	-6.318	136.47	43.29	76.93	1121.9	123.69	143.8
215.	16.756	0.025	-5.931	138.29	43.49	78.00	1082.3	116.77	139.3
220.	16.512	0.025	-5.538	140.10	43.72	79.19	1042.2	110.25	134.8
225.	16.262	0.025	-5.139	141.89	43.98	80.51	1001.5	104.09	130.3
230.	16.002	0.025	-4.733	143.68	44.26	81.99	960.1	98.24	125.9
232.046	15.892	0.024	-4.564	144.41	44.39	82.65	942.9	95.93	124.1
232.046	0.4520	0.860	7.814	197.75	40.53	56.55	253.8	7.55	14.9
235.	0.4428	0.867	7.980	198.46	40.44	55.78	256.5	7.64	15.2
240.	0.4286	0.877	8.257	199.63	40.44	54.89	260.8	7.79	15.6
245.	0.4156	0.886	8.530	200.75	40.58	54.34	264.8	7.94	16.0
250.	0.4037	0.894	8.801	201.85	40.81	54.02	268.7	8.09	16.5
255.	0.3926	0.901	9.070	202.92	41.11	53.87	272.4	8.24	16.9
260.	0.3824	0.907	9.340	203.96	41.46	53.84	276.0	8.39	17.4
265.	0.3727	0.913	9.609	204.99	41.85	53.90	279.5	8.54	17.9
270.	0.3637	0.919	9.879	206.00	42.28	54.04	282.9	8.69	18.4
275.	0.3552	0.923	10.150	206.99	42.72	54.24	286.1	8.84	19.0
280.	0.3472	0.928	10.421	207.97	43.20	54.49	289.3	8.99	19.5

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.7500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.3396	0.932	10.694	208.94	43.69	54.79	292.4	9.14	20.1
290.	0.3324	0.936	10.969	209.89	44.19	55.12	295.4	9.28	20.7
295.	0.3255	0.939	11.246	210.84	44.72	55.48	298.4	9.43	21.3
300.	0.3190	0.943	11.524	211.77	45.26	55.88	301.3	9.57	21.9
310.	0.3068	0.948	12.087	213.62	46.37	56.74	306.9	9.86	23.1
320.	0.2956	0.954	12.659	215.44	47.52	57.68	312.3	10.15	24.4
330.	0.2853	0.958	13.241	217.23	48.70	58.69	317.5	10.43	25.8
340.	0.2758	0.962	13.833	218.99	49.91	59.75	322.6	10.72	27.2
350.	0.2669	0.966	14.436	220.74	51.14	60.85	327.5	11.00	28.6
360.	0.2587	0.969	15.050	222.47	52.39	61.98	332.3	11.27	30.1
370.	0.2510	0.971	15.676	224.19	53.65	63.14	337.0	11.55	31.6
380.	0.2437	0.974	16.313	225.89	54.91	64.31	341.6	11.82	33.1
390.	0.2369	0.976	16.962	227.57	56.18	65.50	346.1	12.09	34.7
400.	0.2305	0.978	17.623	229.24	57.45	66.70	350.5	12.36	36.4
410.	0.2245	0.980	18.296	230.91	58.71	67.91	354.8	12.62	38.0
420.	0.2188	0.982	18.981	232.56	59.98	69.11	359.1	12.88	39.7
430.	0.2134	0.983	19.679	234.20	61.24	70.32	363.3	13.14	41.4
440.	0.2082	0.985	20.388	235.83	62.49	71.53	367.4	13.40	43.1
450.	0.2033	0.986	21.109	237.45	63.73	72.73	371.5	13.66	44.9
460.	0.1987	0.987	21.842	239.06	64.96	73.92	375.5	13.91	46.7
470.	0.1942	0.988	22.587	240.66	66.19	75.11	379.4	14.16	48.5
480.	0.1900	0.989	23.344	242.26	67.40	76.29	383.4	14.41	50.3
490.	0.1860	0.990	24.113	243.84	68.60	77.46	387.2	14.66	52.2
500.	0.1821	0.991	24.894	245.42	69.79	78.62	391.0	14.90	54.0
520.	0.1748	0.992	26.489	248.55	72.13	80.91	398.5		57.8
540.	0.1681	0.994	28.130	251.64	74.41	83.16	405.8		61.7
560.	0.1620	0.995	29.815	254.71	76.65	85.36	413.0		65.6
580.	0.1562	0.996	31.544	257.74	78.84	87.51	420.1		69.5
600.	0.1509	0.996	33.315	260.74	80.97	89.61	427.0		73.5
625.	0.1447	0.997	35.588	264.45	83.57	92.18	435.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.8000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.513	0.047	-14.541	79.98	47.93	68.67	1973.7	1064.30	252.5
100.	21.335	0.045	-14.194	83.54	48.16	70.08	1941.8	883.57	248.5
105.	21.155	0.043	-13.842	86.98	47.91	70.66	1907.4	746.55	244.3
110.	20.974	0.042	-13.488	90.27	47.42	70.79	1871.8	640.73	239.9
115.	20.791	0.040	-13.134	93.42	46.81	70.68	1835.7	557.48	235.4
120.	20.608	0.039	-12.781	96.42	46.17	70.49	1799.2	490.84	230.7
125.	20.424	0.038	-12.430	99.29	45.57	70.28	1762.6	436.63	226.0
130.	20.239	0.037	-12.079	102.05	45.01	70.11	1725.9	391.87	221.2
135.	20.053	0.036	-11.728	104.69	44.51	70.00	1689.0	354.41	216.3
140.	19.866	0.035	-11.379	107.23	44.08	69.96	1652.1	322.66	211.4
145.	19.677	0.034	-11.029	109.69	43.72	70.00	1615.0	295.44	206.5
150.	19.487	0.033	-10.678	112.07	43.41	70.11	1577.9	271.87	201.5
155.	19.295	0.032	-10.327	114.37	43.17	70.31	1540.8	251.25	196.6
160.	19.102	0.031	-9.975	116.60	42.98	70.57	1503.5	233.06	191.7
165.	18.906	0.031	-9.622	118.78	42.84	70.90	1466.1	216.88	186.7
170.	18.707	0.030	-9.266	120.90	42.75	71.30	1428.6	202.39	181.8
175.	18.506	0.030	-8.909	122.98	42.70	71.76	1391.0	189.32	177.0
180.	18.302	0.029	-8.548	125.00	42.69	72.29	1353.3	177.45	172.1
185.	18.094	0.029	-8.186	126.99	42.71	72.88	1315.4	166.62	167.3
190.	17.883	0.028	-7.819	128.94	42.77	73.54	1277.3	156.69	162.5
195.	17.668	0.028	-7.450	130.86	42.85	74.27	1239.0	147.52	157.8
200.	17.448	0.028	-7.077	132.75	42.97	75.07	1200.5	139.03	153.1
205.	17.224	0.027	-6.699	134.62	43.12	75.95	1161.7	131.13	148.5
210.	16.994	0.027	-6.317	136.46	43.29	76.91	1122.5	123.76	143.9
215.	16.758	0.027	-5.930	138.28	43.49	77.98	1082.9	116.84	139.3
220.	16.515	0.026	-5.537	140.09	43.72	79.16	1042.8	110.32	134.8
225.	16.265	0.026	-5.138	141.88	43.98	80.48	1002.2	104.16	130.4
230.	16.005	0.026	-4.732	143.67	44.26	81.96	960.8	98.31	125.9
234.014	15.789	0.026	-4.400	145.10	44.51	83.28	927.0	93.82	122.4
234.014	0.4816	0.854	7.856	197.47	40.95	57.49	253.5	7.63	15.2
235.	0.4782	0.856	7.913	197.71	40.90	57.18	254.4	7.66	15.3
240.	0.4622	0.867	8.196	198.91	40.78	55.98	258.8	7.81	15.7
245.	0.4477	0.877	8.473	200.05	40.85	55.22	263.1	7.96	16.1
250.	0.4345	0.886	8.748	201.16	41.03	54.76	267.1	8.11	16.6
255.	0.4223	0.894	9.021	202.24	41.29	54.49	270.9	8.26	17.0
260.	0.4109	0.901	9.293	203.30	41.62	54.38	274.6	8.41	17.5
265.	0.4004	0.907	9.565	204.34	41.99	54.38	278.2	8.56	18.0
270.	0.3905	0.913	9.837	205.35	42.39	54.47	281.6	8.71	18.5
275.	0.3812	0.918	10.110	206.35	42.83	54.63	285.0	8.86	19.1
280.	0.3724	0.923	10.384	207.34	43.29	54.84	288.2	9.00	19.6

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.8000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.3641	0.927	10.659	208.31	43.77	55.11	291.4	9.15	20.2
290.	0.3563	0.931	10.935	209.27	44.27	55.41	294.5	9.30	20.7
295.	0.3488	0.935	11.213	210.22	44.79	55.76	297.5	9.44	21.3
300.	0.3417	0.939	11.493	211.16	45.32	56.13	300.4	9.59	21.9
310.	0.3285	0.945	12.058	213.02	46.42	56.96	306.1	9.88	23.2
320.	0.3164	0.950	12.632	214.84	47.57	57.87	311.6	10.16	24.5
330.	0.3052	0.955	13.216	216.64	48.74	58.86	316.9	10.45	25.8
340.	0.2950	0.959	13.809	218.41	49.95	59.90	322.0	10.73	27.2
350.	0.2854	0.963	14.414	220.16	51.18	60.98	327.0	11.01	28.6
360.	0.2765	0.966	15.029	221.89	52.42	62.10	331.8	11.29	30.1
370.	0.2682	0.969	15.656	223.61	53.67	63.25	336.6	11.56	31.6
380.	0.2605	0.972	16.294	225.31	54.93	64.41	341.2	11.83	33.2
390.	0.2532	0.975	16.944	227.00	56.20	65.60	345.7	12.10	34.8
400.	0.2463	0.977	17.606	228.68	57.46	66.79	350.2	12.37	36.4
410.	0.2398	0.979	18.280	230.34	58.73	67.99	354.5	12.63	38.0
420.	0.2337	0.980	18.966	231.99	59.99	69.19	358.8	12.90	39.7
430.	0.2279	0.982	19.664	233.64	61.25	70.39	363.0	13.16	41.4
440.	0.2223	0.984	20.374	235.27	62.50	71.59	367.2	13.41	43.2
450.	0.2171	0.985	21.095	236.89	63.74	72.78	371.2	13.67	44.9
460.	0.2121	0.986	21.829	238.50	64.97	73.98	375.3	13.92	46.7
470.	0.2074	0.987	22.575	240.11	66.19	75.16	379.2	14.17	48.5
480.	0.2028	0.988	23.332	241.70	67.41	76.34	383.2	14.42	50.3
490.	0.1985	0.989	24.102	243.29	68.61	77.50	387.0	14.67	52.2
500.	0.1944	0.990	24.883	244.86	69.79	78.66	390.9	14.91	54.1
520.	0.1866	0.992	26.479	247.99	72.13	80.95	398.4		57.8
540.	0.1794	0.993	28.120	251.09	74.42	83.19	405.7		61.7
560.	0.1728	0.994	29.806	254.16	76.66	85.39	412.9		65.6
580.	0.1667	0.995	31.535	257.19	78.84	87.54	420.0		69.5
600.	0.1610	0.996	33.307	260.19	80.98	89.64	426.9		73.5
625.	0.1544	0.997	35.580	263.91	83.58	92.21	435.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.8500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.513	0.050	-14.539	79.98	47.93	68.66	1973.9	1064.75	252.5
100.	21.336	0.048	-14.192	83.54	48.16	70.08	1942.0	883.92	248.5
105.	21.156	0.046	-13.840	86.98	47.91	70.66	1907.6	746.83	244.4
110.	20.974	0.044	-13.486	90.27	47.42	70.79	1872.1	640.96	240.0
115.	20.792	0.043	-13.133	93.41	46.81	70.68	1835.9	557.68	235.4
120.	20.609	0.041	-12.780	96.42	46.18	70.48	1799.5	491.01	230.8
125.	20.425	0.040	-12.428	99.29	45.57	70.28	1762.9	436.78	226.0
130.	20.240	0.039	-12.077	102.04	45.01	70.10	1726.1	392.00	221.2
135.	20.054	0.038	-11.727	104.69	44.51	69.99	1689.3	354.53	216.3
140.	19.867	0.037	-11.377	107.23	44.08	69.96	1652.3	322.77	211.4
145.	19.678	0.036	-11.027	109.69	43.72	69.99	1615.3	295.54	206.5
150.	19.488	0.035	-10.677	112.06	43.42	70.11	1578.2	271.96	201.6
155.	19.297	0.034	-10.326	114.36	43.17	70.30	1541.1	251.34	196.6
160.	19.103	0.033	-9.974	116.60	42.99	70.56	1503.8	233.14	191.7
165.	18.907	0.033	-9.620	118.77	42.85	70.89	1466.4	216.96	186.8
170.	18.708	0.032	-9.264	120.90	42.75	71.29	1429.0	202.47	181.9
175.	18.507	0.032	-8.907	122.97	42.70	71.76	1391.4	189.39	177.0
180.	18.303	0.031	-8.547	125.00	42.69	72.28	1353.7	177.53	172.2
185.	18.096	0.031	-8.184	126.99	42.71	72.87	1315.8	166.70	167.4
190.	17.885	0.030	-7.818	128.94	42.77	73.53	1277.8	156.76	162.6
195.	17.670	0.030	-7.449	130.86	42.86	74.26	1239.5	147.59	157.9
200.	17.450	0.029	-7.075	132.75	42.97	75.05	1201.0	139.10	153.2
205.	17.226	0.029	-6.698	134.61	43.12	75.93	1162.2	131.20	148.5
210.	16.996	0.029	-6.316	136.45	43.29	76.90	1123.0	123.82	143.9
215.	16.761	0.028	-5.929	138.27	43.50	77.96	1083.5	116.90	139.4
220.	16.518	0.028	-5.536	140.08	43.73	79.14	1043.4	110.39	134.9
225.	16.268	0.028	-5.137	141.87	43.98	80.45	1002.8	104.23	130.4
230.	16.008	0.028	-4.731	143.66	44.27	81.92	961.5	98.38	126.0
235.	15.739	0.028	-4.318	145.44	44.58	83.59	919.4	92.81	121.6
235.894	15.689	0.028	-4.243	145.75	44.64	83.91	911.8	91.84	120.8
235.894	0.5114	0.848	7.895	197.21	41.35	58.43	253.1	7.71	15.5
240.	0.4967	0.858	8.132	198.21	41.16	57.18	256.9	7.83	15.8
245.	0.4806	0.868	8.415	199.37	41.14	56.17	261.3	7.98	16.2
250.	0.4659	0.878	8.695	200.50	41.26	55.54	265.4	8.13	16.7
255.	0.4524	0.886	8.971	201.60	41.48	55.16	269.4	8.28	17.1
260.	0.4400	0.894	9.246	202.67	41.78	54.96	273.2	8.43	17.6
265.	0.4284	0.900	9.521	203.71	42.12	54.88	276.9	8.58	18.1
270.	0.4176	0.907	9.796	204.74	42.51	54.92	280.4	8.73	18.6
275.	0.4075	0.912	10.070	205.75	42.93	55.03	283.8	8.87	19.1
280.	0.3979	0.918	10.346	206.74	43.38	55.20	287.1	9.02	19.7

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.8500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.3889	0.922	10.622	207.72	43.86	55.44	290.3	9.17	20.2
290.	0.3804	0.927	10.900	208.69	44.35	55.72	293.5	9.31	20.8
295.	0.3723	0.931	11.180	209.64	44.86	56.03	296.5	9.46	21.4
300.	0.3646	0.935	11.461	210.59	45.39	56.39	299.5	9.60	22.0
310.	0.3503	0.941	12.028	212.45	46.48	57.18	305.3	9.89	23.2
320.	0.3373	0.947	12.605	214.28	47.61	58.07	310.8	10.18	24.5
330.	0.3253	0.952	13.190	216.08	48.78	59.03	316.2	10.46	25.9
340.	0.3142	0.957	13.785	217.86	49.98	60.05	321.4	10.74	27.2
350.	0.3040	0.961	14.391	219.61	51.21	61.12	326.4	11.02	28.7
360.	0.2945	0.964	15.008	221.35	52.44	62.23	331.3	11.30	30.1
370.	0.2856	0.968	15.636	223.07	53.70	63.36	336.1	11.57	31.7
380.	0.2772	0.970	16.275	224.77	54.95	64.52	340.8	11.84	33.2
390.	0.2694	0.973	16.926	226.46	56.22	65.69	345.3	12.11	34.8
400.	0.2621	0.975	17.589	228.14	57.48	66.87	349.8	12.38	36.4
410.	0.2551	0.977	18.264	229.81	58.75	68.06	354.2	12.64	38.1
420.	0.2486	0.979	18.950	231.46	60.01	69.26	358.5	12.91	39.7
430.	0.2424	0.981	19.649	233.11	61.26	70.46	362.7	13.17	41.4
440.	0.2365	0.982	20.359	234.74	62.51	71.65	366.9	13.42	43.2
450.	0.2309	0.984	21.082	236.36	63.75	72.84	371.0	13.68	44.9
460.	0.2256	0.985	21.816	237.98	64.98	74.03	375.1	13.93	46.7
470.	0.2205	0.986	22.562	239.58	66.20	75.21	379.0	14.18	48.5
480.	0.2157	0.988	23.320	241.18	67.41	76.39	383.0	14.43	50.4
490.	0.2110	0.989	24.090	242.77	68.61	77.55	386.9	14.68	52.2
500.	0.2066	0.990	24.871	244.34	69.80	78.71	390.7	14.92	54.1
520.	0.1983	0.991	26.468	247.48	72.14	80.99	398.3		57.9
540.	0.1907	0.993	28.111	250.57	74.43	83.23	405.6		61.7
560.	0.1837	0.994	29.797	253.64	76.66	85.42	412.9		65.6
580.	0.1772	0.995	31.527	256.68	78.85	87.57	419.9		69.6
600.	0.1711	0.996	33.300	259.68	80.98	89.67	426.9		73.6
625.	0.1641	0.997	35.573	263.39	83.58	92.23	435.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.9000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.514	0.053	-14.537	79.97	47.93	68.66	1974.1	1065.20	252.5
100.	21.336	0.051	-14.190	83.54	48.16	70.07	1942.2	884.27	248.6
105.	21.157	0.049	-13.838	86.97	47.92	70.66	1907.8	747.12	244.4
110.	20.975	0.047	-13.484	90.26	47.42	70.78	1872.3	641.19	240.0
115.	20.793	0.045	-13.131	93.41	46.81	70.68	1836.2	557.87	235.5
120.	20.610	0.044	-12.778	96.41	46.18	70.48	1799.7	491.18	230.8
125.	20.426	0.042	-12.426	99.28	45.57	70.27	1763.1	436.93	226.1
130.	20.241	0.041	-12.075	102.04	45.01	70.10	1726.4	392.13	221.2
135.	20.055	0.040	-11.725	104.68	44.51	69.99	1689.5	354.65	216.4
140.	19.868	0.039	-11.375	107.23	44.08	69.95	1652.6	322.88	211.5
145.	19.679	0.038	-11.025	109.68	43.72	69.99	1615.6	295.64	206.5
150.	19.489	0.037	-10.675	112.06	43.42	70.11	1578.5	272.06	201.6
155.	19.298	0.036	-10.324	114.36	43.18	70.30	1541.4	251.43	196.7
160.	19.104	0.035	-9.972	116.59	42.99	70.56	1504.1	233.23	191.7
165.	18.908	0.035	-9.618	118.77	42.85	70.89	1466.8	217.04	186.8
170.	18.710	0.034	-9.263	120.89	42.76	71.29	1429.3	202.55	181.9
175.	18.509	0.033	-8.905	122.96	42.70	71.75	1391.8	189.47	177.0
180.	18.305	0.033	-8.545	124.99	42.69	72.27	1354.1	177.60	172.2
185.	18.097	0.032	-8.182	126.98	42.71	72.86	1316.2	166.77	167.4
190.	17.887	0.032	-7.816	128.93	42.77	73.52	1278.2	156.83	162.6
195.	17.672	0.031	-7.447	130.85	42.86	74.24	1239.9	147.66	157.9
200.	17.452	0.031	-7.074	132.74	42.98	75.04	1201.4	139.17	153.2
205.	17.228	0.031	-6.697	134.60	43.12	75.92	1162.7	131.27	148.6
210.	16.999	0.030	-6.315	136.44	43.30	76.88	1123.6	123.89	144.0
215.	16.763	0.030	-5.928	138.27	43.50	77.94	1084.0	116.97	139.4
220.	16.521	0.030	-5.535	140.07	43.73	79.11	1044.1	110.45	134.9
225.	16.271	0.030	-5.136	141.86	43.98	80.42	1003.5	104.30	130.5
230.	16.012	0.029	-4.731	143.65	44.27	81.89	962.3	98.45	126.0
235.	15.742	0.029	-4.317	145.42	44.58	83.55	920.2	92.88	121.6
237.694	15.592	0.029	-4.091	146.38	44.76	84.54	897.1	89.98	119.3
237.694	0.5413	0.841	7.931	196.96	41.74	59.35	252.6	7.78	15.8
240.	0.5322	0.847	8.067	197.53	41.59	58.52	254.9	7.85	16.0
245.	0.5142	0.859	8.356	198.72	41.46	57.22	259.4	8.00	16.4
250.	0.4980	0.869	8.640	199.87	41.51	56.39	263.8	8.15	16.8
255.	0.4832	0.879	8.920	200.98	41.68	55.87	267.9	8.30	17.2
260.	0.4695	0.887	9.199	202.06	41.94	55.56	271.8	8.45	17.7
265.	0.4569	0.894	9.476	203.12	42.27	55.41	275.5	8.60	18.2
270.	0.4451	0.901	9.753	204.15	42.64	55.38	279.1	8.74	18.7
275.	0.4341	0.907	10.030	205.17	43.04	55.44	282.6	8.89	19.2
280.	0.4237	0.912	10.308	206.17	43.48	55.58	286.0	9.04	19.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.9000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.4140	0.917	10.586	207.15	43.94	55.78	289.3	9.18	20.3
290.	0.4048	0.922	10.865	208.13	44.43	56.03	292.5	9.33	20.9
295.	0.3961	0.926	11.146	209.09	44.93	56.32	295.6	9.48	21.5
300.	0.3878	0.930	11.429	210.04	45.45	56.65	298.6	9.62	22.1
310.	0.3724	0.938	11.999	211.91	46.53	57.41	304.5	9.91	23.3
320.	0.3584	0.944	12.577	213.74	47.66	58.26	310.1	10.19	24.6
330.	0.3455	0.949	13.164	215.55	48.83	59.20	315.5	10.48	25.9
340.	0.3336	0.954	13.761	217.33	50.02	60.21	320.8	10.76	27.3
350.	0.3227	0.958	14.369	219.09	51.24	61.26	325.9	11.04	28.7
360.	0.3125	0.962	14.987	220.83	52.47	62.35	330.8	11.31	30.2
370.	0.3030	0.966	15.616	222.56	53.72	63.47	335.6	11.59	31.7
380.	0.2941	0.969	16.256	224.26	54.98	64.62	340.3	11.86	33.2
390.	0.2857	0.971	16.908	225.96	56.24	65.78	344.9	12.13	34.8
400.	0.2779	0.974	17.572	227.64	57.50	66.96	349.4	12.39	36.4
410.	0.2705	0.976	18.247	229.30	58.76	68.14	353.9	12.66	38.1
420.	0.2635	0.978	18.935	230.96	60.02	69.33	358.2	12.92	39.8
430.	0.2569	0.980	19.634	232.61	61.27	70.52	362.5	13.18	41.5
440.	0.2507	0.981	20.345	234.24	62.52	71.71	366.6	13.44	43.2
450.	0.2447	0.983	21.068	235.87	63.76	72.90	370.8	13.69	45.0
460.	0.2390	0.984	21.803	237.48	64.99	74.09	374.8	13.94	46.7
470.	0.2337	0.986	22.550	239.09	66.21	75.26	378.9	14.19	48.6
480.	0.2285	0.987	23.308	240.68	67.42	76.43	382.8	14.44	50.4
490.	0.2236	0.988	24.079	242.27	68.62	77.60	386.7	14.69	52.2
500.	0.2189	0.989	24.860	243.85	69.81	78.75	390.6	14.93	54.1
520.	0.2101	0.991	26.458	246.98	72.15	81.03	398.1		57.9
540.	0.2020	0.992	28.101	250.08	74.43	83.26	405.5		61.7
560.	0.1946	0.994	29.788	253.15	76.67	85.45	412.8		65.6
580.	0.1876	0.995	31.519	256.19	78.85	87.59	419.9		69.6
600.	0.1812	0.996	33.292	259.19	80.98	89.69	426.8		73.6
625.	0.1738	0.997	35.566	262.91	83.58	92.25	435.3		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.9500 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.514	0.056	-14.535	79.97	47.93	68.66	1974.3	1065.65	252.5
100.	21.337	0.054	-14.188	83.53	48.16	70.07	1942.4	884.62	248.6
105.	21.157	0.051	-13.836	86.97	47.92	70.66	1908.1	747.40	244.4
110.	20.976	0.050	-13.482	90.26	47.42	70.78	1872.5	641.42	240.0
115.	20.794	0.048	-13.129	93.40	46.81	70.68	1836.4	558.07	235.5
120.	20.610	0.046	-12.776	96.41	46.18	70.48	1799.9	491.35	230.8
125.	20.426	0.045	-12.424	99.28	45.57	70.27	1763.3	437.07	226.1
130.	20.242	0.043	-12.073	102.03	45.01	70.10	1726.6	392.27	221.3
135.	20.056	0.042	-11.723	104.68	44.52	69.99	1689.8	354.77	216.4
140.	19.869	0.041	-11.373	107.22	44.09	69.95	1652.9	322.99	211.5
145.	19.680	0.040	-11.023	109.68	43.72	69.99	1615.9	295.74	206.6
150.	19.491	0.039	-10.673	112.05	43.42	70.10	1578.8	272.15	201.6
155.	19.299	0.038	-10.322	114.35	43.18	70.29	1541.7	251.52	196.7
160.	19.105	0.037	-9.970	116.59	42.99	70.55	1504.4	233.31	191.8
165.	18.909	0.037	-9.616	118.76	42.85	70.88	1467.1	217.13	186.8
170.	18.711	0.036	-9.261	120.88	42.76	71.28	1429.7	202.62	181.9
175.	18.510	0.035	-8.904	122.96	42.71	71.74	1392.1	189.54	177.1
180.	18.306	0.035	-8.544	124.99	42.69	72.27	1354.5	177.67	172.2
185.	18.099	0.034	-8.181	126.97	42.72	72.85	1316.6	166.84	167.4
190.	17.888	0.034	-7.815	128.93	42.77	73.51	1278.6	156.90	162.7
195.	17.674	0.033	-7.446	130.84	42.86	74.23	1240.4	147.73	157.9
200.	17.454	0.033	-7.072	132.73	42.98	75.03	1201.9	139.24	153.3
205.	17.230	0.032	-6.695	134.60	43.13	75.90	1163.2	131.34	148.6
210.	17.001	0.032	-6.313	136.44	43.30	76.86	1124.1	123.96	144.0
215.	16.766	0.032	-5.926	138.26	43.50	77.92	1084.6	117.04	139.5
220.	16.524	0.031	-5.534	140.06	43.73	79.09	1044.7	110.52	135.0
225.	16.274	0.031	-5.135	141.85	43.99	80.39	1004.2	104.37	130.5
230.	16.015	0.031	-4.730	143.64	44.27	81.85	963.0	98.52	126.1
235.	15.746	0.031	-4.316	145.41	44.58	83.51	921.0	92.95	121.7
239.423	15.498	0.031	-3.943	146.99	44.88	85.18	883.0	88.23	117.8
239.423	0.5714	0.835	7.964	196.72	42.11	60.28	252.2	7.86	16.1
240.	0.5688	0.837	7.999	196.87	42.06	60.03	252.8	7.87	16.1
245.	0.5488	0.850	8.294	198.08	41.80	58.37	257.6	8.02	16.5
250.	0.5309	0.861	8.583	199.25	41.78	57.31	262.0	8.17	16.9
255.	0.5146	0.871	8.868	200.38	41.90	56.63	266.3	8.32	17.3
260.	0.4996	0.880	9.150	201.48	42.12	56.20	270.3	8.47	17.8
265.	0.4858	0.887	9.430	202.54	42.42	55.97	274.2	8.61	18.3
270.	0.4730	0.895	9.710	203.59	42.77	55.87	277.9	8.76	18.8
275.	0.4611	0.901	9.989	204.61	43.16	55.88	281.4	8.91	19.3
280.	0.4499	0.907	10.269	205.62	43.58	55.97	284.9	9.05	19.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 0.9500 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.4394	0.912	10.549	206.61	44.03	56.13	288.2	9.20	20.4
290.	0.4294	0.918	10.830	207.59	44.51	56.35	291.5	9.35	20.9
295.	0.4200	0.922	11.113	208.56	45.01	56.61	294.6	9.49	21.5
300.	0.4111	0.926	11.396	209.51	45.52	56.92	297.7	9.64	22.1
310.	0.3946	0.934	11.969	211.39	46.59	57.64	303.7	9.92	23.3
320.	0.3796	0.941	12.549	213.23	47.71	58.47	309.4	10.21	24.6
330.	0.3658	0.947	13.139	215.04	48.87	59.38	314.9	10.49	26.0
340.	0.3531	0.952	13.737	216.83	50.06	60.36	320.2	10.77	27.3
350.	0.3414	0.956	14.346	218.60	51.27	61.40	325.3	11.05	28.8
360.	0.3306	0.960	14.965	220.34	52.50	62.47	330.3	11.33	30.2
370.	0.3205	0.964	15.596	222.07	53.74	63.58	335.2	11.60	31.7
380.	0.3110	0.967	16.237	223.78	55.00	64.72	339.9	11.87	33.3
390.	0.3021	0.970	16.890	225.47	56.26	65.88	344.5	12.14	34.9
400.	0.2938	0.972	17.555	227.16	57.52	67.04	349.1	12.40	36.5
410.	0.2859	0.975	18.231	228.83	58.78	68.22	353.5	12.67	38.1
420.	0.2785	0.977	18.919	230.48	60.03	69.41	357.9	12.93	39.8
430.	0.2715	0.979	19.619	232.13	61.29	70.59	362.2	13.19	41.5
440.	0.2649	0.980	20.331	233.77	62.53	71.78	366.4	13.45	43.2
450.	0.2585	0.982	21.055	235.39	63.77	72.96	370.5	13.70	45.0
460.	0.2525	0.984	21.790	237.01	65.00	74.14	374.6	13.95	46.8
470.	0.2468	0.985	22.537	238.62	66.22	75.32	378.7	14.20	48.6
480.	0.2414	0.986	23.296	240.22	67.43	76.48	382.6	14.45	50.4
490.	0.2362	0.987	24.067	241.80	68.63	77.64	386.5	14.70	52.2
500.	0.2312	0.988	24.849	243.38	69.82	78.79	390.4	14.94	54.1
520.	0.2219	0.990	26.448	246.52	72.15	81.07	398.0		57.9
540.	0.2133	0.992	28.092	249.62	74.44	83.30	405.4		61.7
560.	0.2054	0.993	29.779	252.69	76.67	85.48	412.7		65.6
580.	0.1981	0.994	31.511	255.73	78.86	87.62	419.8		69.6
600.	0.1913	0.995	33.284	258.73	80.99	89.72	426.8		73.6
625.	0.1834	0.997	35.559	262.45	83.59	92.28	435.3		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 1.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.515	0.059	-14.533	79.97	47.93	68.65	1974.5	1066.10	252.5
100.	21.338	0.056	-14.186	83.53	48.16	70.07	1942.6	884.97	248.6
105.	21.158	0.054	-13.834	86.96	47.92	70.66	1908.3	747.68	244.4
110.	20.977	0.052	-13.480	90.26	47.42	70.78	1872.7	641.66	240.0
115.	20.794	0.050	-13.127	93.40	46.81	70.67	1836.6	558.26	235.5
120.	20.611	0.049	-12.774	96.40	46.18	70.48	1800.2	491.52	230.9
125.	20.427	0.047	-12.422	99.28	45.57	70.27	1763.6	437.22	226.1
130.	20.243	0.046	-12.071	102.03	45.01	70.10	1726.9	392.40	221.3
135.	20.057	0.044	-11.721	104.67	44.52	69.98	1690.0	354.89	216.4
140.	19.870	0.043	-11.371	107.22	44.09	69.94	1653.1	323.10	211.5
145.	19.681	0.042	-11.021	109.67	43.72	69.98	1616.2	295.85	206.6
150.	19.492	0.041	-10.671	112.05	43.42	70.10	1579.1	272.25	201.7
155.	19.300	0.040	-10.320	114.35	43.18	70.29	1542.0	251.61	196.7
160.	19.106	0.039	-9.968	116.58	42.99	70.55	1504.8	233.40	191.8
165.	18.911	0.039	-9.615	118.76	42.85	70.88	1467.4	217.21	186.9
170.	18.713	0.038	-9.259	120.88	42.76	71.27	1430.0	202.70	182.0
175.	18.512	0.037	-8.902	122.95	42.71	71.73	1392.5	189.62	177.1
180.	18.308	0.036	-8.542	124.98	42.70	72.26	1354.8	177.75	172.3
185.	18.101	0.036	-8.179	126.97	42.72	72.84	1317.0	166.91	167.5
190.	17.890	0.035	-7.813	128.92	42.78	73.50	1279.0	156.97	162.7
195.	17.675	0.035	-7.444	130.84	42.86	74.22	1240.8	147.80	158.0
200.	17.456	0.034	-7.071	132.73	42.98	75.01	1202.4	139.31	153.3
205.	17.233	0.034	-6.694	134.59	43.13	75.88	1163.7	131.41	148.7
210.	17.003	0.034	-6.312	136.43	43.30	76.84	1124.6	124.03	144.1
215.	16.768	0.033	-5.925	138.25	43.50	77.90	1085.2	117.11	139.5
220.	16.526	0.033	-5.533	140.05	43.73	79.07	1045.3	110.59	135.0
225.	16.277	0.033	-5.134	141.84	43.99	80.36	1004.8	104.43	130.6
230.	16.018	0.033	-4.729	143.63	44.27	81.82	963.7	98.59	126.2
235.	15.750	0.032	-4.316	145.40	44.58	83.47	921.7	93.03	121.8
240.	15.469	0.032	-3.894	147.18	44.93	85.36	878.8	87.70	117.4
241.086	15.406	0.032	-3.801	147.57	45.01	85.81	869.3	86.57	116.5
241.086	0.6016	0.829	7.994	196.49	42.48	61.20	251.7	7.93	16.4
245.	0.5843	0.840	8.231	197.47	42.19	59.64	255.6	8.04	16.6
250.	0.5645	0.852	8.525	198.66	42.07	58.31	260.3	8.19	17.0
255.	0.5466	0.863	8.815	199.80	42.13	57.44	264.6	8.34	17.5
260.	0.5303	0.872	9.100	200.91	42.31	56.89	268.8	8.49	17.9
265.	0.5153	0.881	9.384	201.99	42.57	56.55	272.8	8.63	18.4
270.	0.5014	0.888	9.666	203.05	42.90	56.38	276.6	8.78	18.9
275.	0.4885	0.895	9.948	204.08	43.27	56.33	280.2	8.93	19.4
280.	0.4764	0.902	10.230	205.10	43.68	56.37	283.7	9.07	19.9

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 1.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.4650	0.908	10.512	206.09	44.13	56.49	287.2	9.22	20.4
290.	0.4543	0.913	10.795	207.08	44.59	56.68	290.5	9.36	21.0
295.	0.4442	0.918	11.079	208.05	45.08	56.91	293.7	9.51	21.6
300.	0.4347	0.922	11.364	209.01	45.59	57.20	296.8	9.65	22.2
310.	0.4170	0.930	11.939	210.89	46.65	57.87	302.9	9.94	23.4
320.	0.4009	0.937	12.522	212.74	47.76	58.67	308.7	10.22	24.7
330.	0.3863	0.944	13.113	214.56	48.91	59.56	314.2	10.51	26.0
340.	0.3728	0.949	13.713	216.35	50.09	60.52	319.6	10.79	27.4
350.	0.3603	0.954	14.323	218.12	51.30	61.54	324.8	11.06	28.8
360.	0.3488	0.958	14.944	219.87	52.53	62.60	329.8	11.34	30.3
370.	0.3380	0.962	15.575	221.60	53.77	63.70	334.7	11.61	31.8
380.	0.3280	0.965	16.218	223.32	55.02	64.82	339.5	11.88	33.3
390.	0.3186	0.968	16.872	225.01	56.27	65.97	344.2	12.15	34.9
400.	0.3097	0.971	17.537	226.70	57.53	67.13	348.7	12.42	36.5
410.	0.3014	0.973	18.215	228.37	58.79	68.30	353.2	12.68	38.1
420.	0.2935	0.976	18.904	230.03	60.05	69.48	357.6	12.94	39.8
430.	0.2861	0.978	19.604	231.68	61.30	70.66	361.9	13.20	41.5
440.	0.2791	0.979	20.317	233.32	62.55	71.84	366.1	13.46	43.3
450.	0.2724	0.981	21.041	234.95	63.78	73.02	370.3	13.71	45.0
460.	0.2661	0.983	21.777	236.56	65.01	74.20	374.4	13.96	46.8
470.	0.2600	0.984	22.525	238.17	66.23	75.37	378.5	14.22	48.6
480.	0.2543	0.985	23.284	239.77	67.44	76.53	382.4	14.46	50.4
490.	0.2488	0.987	24.056	241.36	68.64	77.69	386.4	14.71	52.3
500.	0.2435	0.988	24.838	242.94	69.82	78.84	390.3	14.95	54.1
520.	0.2337	0.990	26.438	246.08	72.16	81.10	397.9		57.9
540.	0.2247	0.991	28.082	249.18	74.44	83.33	405.3		61.8
560.	0.2163	0.993	29.771	252.25	76.68	85.51	412.6		65.7
580.	0.2086	0.994	31.502	255.29	78.86	87.65	419.7		69.6
600.	0.2014	0.995	33.276	258.30	80.99	89.75	426.7		73.6
625.	0.1931	0.996	35.552	262.01	83.59	92.30	435.3		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 1.5000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.521	0.088	-14.514	79.93	47.92	68.63	1976.7	1070.63	252.8
100.	21.344	0.085	-14.167	83.49	48.17	70.05	1944.8	888.49	248.8
105.	21.165	0.081	-13.815	86.92	47.93	70.63	1910.4	750.50	244.7
110.	20.984	0.078	-13.461	90.21	47.44	70.76	1874.9	643.98	240.3
115.	20.802	0.075	-13.108	93.36	46.83	70.65	1838.9	560.22	235.8
120.	20.619	0.073	-12.755	96.36	46.20	70.45	1802.5	493.21	231.1
125.	20.436	0.071	-12.403	99.23	45.59	70.24	1766.0	438.71	226.4
130.	20.251	0.069	-12.052	101.98	45.04	70.07	1729.4	393.72	221.6
135.	20.066	0.067	-11.702	104.63	44.54	69.95	1692.6	356.08	216.8
140.	19.879	0.065	-11.353	107.17	44.11	69.91	1655.8	324.19	211.9
145.	19.692	0.063	-11.003	109.62	43.75	69.94	1619.0	296.86	206.9
150.	19.502	0.062	-10.653	111.99	43.45	70.05	1582.0	273.20	202.0
155.	19.311	0.060	-10.302	114.29	43.20	70.24	1545.0	252.50	197.1
160.	19.118	0.059	-9.951	116.53	43.02	70.49	1507.9	234.25	192.2
165.	18.923	0.058	-9.597	118.70	42.88	70.82	1470.8	218.02	187.3
170.	18.726	0.057	-9.242	120.82	42.79	71.21	1433.5	203.48	182.4
175.	18.526	0.056	-8.885	122.89	42.73	71.66	1396.2	190.37	177.5
180.	18.323	0.055	-8.526	124.92	42.72	72.17	1358.7	178.48	172.7
185.	18.117	0.054	-8.163	126.90	42.74	72.75	1321.1	167.63	167.9
190.	17.907	0.053	-7.798	128.85	42.80	73.39	1283.3	157.67	163.2
195.	17.694	0.052	-7.429	130.77	42.89	74.10	1245.3	148.49	158.5
200.	17.476	0.052	-7.057	132.65	43.01	74.88	1207.2	139.99	153.8
205.	17.254	0.051	-6.680	134.51	43.15	75.73	1168.7	132.08	149.2
210.	17.027	0.050	-6.299	136.35	43.33	76.67	1130.0	124.70	144.6
215.	16.793	0.050	-5.914	138.16	43.53	77.69	1090.9	117.78	140.1
220.	16.554	0.050	-5.522	139.96	43.75	78.83	1051.4	111.27	135.6
225.	16.306	0.049	-5.125	141.75	44.01	80.09	1011.4	105.12	131.2
230.	16.051	0.049	-4.721	143.52	44.29	81.49	970.8	99.29	126.8
235.	15.786	0.049	-4.310	145.29	44.60	83.07	929.4	93.74	122.4
240.	15.510	0.048	-3.890	147.06	44.94	84.88	887.2	88.43	118.1
245.	15.220	0.048	-3.461	148.83	45.31	86.97	843.8	83.33	113.8
250.	14.914	0.048	-3.020	150.61	45.72	89.43	799.0	78.40	109.5
255.	14.589	0.048	-2.565	152.41	46.16	92.43	752.4	73.61	105.2
255.089	14.583	0.049	-2.557	152.44	46.17	92.49	751.6	73.52	105.1
255.089	0.9144	0.774	8.199	194.61	45.63	70.71	246.0	8.61	19.0
260.	0.8761	0.792	8.537	195.93	44.94	67.13	252.0	8.73	19.2
265.	0.8426	0.808	8.866	197.18	44.64	64.78	257.4	8.87	19.6
270.	0.8131	0.822	9.186	198.38	44.57	63.21	262.5	9.00	19.9
275.	0.7865	0.834	9.499	199.52	44.67	62.14	267.2	9.14	20.4
280.	0.7625	0.845	9.808	200.64	44.88	61.40	271.6	9.28	20.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 1.5000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	0.7404	0.855	10.114	201.72	45.17	60.92	275.8	9.42	21.3
290.	0.7201	0.864	10.418	202.78	45.51	60.61	279.9	9.56	21.8
295.	0.7013	0.872	10.720	203.81	45.90	60.45	283.7	9.70	22.3
300.	0.6837	0.880	11.022	204.83	46.32	60.40	287.5	9.84	22.9
310.	0.6519	0.893	11.627	206.81	47.25	60.54	294.5	10.11	24.0
320.	0.6236	0.904	12.234	208.74	48.27	60.94	301.2	10.39	25.2
330.	0.5983	0.914	12.846	210.62	49.34	61.52	307.4	10.67	26.5
340.	0.5753	0.922	13.465	212.47	50.47	62.23	313.4	10.94	27.9
350.	0.5544	0.930	14.091	214.28	51.62	63.05	319.2	11.21	29.2
360.	0.5352	0.936	14.726	216.07	52.81	63.95	324.7	11.48	30.7
370.	0.5176	0.942	15.370	217.84	54.02	64.91	330.1	11.75	32.1
380.	0.5012	0.947	16.024	219.58	55.24	65.91	335.2	12.02	33.7
390.	0.4860	0.952	16.689	221.31	56.47	66.96	340.3	12.28	35.2
400.	0.4717	0.956	17.364	223.01	57.71	68.03	345.2	12.55	36.8
410.	0.4584	0.960	18.049	224.71	58.95	69.13	349.9	12.81	38.4
420.	0.4459	0.963	18.746	226.39	60.19	70.24	354.6	13.07	40.1
430.	0.4342	0.966	19.454	228.05	61.43	71.36	359.1	13.32	41.8
440.	0.4231	0.969	20.174	229.71	62.67	72.49	363.6	13.58	43.5
450.	0.4126	0.972	20.904	231.35	63.89	73.63	368.0	13.83	45.3
460.	0.4026	0.974	21.646	232.98	65.11	74.76	372.3	14.08	47.0
470.	0.3932	0.976	22.399	234.60	66.33	75.90	376.5	14.33	48.8
480.	0.3842	0.978	23.164	236.21	67.53	77.03	380.7	14.57	50.6
490.	0.3757	0.980	23.940	237.81	68.72	78.16	384.8	14.82	52.5
500.	0.3676	0.982	24.727	239.40	69.90	79.28	388.8	15.06	54.3
520.	0.3524	0.985	26.335	242.55	72.23	81.50	396.7		58.1
540.	0.3384	0.987	27.987	245.67	74.50	83.69	404.4		61.9
560.	0.3256	0.989	29.682	248.75	76.73	85.84	411.8		65.8
580.	0.3138	0.991	31.420	251.80	78.91	87.95	419.2		69.7
600.	0.3028	0.993	33.200	254.82	81.04	90.01	426.3		73.7
625.	0.2902	0.995	35.482	258.54	83.63	92.54	435.0		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 2.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.527	0.118	-14.494	79.89	47.92	68.60	1978.9	1075.18	253.0
100.	21.350	0.113	-14.147	83.45	48.17	70.02	1947.0	892.03	249.1
105.	21.171	0.108	-13.795	86.88	47.94	70.61	1912.6	753.33	244.9
110.	20.991	0.104	-13.442	90.17	47.45	70.74	1877.2	646.31	240.5
115.	20.809	0.101	-13.088	93.32	46.85	70.63	1841.1	562.19	236.0
120.	20.627	0.097	-12.736	96.32	46.22	70.43	1804.8	494.90	231.4
125.	20.444	0.094	-12.384	99.19	45.62	70.22	1768.4	440.20	226.7
130.	20.260	0.091	-12.033	101.94	45.06	70.04	1731.8	395.05	221.9
135.	20.075	0.089	-11.684	104.58	44.56	69.92	1695.2	357.29	217.1
140.	19.889	0.086	-11.334	107.12	44.13	69.88	1658.5	325.29	212.2
145.	19.702	0.084	-10.985	109.57	43.77	69.91	1621.8	297.88	207.3
150.	19.513	0.082	-10.635	111.95	43.47	70.01	1584.9	274.15	202.4
155.	19.323	0.080	-10.284	114.24	43.23	70.19	1548.1	253.40	197.4
160.	19.130	0.079	-9.933	116.48	43.04	70.44	1511.1	235.10	192.5
165.	18.936	0.077	-9.580	118.65	42.90	70.76	1474.1	218.83	187.6
170.	18.739	0.076	-9.225	120.77	42.81	71.14	1437.0	204.27	182.8
175.	18.540	0.074	-8.868	122.83	42.76	71.58	1399.8	191.13	177.9
180.	18.338	0.073	-8.509	124.86	42.74	72.09	1362.5	179.21	173.1
185.	18.133	0.072	-8.147	126.84	42.77	72.66	1325.1	168.34	168.3
190.	17.925	0.071	-7.783	128.79	42.82	73.29	1287.5	158.37	163.6
195.	17.713	0.070	-7.414	130.70	42.91	73.98	1249.8	149.18	158.9
200.	17.496	0.069	-7.043	132.58	43.03	74.75	1211.9	140.67	154.3
205.	17.275	0.068	-6.667	134.44	43.18	75.58	1173.7	132.76	149.7
210.	17.050	0.067	-6.287	136.27	43.35	76.49	1135.3	125.37	145.1
215.	16.818	0.067	-5.902	138.08	43.55	77.50	1096.6	118.45	140.6
220.	16.580	0.066	-5.512	139.88	43.78	78.60	1057.4	111.95	136.1
225.	16.336	0.065	-5.116	141.65	44.03	79.82	1017.9	105.80	131.7
230.	16.083	0.065	-4.713	143.42	44.31	81.18	977.7	99.98	127.4
235.	15.821	0.065	-4.304	145.19	44.62	82.70	936.9	94.44	123.0
240.	15.549	0.064	-3.886	146.94	44.95	84.42	895.4	89.15	118.8
245.	15.264	0.064	-3.459	148.70	45.32	86.40	852.8	84.08	114.5
250.	14.964	0.064	-3.021	150.47	45.72	88.72	808.9	79.18	110.2
255.	14.646	0.064	-2.571	152.26	46.16	91.50	763.5	74.43	106.0
260.	14.306	0.065	-2.105	154.07	46.64	94.93	716.0	69.78	101.7
265.	13.935	0.065	-1.620	155.91	47.18	99.36	665.7	65.17	97.3
266.011	13.856	0.065	-1.519	156.29	47.29	100.42	655.1	64.25	96.5
266.011	1.253	0.722	8.273	193.10	48.28	81.83	239.3	9.25	21.6
270.	1.201	0.742	8.589	194.29	47.40	76.57	245.2	9.33	21.6
275.	1.147	0.763	8.961	195.65	46.81	72.33	251.8	9.45	21.8
280.	1.101	0.780	9.315	196.93	46.57	69.55	257.7	9.56	22.1

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 2.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	1.060	0.796	9.658	198.14	46.55	67.64	263.1	9.69	22.4
290.	1.024	0.810	9.992	199.30	46.67	66.30	268.1	9.81	22.8
295.	0.9918	0.822	10.321	200.43	46.90	65.35	272.8	9.94	23.3
300.	0.9622	0.833	10.646	201.52	47.20	64.69	277.3	10.07	23.8
310.	0.9100	0.853	11.289	203.63	47.94	63.94	285.6	10.33	24.8
320.	0.8651	0.869	11.927	205.65	48.83	63.72	293.3	10.59	25.9
330.	0.8257	0.883	12.564	207.62	49.81	63.85	300.5	10.86	27.1
340.	0.7908	0.895	13.205	209.53	50.86	64.22	307.2	11.12	28.4
350.	0.7594	0.905	13.849	211.40	51.97	64.77	313.5	11.39	29.7
360.	0.7310	0.914	14.500	213.23	53.11	65.46	319.6	11.65	31.1
370.	0.7050	0.922	15.159	215.03	54.28	66.24	325.4	11.91	32.6
380.	0.6812	0.929	15.826	216.81	55.47	67.11	331.0	12.17	34.1
390.	0.6592	0.936	16.501	218.57	56.68	68.03	336.4	12.43	35.6
400.	0.6389	0.941	17.186	220.30	57.89	69.00	341.6	12.69	37.2
410.	0.6199	0.946	17.881	222.02	59.11	70.01	346.7	12.95	38.8
420.	0.6022	0.951	18.587	223.72	60.34	71.05	351.6	13.20	40.4
430.	0.5857	0.955	19.302	225.40	61.56	72.11	356.5	13.46	42.1
440.	0.5701	0.959	20.029	227.07	62.79	73.18	361.2	13.71	43.8
450.	0.5554	0.962	20.766	228.73	64.00	74.26	365.7	13.96	45.5
460.	0.5416	0.966	21.514	230.37	65.22	75.35	370.2	14.20	47.3
470.	0.5285	0.968	22.273	232.00	66.42	76.45	374.6	14.45	49.0
480.	0.5161	0.971	23.043	233.63	67.62	77.54	379.0	14.69	50.9
490.	0.5043	0.973	23.824	235.24	68.80	78.64	383.2	14.93	52.7
500.	0.4931	0.976	24.616	236.84	69.98	79.73	387.4	15.17	54.5
520.	0.4722	0.980	26.232	240.00	72.29	81.90	395.5		58.3
540.	0.4531	0.983	27.892	243.14	74.56	84.05	403.4		62.1
560.	0.4357	0.986	29.594	246.23	76.78	86.16	411.1		66.0
580.	0.4196	0.988	31.338	249.29	78.96	88.24	418.6		69.9
600.	0.4047	0.991	33.123	252.32	81.08	90.28	425.9		73.9
625.	0.3876	0.993	35.412	256.05	83.67	92.78	434.8		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 2.5000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.533	0.147	-14.475	79.85	47.92	68.57	1981.1	1079.77	253.2
100.	21.357	0.141	-14.128	83.41	48.18	70.00	1949.1	895.59	249.3
105.	21.178	0.135	-13.776	86.84	47.95	70.59	1914.8	756.18	245.2
110.	20.998	0.130	-13.423	90.13	47.47	70.72	1879.4	648.66	240.8
115.	20.817	0.126	-13.069	93.27	46.87	70.61	1843.4	564.17	236.3
120.	20.635	0.121	-12.717	96.27	46.24	70.41	1807.2	496.61	231.7
125.	20.452	0.118	-12.365	99.14	45.64	70.19	1770.8	441.69	227.0
130.	20.268	0.114	-12.015	101.89	45.08	70.01	1734.3	396.38	222.2
135.	20.084	0.111	-11.665	104.53	44.59	69.89	1697.8	358.49	217.4
140.	19.899	0.108	-11.316	107.07	44.16	69.84	1661.2	326.40	212.5
145.	19.712	0.105	-10.966	109.53	43.79	69.87	1624.5	298.90	207.6
150.	19.524	0.103	-10.617	111.90	43.49	69.97	1587.8	275.10	202.7
155.	19.334	0.100	-10.267	114.19	43.25	70.14	1551.1	254.30	197.8
160.	19.142	0.098	-9.915	116.42	43.06	70.39	1514.3	235.95	192.9
165.	18.949	0.096	-9.563	118.59	42.93	70.70	1477.4	219.65	188.0
170.	18.753	0.094	-9.208	120.71	42.83	71.08	1440.4	205.05	183.1
175.	18.554	0.093	-8.852	122.78	42.78	71.51	1403.4	191.89	178.3
180.	18.353	0.091	-8.493	124.80	42.77	72.01	1366.3	179.95	173.5
185.	18.149	0.090	-8.131	126.78	42.79	72.57	1329.1	169.06	168.8
190.	17.942	0.088	-7.767	128.72	42.85	73.19	1291.7	159.07	164.0
195.	17.731	0.087	-7.399	130.63	42.94	73.87	1254.2	149.87	159.4
200.	17.516	0.086	-7.028	132.51	43.05	74.62	1216.5	141.35	154.7
205.	17.296	0.085	-6.653	134.36	43.20	75.43	1178.7	133.43	150.1
210.	17.072	0.084	-6.274	136.19	43.37	76.33	1140.5	126.04	145.6
215.	16.843	0.083	-5.890	138.00	43.57	77.31	1102.1	119.12	141.1
220.	16.607	0.082	-5.501	139.79	43.80	78.38	1063.4	112.62	136.7
225.	16.365	0.082	-5.106	141.56	44.05	79.56	1024.2	106.48	132.3
230.	16.115	0.081	-4.705	143.33	44.33	80.87	984.6	100.66	128.0
235.	15.856	0.081	-4.297	145.08	44.64	82.34	944.3	95.14	123.7
240.	15.587	0.080	-3.881	146.83	44.97	83.99	903.3	89.86	119.4
245.	15.307	0.080	-3.457	148.58	45.33	85.87	861.5	84.81	115.2
250.	15.013	0.080	-3.022	150.34	45.72	88.06	818.5	79.94	111.0
255.	14.702	0.080	-2.575	152.11	46.15	90.65	774.2	75.23	106.8
260.	14.370	0.080	-2.114	153.90	46.62	93.80	728.1	70.63	102.5
265.	14.012	0.081	-1.636	155.72	47.15	97.77	679.6	66.10	98.3
270.	13.618	0.082	-1.135	157.59	47.73	103.06	627.8	61.58	93.9
275.	13.173	0.083	-0.601	159.55	48.43	110.70	571.0	56.98	89.4
275.090	13.165	0.083	-0.592	159.58	48.44	110.86	569.9	56.89	89.4
275.090	1.628	0.672	8.251	191.73	50.74	96.46	231.9	9.93	24.4
280.	1.529	0.702	8.697	193.34	49.30	85.69	240.6	9.98	24.1

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 2.5000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	1.451	0.727	9.109	194.80	48.58	79.42	248.1	10.06	24.1
290.	1.386	0.748	9.495	196.14	48.26	75.43	254.7	10.16	24.3
295.	1.330	0.766	9.865	197.41	48.18	72.71	260.7	10.26	24.6
300.	1.281	0.782	10.224	198.61	48.27	70.80	266.2	10.37	24.9
310.	1.198	0.810	10.919	200.89	48.74	68.43	276.2	10.60	25.7
320.	1.130	0.832	11.596	203.04	49.46	67.21	285.1	10.84	26.7
330.	1.072	0.850	12.265	205.10	50.33	66.67	293.2	11.08	27.8
340.	1.021	0.866	12.931	207.09	51.29	66.56	300.8	11.33	29.0
350.	0.9766	0.880	13.597	209.02	52.33	66.75	307.8	11.58	30.3
360.	0.9369	0.892	14.267	210.90	53.42	67.16	314.5	11.84	31.6
370.	0.9011	0.902	14.941	212.75	54.55	67.73	320.8	12.09	33.0
380.	0.8686	0.911	15.622	214.57	55.71	68.41	326.8	12.35	34.5
390.	0.8388	0.919	16.310	216.35	56.88	69.19	332.6	12.60	36.0
400.	0.8114	0.926	17.006	218.12	58.08	70.05	338.2	12.85	37.5
410.	0.7861	0.933	17.711	219.86	59.28	70.95	343.6	13.10	39.1
420.	0.7626	0.939	18.425	221.58	60.49	71.90	348.8	13.35	40.7
430.	0.7407	0.944	19.149	223.28	61.70	72.89	353.8	13.60	42.4
440.	0.7203	0.949	19.883	224.97	62.91	73.90	358.8	13.85	44.1
450.	0.7010	0.953	20.627	226.64	64.12	74.93	363.6	14.09	45.8
460.	0.6830	0.957	21.381	228.30	65.32	75.97	368.3	14.33	47.5
470.	0.6659	0.961	22.146	229.94	66.51	77.02	372.9	14.58	49.3
480.	0.6498	0.964	22.922	231.58	67.70	78.07	377.3	14.82	51.1
490.	0.6345	0.967	23.708	233.20	68.88	79.13	381.7	15.06	52.9
500.	0.6200	0.970	24.504	234.81	70.05	80.20	386.1	15.29	54.7
520.	0.5932	0.975	26.130	237.99	72.36	82.31	394.5		58.5
540.	0.5687	0.979	27.797	241.14	74.62	84.41	402.6		62.3
560.	0.5464	0.983	29.506	244.25	76.84	86.49	410.5		66.1
580.	0.5259	0.986	31.256	247.32	79.00	88.54	418.1		70.1
600.	0.5069	0.989	33.047	250.35	81.12	90.55	425.6		74.0
625.	0.4852	0.991	35.342	254.10	83.71	93.03	434.7		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 3.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.539	0.176	-14.455	79.82	47.92	68.54	1983.3	1084.38	253.4
100.	21.363	0.169	-14.108	83.37	48.19	69.98	1951.3	899.17	249.5
105.	21.185	0.162	-13.757	86.80	47.97	70.57	1917.0	759.04	245.4
110.	21.005	0.156	-13.403	90.09	47.49	70.70	1881.6	651.01	241.1
115.	20.824	0.151	-13.050	93.23	46.89	70.59	1845.7	566.15	236.6
120.	20.642	0.146	-12.698	96.23	46.26	70.39	1809.5	498.32	232.0
125.	20.460	0.141	-12.346	99.10	45.66	70.17	1773.2	443.19	227.3
130.	20.277	0.137	-11.996	101.85	45.10	69.99	1736.8	397.72	222.5
135.	20.093	0.133	-11.646	104.49	44.61	69.86	1700.3	359.70	217.7
140.	19.908	0.129	-11.297	107.03	44.18	69.81	1663.8	327.50	212.8
145.	19.722	0.126	-10.948	109.48	43.82	69.83	1627.3	299.93	207.9
150.	19.534	0.123	-10.599	111.85	43.52	69.93	1590.7	276.06	203.0
155.	19.345	0.120	-10.249	114.14	43.28	70.10	1554.1	255.20	198.1
160.	19.154	0.118	-9.897	116.37	43.09	70.34	1517.4	236.81	193.3
165.	18.961	0.115	-9.545	118.54	42.95	70.64	1480.7	220.46	188.4
170.	18.766	0.113	-9.191	120.65	42.86	71.01	1443.9	205.83	183.5
175.	18.568	0.111	-8.835	122.72	42.81	71.44	1407.0	192.64	178.7
180.	18.368	0.109	-8.476	124.74	42.79	71.93	1370.1	180.68	173.9
185.	18.165	0.107	-8.115	126.72	42.82	72.48	1333.0	169.77	169.2
190.	17.959	0.106	-7.752	128.66	42.87	73.09	1295.9	159.77	164.5
195.	17.749	0.104	-7.384	130.56	42.96	73.76	1258.6	150.55	159.8
200.	17.535	0.103	-7.014	132.44	43.08	74.49	1221.2	142.03	155.2
205.	17.317	0.102	-6.639	134.29	43.22	75.29	1183.6	134.10	150.6
210.	17.095	0.101	-6.261	136.11	43.40	76.17	1145.7	126.71	146.1
215.	16.867	0.099	-5.878	137.92	43.60	77.12	1107.6	119.79	141.7
220.	16.633	0.099	-5.489	139.70	43.82	78.17	1069.2	113.28	137.2
225.	16.393	0.098	-5.096	141.47	44.07	79.32	1030.5	107.15	132.9
230.	16.146	0.097	-4.696	143.23	44.35	80.58	991.3	101.34	128.6
235.	15.890	0.097	-4.290	144.98	44.65	82.00	951.5	95.83	124.3
240.	15.625	0.096	-3.876	146.72	44.98	83.58	911.1	90.57	120.1
245.	15.349	0.096	-3.454	148.46	45.34	85.37	870.0	85.53	115.9
250.	15.060	0.096	-3.022	150.21	45.73	87.44	827.9	80.70	111.7
255.	14.755	0.096	-2.579	151.96	46.15	89.86	784.5	76.02	107.5
260.	14.432	0.096	-2.122	153.73	46.61	92.77	739.6	71.46	103.4
265.	14.085	0.097	-1.650	155.53	47.12	96.37	692.7	67.00	99.2
270.	13.706	0.098	-1.157	157.37	47.69	101.03	643.1	62.57	95.0
275.	13.284	0.099	-0.636	159.28	48.33	107.47	589.5	58.10	90.6
280.	12.798	0.101	-0.077	161.30	49.12	117.31	529.7	53.47	86.1
282.915	12.468	0.102	0.277	162.56	49.69	126.19	490.4	50.61	83.2
282.915	2.055	0.621	8.140	190.35	53.17	117.99	224.1	10.69	27.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 3.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
285.	1.980	0.639	8.378	191.19	52.14	107.55	229.0	10.66	27.3
290.	1.846	0.674	8.876	192.92	50.69	93.22	238.6	10.66	26.7
295.	1.743	0.702	9.320	194.44	49.98	85.33	246.7	10.71	26.5
300.	1.659	0.725	9.734	195.83	49.67	80.39	253.8	10.77	26.5
310.	1.526	0.763	10.506	198.37	49.70	74.70	266.0	10.94	27.0
320.	1.424	0.792	11.237	200.69	50.17	71.74	276.5	11.14	27.7
330.	1.340	0.816	11.945	202.87	50.89	70.14	285.8	11.35	28.7
340.	1.269	0.836	12.642	204.95	51.75	69.34	294.2	11.58	29.8
350.	1.208	0.854	13.334	206.95	52.71	69.04	302.0	11.81	31.0
360.	1.154	0.868	14.024	208.90	53.75	69.09	309.3	12.05	32.2
370.	1.107	0.881	14.716	210.79	54.83	69.38	316.2	12.29	33.6
380.	1.064	0.893	15.412	212.65	55.95	69.85	322.7	12.54	35.0
390.	1.025	0.903	16.114	214.47	57.10	70.46	328.9	12.78	36.4
400.	0.9897	0.911	16.822	216.26	58.27	71.17	334.8	13.02	37.9
410.	0.9572	0.919	17.537	218.03	59.45	71.96	340.5	13.27	39.5
420.	0.9273	0.926	18.261	219.77	60.64	72.81	346.0	13.51	41.1
430.	0.8995	0.933	18.994	221.50	61.84	73.71	351.3	13.75	42.7
440.	0.8736	0.939	19.736	223.20	63.03	74.65	356.5	14.00	44.4
450.	0.8494	0.944	20.487	224.89	64.23	75.61	361.5	14.24	46.1
460.	0.8268	0.949	21.248	226.56	65.42	76.60	366.4	14.48	47.8
470.	0.8055	0.953	22.019	228.22	66.61	77.61	371.1	14.71	49.6
480.	0.7854	0.957	22.800	229.87	67.79	78.62	375.8	14.95	51.3
490.	0.7665	0.961	23.591	231.50	68.96	79.64	380.3	15.19	53.1
500.	0.7485	0.964	24.393	233.12	70.13	80.67	384.8	15.42	55.0
520.	0.7153	0.970	26.027	236.32	72.42	82.73	393.5		58.7
540.	0.6852	0.975	27.702	239.48	74.68	84.79	401.8		62.5
560.	0.6578	0.979	29.418	242.60	76.89	86.82	409.9		66.3
580.	0.6327	0.983	31.175	245.69	79.05	88.84	417.7		70.2
600.	0.6096	0.986	32.972	248.73	81.16	90.83	425.3		74.2
625.	0.5832	0.990	35.273	252.49	83.74	93.27	434.6		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 4.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.551	0.235	-14.416	79.74	47.91	68.49	1987.6	1093.70	253.9
100.	21.376	0.225	-14.069	83.29	48.20	69.93	1955.6	906.38	250.0
105.	21.198	0.216	-13.718	86.72	47.99	70.53	1921.3	764.81	245.9
110.	21.019	0.208	-13.365	90.01	47.52	70.66	1886.0	655.75	241.6
115.	20.839	0.201	-13.012	93.15	46.92	70.55	1850.1	570.15	237.1
120.	20.658	0.194	-12.659	96.15	46.30	70.34	1814.1	501.75	232.5
125.	20.476	0.188	-12.308	99.01	45.70	70.12	1777.9	446.20	227.8
130.	20.294	0.182	-11.958	101.76	45.14	69.93	1741.7	400.40	223.1
135.	20.111	0.177	-11.609	104.40	44.65	69.80	1705.4	362.12	218.3
140.	19.927	0.172	-11.260	106.93	44.22	69.74	1669.1	329.72	213.5
145.	19.742	0.168	-10.911	109.38	43.86	69.76	1632.8	301.98	208.6
150.	19.555	0.164	-10.562	111.75	43.56	69.85	1596.4	277.97	203.7
155.	19.367	0.160	-10.213	114.04	43.32	70.01	1560.0	257.00	198.9
160.	19.178	0.157	-9.862	116.27	43.13	70.24	1523.6	238.51	194.0
165.	18.986	0.154	-9.510	118.43	43.00	70.53	1487.2	222.09	189.1
170.	18.792	0.151	-9.157	120.54	42.90	70.89	1450.7	207.39	184.3
175.	18.596	0.148	-8.801	122.60	42.85	71.30	1414.1	194.15	179.5
180.	18.398	0.145	-8.443	124.62	42.84	71.78	1377.5	182.14	174.8
185.	18.197	0.143	-8.083	126.59	42.86	72.31	1340.8	171.20	170.0
190.	17.992	0.141	-7.720	128.53	42.92	72.90	1304.1	161.16	165.4
195.	17.785	0.139	-7.354	130.43	43.01	73.54	1267.2	151.92	160.7
200.	17.573	0.137	-6.985	132.30	43.13	74.25	1230.3	143.38	156.1
205.	17.358	0.135	-6.612	134.14	43.27	75.02	1193.2	135.44	151.6
210.	17.138	0.134	-6.234	135.96	43.44	75.86	1155.9	128.04	147.1
215.	16.914	0.132	-5.853	137.76	43.64	76.77	1118.4	121.11	142.7
220.	16.684	0.131	-5.467	139.53	43.87	77.76	1080.7	114.61	138.3
225.	16.449	0.130	-5.075	141.29	44.12	78.85	1042.7	108.48	134.0
230.	16.206	0.129	-4.678	143.04	44.39	80.04	1004.3	102.68	129.7
235.	15.956	0.128	-4.275	144.77	44.69	81.36	965.5	97.19	125.5
240.	15.698	0.128	-3.864	146.50	45.02	82.82	926.3	91.96	121.3
245.	15.430	0.127	-3.446	148.23	45.37	84.46	886.4	86.96	117.2
250.	15.150	0.127	-3.019	149.95	45.75	86.32	845.7	82.16	113.1
255.	14.857	0.127	-2.582	151.68	46.16	88.47	804.1	77.54	109.0
260.	14.548	0.127	-2.134	153.42	46.60	90.98	761.4	73.07	105.0
265.	14.220	0.128	-1.672	155.18	47.09	94.00	717.2	68.71	100.9
270.	13.867	0.128	-1.193	156.97	47.61	97.74	671.1	64.43	96.9
275.	13.481	0.130	-0.693	158.81	48.20	102.57	622.4	60.17	92.8
280.	13.051	0.132	-0.164	160.71	48.88	109.23	569.9	55.86	88.5
285.	12.555	0.134	0.405	162.73	49.70	119.29	512.0	51.40	84.1
290.	11.946	0.139	1.041	164.94	50.81	137.19	444.6	46.55	79.4

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 4.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	11.087	0.147	1.820	167.60	52.86	183.68	356.7	40.66	74.2
295.981	10.852	0.150	2.009	168.24	53.60	205.14	334.1	39.21	73.2
295.981	3.196	0.509	7.580	187.06	58.83	233.23	207.1	12.80	38.8
300.	2.824	0.568	8.300	189.48	55.20	145.57	221.1	12.33	34.0
310.	2.387	0.650	9.471	193.32	52.47	100.11	242.5	12.01	31.1
320.	2.139	0.703	10.394	196.26	51.98	86.56	257.8	11.99	30.7
330.	1.965	0.742	11.225	198.81	52.21	80.24	270.2	12.08	31.0
340.	1.830	0.773	12.008	201.15	52.78	76.82	280.9	12.22	31.7
350.	1.720	0.799	12.766	203.35	53.55	74.88	290.4	12.39	32.6
360.	1.628	0.821	13.509	205.44	54.44	73.81	299.1	12.58	33.7
370.	1.549	0.839	14.244	207.46	55.42	73.30	307.1	12.78	34.8
380.	1.480	0.855	14.976	209.41	56.46	73.18	314.6	12.99	36.1
390.	1.419	0.869	15.709	211.31	57.54	73.33	321.7	13.20	37.5
400.	1.364	0.881	16.443	213.17	58.65	73.67	328.3	13.43	38.9
410.	1.315	0.892	17.183	215.00	59.79	74.17	334.7	13.65	40.4
420.	1.270	0.902	17.927	216.79	60.95	74.78	340.7	13.87	41.9
430.	1.228	0.911	18.678	218.56	62.11	75.48	346.6	14.10	43.5
440.	1.190	0.919	19.437	220.30	63.28	76.25	352.2	14.33	45.1
450.	1.155	0.926	20.204	222.03	64.46	77.08	357.6	14.56	46.7
460.	1.122	0.932	20.979	223.73	65.63	77.94	362.9	14.79	48.4
470.	1.091	0.938	21.763	225.41	66.80	78.84	368.0	15.01	50.1
480.	1.062	0.944	22.556	227.08	67.96	79.76	373.0	15.24	51.9
490.	1.035	0.948	23.358	228.74	69.12	80.70	377.8	15.47	53.7
500.	1.010	0.953	24.170	230.38	70.28	81.65	382.5	15.69	55.5
520.	0.9629	0.961	25.822	233.62	72.56	83.59	391.7		59.1
540.	0.9208	0.968	27.513	236.81	74.79	85.54	400.4		62.9
560.	0.8826	0.973	29.244	239.96	76.99	87.50	408.9		66.7
580.	0.8479	0.978	31.013	243.06	79.14	89.45	417.0		70.6
600.	0.8160	0.983	32.821	246.13	81.25	91.38	424.9		74.5
625.	0.7798	0.987	35.136	249.90	83.82	93.76	434.5		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 5.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.563	0.294	-14.376	79.67	47.91	68.43	1991.9	1103.13	254.3
100.	21.388	0.281	-14.030	83.22	48.22	69.89	1959.8	913.68	250.5
105.	21.211	0.270	-13.679	86.64	48.02	70.49	1925.6	770.64	246.4
110.	21.033	0.260	-13.326	89.93	47.55	70.62	1890.3	660.54	242.1
115.	20.853	0.251	-12.973	93.07	46.96	70.51	1854.6	574.17	237.6
120.	20.673	0.242	-12.621	96.06	46.34	70.30	1818.7	505.21	233.1
125.	20.492	0.235	-12.270	98.93	45.74	70.08	1782.7	449.23	228.4
130.	20.311	0.228	-11.920	101.67	45.19	69.88	1746.6	403.10	223.7
135.	20.129	0.221	-11.571	104.31	44.70	69.75	1710.5	364.56	218.9
140.	19.946	0.215	-11.223	106.84	44.27	69.68	1674.4	331.95	214.1
145.	19.762	0.210	-10.874	109.29	43.91	69.69	1638.3	304.03	209.3
150.	19.576	0.205	-10.526	111.65	43.61	69.77	1602.1	279.89	204.4
155.	19.389	0.200	-10.176	113.94	43.37	69.92	1565.9	258.80	199.5
160.	19.201	0.196	-9.826	116.16	43.18	70.14	1529.8	240.22	194.7
165.	19.011	0.192	-9.475	118.33	43.04	70.42	1493.6	223.72	189.9
170.	18.818	0.188	-9.122	120.43	42.95	70.77	1457.4	208.96	185.1
175.	18.624	0.185	-8.767	122.49	42.90	71.17	1421.1	195.66	180.3
180.	18.427	0.181	-8.410	124.50	42.89	71.63	1384.9	183.61	175.6
185.	18.228	0.178	-8.051	126.47	42.91	72.14	1348.5	172.62	170.9
190.	18.025	0.176	-7.689	128.40	42.97	72.71	1312.2	162.56	166.2
195.	17.820	0.173	-7.324	130.30	43.06	73.34	1275.7	153.29	161.6
200.	17.611	0.171	-6.955	132.16	43.17	74.02	1239.2	144.72	157.0
205.	17.398	0.169	-6.583	134.00	43.32	74.76	1202.6	136.77	152.5
210.	17.181	0.167	-6.208	135.81	43.49	75.56	1165.8	129.36	148.1
215.	16.960	0.165	-5.828	137.60	43.69	76.43	1128.9	122.43	143.7
220.	16.734	0.163	-5.443	139.37	43.91	77.38	1091.8	115.92	139.4
225.	16.502	0.162	-5.054	141.12	44.16	78.41	1054.5	109.79	135.1
230.	16.265	0.161	-4.659	142.85	44.43	79.54	1017.0	104.01	130.8
235.	16.020	0.160	-4.258	144.58	44.73	80.77	979.1	98.53	126.7
240.	15.768	0.159	-3.851	146.29	45.05	82.13	940.8	93.32	122.6
245.	15.507	0.158	-3.437	148.00	45.40	83.64	902.0	88.35	118.5
250.	15.236	0.158	-3.014	149.71	45.77	85.33	862.7	83.59	114.5
255.	14.953	0.158	-2.583	151.41	46.17	87.25	822.6	79.02	110.5
260.	14.656	0.158	-2.141	153.13	46.60	89.46	781.7	74.61	106.5
265.	14.344	0.158	-1.688	154.86	47.07	92.05	739.7	70.33	102.6
270.	14.011	0.159	-1.220	156.61	47.57	95.16	696.3	66.16	98.7
275.	13.653	0.160	-0.735	158.39	48.12	98.99	651.2	62.05	94.7
280.	13.262	0.162	-0.228	160.21	48.73	103.93	603.7	57.96	90.7
285.	12.826	0.165	0.307	162.11	49.43	110.65	553.0	53.83	86.6
290.	12.325	0.168	0.884	164.11	50.26	120.55	497.6	49.56	82.4

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 5.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	11.718	0.174	1.524	166.30	51.37	137.09	435.1	44.97	77.9
300.	10.906	0.184	2.283	168.85	53.19	172.16	360.6	39.64	73.1
310.	4.127	0.470	7.602	186.23	59.31	263.20	210.7	14.98	45.4
320.	3.181	0.591	9.258	191.50	54.72	123.27	236.9	13.55	36.4
330.	2.774	0.657	10.347	194.85	53.90	98.73	253.9	13.22	34.7
340.	2.512	0.704	11.277	197.63	53.99	88.51	267.5	13.14	34.5
350.	2.319	0.741	12.133	200.11	54.49	83.15	279.1	13.17	34.8
360.	2.167	0.771	12.948	202.40	55.20	80.07	289.4	13.26	35.5
370.	2.042	0.796	13.739	204.57	56.05	78.26	298.6	13.39	36.4
380.	1.937	0.817	14.515	206.64	56.99	77.23	307.1	13.55	37.5
390.	1.846	0.836	15.285	208.64	58.00	76.72	315.0	13.72	38.7
400.	1.766	0.852	16.051	210.58	59.05	76.57	322.4	13.91	40.0
410.	1.694	0.866	16.817	212.47	60.14	76.68	329.4	14.10	41.4
420.	1.630	0.878	17.585	214.32	61.26	76.98	336.0	14.30	42.8
430.	1.573	0.889	18.357	216.14	62.39	77.43	342.3	14.50	44.3
440.	1.520	0.899	19.134	217.93	63.53	78.00	348.4	14.71	45.9
450.	1.471	0.908	19.917	219.69	64.68	78.65	354.2	14.92	47.5
460.	1.427	0.916	20.707	221.42	65.83	79.37	359.8	15.14	49.1
470.	1.385	0.924	21.505	223.14	66.99	80.14	365.3	15.35	50.8
480.	1.346	0.930	22.310	224.83	68.14	80.95	370.6	15.56	52.5
490.	1.310	0.937	23.124	226.51	69.28	81.80	375.7	15.78	54.3
500.	1.276	0.942	23.946	228.17	70.43	82.67	380.7	15.99	56.0
520.	1.215	0.952	25.618	231.45	72.68	84.47	390.2		59.6
540.	1.160	0.960	27.326	234.67	74.91	86.32	399.4		63.3
560.	1.110	0.968	29.071	237.85	77.09	88.19	408.2		67.1
580.	1.065	0.974	30.853	240.97	79.23	90.06	416.6		70.9
600.	1.024	0.979	32.673	244.06	81.33	91.93	424.8		74.8
625.	0.9772	0.985	35.000	247.86	83.89	94.25	434.6		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 6.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.575	0.352	-14.337	79.59	47.91	68.38	1996.2	1112.69	254.7
100.	21.401	0.337	-13.991	83.14	48.23	69.84	1964.1	921.07	250.9
105.	21.224	0.324	-13.640	86.57	48.04	70.45	1929.8	776.53	246.8
110.	21.046	0.312	-13.287	89.85	47.58	70.58	1894.7	665.37	242.6
115.	20.868	0.301	-12.935	92.98	47.00	70.47	1859.1	578.23	238.1
120.	20.688	0.291	-12.583	95.98	46.38	70.26	1823.3	508.70	233.6
125.	20.508	0.281	-12.232	98.84	45.78	70.03	1787.4	452.28	229.0
130.	20.328	0.273	-11.882	101.58	45.23	69.83	1751.5	405.82	224.3
135.	20.146	0.265	-11.534	104.22	44.74	69.69	1715.5	367.01	219.5
140.	19.964	0.258	-11.185	106.75	44.31	69.62	1679.6	334.19	214.7
145.	19.781	0.252	-10.837	109.19	43.95	69.62	1643.7	306.10	209.9
150.	19.597	0.245	-10.489	111.55	43.65	69.69	1607.7	281.82	205.1
155.	19.411	0.240	-10.140	113.84	43.41	69.84	1571.8	260.61	200.2
160.	19.224	0.235	-9.791	116.06	43.23	70.05	1535.9	241.94	195.4
165.	19.035	0.230	-9.440	118.22	43.09	70.32	1499.9	225.36	190.6
170.	18.844	0.225	-9.087	120.32	43.00	70.65	1464.0	210.53	185.8
175.	18.651	0.221	-8.733	122.38	42.95	71.04	1428.1	197.17	181.1
180.	18.456	0.217	-8.377	124.39	42.94	71.49	1392.1	185.07	176.4
185.	18.258	0.214	-8.018	126.35	42.96	71.98	1356.1	174.04	171.7
190.	18.058	0.210	-7.657	128.28	43.02	72.53	1320.1	163.95	167.1
195.	17.854	0.207	-7.293	130.17	43.10	73.14	1284.1	154.65	162.5
200.	17.648	0.204	-6.926	132.03	43.22	73.80	1248.0	146.06	158.0
205.	17.437	0.202	-6.555	133.86	43.36	74.51	1211.8	138.09	153.5
210.	17.224	0.200	-6.180	135.66	43.54	75.28	1175.6	130.67	149.1
215.	17.005	0.197	-5.802	137.45	43.73	76.12	1139.2	123.73	144.7
220.	16.783	0.195	-5.419	139.21	43.96	77.02	1102.7	117.22	140.4
225.	16.555	0.194	-5.031	140.95	44.20	78.00	1066.1	111.10	136.1
230.	16.321	0.192	-4.639	142.67	44.47	79.07	1029.2	105.32	132.0
235.	16.082	0.191	-4.241	144.39	44.77	80.23	992.1	99.85	127.8
240.	15.835	0.190	-3.836	146.09	45.09	81.50	954.7	94.65	123.8
245.	15.580	0.189	-3.425	147.78	45.43	82.90	917.0	89.70	119.8
250.	15.317	0.188	-3.007	149.47	45.80	84.45	878.8	84.98	115.8
255.	15.043	0.188	-2.581	151.16	46.19	86.19	840.1	80.45	111.9
260.	14.758	0.188	-2.145	152.85	46.61	88.16	800.7	76.09	108.0
265.	14.458	0.188	-1.699	154.55	47.06	90.42	760.6	71.88	104.2
270.	14.142	0.189	-1.240	156.27	47.54	93.07	719.5	67.79	100.3
275.	13.806	0.190	-0.767	158.00	48.07	96.22	677.1	63.79	96.5
280.	13.444	0.192	-0.277	159.77	48.63	100.11	633.2	59.86	92.7
285.	13.049	0.194	0.236	161.59	49.26	105.05	587.2	55.95	88.9
290.	12.611	0.197	0.777	163.47	49.97	111.65	538.6	52.00	84.9

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 6.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	12.111	0.202	1.357	165.45	50.81	121.02	486.5	47.95	80.9
300.	11.516	0.209	1.995	167.60	51.88	135.51	429.9	43.65	76.7
310.	9.684	0.240	3.662	173.05	56.14	222.98	296.8	33.14	67.8
320.	5.268	0.428	7.314	184.64	59.68	284.90	217.8	17.85	51.8
330.	3.937	0.555	9.199	190.45	56.13	139.15	239.0	15.25	41.3
340.	3.382	0.628	10.408	194.06	55.40	108.15	255.4	14.54	38.6
350.	3.036	0.679	11.418	196.99	55.52	95.25	268.9	14.26	37.9
360.	2.787	0.719	12.333	199.57	56.01	88.48	280.6	14.17	37.9
370.	2.594	0.752	13.197	201.93	56.71	84.53	291.0	14.18	38.4
380.	2.438	0.779	14.029	204.15	57.54	82.15	300.5	14.24	39.2
390.	2.307	0.802	14.843	206.27	58.47	80.71	309.1	14.35	40.2
400.	2.195	0.822	15.645	208.30	59.46	79.89	317.2	14.48	41.3
410.	2.097	0.839	16.442	210.27	60.50	79.50	324.8	14.63	42.6
420.	2.010	0.855	17.236	212.18	61.57	79.41	331.9	14.79	43.9
430.	1.933	0.868	18.031	214.05	62.67	79.56	338.7	14.96	45.3
440.	1.863	0.880	18.828	215.88	63.78	79.88	345.2	15.15	46.8
450.	1.799	0.891	19.629	217.68	64.91	80.33	351.4	15.33	48.3
460.	1.741	0.901	20.435	219.45	66.04	80.88	357.3	15.53	49.9
470.	1.687	0.910	21.247	221.20	67.17	81.51	363.0	15.72	51.5
480.	1.638	0.918	22.065	222.92	68.31	82.20	368.6	15.92	53.2
490.	1.591	0.925	22.891	224.62	69.44	82.94	374.0	16.12	54.9
500.	1.548	0.932	23.724	226.31	70.57	83.73	379.2	16.33	56.6
520.	1.470	0.944	25.415	229.62	72.81	85.38	389.2		60.2
540.	1.401	0.954	27.140	232.88	75.02	87.11	398.7		63.8
560.	1.339	0.962	28.900	236.08	77.19	88.88	407.8		67.5
580.	1.283	0.970	30.695	239.23	79.32	90.68	416.5		71.3
600.	1.233	0.976	32.527	242.33	81.41	92.48	424.9		75.2
625.	1.175	0.982	34.867	246.15	83.96	94.74	435.0		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 7.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.587	0.411	-14.298	79.52	47.90	68.32	2000.4	1122.37	255.2
100.	21.413	0.393	-13.952	83.06	48.24	69.80	1968.3	928.54	251.4
105.	21.237	0.378	-13.601	86.49	48.07	70.41	1934.1	782.48	247.3
110.	21.060	0.363	-13.249	89.77	47.61	70.55	1899.0	670.24	243.1
115.	20.882	0.351	-12.896	92.90	47.03	70.43	1863.5	582.32	238.7
120.	20.703	0.339	-12.545	95.89	46.42	70.22	1827.8	512.21	234.1
125.	20.524	0.328	-12.194	98.76	45.82	69.98	1792.0	455.35	229.5
130.	20.344	0.318	-11.845	101.50	45.27	69.78	1756.3	408.55	224.9
135.	20.164	0.309	-11.496	104.13	44.78	69.64	1720.5	369.47	220.1
140.	19.983	0.301	-11.148	106.66	44.36	69.56	1684.8	336.43	215.3
145.	19.801	0.293	-10.800	109.10	44.00	69.55	1649.0	308.18	210.6
150.	19.617	0.286	-10.453	111.46	43.70	69.62	1613.3	283.75	205.7
155.	19.433	0.280	-10.104	113.74	43.46	69.75	1577.6	262.43	200.9
160.	19.246	0.273	-9.755	115.96	43.27	69.95	1541.9	243.66	196.1
165.	19.059	0.268	-9.404	118.12	43.14	70.22	1506.2	226.99	191.3
170.	18.869	0.262	-9.053	120.22	43.04	70.54	1470.6	212.09	186.6
175.	18.678	0.258	-8.699	122.27	42.99	70.92	1434.9	198.68	181.9
180.	18.484	0.253	-8.343	124.27	42.98	71.35	1399.3	186.53	177.2
185.	18.288	0.249	-7.985	126.23	43.01	71.83	1363.6	175.46	172.5
190.	18.090	0.245	-7.625	128.15	43.06	72.36	1328.0	165.33	167.9
195.	17.888	0.241	-7.262	130.04	43.15	72.95	1292.3	156.01	163.4
200.	17.684	0.238	-6.895	131.90	43.27	73.58	1256.6	147.40	158.9
205.	17.476	0.235	-6.526	133.72	43.41	74.27	1220.9	139.41	154.4
210.	17.265	0.232	-6.153	135.52	43.58	75.02	1185.1	131.97	150.0
215.	17.049	0.230	-5.776	137.29	43.78	75.82	1149.3	125.02	145.7
220.	16.830	0.227	-5.394	139.05	44.00	76.69	1113.3	118.51	141.4
225.	16.606	0.225	-5.009	140.78	44.25	77.62	1077.3	112.38	137.2
230.	16.376	0.224	-4.618	142.50	44.52	78.63	1041.1	106.61	133.1
235.	16.141	0.222	-4.222	144.20	44.81	79.73	1004.7	101.15	129.0
240.	15.900	0.221	-3.821	145.89	45.12	80.92	968.2	95.96	124.9
245.	15.651	0.220	-3.413	147.57	45.46	82.22	931.3	91.04	121.0
250.	15.395	0.219	-2.998	149.25	45.83	83.66	894.2	86.34	117.1
255.	15.129	0.218	-2.576	150.92	46.21	85.24	856.7	81.84	113.2
260.	14.853	0.218	-2.145	152.59	46.63	87.02	818.7	77.52	109.4
265.	14.565	0.218	-1.705	154.27	47.06	89.03	780.1	73.36	105.7
270.	14.263	0.219	-1.255	155.95	47.53	91.32	740.9	69.34	101.9
275.	13.944	0.220	-0.792	157.65	48.03	94.00	700.8	65.44	98.2
280.	13.605	0.221	-0.314	159.37	48.57	97.18	659.6	61.62	94.6
285.	13.241	0.223	0.181	161.13	49.15	101.04	617.1	57.86	90.9
290.	12.846	0.226	0.698	162.93	49.79	105.89	573.0	54.12	87.2

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 7.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	12.408	0.230	1.243	164.79	50.51	112.19	527.0	50.37	83.4
300.	11.914	0.236	1.824	166.74	51.34	120.74	478.6	46.55	79.6
310.	10.646	0.255	3.164	171.13	53.63	151.66	375.5	38.33	71.6
320.	8.552	0.308	5.050	177.11	57.57	243.11	270.7	28.34	63.7
330.	5.793	0.440	7.634	185.07	58.30	217.92	235.5	19.51	52.3
340.	4.542	0.545	9.359	190.22	56.88	140.79	247.8	16.82	44.8
350.	3.912	0.615	10.606	193.84	56.57	112.72	261.5	15.84	42.0
360.	3.508	0.667	11.661	196.81	56.82	99.58	273.9	15.39	41.1
370.	3.216	0.708	12.617	199.43	57.37	92.35	285.1	15.18	40.9
380.	2.990	0.741	13.517	201.83	58.09	88.02	295.2	15.10	41.3
390.	2.807	0.769	14.383	204.08	58.93	85.32	304.5	15.10	42.0
400.	2.654	0.793	15.227	206.22	59.86	83.64	313.1	15.16	42.9
410.	2.523	0.814	16.058	208.27	60.85	82.62	321.1	15.24	43.9
420.	2.409	0.832	16.881	210.25	61.88	82.07	328.7	15.36	45.1
430.	2.309	0.848	17.700	212.18	62.94	81.85	335.8	15.49	46.4
440.	2.219	0.862	18.519	214.06	64.03	81.88	342.6	15.64	47.8
450.	2.138	0.875	19.339	215.91	65.13	82.10	349.1	15.80	49.3
460.	2.064	0.887	20.161	217.71	66.24	82.46	355.4	15.96	50.8
470.	1.997	0.897	20.988	219.49	67.36	82.93	361.4	16.14	52.3
480.	1.935	0.906	21.820	221.24	68.48	83.49	367.1	16.32	53.9
490.	1.878	0.915	22.658	222.97	69.60	84.12	372.7	16.50	55.6
500.	1.825	0.923	23.503	224.68	70.71	84.81	378.1	16.69	57.3
520.	1.729	0.936	25.214	228.03	72.94	86.30	388.5		60.8
540.	1.645	0.948	26.956	231.32	75.13	87.90	398.3		64.3
560.	1.570	0.957	28.730	234.55	77.29	89.58	407.7		68.0
580.	1.503	0.966	30.539	237.72	79.41	91.30	416.6		71.8
600.	1.442	0.973	32.383	240.84	81.49	93.04	425.2		75.6
625.	1.374	0.981	34.736	244.69	84.03	95.22	435.6		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 8.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.599	0.469	-14.258	79.44	47.90	68.27	2004.7	1132.19	255.6
100.	21.426	0.449	-13.913	82.99	48.26	69.75	1972.5	936.09	251.8
105.	21.250	0.431	-13.562	86.41	48.09	70.37	1938.3	788.48	247.8
110.	21.074	0.415	-13.210	89.69	47.64	70.51	1903.3	675.15	243.6
115.	20.896	0.400	-12.858	92.82	47.07	70.39	1867.9	586.45	239.2
120.	20.718	0.387	-12.506	95.81	46.46	70.18	1832.3	515.75	234.7
125.	20.540	0.375	-12.156	98.67	45.86	69.94	1796.7	458.45	230.1
130.	20.361	0.364	-11.807	101.41	45.31	69.73	1761.1	411.29	225.4
135.	20.181	0.353	-11.459	104.04	44.82	69.58	1725.5	371.95	220.7
140.	20.001	0.344	-11.111	106.57	44.40	69.50	1689.9	338.69	216.0
145.	19.820	0.335	-10.763	109.01	44.04	69.49	1654.4	310.26	211.2
150.	19.637	0.327	-10.416	111.36	43.74	69.54	1618.9	285.69	206.4
155.	19.454	0.319	-10.068	113.64	43.50	69.67	1583.4	264.25	201.6
160.	19.269	0.312	-9.719	115.86	43.32	69.86	1547.9	245.38	196.8
165.	19.083	0.306	-9.369	118.01	43.18	70.12	1512.5	228.63	192.1
170.	18.894	0.300	-9.018	120.11	43.09	70.43	1477.1	213.66	187.3
175.	18.704	0.294	-8.665	122.16	43.04	70.79	1441.7	200.19	182.6
180.	18.512	0.289	-8.310	124.16	43.03	71.21	1406.4	187.99	178.0
185.	18.318	0.284	-7.953	126.11	43.05	71.68	1371.0	176.88	173.3
190.	18.121	0.279	-7.593	128.03	43.11	72.20	1335.7	166.72	168.8
195.	17.922	0.275	-7.230	129.92	43.20	72.77	1300.4	157.37	164.2
200.	17.719	0.272	-6.865	131.77	43.31	73.38	1265.1	148.73	159.7
205.	17.514	0.268	-6.497	133.59	43.46	74.05	1229.8	140.72	155.3
210.	17.305	0.265	-6.125	135.38	43.63	74.76	1194.5	133.27	151.0
215.	17.093	0.262	-5.749	137.15	43.82	75.54	1159.1	126.31	146.7
220.	16.876	0.259	-5.369	138.89	44.05	76.37	1123.7	119.79	142.4
225.	16.655	0.257	-4.985	140.62	44.29	77.26	1088.2	113.66	138.2
230.	16.430	0.255	-4.596	142.33	44.56	78.22	1052.7	107.89	134.1
235.	16.199	0.253	-4.203	144.02	44.85	79.26	1017.0	102.43	130.1
240.	15.962	0.251	-3.804	145.70	45.16	80.38	981.2	97.26	126.1
245.	15.719	0.250	-3.399	147.37	45.50	81.60	945.2	92.35	122.2
250.	15.469	0.249	-2.987	149.03	45.86	82.94	909.0	87.67	118.3
255.	15.211	0.248	-2.569	150.69	46.24	84.40	872.5	83.20	114.5
260.	14.943	0.248	-2.143	152.34	46.64	86.01	835.7	78.91	110.8
265.	14.665	0.248	-1.709	154.00	47.07	87.82	798.5	74.80	107.1
270.	14.375	0.248	-1.265	155.66	47.53	89.85	760.8	70.83	103.5
275.	14.071	0.249	-0.810	157.33	48.01	92.16	722.6	66.99	99.9
280.	13.751	0.250	-0.342	159.01	48.53	94.84	683.6	63.26	96.3
285.	13.411	0.252	0.139	160.72	49.08	97.99	643.8	59.62	92.8
290.	13.046	0.254	0.639	162.45	49.67	101.78	603.0	56.03	89.2

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 8.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	12.651	0.258	1.159	164.23	50.32	106.43	561.0	52.48	85.7
300.	12.218	0.262	1.705	166.07	51.04	112.29	517.8	48.93	82.1
310.	11.186	0.277	2.908	170.01	52.77	129.90	428.5	41.68	74.9
320.	9.793	0.307	4.353	174.60	55.09	162.85	341.0	33.97	67.5
330.	7.849	0.371	6.223	180.34	57.38	206.54	272.3	25.92	60.2
340.	6.029	0.469	8.185	186.21	57.69	174.83	253.9	20.46	52.3
350.	4.974	0.553	9.712	190.63	57.43	134.32	260.5	18.10	47.3
360.	4.342	0.616	10.937	194.09	57.55	113.12	271.1	17.02	44.9
370.	3.913	0.665	12.006	197.02	57.98	101.59	281.8	16.46	43.9
380.	3.595	0.704	12.985	199.63	58.61	94.77	292.0	16.16	43.7
390.	3.346	0.737	13.909	202.03	59.38	90.51	301.4	16.01	44.0
400.	3.143	0.765	14.800	204.28	60.25	87.77	310.3	15.95	44.6
410.	2.972	0.790	15.668	206.43	61.19	86.01	318.6	15.96	45.5
420.	2.827	0.810	16.522	208.49	62.18	84.92	326.4	16.01	46.5
430.	2.699	0.829	17.368	210.48	63.21	84.29	333.9	16.09	47.7
440.	2.587	0.845	18.209	212.41	64.27	83.99	340.9	16.19	48.9
450.	2.487	0.860	19.049	214.30	65.34	83.95	347.6	16.31	50.3
460.	2.396	0.873	19.889	216.14	66.44	84.10	354.1	16.45	51.7
470.	2.314	0.885	20.731	217.96	67.54	84.40	360.3	16.59	53.2
480.	2.239	0.895	21.577	219.74	68.64	84.82	366.3	16.75	54.8
490.	2.170	0.905	22.428	221.49	69.75	85.33	372.0	16.91	56.4
500.	2.106	0.914	23.284	223.22	70.85	85.91	377.6	17.08	58.0
520.	1.992	0.929	25.015	226.61	73.06	87.23	388.2		61.4
540.	1.891	0.942	26.774	229.93	75.23	88.71	398.3		64.9
560.	1.803	0.953	28.564	233.19	77.38	90.28	407.9		68.5
580.	1.724	0.962	30.386	236.38	79.49	91.92	417.1		72.2
600.	1.652	0.970	32.241	239.53	81.57	93.59	425.9		76.0
625.	1.572	0.979	34.607	243.39	84.10	95.71	436.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 9.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.611	0.527	-14.219	79.37	47.90	68.21	2008.9	1142.13	256.0
100.	21.438	0.505	-13.874	82.91	48.27	69.71	1976.7	943.74	252.3
105.	21.263	0.485	-13.524	86.33	48.11	70.34	1942.5	794.56	248.3
110.	21.087	0.467	-13.171	89.61	47.67	70.47	1907.6	680.12	244.1
115.	20.910	0.450	-12.819	92.74	47.10	70.36	1872.2	590.61	239.7
120.	20.733	0.435	-12.468	95.73	46.50	70.14	1836.8	519.31	235.2
125.	20.556	0.421	-12.118	98.59	45.90	69.90	1801.3	461.56	230.7
130.	20.377	0.409	-11.769	101.32	45.36	69.69	1765.9	414.05	226.0
135.	20.199	0.397	-11.421	103.95	44.87	69.53	1730.4	374.43	221.3
140.	20.019	0.386	-11.073	106.48	44.44	69.44	1695.0	340.96	216.6
145.	19.839	0.376	-10.726	108.91	44.08	69.42	1659.7	312.35	211.8
150.	19.658	0.367	-10.379	111.27	43.79	69.47	1624.3	287.63	207.1
155.	19.475	0.359	-10.032	113.55	43.55	69.59	1589.1	266.08	202.3
160.	19.291	0.351	-9.683	115.76	43.36	69.78	1553.8	247.11	197.5
165.	19.106	0.343	-9.334	117.91	43.23	70.02	1518.7	230.28	192.8
170.	18.919	0.337	-8.983	120.01	43.13	70.32	1483.5	215.24	188.1
175.	18.730	0.330	-8.630	122.05	43.09	70.68	1448.4	201.71	183.4
180.	18.540	0.324	-8.276	124.05	43.07	71.08	1413.4	189.46	178.7
185.	18.347	0.319	-7.919	126.00	43.10	71.54	1378.3	178.30	174.1
190.	18.152	0.314	-7.560	127.91	43.15	72.04	1343.4	168.10	169.6
195.	17.954	0.309	-7.199	129.79	43.24	72.59	1308.4	158.72	165.1
200.	17.754	0.305	-6.835	131.64	43.36	73.19	1273.5	150.06	160.6
205.	17.551	0.301	-6.467	133.45	43.50	73.83	1238.6	142.03	156.2
210.	17.345	0.297	-6.096	135.24	43.67	74.52	1203.6	134.56	151.9
215.	17.135	0.294	-5.722	137.00	43.87	75.27	1168.7	127.59	147.6
220.	16.921	0.291	-5.343	138.74	44.09	76.07	1133.8	121.06	143.4
225.	16.704	0.288	-4.961	140.46	44.33	76.92	1098.9	114.93	139.3
230.	16.482	0.286	-4.574	142.16	44.60	77.84	1063.9	109.15	135.2
235.	16.255	0.283	-4.182	143.84	44.89	78.83	1028.9	103.70	131.2
240.	16.023	0.281	-3.786	145.52	45.20	79.89	993.8	98.53	127.2
245.	15.785	0.280	-3.383	147.17	45.53	81.04	958.5	93.63	123.4
250.	15.540	0.279	-2.975	148.82	45.89	82.28	923.2	88.97	119.5
255.	15.289	0.278	-2.560	150.47	46.27	83.64	887.7	84.52	115.8
260.	15.029	0.277	-2.139	152.10	46.67	85.12	851.9	80.27	112.1
265.	14.760	0.277	-1.709	153.74	47.09	86.75	815.9	76.19	108.5
270.	14.481	0.277	-1.271	155.38	47.54	88.57	779.6	72.27	104.9
275.	14.189	0.277	-0.823	157.02	48.01	90.61	742.9	68.48	101.4
280.	13.884	0.278	-0.364	158.68	48.51	92.92	705.8	64.82	97.9
285.	13.563	0.280	0.107	160.34	49.04	95.57	668.1	61.26	94.5
290.	13.223	0.282	0.592	162.03	49.60	98.65	629.8	57.78	91.1

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 9.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	12.859	0.285	1.094	163.75	50.20	102.30	590.9	54.37	87.7
300.	12.468	0.289	1.616	165.50	50.85	106.67	551.2	51.01	84.4
310.	11.573	0.302	2.738	169.18	52.33	118.55	470.6	44.32	77.6
320.	10.466	0.323	4.008	173.21	54.11	136.78	392.3	37.58	70.9
330.	9.064	0.362	5.501	177.80	55.98	162.27	324.7	30.81	64.4
340.	7.469	0.426	7.201	182.88	57.27	171.68	282.3	24.89	58.2
350.	6.153	0.503	8.822	187.58	57.77	149.72	271.0	21.12	52.7
360.	5.272	0.570	10.195	191.45	58.06	126.36	274.6	19.13	49.2
370.	4.678	0.625	11.378	194.69	58.48	111.28	282.6	18.06	47.3
380.	4.249	0.670	12.440	197.52	59.07	101.96	291.6	17.44	46.5
390.	3.921	0.708	13.428	200.09	59.79	96.03	300.6	17.08	46.3
400.	3.659	0.740	14.368	202.47	60.61	92.15	309.3	16.88	46.6
410.	3.443	0.767	15.275	204.71	61.51	89.59	317.6	16.78	47.2
420.	3.261	0.790	16.162	206.85	62.46	87.89	325.4	16.74	48.0
430.	3.104	0.811	17.035	208.90	63.46	86.81	333.0	16.75	49.0
440.	2.966	0.829	17.900	210.89	64.49	86.17	340.1	16.80	50.1
450.	2.844	0.846	18.760	212.82	65.55	85.85	347.0	16.88	51.4
460.	2.736	0.860	19.618	214.71	66.62	85.78	353.6	16.98	52.7
470.	2.637	0.873	20.476	216.55	67.71	85.90	359.9	17.09	54.1
480.	2.548	0.885	21.336	218.36	68.80	86.16	366.0	17.22	55.6
490.	2.466	0.896	22.200	220.14	69.89	86.54	371.9	17.35	57.2
500.	2.391	0.906	23.067	221.90	70.99	87.02	377.5	17.50	58.8
520.	2.256	0.923	24.819	225.33	73.17	88.17	388.4		62.1
540.	2.139	0.937	26.595	228.68	75.34	89.51	398.7		65.5
560.	2.037	0.949	28.400	231.96	77.47	90.98	408.5		69.1
580.	1.945	0.959	30.235	235.18	79.58	92.53	417.8		72.7
600.	1.863	0.968	32.102	238.35	81.64	94.14	426.7		76.5
625.	1.771	0.978	34.481	242.23	84.17	96.19	437.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 10.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.623	0.586	-14.180	79.30	47.89	68.16	2013.1	1152.21	256.4
100.	21.450	0.561	-13.835	82.84	48.28	69.67	1980.8	951.48	252.7
105.	21.276	0.538	-13.485	86.25	48.14	70.30	1946.7	800.69	248.7
110.	21.101	0.518	-13.133	89.53	47.71	70.44	1911.8	685.13	244.6
115.	20.925	0.500	-12.781	92.66	47.14	70.32	1876.6	594.80	240.2
120.	20.748	0.483	-12.430	95.65	46.53	70.10	1841.3	522.90	235.8
125.	20.571	0.468	-12.080	98.50	45.94	69.86	1805.9	464.69	231.2
130.	20.394	0.454	-11.731	101.24	45.40	69.64	1770.6	416.83	226.6
135.	20.216	0.441	-11.383	103.86	44.91	69.48	1735.3	376.93	221.9
140.	20.037	0.429	-11.036	106.39	44.49	69.38	1700.1	343.24	217.2
145.	19.858	0.418	-10.689	108.82	44.13	69.36	1664.9	314.45	212.5
150.	19.677	0.407	-10.342	111.17	43.83	69.40	1629.8	289.59	207.7
155.	19.496	0.398	-9.995	113.45	43.59	69.52	1594.7	267.91	203.0
160.	19.313	0.389	-9.647	115.66	43.41	69.69	1559.7	248.84	198.2
165.	19.129	0.381	-9.298	117.81	43.27	69.93	1524.8	231.92	193.5
170.	18.944	0.373	-8.948	119.90	43.18	70.22	1489.9	216.81	188.8
175.	18.756	0.366	-8.596	121.94	43.13	70.56	1455.0	203.22	184.1
180.	18.567	0.360	-8.242	123.93	43.12	70.96	1420.3	190.92	179.5
185.	18.376	0.354	-7.886	125.88	43.14	71.40	1385.5	179.72	174.9
190.	18.183	0.348	-7.528	127.79	43.20	71.89	1350.9	169.48	170.4
195.	17.987	0.343	-7.167	129.67	43.29	72.42	1316.3	160.07	165.9
200.	17.788	0.338	-6.804	131.51	43.41	73.00	1281.7	151.38	161.5
205.	17.587	0.334	-6.437	133.32	43.55	73.62	1247.2	143.33	157.1
210.	17.383	0.329	-6.067	135.10	43.72	74.29	1212.7	135.85	152.8
215.	17.176	0.326	-5.694	136.86	43.92	75.01	1178.2	128.86	148.6
220.	16.965	0.322	-5.317	138.59	44.13	75.78	1143.7	122.32	144.4
225.	16.751	0.319	-4.936	140.30	44.38	76.60	1109.3	116.18	140.3
230.	16.532	0.316	-4.551	142.00	44.64	77.48	1074.9	110.41	136.2
235.	16.309	0.314	-4.161	143.67	44.93	78.42	1040.4	104.95	132.2
240.	16.081	0.312	-3.767	145.33	45.24	79.43	1006.0	99.79	128.3
245.	15.848	0.310	-3.367	146.98	45.57	80.51	971.5	94.90	124.5
250.	15.609	0.308	-2.961	148.62	45.93	81.68	936.9	90.25	120.7
255.	15.363	0.307	-2.550	150.25	46.30	82.94	902.2	85.82	117.0
260.	15.110	0.306	-2.132	151.87	46.69	84.31	867.4	81.59	113.4
265.	14.850	0.306	-1.707	153.49	47.11	85.81	832.5	77.54	109.8
270.	14.580	0.306	-1.273	155.11	47.55	87.46	797.4	73.66	106.3
275.	14.299	0.306	-0.832	156.74	48.01	89.27	762.0	69.92	102.9
280.	14.007	0.307	-0.380	158.36	48.50	91.30	726.4	66.31	99.5
285.	13.702	0.308	0.082	160.00	49.01	93.58	690.5	62.82	96.2
290.	13.381	0.310	0.556	161.65	49.55	96.18	654.2	59.42	92.9

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 10.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.042	0.313	1.044	163.32	50.12	99.15	617.6	56.12	89.6
300.	12.682	0.316	1.548	165.01	50.73	102.60	580.6	52.88	86.4
310.	11.880	0.327	2.616	168.51	52.07	111.37	506.3	46.56	80.0
320.	10.936	0.344	3.787	172.23	53.59	123.47	434.1	40.37	73.8
330.	9.808	0.372	5.098	176.26	55.21	139.15	369.9	34.34	67.8
340.	8.515	0.415	6.562	180.63	56.59	151.90	321.0	28.79	62.2
350.	7.248	0.474	8.080	185.03	57.58	148.87	294.3	24.46	57.3
360.	6.227	0.536	9.499	189.03	58.24	134.09	286.6	21.65	53.4
370.	5.483	0.593	10.763	192.49	58.80	119.38	288.9	19.97	50.9
380.	4.938	0.641	11.901	195.53	59.42	108.70	295.0	18.96	49.4
390.	4.524	0.682	12.949	198.25	60.13	101.44	302.5	18.33	48.8
400.	4.198	0.716	13.937	200.75	60.92	96.53	310.4	17.94	48.7
410.	3.931	0.746	14.885	203.09	61.79	93.18	318.2	17.70	49.0
420.	3.709	0.772	15.804	205.31	62.72	90.90	325.9	17.56	49.7
430.	3.519	0.795	16.705	207.43	63.70	89.37	333.3	17.49	50.5
440.	3.354	0.815	17.594	209.47	64.71	88.37	340.4	17.48	51.5
450.	3.210	0.833	18.474	211.45	65.75	87.77	347.2	17.50	52.6
460.	3.081	0.849	19.350	213.38	66.80	87.47	353.8	17.55	53.8
470.	2.965	0.863	20.224	215.26	67.87	87.40	360.2	17.63	55.2
480.	2.861	0.876	21.099	217.10	68.95	87.51	366.4	17.72	56.6
490.	2.765	0.888	21.975	218.90	70.03	87.76	372.3	17.83	58.0
500.	2.678	0.898	22.854	220.68	71.12	88.12	378.1	17.95	59.6
520.	2.523	0.917	24.626	224.15	73.29	89.10	389.1		62.8
540.	2.388	0.933	26.420	227.54	75.44	90.31	399.5		66.1
560.	2.271	0.946	28.239	230.85	77.56	91.67	409.4		69.6
580.	2.167	0.957	30.087	234.09	79.66	93.14	418.8		73.2
600.	2.073	0.967	31.966	237.27	81.71	94.68	427.9		76.9
625.	1.970	0.977	34.357	241.18	84.23	96.66	438.7		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 11.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.634	0.644	-14.141	79.22	47.89	68.11	2017.3	1162.42	256.9
100.	21.463	0.616	-13.796	82.76	48.30	69.63	1985.0	959.31	253.2
105.	21.289	0.592	-13.446	86.18	48.16	70.26	1950.9	806.89	249.2
110.	21.114	0.570	-13.094	89.45	47.74	70.40	1916.1	690.18	245.1
115.	20.939	0.549	-12.742	92.58	47.17	70.29	1880.9	599.03	240.7
120.	20.763	0.531	-12.391	95.56	46.57	70.06	1845.7	526.52	236.3
125.	20.587	0.514	-12.042	98.42	45.98	69.82	1810.5	467.84	231.8
130.	20.410	0.499	-11.693	101.15	45.44	69.60	1775.3	419.63	227.2
135.	20.233	0.484	-11.345	103.78	44.95	69.43	1740.2	379.45	222.5
140.	20.055	0.471	-10.999	106.30	44.53	69.33	1705.1	345.53	217.8
145.	19.877	0.459	-10.652	108.73	44.17	69.30	1670.1	316.56	213.1
150.	19.697	0.448	-10.306	111.08	43.87	69.34	1635.2	291.55	208.4
155.	19.517	0.437	-9.959	113.36	43.64	69.44	1600.4	269.75	203.7
160.	19.335	0.428	-9.611	115.56	43.45	69.61	1565.6	250.57	198.9
165.	19.152	0.419	-9.262	117.71	43.32	69.84	1530.8	233.57	194.2
170.	18.968	0.410	-8.913	119.80	43.22	70.12	1496.2	218.39	189.5
175.	18.782	0.403	-8.561	121.83	43.18	70.45	1461.6	204.73	184.9
180.	18.594	0.395	-8.208	123.82	43.16	70.84	1427.1	192.38	180.3
185.	18.404	0.389	-7.853	125.77	43.19	71.27	1392.7	181.14	175.7
190.	18.213	0.382	-7.495	127.68	43.25	71.74	1358.3	170.86	171.2
195.	18.019	0.377	-7.135	129.55	43.33	72.26	1324.0	161.42	166.8
200.	17.822	0.371	-6.773	131.38	43.45	72.82	1289.8	152.70	162.4
205.	17.623	0.366	-6.407	133.19	43.59	73.43	1255.6	144.63	158.0
210.	17.421	0.362	-6.038	134.97	43.76	74.07	1221.5	137.12	153.7
215.	17.217	0.357	-5.666	136.72	43.96	74.77	1187.5	130.12	149.5
220.	17.009	0.354	-5.290	138.45	44.18	75.51	1153.5	123.58	145.4
225.	16.797	0.350	-4.911	140.15	44.42	76.30	1119.5	117.43	141.3
230.	16.582	0.347	-4.527	141.84	44.69	77.14	1085.6	111.65	137.2
235.	16.362	0.344	-4.139	143.51	44.97	78.04	1051.7	106.20	133.3
240.	16.138	0.342	-3.747	145.16	45.28	79.00	1017.8	101.04	129.4
245.	15.909	0.339	-3.349	146.80	45.61	80.03	984.0	96.15	125.6
250.	15.675	0.338	-2.946	148.43	45.96	81.13	950.1	91.51	121.9
255.	15.435	0.336	-2.538	150.04	46.33	82.31	916.2	87.10	118.2
260.	15.189	0.335	-2.123	151.65	46.72	83.59	882.3	82.89	114.7
265.	14.935	0.334	-1.702	153.26	47.13	84.97	848.3	78.86	111.1
270.	14.673	0.334	-1.273	154.86	47.57	86.47	814.2	75.00	107.7
275.	14.403	0.334	-0.837	156.46	48.02	88.11	780.1	71.30	104.3
280.	14.122	0.335	-0.392	158.07	48.50	89.92	745.8	67.74	101.0
285.	13.830	0.336	0.063	159.68	48.99	91.92	711.3	64.30	97.7
290.	13.525	0.337	0.528	161.29	49.52	94.15	676.7	60.97	94.5

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 11.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.206	0.340	1.005	162.92	50.07	96.66	642.0	57.74	91.4
300.	12.870	0.343	1.495	164.57	50.64	99.49	607.1	54.60	88.3
310.	12.135	0.352	2.523	167.94	51.89	106.36	537.5	48.54	82.2
320.	11.298	0.366	3.628	171.45	53.28	115.19	470.0	42.71	76.3
330.	10.336	0.388	4.833	175.16	54.74	125.99	408.8	37.14	70.7
340.	9.252	0.421	6.148	179.08	56.10	136.35	358.6	31.97	65.5
350.	8.127	0.465	7.536	183.11	57.24	139.76	324.3	27.58	60.9
360.	7.106	0.517	8.911	186.98	58.16	134.01	306.6	24.31	57.1
370.	6.276	0.570	10.201	190.51	58.92	123.71	301.2	22.10	54.3
380.	5.636	0.618	11.387	193.68	59.64	113.82	302.8	20.67	52.5
390.	5.141	0.660	12.485	196.53	60.38	106.13	307.7	19.74	51.4
400.	4.749	0.696	13.517	199.14	61.18	100.56	314.0	19.13	51.0
410.	4.431	0.728	14.502	201.58	62.04	96.60	320.9	18.73	51.0
420.	4.167	0.756	15.453	203.87	62.96	93.81	327.9	18.47	51.4
430.	3.943	0.780	16.381	206.05	63.91	91.86	334.9	18.31	52.0
440.	3.749	0.802	17.292	208.15	64.91	90.53	341.8	18.21	52.9
450.	3.580	0.821	18.193	210.17	65.93	89.66	348.5	18.17	53.9
460.	3.431	0.838	19.087	212.13	66.97	89.14	355.0	18.17	55.0
470.	3.297	0.854	19.977	214.05	68.03	88.89	361.3	18.21	56.2
480.	3.176	0.868	20.865	215.92	69.10	88.85	367.4	18.26	57.5
490.	3.067	0.880	21.754	217.75	70.17	88.97	373.4	18.34	58.9
500.	2.967	0.892	22.645	219.55	71.24	89.22	379.1	18.43	60.4
520.	2.790	0.912	24.437	223.07	73.40	90.02	390.2		63.5
540.	2.638	0.929	26.248	226.48	75.53	91.09	400.7		66.8
560.	2.505	0.943	28.082	229.82	77.65	92.36	410.7		70.2
580.	2.388	0.955	29.943	233.08	79.73	93.74	420.2		73.8
600.	2.284	0.966	31.832	236.29	81.79	95.21	429.3		77.4
625.	2.168	0.977	34.236	240.21	84.30	97.12	440.2		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 12.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.646	0.702	-14.101	79.15	47.89	68.06	2021.5	1172.78	257.3
100.	21.475	0.672	-13.757	82.69	48.31	69.59	1989.1	967.23	253.6
105.	21.302	0.645	-13.407	86.10	48.19	70.23	1955.1	813.16	249.7
110.	21.127	0.621	-13.055	89.37	47.77	70.37	1920.3	695.29	245.6
115.	20.953	0.599	-12.704	92.50	47.21	70.25	1885.2	603.30	241.3
120.	20.777	0.579	-12.353	95.48	46.61	70.03	1850.1	530.16	236.8
125.	20.602	0.560	-12.003	98.34	46.02	69.78	1815.0	471.02	232.3
130.	20.426	0.544	-11.655	101.07	45.48	69.55	1780.0	422.44	227.8
135.	20.250	0.528	-11.308	103.69	44.99	69.38	1745.0	381.98	223.1
140.	20.073	0.514	-10.961	106.21	44.57	69.28	1710.2	347.83	218.4
145.	19.895	0.500	-10.615	108.64	44.21	69.24	1675.3	318.68	213.8
150.	19.717	0.488	-10.269	110.99	43.92	69.27	1640.6	293.52	209.0
155.	19.537	0.477	-9.922	113.26	43.68	69.37	1605.9	271.59	204.3
160.	19.357	0.466	-9.575	115.47	43.49	69.53	1571.3	252.31	199.6
165.	19.175	0.456	-9.227	117.61	43.36	69.75	1536.8	235.23	194.9
170.	18.992	0.447	-8.877	119.69	43.27	70.02	1502.4	219.97	190.3
175.	18.807	0.439	-8.526	121.73	43.22	70.35	1468.1	206.25	185.6
180.	18.621	0.431	-8.174	123.72	43.21	70.72	1433.9	193.84	181.1
185.	18.432	0.423	-7.819	125.66	43.23	71.14	1399.7	182.56	176.5
190.	18.242	0.416	-7.462	127.56	43.29	71.60	1365.6	172.24	172.0
195.	18.050	0.410	-7.103	129.43	43.38	72.10	1331.6	162.76	167.6
200.	17.855	0.404	-6.741	131.26	43.50	72.65	1297.7	154.02	163.2
205.	17.658	0.399	-6.377	133.06	43.64	73.24	1263.9	145.92	158.9
210.	17.459	0.394	-6.009	134.83	43.81	73.86	1230.2	138.40	154.6
215.	17.256	0.389	-5.638	136.58	44.00	74.54	1196.6	131.38	150.4
220.	17.051	0.385	-5.263	138.30	44.22	75.25	1163.0	124.82	146.3
225.	16.842	0.381	-4.885	140.00	44.47	76.01	1129.5	118.67	142.2
230.	16.630	0.377	-4.503	141.68	44.73	76.82	1096.0	112.88	138.3
235.	16.414	0.374	-4.117	143.34	45.02	77.68	1062.7	107.43	134.3
240.	16.193	0.371	-3.726	144.99	45.32	78.60	1029.4	102.27	130.5
245.	15.969	0.369	-3.331	146.62	45.65	79.58	996.1	97.39	126.7
250.	15.739	0.367	-2.930	148.24	46.00	80.62	962.9	92.76	123.0
255.	15.504	0.365	-2.525	149.84	46.37	81.73	929.7	88.35	119.4
260.	15.263	0.364	-2.113	151.44	46.75	82.92	896.6	84.16	115.9
265.	15.016	0.363	-1.695	153.03	47.16	84.21	863.4	80.15	112.4
270.	14.762	0.362	-1.271	154.62	47.59	85.59	830.3	76.32	109.0
275.	14.500	0.362	-0.839	156.20	48.04	87.09	797.2	72.64	105.7
280.	14.230	0.362	-0.400	157.79	48.50	88.72	764.0	69.11	102.4
285.	13.949	0.363	0.048	159.37	48.99	90.50	730.8	65.72	99.2
290.	13.658	0.364	0.506	160.96	49.50	92.46	697.6	62.44	96.1

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 12.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.355	0.366	0.973	162.56	50.03	94.62	664.4	59.28	93.0
300.	13.038	0.369	1.452	164.17	50.59	97.01	631.2	56.21	90.0
310.	12.356	0.377	2.449	167.44	51.77	102.62	565.4	50.34	84.2
320.	11.596	0.389	3.509	170.80	53.07	109.48	501.8	44.77	78.6
330.	10.745	0.407	4.643	174.29	54.43	117.52	443.1	39.50	73.3
340.	9.803	0.433	5.860	177.93	55.76	125.62	393.1	34.62	68.4
350.	8.810	0.468	7.145	181.65	56.94	130.48	355.3	30.33	64.0
360.	7.851	0.511	8.449	185.33	57.98	129.52	331.0	26.87	60.3
370.	7.008	0.557	9.719	188.81	58.90	123.93	318.8	24.31	57.4
380.	6.312	0.602	10.922	192.01	59.74	116.50	315.0	22.51	55.4
390.	5.752	0.643	12.051	194.95	60.55	109.52	316.2	21.28	54.0
400.	5.302	0.681	13.117	197.64	61.38	103.88	320.2	20.44	53.3
410.	4.934	0.713	14.133	200.15	62.25	99.61	325.6	19.86	53.1
420.	4.629	0.742	15.113	202.52	63.15	96.47	331.7	19.46	53.2
430.	4.370	0.768	16.066	204.76	64.10	94.20	338.0	19.19	53.6
440.	4.148	0.791	16.999	206.90	65.09	92.59	344.4	19.01	54.3
450.	3.954	0.811	17.919	208.97	66.10	91.48	350.8	18.90	55.2
460.	3.783	0.829	18.830	210.97	67.13	90.76	357.1	18.84	56.2
470.	3.630	0.846	19.735	212.92	68.17	90.34	363.2	18.82	57.3
480.	3.494	0.861	20.637	214.82	69.23	90.15	369.2	18.84	58.6
490.	3.370	0.874	21.539	216.68	70.29	90.14	375.1	18.88	59.9
500.	3.257	0.886	22.441	218.50	71.36	90.29	380.8	18.94	61.3
520.	3.058	0.908	24.252	222.05	73.50	90.92	391.8		64.3
540.	2.888	0.925	26.080	225.50	75.63	91.86	402.3		67.5
560.	2.740	0.941	27.928	228.86	77.73	93.02	412.3		70.8
580.	2.609	0.954	29.802	232.15	79.81	94.33	421.9		74.3
600.	2.493	0.965	31.702	235.37	81.85	95.73	431.0		77.9
625.	2.365	0.976	34.118	239.32	84.36	97.58	442.0		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 13.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.657	0.760	-14.062	79.08	47.89	68.01	2025.6	1183.27	257.7
100.	21.487	0.728	-13.718	82.61	48.33	69.55	1993.2	975.25	254.1
105.	21.314	0.699	-13.368	86.02	48.21	70.19	1959.2	819.50	250.2
110.	21.141	0.672	-13.016	89.29	47.80	70.33	1924.5	700.44	246.0
115.	20.966	0.648	-12.665	92.42	47.24	70.22	1889.5	607.60	241.8
120.	20.792	0.627	-12.314	95.40	46.65	69.99	1854.5	533.84	237.4
125.	20.617	0.607	-11.965	98.25	46.06	69.74	1819.6	474.22	232.9
130.	20.442	0.588	-11.617	100.98	45.52	69.51	1784.7	425.27	228.3
135.	20.267	0.571	-11.270	103.60	45.03	69.33	1749.9	384.52	223.7
140.	20.090	0.556	-10.924	106.12	44.61	69.22	1715.1	350.14	219.1
145.	19.914	0.541	-10.578	108.55	44.26	69.18	1680.5	320.80	214.4
150.	19.736	0.528	-10.232	110.90	43.96	69.21	1645.9	295.49	209.7
155.	19.558	0.516	-9.885	113.17	43.72	69.30	1611.5	273.44	205.0
160.	19.378	0.504	-9.539	115.37	43.54	69.45	1577.1	254.06	200.3
165.	19.198	0.494	-9.191	117.51	43.40	69.66	1542.8	236.88	195.7
170.	19.016	0.484	-8.842	119.59	43.31	69.93	1508.6	221.55	191.0
175.	18.832	0.474	-8.492	121.62	43.26	70.24	1474.5	207.77	186.4
180.	18.647	0.466	-8.139	123.61	43.25	70.60	1440.5	195.31	181.8
185.	18.460	0.458	-7.785	125.55	43.28	71.01	1406.6	183.98	177.3
190.	18.272	0.450	-7.429	127.45	43.34	71.46	1372.9	173.62	172.9
195.	18.081	0.443	-7.071	129.31	43.42	71.95	1339.2	164.11	168.4
200.	17.888	0.437	-6.710	131.14	43.54	72.48	1305.6	155.33	164.1
205.	17.693	0.431	-6.346	132.94	43.68	73.05	1272.1	147.21	159.8
210.	17.496	0.426	-5.979	134.70	43.85	73.66	1238.8	139.67	155.5
215.	17.295	0.420	-5.609	136.44	44.05	74.31	1205.5	132.64	151.4
220.	17.092	0.416	-5.236	138.16	44.27	75.01	1172.3	126.06	147.3
225.	16.886	0.412	-4.859	139.85	44.51	75.74	1139.2	119.90	143.2
230.	16.677	0.408	-4.478	141.53	44.77	76.52	1106.3	114.10	139.3
235.	16.464	0.404	-4.094	143.18	45.06	77.35	1073.4	108.65	135.4
240.	16.247	0.401	-3.705	144.82	45.36	78.23	1040.6	103.49	131.6
245.	16.026	0.398	-3.311	146.44	45.69	79.16	1007.9	98.61	127.8
250.	15.801	0.396	-2.913	148.05	46.04	80.14	975.3	93.98	124.2
255.	15.571	0.394	-2.510	149.65	46.40	81.20	942.8	89.59	120.6
260.	15.335	0.392	-2.101	151.24	46.79	82.32	910.4	85.40	117.1
265.	15.094	0.391	-1.687	152.81	47.19	83.52	878.0	81.41	113.6
270.	14.847	0.390	-1.266	154.39	47.61	84.80	845.7	77.60	110.3
275.	14.593	0.390	-0.838	155.96	48.05	86.18	813.5	73.95	107.0
280.	14.331	0.390	-0.404	157.52	48.51	87.66	781.3	70.45	103.8
285.	14.061	0.390	0.038	159.09	48.99	89.27	749.2	67.09	100.7
290.	13.781	0.391	0.489	160.66	49.49	91.01	717.2	63.86	97.6

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 13.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.492	0.393	0.949	162.23	50.01	92.91	685.3	60.74	94.6
300.	13.191	0.395	1.419	163.81	50.55	94.98	653.6	57.73	91.7
310.	12.550	0.402	2.391	166.99	51.69	99.70	590.8	52.00	86.0
320.	11.849	0.412	3.415	170.25	52.92	105.27	530.3	46.61	80.7
330.	11.078	0.428	4.499	173.58	54.21	111.59	474.0	41.57	75.6
340.	10.239	0.449	5.648	177.01	55.50	118.03	424.8	36.91	70.9
350.	9.351	0.478	6.855	180.51	56.71	122.86	385.2	32.74	66.7
360.	8.468	0.513	8.093	183.99	57.81	124.06	356.9	29.23	63.2
370.	7.650	0.552	9.323	187.37	58.82	121.60	339.5	26.46	60.3
380.	6.937	0.593	10.517	190.55	59.75	116.83	330.7	24.39	58.0
390.	6.338	0.633	11.658	193.51	60.64	111.32	328.0	22.90	56.5
400.	5.843	0.669	12.745	196.27	61.51	106.23	329.1	21.83	55.6
410.	5.432	0.702	13.785	198.83	62.40	102.02	332.6	21.06	55.1
420.	5.088	0.732	14.788	201.25	63.32	98.75	337.2	20.52	55.0
430.	4.796	0.758	15.763	203.55	64.27	96.28	342.6	20.13	55.3
440.	4.546	0.782	16.716	205.74	65.24	94.47	348.3	19.86	55.8
450.	4.327	0.803	17.654	207.84	66.25	93.17	354.2	19.67	56.6
460.	4.135	0.822	18.581	209.88	67.27	92.28	360.1	19.55	57.5
470.	3.964	0.839	19.501	211.86	68.31	91.71	366.0	19.48	58.5
480.	3.811	0.855	20.416	213.79	69.36	91.39	371.8	19.45	59.6
490.	3.673	0.869	21.329	215.67	70.41	91.28	377.5	19.45	60.9
500.	3.547	0.882	22.242	217.51	71.47	91.32	383.1	19.48	62.2
520.	3.326	0.904	24.072	221.10	73.60	91.79	394.0		65.1
540.	3.137	0.923	25.916	224.58	75.72	92.61	404.3		68.2
560.	2.974	0.939	27.778	227.97	77.81	93.67	414.3		71.5
580.	2.830	0.953	29.664	231.28	79.88	94.90	423.8		74.9
600.	2.702	0.964	31.575	234.52	81.92	96.24	433.0		78.4
625.	2.561	0.977	34.003	238.48	84.42	98.02	444.0		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 14.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.669	0.818	-14.023	79.01	47.88	67.96	2029.7	1193.92	258.2
100.	21.499	0.783	-13.678	82.54	48.34	69.51	1997.3	983.37	254.5
105.	21.327	0.752	-13.329	85.95	48.24	70.16	1963.3	825.90	250.6
110.	21.154	0.724	-12.978	89.22	47.83	70.30	1928.7	705.65	246.5
115.	20.980	0.698	-12.626	92.34	47.28	70.18	1893.8	611.94	242.3
120.	20.806	0.674	-12.276	95.32	46.68	69.95	1858.9	537.54	237.9
125.	20.632	0.653	-11.927	98.17	46.10	69.70	1824.1	477.44	233.4
130.	20.458	0.633	-11.579	100.90	45.56	69.47	1789.3	428.12	228.9
135.	20.283	0.615	-11.232	103.52	45.08	69.29	1754.6	387.08	224.3
140.	20.108	0.598	-10.886	106.04	44.66	69.17	1720.1	352.47	219.7
145.	19.932	0.583	-10.540	108.46	44.30	69.12	1685.6	322.94	215.0
150.	19.755	0.568	-10.195	110.81	44.00	69.14	1651.2	297.47	210.3
155.	19.578	0.555	-9.849	113.07	43.77	69.23	1616.9	275.30	205.7
160.	19.399	0.542	-9.502	115.27	43.58	69.37	1582.8	255.81	201.0
165.	19.220	0.531	-9.155	117.41	43.45	69.58	1548.7	238.54	196.4
170.	19.039	0.520	-8.806	119.49	43.36	69.83	1514.7	223.13	191.7
175.	18.857	0.510	-8.457	121.52	43.31	70.14	1480.9	209.29	187.1
180.	18.673	0.501	-8.105	123.50	43.30	70.49	1447.1	196.77	182.6
185.	18.488	0.492	-7.752	125.44	43.32	70.89	1413.5	185.39	178.1
190.	18.301	0.484	-7.396	127.34	43.38	71.33	1380.0	174.99	173.7
195.	18.112	0.477	-7.038	129.19	43.47	71.81	1346.6	165.45	169.3
200.	17.920	0.470	-6.678	131.02	43.58	72.32	1313.4	156.65	164.9
205.	17.727	0.463	-6.315	132.81	43.73	72.88	1280.2	148.50	160.6
210.	17.532	0.457	-5.949	134.57	43.90	73.47	1247.2	140.94	156.4
215.	17.334	0.452	-5.580	136.31	44.09	74.10	1214.3	133.89	152.3
220.	17.133	0.447	-5.208	138.02	44.31	74.77	1181.5	127.30	148.2
225.	16.929	0.442	-4.832	139.71	44.55	75.48	1148.8	121.12	144.2
230.	16.723	0.438	-4.453	141.38	44.82	76.24	1116.3	115.32	140.2
235.	16.513	0.434	-4.070	143.02	45.10	77.03	1083.9	109.86	136.4
240.	16.299	0.430	-3.683	144.66	45.40	77.87	1051.6	104.70	132.6
245.	16.082	0.427	-3.291	146.27	45.73	78.76	1019.4	99.82	128.9
250.	15.861	0.425	-2.895	147.87	46.07	79.70	987.4	95.19	125.3
255.	15.635	0.422	-2.494	149.46	46.44	80.70	955.5	90.80	121.7
260.	15.405	0.420	-2.088	151.04	46.82	81.76	923.7	86.63	118.2
265.	15.169	0.419	-1.676	152.60	47.22	82.89	892.0	82.65	114.8
270.	14.928	0.418	-1.259	154.16	47.64	84.08	860.5	78.85	111.5
275.	14.681	0.417	-0.835	155.72	48.08	85.36	829.0	75.22	108.3
280.	14.427	0.417	-0.405	157.27	48.53	86.73	797.8	71.75	105.1
285.	14.165	0.417	0.032	158.82	49.00	88.19	766.6	68.42	102.0
290.	13.896	0.418	0.477	160.36	49.50	89.76	735.7	65.21	99.0

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 14.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.619	0.419	0.930	161.91	50.00	91.45	704.9	62.14	96.1
300.	13.331	0.421	1.392	163.46	50.53	93.27	674.3	59.17	93.2
310.	12.725	0.427	2.344	166.59	51.64	97.35	614.2	53.55	87.7
320.	12.069	0.436	3.341	169.75	52.82	102.02	556.3	48.31	82.5
330.	11.360	0.449	4.386	172.97	54.06	107.19	502.1	43.43	77.7
340.	10.597	0.467	5.485	176.25	55.31	112.46	453.8	38.93	73.2
350.	9.793	0.491	6.633	179.57	56.52	116.86	413.5	34.88	69.2
360.	8.980	0.521	7.814	182.90	57.65	118.97	382.8	31.38	65.7
370.	8.204	0.555	9.003	186.16	58.72	118.33	361.6	28.50	62.8
380.	7.499	0.591	10.174	189.28	59.72	115.59	348.8	26.25	60.5
390.	6.884	0.627	11.311	192.24	60.67	111.68	342.3	24.54	58.9
400.	6.359	0.662	12.407	195.01	61.59	107.52	340.4	23.26	57.8
410.	5.915	0.694	13.462	197.62	62.51	103.72	341.6	22.32	57.1
420.	5.539	0.724	14.483	200.08	63.45	100.55	344.6	21.63	56.9
430.	5.217	0.751	15.476	202.41	64.40	98.04	348.7	21.13	57.0
440.	4.940	0.775	16.446	204.64	65.38	96.12	353.5	20.76	57.4
450.	4.698	0.796	17.400	206.79	66.38	94.69	358.7	20.49	58.0
460.	4.485	0.816	18.341	208.86	67.40	93.67	364.1	20.30	58.7
470.	4.296	0.834	19.274	210.86	68.43	92.98	369.6	20.17	59.7
480.	4.127	0.850	20.202	212.82	69.47	92.56	375.1	20.09	60.7
490.	3.974	0.865	21.126	214.72	70.52	92.34	380.6	20.05	61.9
500.	3.836	0.878	22.049	216.59	71.58	92.31	386.0	20.04	63.2
520.	3.592	0.901	23.898	220.21	73.69	92.63	396.6		65.9
540.	3.385	0.921	25.757	223.72	75.80	93.33	406.8		69.0
560.	3.206	0.938	27.633	227.13	77.89	94.30	416.7		72.2
580.	3.049	0.952	29.530	230.46	79.95	95.46	426.1		75.5
600.	2.910	0.964	31.452	233.72	81.98	96.74	435.3		78.9
625.	2.757	0.977	33.892	237.70	84.48	98.45	446.2		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 15.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.680	0.876	-13.983	78.94	47.88	67.91	2033.8	1204.71	258.6
100.	21.511	0.839	-13.639	82.46	48.35	69.47	2001.4	991.59	255.0
105.	21.339	0.805	-13.290	85.87	48.26	70.12	1967.4	832.38	251.1
110.	21.167	0.775	-12.939	89.14	47.86	70.27	1932.8	710.91	247.0
115.	20.994	0.747	-12.588	92.26	47.31	70.15	1898.1	616.32	242.8
120.	20.821	0.722	-12.238	95.24	46.72	69.92	1863.3	541.27	238.4
125.	20.647	0.699	-11.889	98.09	46.14	69.66	1828.6	480.68	234.0
130.	20.474	0.678	-11.541	100.82	45.60	69.43	1793.9	430.99	229.5
135.	20.300	0.658	-11.194	103.43	45.12	69.24	1759.4	389.65	224.9
140.	20.125	0.640	-10.848	105.95	44.70	69.12	1725.0	354.81	220.3
145.	19.950	0.624	-10.503	108.37	44.34	69.07	1690.7	325.09	215.6
150.	19.775	0.608	-10.158	110.72	44.05	69.08	1656.5	299.47	211.0
155.	19.598	0.594	-9.812	112.98	43.81	69.16	1622.4	277.16	206.3
160.	19.420	0.581	-9.466	115.18	43.62	69.30	1588.4	257.56	201.7
165.	19.242	0.568	-9.119	117.31	43.49	69.50	1554.5	240.21	197.1
170.	19.062	0.557	-8.771	119.39	43.40	69.75	1520.8	224.72	192.5
175.	18.881	0.546	-8.421	121.42	43.35	70.04	1487.2	210.81	187.9
180.	18.699	0.536	-8.070	123.40	43.34	70.39	1453.7	198.24	183.4
185.	18.515	0.527	-7.718	125.33	43.37	70.77	1420.3	186.81	178.9
190.	18.329	0.518	-7.363	127.22	43.42	71.20	1387.1	176.37	174.5
195.	18.142	0.510	-7.005	129.08	43.51	71.66	1354.0	166.79	170.1
200.	17.952	0.502	-6.646	130.90	43.63	72.17	1321.0	157.96	165.8
205.	17.761	0.495	-6.284	132.69	43.77	72.71	1288.2	149.79	161.5
210.	17.567	0.489	-5.919	134.45	43.94	73.29	1255.5	142.20	157.3
215.	17.371	0.483	-5.551	136.18	44.14	73.90	1222.9	135.13	153.2
220.	17.173	0.478	-5.180	137.88	44.35	74.55	1190.5	128.53	149.1
225.	16.972	0.472	-4.805	139.57	44.60	75.24	1158.2	122.34	145.1
230.	16.768	0.468	-4.427	141.23	44.86	75.96	1126.1	116.53	141.2
235.	16.561	0.464	-4.046	142.87	45.14	76.73	1094.1	111.06	137.4
240.	16.350	0.460	-3.660	144.49	45.45	77.54	1062.3	105.89	133.6
245.	16.137	0.456	-3.270	146.10	45.77	78.39	1030.6	101.01	129.9
250.	15.919	0.453	-2.876	147.70	46.11	79.29	999.1	96.39	126.3
255.	15.697	0.451	-2.477	149.27	46.47	80.24	967.7	92.01	122.8
260.	15.472	0.448	-2.073	150.84	46.85	81.25	936.5	87.84	119.4
265.	15.241	0.447	-1.665	152.40	47.25	82.31	905.5	83.87	116.0
270.	15.006	0.445	-1.250	153.95	47.67	83.43	874.7	80.08	112.7
275.	14.765	0.444	-0.830	155.49	48.10	84.62	844.0	76.47	109.5
280.	14.518	0.444	-0.404	157.03	48.55	85.89	813.5	73.01	106.4
285.	14.265	0.444	0.029	158.56	49.02	87.24	783.2	69.70	103.4
290.	14.005	0.444	0.469	160.09	49.50	88.67	753.2	66.53	100.4

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 15.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.737	0.445	0.916	161.62	50.00	90.19	723.4	63.48	97.5
300.	13.461	0.447	1.371	163.15	50.52	91.82	693.9	60.55	94.7
310.	12.884	0.452	2.307	166.21	51.61	95.40	636.0	55.02	89.4
320.	12.266	0.460	3.280	169.31	52.75	99.41	580.2	49.89	84.3
330.	11.605	0.471	4.296	172.43	53.95	103.77	528.0	45.14	79.6
340.	10.901	0.487	5.356	175.59	55.17	108.20	480.8	40.76	75.3
350.	10.163	0.507	6.458	178.79	56.37	112.11	440.3	36.81	71.4
360.	9.412	0.532	7.593	181.99	57.52	114.56	407.9	33.34	68.0
370.	8.680	0.562	8.743	185.14	58.62	114.98	384.1	30.41	65.1
380.	7.996	0.594	9.887	188.19	59.66	113.60	368.1	28.03	62.8
390.	7.382	0.627	11.011	191.11	60.67	111.03	358.5	26.16	61.1
400.	6.842	0.659	12.105	193.88	61.64	107.88	353.7	24.72	59.9
410.	6.376	0.690	13.168	196.50	62.59	104.69	352.4	23.62	59.1
420.	5.974	0.719	14.200	198.99	63.54	101.82	353.5	22.79	58.7
430.	5.628	0.746	15.206	201.36	64.51	99.41	356.2	22.16	58.7
440.	5.327	0.770	16.190	203.62	65.50	97.49	360.0	21.69	58.9
450.	5.064	0.792	17.158	205.79	66.50	96.01	364.3	21.34	59.4
460.	4.832	0.812	18.112	207.89	67.51	94.92	369.1	21.08	60.1
470.	4.625	0.830	19.057	209.92	68.54	94.14	374.1	20.89	60.9
480.	4.440	0.846	19.996	211.90	69.58	93.63	379.2	20.76	61.9
490.	4.273	0.862	20.930	213.83	70.63	93.34	384.3	20.67	63.0
500.	4.122	0.875	21.863	215.71	71.68	93.23	389.5	20.62	64.2
520.	3.857	0.900	23.729	219.37	73.78	93.42	399.7		66.8
540.	3.632	0.920	25.603	222.91	75.88	94.02	409.7		69.7
560.	3.437	0.937	27.492	226.34	77.96	94.91	419.4		72.8
580.	3.267	0.952	29.400	229.69	80.02	95.99	428.8		76.1
600.	3.116	0.965	31.332	232.96	82.05	97.21	437.8		79.5
625.	2.950	0.978	33.783	236.97	84.53	98.87	448.7		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 16.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.692	0.934	-13.944	78.86	47.88	67.86	2037.9	1215.66	259.0
100.	21.523	0.894	-13.600	82.39	48.37	69.43	2005.5	999.92	255.4
105.	21.352	0.858	-13.251	85.80	48.28	70.09	1971.5	838.93	251.6
110.	21.180	0.826	-12.900	89.06	47.89	70.24	1937.0	716.21	247.5
115.	21.008	0.797	-12.549	92.18	47.35	70.12	1902.3	620.74	243.3
120.	20.835	0.770	-12.199	95.16	46.76	69.88	1867.6	545.03	239.0
125.	20.662	0.745	-11.850	98.01	46.18	69.62	1833.0	483.95	234.5
130.	20.489	0.722	-11.503	100.73	45.64	69.39	1798.5	433.88	230.0
135.	20.316	0.702	-11.156	103.35	45.16	69.20	1764.1	392.24	225.5
140.	20.143	0.682	-10.811	105.86	44.74	69.07	1729.9	357.15	220.9
145.	19.968	0.665	-10.466	108.29	44.38	69.01	1695.7	327.24	216.3
150.	19.793	0.648	-10.121	110.63	44.09	69.02	1661.7	301.46	211.6
155.	19.618	0.633	-9.775	112.89	43.85	69.09	1627.8	279.03	207.0
160.	19.441	0.619	-9.430	115.09	43.67	69.23	1594.0	259.32	202.4
165.	19.264	0.605	-9.083	117.22	43.53	69.42	1560.3	241.88	197.8
170.	19.085	0.593	-8.735	119.29	43.44	69.66	1526.8	226.31	193.2
175.	18.905	0.582	-8.386	121.32	43.39	69.95	1493.4	212.34	188.6
180.	18.724	0.571	-8.036	123.29	43.38	70.28	1460.2	199.71	184.1
185.	18.541	0.561	-7.683	125.22	43.41	70.66	1427.0	188.23	179.7
190.	18.357	0.552	-7.329	127.11	43.47	71.07	1394.1	177.75	175.2
195.	18.171	0.543	-6.973	128.96	43.55	71.53	1361.2	168.13	170.9
200.	17.984	0.535	-6.614	130.78	43.67	72.02	1328.5	159.27	166.6
205.	17.794	0.528	-6.252	132.57	43.82	72.55	1296.0	151.07	162.3
210.	17.602	0.521	-5.888	134.32	43.99	73.11	1263.6	143.46	158.2
215.	17.408	0.514	-5.521	136.05	44.18	73.70	1231.4	136.37	154.1
220.	17.212	0.508	-5.151	137.75	44.40	74.34	1199.3	129.75	150.0
225.	17.013	0.503	-4.778	139.43	44.64	75.00	1167.4	123.55	146.1
230.	16.812	0.498	-4.401	141.08	44.90	75.71	1135.7	117.73	142.2
235.	16.607	0.493	-4.021	142.72	45.18	76.45	1104.1	112.25	138.4
240.	16.400	0.489	-3.637	144.34	45.49	77.23	1072.7	107.08	134.6
245.	16.189	0.485	-3.248	145.94	45.81	78.05	1041.5	102.20	131.0
250.	15.975	0.482	-2.856	147.52	46.15	78.91	1010.5	97.58	127.4
255.	15.758	0.479	-2.459	149.10	46.51	79.82	979.7	93.19	123.9
260.	15.536	0.476	-2.058	150.65	46.89	80.77	949.0	89.03	120.5
265.	15.310	0.474	-1.651	152.20	47.29	81.78	918.6	85.06	117.2
270.	15.080	0.473	-1.240	153.74	47.70	82.84	888.4	81.29	113.9
275.	14.845	0.471	-0.823	155.27	48.13	83.95	858.4	77.69	110.8
280.	14.605	0.471	-0.400	156.79	48.58	85.13	828.6	74.25	107.7
285.	14.359	0.470	0.029	158.31	49.04	86.38	799.1	70.96	104.7
290.	14.107	0.470	0.464	159.83	49.52	87.70	769.8	67.81	101.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 16.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.848	0.471	0.906	161.34	50.01	89.09	740.9	64.78	98.9
300.	13.583	0.472	1.355	162.85	50.52	90.57	712.3	61.88	96.2
310.	13.030	0.476	2.276	165.87	51.58	93.76	656.3	56.42	90.9
320.	12.443	0.483	3.231	168.90	52.70	97.28	602.5	51.38	86.0
330.	11.821	0.493	4.222	171.95	53.87	101.04	551.9	46.72	81.4
340.	11.165	0.507	5.252	175.02	55.07	104.85	505.8	42.45	77.2
350.	10.480	0.525	6.318	178.11	56.26	108.32	465.5	38.57	73.4
360.	9.782	0.546	7.415	181.20	57.41	110.82	432.2	35.14	70.1
370.	9.092	0.572	8.530	184.26	58.53	111.84	406.4	32.18	67.3
380.	8.436	0.600	9.647	187.24	59.60	111.37	388.0	29.73	65.0
390.	7.831	0.630	10.754	190.11	60.64	109.80	375.7	27.74	63.2
400.	7.289	0.660	11.841	192.86	61.65	107.56	368.3	26.16	61.9
410.	6.810	0.689	12.904	195.49	62.64	105.04	364.7	24.92	61.0
420.	6.390	0.717	13.942	197.99	63.62	102.59	363.9	23.96	60.5
430.	6.024	0.743	14.956	200.38	64.60	100.40	365.1	23.22	60.3
440.	5.703	0.767	15.951	202.66	65.59	98.57	367.6	22.65	60.4
450.	5.421	0.789	16.929	204.86	66.60	97.11	371.0	22.22	60.8
460.	5.171	0.809	17.894	206.98	67.61	95.99	375.0	21.88	61.4
470.	4.949	0.827	18.850	209.04	68.64	95.17	379.4	21.63	62.1
480.	4.749	0.844	19.799	211.04	69.68	94.60	384.0	21.45	63.0
490.	4.569	0.860	20.743	212.98	70.72	94.25	388.8	21.32	64.0
500.	4.405	0.874	21.684	214.88	71.77	94.08	393.6	21.23	65.2
520.	4.119	0.898	23.566	218.57	73.87	94.17	403.4		67.7
540.	3.876	0.919	25.454	222.14	75.96	94.68	413.0		70.5
560.	3.666	0.937	27.355	225.59	78.03	95.49	422.5		73.5
580.	3.483	0.953	29.274	228.96	80.08	96.50	431.7		76.7
600.	3.321	0.966	31.216	232.25	82.11	97.67	440.6		80.1
625.	3.143	0.980	33.678	236.27	84.59	99.27	451.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 17.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.703	0.992	-13.905	78.79	47.88	67.81	2042.0	1226.77	259.4
100.	21.534	0.949	-13.561	82.32	48.38	69.39	2009.5	1008.35	255.9
105.	21.364	0.911	-13.212	85.72	48.31	70.05	1975.6	845.55	252.0
110.	21.193	0.877	-12.861	88.98	47.92	70.20	1941.1	721.58	248.0
115.	21.021	0.846	-12.511	92.10	47.38	70.09	1906.5	625.20	243.8
120.	20.849	0.817	-12.161	95.08	46.80	69.85	1871.9	548.83	239.5
125.	20.677	0.791	-11.812	97.93	46.22	69.59	1837.4	487.24	235.1
130.	20.505	0.767	-11.465	100.65	45.68	69.35	1803.1	436.78	230.6
135.	20.332	0.745	-11.119	103.27	45.20	69.15	1768.8	394.84	226.1
140.	20.160	0.724	-10.773	105.78	44.78	69.02	1734.7	359.52	221.5
145.	19.986	0.706	-10.428	108.20	44.42	68.96	1700.7	329.41	216.9
150.	19.812	0.688	-10.083	110.54	44.13	68.96	1666.9	303.47	212.3
155.	19.638	0.672	-9.739	112.80	43.89	69.03	1633.2	280.90	207.7
160.	19.462	0.657	-9.393	114.99	43.71	69.16	1599.6	261.09	203.0
165.	19.286	0.643	-9.047	117.12	43.57	69.34	1566.1	243.55	198.5
170.	19.108	0.629	-8.700	119.20	43.48	69.57	1532.8	227.91	193.9
175.	18.929	0.617	-8.351	121.22	43.44	69.86	1499.6	213.86	189.3
180.	18.749	0.606	-8.001	123.19	43.43	70.18	1466.6	201.18	184.9
185.	18.568	0.595	-7.649	125.12	43.45	70.55	1433.7	189.65	180.4
190.	18.385	0.585	-7.295	127.00	43.51	70.95	1401.0	179.13	176.0
195.	18.201	0.576	-6.940	128.85	43.60	71.40	1368.4	169.47	171.7
200.	18.014	0.567	-6.581	130.67	43.71	71.88	1336.0	160.58	167.4
205.	17.826	0.559	-6.221	132.45	43.86	72.39	1303.7	152.35	163.2
210.	17.636	0.552	-5.857	134.20	44.03	72.94	1271.7	144.72	159.0
215.	17.444	0.545	-5.491	135.92	44.22	73.52	1239.7	137.61	154.9
220.	17.250	0.539	-5.122	137.62	44.44	74.13	1208.0	130.97	150.9
225.	17.054	0.533	-4.750	139.29	44.68	74.78	1176.5	124.75	147.0
230.	16.855	0.527	-4.374	140.94	44.94	75.46	1145.1	118.92	143.1
235.	16.653	0.522	-3.995	142.57	45.22	76.18	1113.9	113.43	139.3
240.	16.448	0.518	-3.613	144.18	45.53	76.93	1083.0	108.26	135.6
245.	16.241	0.514	-3.226	145.78	45.85	77.72	1052.2	103.37	132.0
250.	16.030	0.510	-2.835	147.36	46.19	78.55	1021.6	98.75	128.4
255.	15.816	0.507	-2.440	148.92	46.55	79.42	991.3	94.36	125.0
260.	15.599	0.504	-2.041	150.47	46.93	80.33	961.2	90.20	121.6
265.	15.377	0.502	-1.637	152.01	47.32	81.28	931.3	86.25	118.3
270.	15.152	0.500	-1.228	153.54	47.73	82.29	901.6	82.48	115.1
275.	14.922	0.498	-0.814	155.06	48.16	83.34	872.3	78.89	112.0
280.	14.688	0.497	-0.395	156.57	48.60	84.45	843.1	75.46	108.9
285.	14.448	0.497	0.031	158.08	49.06	85.61	814.3	72.18	105.9
290.	14.203	0.496	0.462	159.57	49.53	86.83	785.8	69.05	103.1

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 17.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	13.953	0.497	0.899	161.07	50.02	88.12	757.6	66.05	100.3
300.	13.697	0.498	1.343	162.56	50.53	89.46	729.8	63.17	97.6
310.	13.165	0.501	2.252	165.54	51.57	92.35	675.4	57.77	92.4
320.	12.605	0.507	3.191	168.52	52.67	95.49	623.3	52.79	87.6
330.	12.016	0.516	4.162	171.51	53.82	98.80	574.2	48.21	83.1
340.	11.399	0.528	5.167	174.51	54.99	102.14	529.2	44.01	79.0
350.	10.758	0.543	6.204	177.52	56.17	105.23	489.2	40.20	75.3
360.	10.103	0.562	7.269	180.52	57.32	107.67	455.4	36.81	72.0
370.	9.453	0.585	8.354	183.49	58.45	109.02	428.3	33.85	69.3
380.	8.825	0.610	9.446	186.40	59.55	109.16	407.9	31.33	66.9
390.	8.236	0.637	10.534	189.23	60.61	108.32	393.4	29.26	65.1
400.	7.698	0.664	11.610	191.95	61.65	106.80	383.8	27.57	63.7
410.	7.214	0.691	12.668	194.57	62.66	104.91	378.1	26.22	62.8
420.	6.783	0.718	13.708	197.07	63.67	102.91	375.5	25.14	62.2
430.	6.402	0.743	14.727	199.47	64.67	101.02	375.1	24.30	61.9
440.	6.066	0.766	15.729	201.77	65.67	99.36	376.3	23.64	61.9
450.	5.768	0.788	16.715	203.99	66.68	97.97	378.6	23.12	62.2
460.	5.502	0.808	17.689	206.13	67.70	96.88	381.8	22.71	62.7
470.	5.265	0.826	18.654	208.20	68.73	96.05	385.5	22.40	63.3
480.	5.052	0.843	19.611	210.22	69.77	95.45	389.5	22.16	64.2
490.	4.860	0.859	20.563	212.18	70.81	95.07	393.9	21.98	65.1
500.	4.684	0.873	21.513	214.10	71.85	94.85	398.3	21.85	66.2
520.	4.378	0.898	23.409	217.82	73.95	94.86	407.5		68.6
540.	4.118	0.920	25.310	221.41	76.03	95.29	416.8		71.3
560.	3.893	0.938	27.223	224.89	78.10	96.03	425.9		74.2
580.	3.697	0.954	29.153	228.27	80.15	96.99	434.9		77.4
600.	3.524	0.967	31.104	231.58	82.16	98.11	443.7		80.6
625.	3.333	0.981	33.576	235.61	84.64	99.66	454.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 18.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.714	10.049	-13.865	78.72	47.88	67.76	2046.1	1238.04	259.8
100.	21.546	10.005	-13.522	82.24	48.40	69.35	2013.5	1016.88	256.3
105.	21.376	0.965	-13.173	85.65	48.33	70.02	1979.6	852.24	252.5
110.	21.206	0.928	-12.823	88.91	47.95	70.17	1945.2	726.99	248.5
115.	21.035	0.895	-12.472	92.03	47.42	70.06	1910.7	629.70	244.3
120.	20.863	0.865	-12.122	95.00	46.83	69.82	1876.2	552.65	240.0
125.	20.692	0.837	-11.774	97.85	46.26	69.55	1841.9	490.55	235.6
130.	20.521	0.812	-11.427	100.57	45.72	69.31	1807.6	439.71	231.2
135.	20.349	0.788	-11.081	103.18	45.24	69.11	1773.5	397.46	226.6
140.	20.177	0.766	-10.735	105.69	44.82	68.98	1739.6	361.89	222.1
145.	20.004	0.746	-10.391	108.11	44.47	68.91	1705.7	331.59	217.5
150.	19.831	0.728	-10.046	110.45	44.17	68.91	1672.0	305.49	212.9
155.	19.657	0.711	-9.702	112.71	43.93	68.97	1638.5	282.79	208.3
160.	19.482	0.694	-9.357	114.90	43.75	69.09	1605.1	262.86	203.7
165.	19.307	0.680	-9.011	117.03	43.62	69.26	1571.8	245.23	199.1
170.	19.131	0.666	-8.664	119.10	43.53	69.49	1538.7	229.51	194.6
175.	18.953	0.653	-8.316	121.12	43.48	69.76	1505.7	215.39	190.1
180.	18.774	0.641	-7.966	123.09	43.47	70.08	1472.9	202.65	185.6
185.	18.594	0.629	-7.615	125.01	43.49	70.44	1440.3	191.07	181.2
190.	18.412	0.619	-7.262	126.90	43.55	70.84	1407.8	180.50	176.8
195.	18.229	0.609	-6.906	128.74	43.64	71.27	1375.5	170.81	172.5
200.	18.045	0.600	-6.549	130.55	43.76	71.74	1343.3	161.88	168.2
205.	17.858	0.591	-6.189	132.33	43.90	72.24	1311.4	153.63	164.0
210.	17.670	0.583	-5.826	134.08	44.07	72.77	1279.6	145.97	159.9
215.	17.480	0.576	-5.461	135.79	44.27	73.34	1248.0	138.84	155.8
220.	17.288	0.569	-5.093	137.49	44.48	73.94	1216.6	132.18	151.8
225.	17.093	0.563	-4.722	139.16	44.72	74.56	1185.4	125.95	147.9
230.	16.897	0.557	-4.347	140.80	44.98	75.23	1154.4	120.11	144.1
235.	16.698	0.552	-3.969	142.43	45.27	75.92	1123.6	114.61	140.3
240.	16.496	0.547	-3.588	144.03	45.57	76.65	1093.0	109.43	136.6
245.	16.291	0.542	-3.203	145.62	45.89	77.41	1062.6	104.54	133.0
250.	16.084	0.538	-2.814	147.19	46.23	78.21	1032.5	99.91	129.5
255.	15.873	0.535	-2.421	148.75	46.59	79.04	1002.6	95.52	126.0
260.	15.660	0.532	-2.023	150.29	46.96	79.92	973.0	91.36	122.7
265.	15.442	0.529	-1.622	151.82	47.36	80.83	943.6	87.41	119.4
270.	15.221	0.527	-1.215	153.34	47.76	81.78	914.5	83.65	116.2
275.	14.996	0.525	-0.804	154.85	48.19	82.78	885.7	80.06	113.1
280.	14.767	0.524	-0.387	156.35	48.63	83.82	857.1	76.64	110.1
285.	14.534	0.523	0.035	157.85	49.09	84.91	828.9	73.38	107.2
290.	14.296	0.522	0.462	159.33	49.56	86.06	801.0	70.26	104.3

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 18.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	14.053	0.522	0.895	160.82	50.04	87.25	773.5	67.28	101.6
300.	13.804	0.523	1.335	162.29	50.54	88.49	746.4	64.42	98.9
310.	13.291	0.525	2.233	165.24	51.57	91.13	693.6	59.06	93.8
320.	12.754	0.530	3.158	168.17	52.65	93.96	642.9	54.14	89.1
330.	12.193	0.538	4.112	171.11	53.78	96.92	595.2	49.62	84.7
340.	11.608	0.549	5.096	174.05	54.93	99.89	551.1	45.48	80.7
350.	11.003	0.562	6.110	176.98	56.10	102.69	511.7	41.73	77.1
360.	10.387	0.579	7.149	179.91	57.25	105.00	477.6	38.36	73.9
370.	9.771	0.599	8.207	182.81	58.38	106.52	449.6	35.41	71.1
380.	9.171	0.621	9.276	185.66	59.49	107.07	427.6	32.86	68.8
390.	8.601	0.645	10.346	188.44	60.58	106.76	411.3	30.71	67.0
400.	8.072	0.671	11.409	191.13	61.64	105.80	399.9	28.94	65.5
410.	7.589	0.696	12.460	193.73	62.68	104.45	392.3	27.49	64.5
420.	7.152	0.721	13.497	196.23	63.70	102.89	387.9	26.32	63.8
430.	6.762	0.745	14.518	198.63	64.72	101.33	386.0	25.38	63.5
440.	6.413	0.767	15.524	200.94	65.73	99.87	385.9	24.63	63.4
450.	6.102	0.788	16.516	203.17	66.75	98.62	387.1	24.03	63.6
460.	5.824	0.808	17.497	205.33	67.78	97.58	389.3	23.56	64.0
470.	5.574	0.826	18.469	207.42	68.81	96.78	392.3	23.18	64.6
480.	5.348	0.843	19.433	209.45	69.85	96.19	395.7	22.89	65.3
490.	5.144	0.859	20.393	211.43	70.89	95.78	399.5	22.66	66.2
500.	4.958	0.873	21.350	213.36	71.93	95.55	403.6	22.49	67.2
520.	4.633	0.899	23.259	217.11	74.02	95.49	412.1		69.5
540.	4.356	0.920	25.172	220.71	76.10	95.86	420.9		72.1
560.	4.117	0.939	27.096	224.21	78.17	96.55	429.7		75.0
580.	3.909	0.955	29.035	227.62	80.21	97.46	438.5		78.0
600.	3.724	0.969	30.995	230.94	82.22	98.53	447.1		81.2
625.	3.522	0.983	33.477	234.99	84.69	100.03	457.5		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 19.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.725	1.107	-13.826	78.65	47.87	67.71	2050.1	1249.47	260.3
100.	21.558	1.060	-13.483	82.17	48.41	69.31	2017.6	1025.53	256.8
105.	21.389	1.018	-13.134	85.57	48.36	69.99	1983.7	859.02	253.0
110.	21.219	0.979	-12.784	88.83	47.98	70.14	1949.3	732.46	249.0
115.	21.048	0.944	-12.433	91.95	47.45	70.02	1914.9	634.23	244.8
120.	20.878	0.912	-12.084	94.92	46.87	69.79	1880.5	556.50	240.5
125.	20.707	0.883	-11.736	97.77	46.29	69.52	1846.3	493.89	236.2
130.	20.536	0.856	-11.389	100.49	45.76	69.27	1812.1	442.65	231.7
135.	20.365	0.831	-11.043	103.10	45.28	69.07	1778.2	400.09	227.2
140.	20.193	0.808	-10.698	105.61	44.86	68.93	1744.4	364.28	222.7
145.	20.022	0.787	-10.353	108.03	44.51	68.86	1710.7	333.78	218.1
150.	19.849	0.768	-10.009	110.36	44.21	68.85	1677.1	307.51	213.5
155.	19.676	0.749	-9.665	112.62	43.98	68.91	1643.8	284.68	209.0
160.	19.503	0.732	-9.320	114.81	43.79	69.02	1610.5	264.64	204.4
165.	19.328	0.717	-8.974	116.93	43.66	69.19	1577.5	246.91	199.8
170.	19.153	0.702	-8.628	119.00	43.57	69.41	1544.6	231.11	195.3
175.	18.976	0.688	-8.280	121.02	43.52	69.68	1511.8	216.93	190.8
180.	18.799	0.675	-7.931	122.99	43.51	69.99	1479.2	204.12	186.3
185.	18.620	0.663	-7.580	124.91	43.54	70.34	1446.8	192.49	181.9
190.	18.440	0.652	-7.228	126.79	43.59	70.72	1414.5	181.88	177.6
195.	18.258	0.642	-6.873	128.63	43.68	71.15	1382.5	172.15	173.3
200.	18.075	0.632	-6.516	130.44	43.80	71.60	1350.6	163.19	169.0
205.	17.890	0.623	-6.157	132.21	43.94	72.09	1318.9	154.90	164.8
210.	17.703	0.615	-5.795	133.96	44.11	72.61	1287.4	147.22	160.7
215.	17.515	0.607	-5.431	135.67	44.31	73.17	1256.1	140.07	156.7
220.	17.325	0.600	-5.063	137.36	44.52	73.75	1225.0	133.40	152.7
225.	17.133	0.593	-4.693	139.02	44.76	74.36	1194.1	127.15	148.8
230.	16.938	0.587	-4.320	140.66	45.03	75.00	1163.4	121.29	145.0
235.	16.741	0.581	-3.943	142.28	45.31	75.68	1133.0	115.78	141.2
240.	16.542	0.576	-3.563	143.89	45.61	76.38	1102.8	110.59	137.6
245.	16.340	0.571	-3.179	145.47	45.93	77.12	1072.8	105.69	134.0
250.	16.136	0.566	-2.792	147.03	46.27	77.89	1043.1	101.06	130.5
255.	15.929	0.563	-2.400	148.58	46.63	78.69	1013.6	96.67	127.1
260.	15.718	0.559	-2.005	150.12	47.00	79.53	984.5	92.51	123.7
265.	15.505	0.556	-1.605	151.64	47.39	80.40	955.5	88.56	120.5
270.	15.288	0.554	-1.201	153.15	47.80	81.31	926.9	84.80	117.3
275.	15.068	0.551	-0.792	154.66	48.22	82.26	898.6	81.22	114.3
280.	14.844	0.550	-0.378	156.15	48.66	83.25	870.6	77.81	111.3
285.	14.616	0.549	0.041	157.63	49.11	84.28	843.0	74.56	108.4
290.	14.384	0.548	0.465	159.10	49.58	85.35	815.7	71.45	105.6

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 19.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	14.147	0.548	0.894	160.57	50.06	86.46	788.8	68.48	102.8
300.	13.906	0.548	1.330	162.03	50.55	87.62	762.3	65.63	100.2
310.	13.410	0.550	2.218	164.95	51.58	90.06	710.8	60.31	95.2
320.	12.893	0.554	3.131	167.85	52.64	92.64	661.5	55.43	90.5
330.	12.355	0.560	4.071	170.74	53.75	95.32	614.9	50.96	86.2
340.	11.798	0.570	5.038	173.62	54.89	98.01	571.8	46.87	82.3
350.	11.224	0.582	6.031	176.50	56.04	100.55	532.9	43.16	78.7
360.	10.640	0.597	7.048	179.37	57.19	102.74	498.8	39.83	75.6
370.	10.055	0.614	8.083	182.21	58.33	104.33	470.1	36.87	72.9
380.	9.481	0.634	9.131	185.00	59.45	105.15	447.0	34.30	70.6
390.	8.931	0.656	10.184	187.73	60.55	105.22	429.2	32.11	68.7
400.	8.413	0.679	11.234	190.39	61.62	104.70	416.1	30.27	67.2
410.	7.935	0.702	12.277	192.97	62.68	103.78	407.0	28.74	66.2
420.	7.497	0.726	13.309	195.45	63.72	102.62	401.0	27.48	65.4
430.	7.101	0.748	14.329	197.85	64.76	101.37	397.6	26.46	65.0
440.	6.744	0.770	15.336	200.17	65.78	100.15	396.2	25.62	64.9
450.	6.423	0.791	16.332	202.41	66.81	99.05	396.3	24.95	65.0
460.	6.134	0.810	17.318	204.58	67.84	98.12	397.6	24.41	65.3
470.	5.873	0.828	18.295	206.68	68.88	97.37	399.8	23.98	65.8
480.	5.637	0.845	19.266	208.72	69.92	96.80	402.6	23.63	66.5
490.	5.422	0.860	20.232	210.71	70.96	96.40	405.8	23.36	67.3
500.	5.227	0.874	21.194	212.66	72.00	96.16	409.4	23.14	68.2
520.	4.883	0.900	23.116	216.43	74.09	96.06	417.2		70.4
540.	4.590	0.922	25.040	220.06	76.17	96.39	425.4		72.9
560.	4.338	0.941	26.974	223.57	78.23	97.03	433.9		75.7
580.	4.117	0.957	28.922	226.99	80.26	97.89	442.3		78.7
600.	3.923	0.971	30.890	230.33	82.27	98.93	450.7		81.8
625.	3.709	0.986	33.382	234.39	84.74	100.39	460.9		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 20.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.737	1.165	-13.787	78.58	47.87	67.66	2054.1	1261.07	260.7
100.	21.570	1.115	-13.444	82.10	48.42	69.27	2021.6	1034.29	257.2
105.	21.401	1.070	-13.095	85.50	48.38	69.96	1987.7	865.87	253.4
110.	21.231	1.030	-12.745	88.76	48.01	70.11	1953.4	737.99	249.5
115.	21.062	0.993	-12.395	91.87	47.48	69.99	1919.0	638.82	245.3
120.	20.891	0.959	-12.045	94.85	46.91	69.75	1884.8	560.39	241.1
125.	20.721	0.929	-11.697	97.69	46.33	69.48	1850.6	497.26	236.7
130.	20.551	0.900	-11.350	100.41	45.80	69.23	1816.6	445.61	232.3
135.	20.381	0.874	-11.005	103.02	45.32	69.03	1782.8	402.74	227.8
140.	20.210	0.850	-10.660	105.52	44.90	68.89	1749.1	366.68	223.3
145.	20.039	0.828	-10.316	107.94	44.55	68.81	1715.6	335.97	218.7
150.	19.868	0.807	-9.972	110.27	44.25	68.80	1682.2	309.55	214.2
155.	19.696	0.788	-9.628	112.53	44.02	68.85	1649.0	286.57	209.6
160.	19.523	0.770	-9.283	114.72	43.83	68.95	1616.0	266.42	205.1
165.	19.349	0.753	-8.938	116.84	43.70	69.12	1583.1	248.60	200.5
170.	19.175	0.738	-8.592	118.91	43.61	69.33	1550.4	232.71	196.0
175.	19.000	0.723	-8.245	120.92	43.56	69.59	1517.8	218.46	191.5
180.	18.823	0.710	-7.896	122.89	43.55	69.89	1485.4	205.60	187.1
185.	18.645	0.697	-7.546	124.80	43.58	70.24	1453.2	193.92	182.7
190.	18.466	0.686	-7.194	126.68	43.64	70.62	1421.2	183.26	178.3
195.	18.286	0.675	-6.839	128.52	43.72	71.03	1389.4	173.49	174.1
200.	18.104	0.664	-6.483	130.33	43.84	71.48	1357.8	164.49	169.8
205.	17.921	0.655	-6.125	132.10	43.99	71.95	1326.3	156.18	165.7
210.	17.736	0.646	-5.764	133.84	44.16	72.46	1295.1	148.47	161.6
215.	17.550	0.638	-5.400	135.55	44.35	73.00	1264.1	141.30	157.5
220.	17.361	0.630	-5.034	137.23	44.57	73.57	1233.3	134.60	153.6
225.	17.171	0.623	-4.664	138.89	44.81	74.16	1202.7	128.34	149.7
230.	16.979	0.616	-4.292	140.53	45.07	74.79	1172.4	122.47	145.9
235.	16.784	0.610	-3.916	142.14	45.35	75.44	1142.3	116.95	142.2
240.	16.587	0.604	-3.537	143.74	45.65	76.13	1112.4	111.75	138.5
245.	16.388	0.599	-3.155	145.32	45.97	76.84	1082.8	106.84	135.0
250.	16.187	0.594	-2.769	146.88	46.31	77.59	1053.5	102.20	131.5
255.	15.983	0.590	-2.379	148.42	46.66	78.36	1024.4	97.81	128.1
260.	15.776	0.586	-1.985	149.95	47.04	79.17	995.7	93.65	124.8
265.	15.566	0.583	-1.587	151.47	47.43	80.01	967.2	89.70	121.6
270.	15.353	0.580	-1.185	152.97	47.83	80.88	939.0	85.94	118.4
275.	15.137	0.578	-0.779	154.46	48.25	81.78	911.2	82.36	115.4
280.	14.917	0.576	-0.367	155.94	48.69	82.72	883.7	78.96	112.4
285.	14.695	0.574	0.049	157.42	49.14	83.70	856.6	75.71	109.5
290.	14.468	0.573	0.470	158.88	49.60	84.71	829.9	72.61	106.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 20.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	14.237	0.573	0.896	160.34	50.08	85.75	803.5	69.65	104.1
300.	14.003	0.573	1.327	161.79	50.57	86.84	777.6	66.82	101.4
310.	13.521	0.574	2.207	164.67	51.59	89.10	727.2	61.52	96.5
320.	13.022	0.577	3.110	167.54	52.64	91.49	679.1	56.68	91.9
330.	12.506	0.583	4.037	170.39	53.74	93.95	633.6	52.24	87.7
340.	11.972	0.591	4.989	173.23	54.86	96.40	591.4	48.20	83.8
350.	11.425	0.602	5.965	176.06	56.00	98.73	553.0	44.52	80.3
360.	10.869	0.615	6.962	178.87	57.15	100.80	519.1	41.21	77.2
370.	10.311	0.631	7.979	181.66	58.29	102.40	490.0	38.27	74.5
380.	9.761	0.648	9.008	184.40	59.41	103.39	466.0	35.68	72.2
390.	9.230	0.668	10.045	187.09	60.52	103.75	447.0	33.45	70.4
400.	8.726	0.689	11.082	189.72	61.61	103.57	432.5	31.55	68.9
410.	8.254	0.711	12.115	192.27	62.68	103.00	421.9	29.95	67.7
420.	7.819	0.732	13.141	194.74	63.74	102.18	414.5	28.62	67.0
430.	7.421	0.754	14.158	197.14	64.79	101.22	409.8	27.52	66.5
440.	7.058	0.775	15.165	199.45	65.83	100.24	407.1	26.62	66.3
450.	6.730	0.794	16.163	201.69	66.86	99.31	406.2	25.88	66.3
460.	6.432	0.813	17.152	203.87	67.90	98.50	406.5	25.27	66.5
470.	6.162	0.831	18.133	205.98	68.94	97.82	407.9	24.78	67.0
480.	5.916	0.847	19.109	208.03	69.98	97.30	409.9	24.38	67.6
490.	5.693	0.862	20.080	210.03	71.02	96.92	412.6	24.06	68.3
500.	5.488	0.877	21.048	211.99	72.07	96.68	415.7	23.80	69.2
520.	5.128	0.902	22.980	215.78	74.15	96.58	422.7		71.3
540.	4.821	0.924	24.913	219.43	76.23	96.87	430.3		73.7
560.	4.555	0.943	26.856	222.96	78.29	97.47	438.3		76.4
580.	4.323	0.959	28.814	226.40	80.32	98.30	446.4		79.4
600.	4.118	0.973	30.790	229.74	82.32	99.30	454.5		82.4
625.	3.893	0.989	33.290	233.83	84.79	100.73	464.5		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 25.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
95.	21.792	1.452	-13.590	78.23	47.87	67.43	2074.0	1321.76	262.8
100.	21.627	1.390	-13.248	81.74	48.49	69.09	2041.3	1079.85	259.4
105.	21.461	1.334	-12.900	85.13	48.50	69.80	2007.6	901.35	255.7
110.	21.294	1.284	-12.551	88.38	48.16	69.97	1973.5	766.50	251.9
115.	21.127	1.238	-12.201	91.49	47.65	69.85	1939.6	662.37	247.8
120.	20.960	1.195	-11.853	94.46	47.09	69.61	1905.8	580.32	243.7
125.	20.793	1.157	-11.505	97.30	46.52	69.32	1872.2	514.47	239.4
130.	20.626	1.121	-11.159	100.01	45.99	69.06	1838.8	460.74	235.1
135.	20.459	1.089	-10.815	102.61	45.51	68.84	1805.6	416.24	230.7
140.	20.292	1.058	-10.471	105.11	45.10	68.67	1772.6	378.88	226.2
145.	20.125	1.030	-10.128	107.52	44.75	68.57	1739.8	347.13	221.8
150.	19.957	1.004	-9.785	109.84	44.45	68.54	1707.2	319.85	217.3
155.	19.789	0.980	-9.442	112.09	44.22	68.57	1674.8	296.18	212.8
160.	19.621	0.958	-9.099	114.27	44.03	68.65	1642.6	275.43	208.3
165.	19.452	0.937	-8.756	116.38	43.90	68.78	1610.5	257.11	203.9
170.	19.282	0.917	-8.411	118.44	43.81	68.97	1578.7	240.80	199.5
175.	19.112	0.899	-8.066	120.44	43.76	69.20	1547.1	226.19	195.1
180.	18.941	0.882	-7.719	122.40	43.76	69.47	1515.8	213.01	190.7
185.	18.769	0.866	-7.371	124.30	43.78	69.77	1484.6	201.06	186.4
190.	18.596	0.851	-7.021	126.17	43.84	70.11	1453.6	190.17	182.1
195.	18.422	0.837	-6.670	127.99	43.93	70.49	1422.9	180.19	177.9
200.	18.247	0.824	-6.317	129.78	44.05	70.89	1392.4	171.01	173.8
205.	18.071	0.812	-5.961	131.54	44.19	71.32	1362.2	162.54	169.7
210.	17.893	0.800	-5.603	133.26	44.36	71.78	1332.2	154.69	165.7
215.	17.715	0.789	-5.243	134.96	44.55	72.26	1302.5	147.40	161.7
220.	17.535	0.779	-4.881	136.63	44.77	72.77	1273.0	140.59	157.9
225.	17.353	0.770	-4.516	138.27	45.01	73.30	1243.8	134.24	154.1
230.	17.171	0.761	-4.148	139.88	45.27	73.85	1214.9	128.28	150.4
235.	16.986	0.753	-3.777	141.48	45.55	74.43	1186.3	122.69	146.7
240.	16.801	0.746	-3.403	143.05	45.85	75.03	1158.0	117.43	143.2
245.	16.613	0.739	-3.027	144.60	46.17	75.65	1130.0	112.48	139.7
250.	16.424	0.732	-2.647	146.14	46.50	76.29	1102.3	107.80	136.3
255.	16.233	0.726	-2.264	147.66	46.86	76.96	1074.9	103.37	133.0
260.	16.041	0.721	-1.877	149.16	47.23	77.64	1048.0	99.18	129.8
265.	15.846	0.716	-1.487	150.64	47.61	78.35	1021.3	95.21	126.7
270.	15.650	0.712	-1.094	152.11	48.01	79.08	995.1	91.44	123.6
275.	15.451	0.708	-0.696	153.57	48.43	79.83	969.2	87.86	120.7
280.	15.251	0.704	-0.295	155.02	48.85	80.60	943.7	84.46	117.8
285.	15.048	0.701	0.110	156.45	49.30	81.38	918.7	81.22	115.1
290.	14.843	0.699	0.519	157.87	49.75	82.19	894.1	78.14	112.4

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 25.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
295.	14.637	0.696	0.932	159.29	50.22	83.01	869.9	75.20	109.8
300.	14.427	0.695	1.349	160.69	50.70	83.85	846.2	72.39	107.3
310.	14.003	0.693	2.196	163.47	51.68	85.57	800.3	67.17	102.6
320.	13.569	0.692	3.060	166.21	52.71	87.34	756.6	62.41	98.2
330.	13.127	0.694	3.943	168.92	53.76	89.13	715.2	58.07	94.2
340.	12.677	0.698	4.843	171.61	54.85	90.90	676.5	54.12	90.6
350.	12.222	0.703	5.760	174.27	55.95	92.61	640.7	50.54	87.3
360.	11.762	0.710	6.695	176.90	57.07	94.21	608.1	47.29	84.3
370.	11.302	0.719	7.644	179.50	58.19	95.65	578.7	44.36	81.8
380.	10.845	0.730	8.607	182.07	59.32	96.87	552.9	41.73	79.5
390.	10.394	0.742	9.581	184.60	60.44	97.83	530.6	39.40	77.6
400.	9.956	0.755	10.563	187.09	61.56	98.50	511.8	37.33	76.1
410.	9.533	0.769	11.550	189.53	62.67	98.92	496.4	35.52	74.8
420.	9.129	0.784	12.540	191.91	63.77	99.11	483.9	33.95	73.8
430.	8.747	0.799	13.532	194.24	64.87	99.14	474.1	32.58	73.2
440.	8.387	0.815	14.523	196.52	65.95	99.05	466.6	31.41	72.7
450.	8.050	0.830	15.512	198.75	67.03	98.89	461.0	30.40	72.5
460.	7.736	0.845	16.500	200.92	68.10	98.71	457.0	29.54	72.5
470.	7.443	0.859	17.487	203.04	69.16	98.52	454.5	28.80	72.7
480.	7.172	0.873	18.471	205.11	70.22	98.37	453.1	28.17	73.0
490.	6.920	0.887	19.454	207.14	71.28	98.26	452.6	27.64	73.5
500.	6.686	0.899	20.436	209.12	72.33	98.20	452.9	27.19	74.2
520.	6.266	0.923	22.401	212.98	74.42	98.28	455.4		75.8
540.	5.901	0.944	24.369	216.69	76.49	98.62	459.5		77.8
560.	5.582	0.962	26.347	220.29	78.54	99.18	464.8		80.2
580.	5.301	0.978	28.338	223.78	80.56	99.94	470.7		82.8
600.	5.051	0.992	30.345	227.18	82.55	100.85	477.1		85.5
625.	4.776	1.007	32.883	231.33	85.00	102.15	485.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 30.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
100.	21.683	1.664	-13.052	81.39	48.56	68.92	2060.7	1128.63	261.6
105.	21.520	1.597	-12.705	84.77	48.61	69.66	2027.0	939.02	258.0
110.	21.355	1.536	-12.356	88.02	48.30	69.84	1993.3	796.59	254.2
115.	21.191	1.481	-12.007	91.12	47.82	69.72	1959.7	687.09	250.3
120.	21.027	1.430	-11.659	94.09	47.26	69.47	1926.3	601.13	246.2
125.	20.863	1.384	-11.313	96.92	46.70	69.18	1893.2	532.37	242.1
130.	20.699	1.341	-10.968	99.62	46.18	68.90	1860.4	476.41	237.8
135.	20.535	1.302	-10.624	102.22	45.71	68.66	1827.8	430.18	233.5
140.	20.371	1.265	-10.281	104.71	45.29	68.48	1795.4	391.44	229.1
145.	20.208	1.231	-9.939	107.11	44.94	68.37	1763.3	358.59	224.8
150.	20.044	1.200	-9.597	109.43	44.65	68.31	1731.4	330.41	220.4
155.	19.880	1.171	-9.256	111.67	44.41	68.32	1699.7	305.98	216.0
160.	19.715	1.144	-8.914	113.84	44.23	68.38	1668.3	284.62	211.6
165.	19.550	1.119	-8.572	115.95	44.10	68.49	1637.0	265.77	207.2
170.	19.385	1.095	-8.229	117.99	44.01	68.65	1606.1	249.01	202.8
175.	19.219	1.073	-7.885	119.98	43.96	68.85	1575.3	234.02	198.5
180.	19.053	1.052	-7.540	121.93	43.95	69.09	1544.8	220.50	194.2
185.	18.886	1.033	-7.194	123.82	43.98	69.37	1514.6	208.26	190.0
190.	18.718	1.015	-6.847	125.68	44.03	69.68	1484.6	197.12	185.8
195.	18.550	0.997	-6.497	127.49	44.12	70.02	1454.8	186.92	181.7
200.	18.381	0.981	-6.146	129.27	44.24	70.38	1425.3	177.54	177.6
205.	18.211	0.966	-5.793	131.01	44.38	70.78	1396.1	168.90	173.6
210.	18.040	0.952	-5.439	132.72	44.55	71.19	1367.2	160.89	169.6
215.	17.868	0.939	-5.082	134.40	44.75	71.64	1338.6	153.46	165.8
220.	17.696	0.927	-4.722	136.06	44.96	72.10	1310.2	146.54	162.0
225.	17.522	0.915	-4.360	137.68	45.20	72.58	1282.2	140.07	158.3
230.	17.347	0.904	-3.996	139.28	45.46	73.08	1254.5	134.02	154.6
235.	17.171	0.894	-3.630	140.86	45.74	73.60	1227.0	128.34	151.1
240.	16.995	0.885	-3.260	142.41	46.04	74.14	1200.0	123.01	147.6
245.	16.817	0.876	-2.888	143.95	46.36	74.70	1173.3	117.98	144.2
250.	16.638	0.867	-2.513	145.46	46.69	75.28	1146.9	113.24	140.9
255.	16.458	0.860	-2.135	146.96	47.04	75.87	1120.9	108.76	137.6
260.	16.276	0.853	-1.755	148.44	47.41	76.48	1095.3	104.53	134.5
265.	16.094	0.846	-1.371	149.90	47.79	77.10	1070.1	100.52	131.5
270.	15.910	0.840	-0.983	151.35	48.19	77.74	1045.2	96.72	128.5
275.	15.725	0.834	-0.593	152.78	48.60	78.39	1020.8	93.11	125.6
280.	15.539	0.829	-0.200	154.20	49.03	79.05	996.8	89.68	122.8
285.	15.351	0.825	0.197	155.61	49.46	79.73	973.3	86.42	120.1
290.	15.162	0.821	0.598	157.00	49.91	80.42	950.2	83.32	117.5
295.	14.972	0.817	1.002	158.38	50.38	81.12	927.5	80.37	115.0

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 30.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
300.	14.781	0.814	1.409	159.75	50.85	81.83	905.4	77.56	112.6
310.	14.395	0.809	2.234	162.45	51.82	83.27	862.5	72.33	108.0
320.	14.004	0.805	3.074	165.12	52.83	84.73	821.7	67.57	103.8
330.	13.609	0.803	3.929	167.75	53.87	86.20	783.1	63.25	99.9
340.	13.211	0.803	4.798	170.35	54.93	87.65	746.9	59.31	96.4
350.	12.810	0.805	5.682	172.91	56.02	89.07	713.1	55.73	93.2
360.	12.408	0.808	6.580	175.44	57.12	90.44	681.8	52.48	90.4
370.	12.007	0.812	7.490	177.93	58.23	91.72	653.2	49.53	87.8
380.	11.608	0.818	8.414	180.39	59.34	92.89	627.3	46.87	85.6
390.	11.214	0.825	9.348	182.82	60.47	93.94	604.2	44.47	83.7
400.	10.827	0.833	10.292	185.21	61.59	94.85	583.8	42.31	82.1
410.	10.450	0.842	11.244	187.56	62.71	95.60	566.0	40.39	80.8
420.	10.083	0.852	12.204	189.87	63.82	96.22	550.8	38.67	79.7
430.	9.730	0.862	13.168	192.14	64.93	96.71	537.9	37.15	78.9
440.	9.392	0.873	14.137	194.37	66.04	97.09	527.2	35.81	78.4
450.	9.069	0.884	15.110	196.56	67.13	97.40	518.5	34.62	78.0
460.	8.762	0.895	16.085	198.70	68.22	97.64	511.4	33.58	77.8
470.	8.471	0.906	17.063	200.80	69.31	97.86	505.8	32.67	77.8
480.	8.196	0.917	18.042	202.86	70.38	98.05	501.5	31.87	78.0
490.	7.936	0.928	19.024	204.89	71.45	98.23	498.4	31.17	78.4
500.	7.692	0.938	20.007	206.87	72.51	98.43	496.2	30.56	78.8
520.	7.245	0.958	21.980	210.74	74.61	98.88	494.1		80.1
540.	6.849	0.976	23.963	214.49	76.69	99.44	494.5		81.8
560.	6.496	0.992	25.958	218.11	78.74	100.13	496.6		83.9
580.	6.182	1.006	27.969	221.64	80.76	100.94	500.0		86.2
600.	5.900	1.019	29.996	225.08	82.74	101.86	504.3		88.7
625.	5.586	1.033	32.559	229.26	85.18	103.15	510.4		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 35.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
100.	21.738	1.936	-12.856	81.05	48.63	68.76	2079.7	1180.99	263.7
105.	21.577	1.858	-12.510	84.42	48.73	69.52	2046.2	979.13	260.3
110.	21.415	1.787	-12.162	87.66	48.44	69.72	2012.7	828.40	256.6
115.	21.253	1.722	-11.813	90.76	47.98	69.60	1979.4	713.08	252.7
120.	21.092	1.663	-11.466	93.72	47.43	69.35	1946.5	622.91	248.8
125.	20.931	1.609	-11.120	96.54	46.88	69.05	1913.8	551.01	244.7
130.	20.770	1.559	-10.776	99.25	46.36	68.76	1881.5	492.68	240.5
135.	20.609	1.513	-10.432	101.84	45.89	68.51	1849.5	444.59	236.3
140.	20.448	1.470	-10.090	104.32	45.48	68.31	1817.7	404.40	232.0
145.	20.288	1.431	-9.749	106.72	45.13	68.18	1786.2	370.38	227.7
150.	20.127	1.394	-9.409	109.03	44.83	68.11	1754.9	341.24	223.4
155.	19.967	1.360	-9.068	111.26	44.60	68.09	1723.9	316.02	219.1
160.	19.806	1.328	-8.728	113.42	44.42	68.13	1693.2	294.00	214.7
165.	19.645	1.299	-8.387	115.52	44.28	68.22	1662.7	274.59	210.4
170.	19.484	1.271	-8.045	117.56	44.19	68.36	1632.4	257.36	206.1
175.	19.322	1.245	-7.703	119.54	44.15	68.54	1602.5	241.95	201.9
180.	19.160	1.221	-7.360	121.48	44.14	68.76	1572.8	228.09	197.7
185.	18.998	1.198	-7.015	123.36	44.16	69.01	1543.3	215.54	193.5
190.	18.835	1.176	-6.670	125.21	44.22	69.30	1514.2	204.13	189.4
195.	18.671	1.156	-6.322	127.01	44.31	69.61	1485.3	193.69	185.3
200.	18.508	1.137	-5.973	128.78	44.43	69.95	1456.7	184.10	181.3
205.	18.343	1.119	-5.623	130.51	44.57	70.31	1428.4	175.27	177.4
210.	18.178	1.103	-5.270	132.21	44.74	70.70	1400.4	167.10	173.5
215.	18.012	1.087	-4.916	133.88	44.93	71.10	1372.7	159.52	169.7
220.	17.846	1.072	-4.559	135.52	45.15	71.53	1345.3	152.46	165.9
225.	17.679	1.058	-4.200	137.13	45.39	71.98	1318.3	145.87	162.3
230.	17.511	1.045	-3.839	138.72	45.65	72.44	1291.6	139.71	158.7
235.	17.343	1.033	-3.476	140.28	45.92	72.92	1265.2	133.93	155.2
240.	17.173	1.021	-3.110	141.82	46.22	73.42	1239.2	128.51	151.8
245.	17.004	1.010	-2.742	143.34	46.54	73.93	1213.5	123.40	148.5
250.	16.833	1.000	-2.371	144.84	46.87	74.45	1188.2	118.59	145.2
255.	16.662	0.991	-1.997	146.32	47.22	74.99	1163.3	114.04	142.0
260.	16.489	0.982	-1.621	147.78	47.59	75.55	1138.8	109.75	139.0
265.	16.317	0.974	-1.242	149.22	47.97	76.11	1114.7	105.68	136.0
270.	16.143	0.966	-0.860	150.65	48.37	76.69	1091.0	101.83	133.1
275.	15.969	0.959	-0.475	152.06	48.78	77.28	1067.7	98.18	130.3
280.	15.793	0.952	-0.087	153.46	49.20	77.88	1044.9	94.71	127.5
285.	15.618	0.946	0.304	154.85	49.63	78.48	1022.4	91.41	124.9
290.	15.441	0.940	0.698	156.22	50.08	79.10	1000.5	88.28	122.3
295.	15.264	0.935	1.095	157.57	50.54	79.72	979.0	85.30	119.9

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 35.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
300.	15.086	0.930	1.495	158.92	51.01	80.35	958.0	82.46	117.5
310.	14.728	0.922	2.305	161.57	51.97	81.63	917.3	77.18	113.0
320.	14.368	0.916	3.128	164.19	52.97	82.92	878.7	72.39	108.9
330.	14.007	0.911	3.963	166.76	54.00	84.21	842.1	68.03	105.1
340.	13.644	0.907	4.812	169.29	55.05	85.49	807.7	64.06	101.7
350.	13.280	0.906	5.673	171.79	56.13	86.75	775.4	60.44	98.5
360.	12.918	0.905	6.547	174.25	57.22	87.98	745.3	57.15	95.7
370.	12.556	0.906	7.433	176.68	58.32	89.16	717.5	54.16	93.2
380.	12.198	0.908	8.330	179.07	59.43	90.28	692.0	51.45	91.0
390.	11.843	0.911	9.238	181.43	60.55	91.32	668.8	48.99	89.1
400.	11.493	0.916	10.156	183.75	61.67	92.29	647.8	46.76	87.5
410.	11.151	0.921	11.083	186.04	62.79	93.17	629.1	44.75	86.1
420.	10.816	0.927	12.019	188.30	63.91	93.96	612.5	42.93	85.0
430.	10.490	0.933	12.962	190.51	65.02	94.66	597.9	41.30	84.1
440.	10.175	0.940	13.912	192.70	66.13	95.29	585.3	39.84	83.4
450.	9.871	0.948	14.868	194.85	67.24	95.85	574.4	38.53	82.9
460.	9.579	0.955	15.829	196.96	68.34	96.36	565.2	37.36	82.7
470.	9.298	0.963	16.795	199.04	69.43	96.82	557.4	36.32	82.6
480.	9.030	0.971	17.765	201.08	70.51	97.25	550.9	35.38	82.6
490.	8.774	0.979	18.740	203.09	71.59	97.66	545.7	34.56	82.8
500.	8.530	0.987	19.718	205.07	72.66	98.06	541.4	33.82	83.2
520.	8.078	1.002	21.687	208.93	74.77	98.85	535.5		84.2
540.	7.668	1.017	23.672	212.67	76.85	99.66	532.5		85.7
560.	7.299	1.030	25.674	216.31	78.90	100.53	531.7		87.5
580.	6.965	1.042	27.694	219.86	80.92	101.46	532.5		89.6
600.	6.662	1.053	29.733	223.31	82.91	102.46	534.5		91.8
625.	6.321	1.065	32.311	227.52	85.34	103.80	538.3		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 40.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
100.	21.792	2.208	-12.660	80.71	48.70	68.61	2098.4	1237.38	265.8
105.	21.633	2.118	-12.315	84.08	48.84	69.40	2065.0	1021.96	262.5
110.	21.474	2.037	-11.967	87.31	48.58	69.60	2031.7	862.12	258.9
115.	21.314	1.963	-11.619	90.41	48.13	69.49	1998.8	740.46	255.1
120.	21.155	1.895	-11.272	93.36	47.60	69.24	1966.2	645.73	251.3
125.	20.997	1.833	-10.927	96.18	47.06	68.93	1934.0	570.47	247.3
130.	20.838	1.776	-10.583	98.88	46.54	68.63	1902.2	509.58	243.2
135.	20.680	1.723	-10.241	101.46	46.07	68.37	1870.7	459.53	239.0
140.	20.523	1.674	-9.899	103.94	45.66	68.16	1839.4	417.79	234.8
145.	20.365	1.629	-9.559	106.33	45.31	68.01	1808.5	382.51	230.6
150.	20.208	1.587	-9.219	108.64	45.02	67.92	1777.8	352.36	226.3
155.	20.051	1.548	-8.880	110.86	44.78	67.89	1747.4	326.31	222.1
160.	19.893	1.511	-8.540	113.02	44.60	67.91	1717.3	303.59	217.8
165.	19.736	1.477	-8.200	115.11	44.46	67.99	1687.5	283.59	213.6
170.	19.578	1.445	-7.860	117.14	44.37	68.11	1658.0	265.86	209.4
175.	19.421	1.416	-7.519	119.12	44.33	68.27	1628.7	250.02	205.2
180.	19.263	1.388	-7.178	121.04	44.32	68.47	1599.7	235.79	201.0
185.	19.104	1.361	-6.835	122.92	44.34	68.70	1571.1	222.91	196.9
190.	18.946	1.336	-6.490	124.76	44.40	68.96	1542.7	211.21	192.9
195.	18.787	1.313	-6.145	126.55	44.49	69.25	1514.6	200.52	188.9
200.	18.628	1.291	-5.798	128.31	44.60	69.57	1486.8	190.71	184.9
205.	18.468	1.271	-5.449	130.03	44.75	69.90	1459.3	181.68	181.0
210.	18.308	1.251	-5.099	131.72	44.92	70.26	1432.1	173.32	177.2
215.	18.148	1.233	-4.747	133.38	45.11	70.65	1405.2	165.58	173.5
220.	17.987	1.216	-4.392	135.01	45.33	71.04	1378.7	158.37	169.8
225.	17.826	1.199	-4.036	136.61	45.56	71.46	1352.5	151.65	166.2
230.	17.664	1.184	-3.678	138.18	45.82	71.90	1326.6	145.37	162.7
235.	17.502	1.170	-3.317	139.74	46.10	72.34	1301.1	139.49	159.2
240.	17.339	1.156	-2.954	141.26	46.40	72.81	1276.0	133.96	155.8
245.	17.176	1.143	-2.589	142.77	46.71	73.28	1251.2	128.76	152.6
250.	17.013	1.131	-2.221	144.25	47.05	73.77	1226.9	123.86	149.4
255.	16.849	1.120	-1.851	145.72	47.40	74.28	1202.9	119.24	146.3
260.	16.685	1.109	-1.479	147.17	47.76	74.79	1179.3	114.88	143.2
265.	16.520	1.099	-1.103	148.60	48.14	75.31	1156.1	110.74	140.3
270.	16.355	1.089	-0.725	150.01	48.54	75.85	1133.3	106.83	137.4
275.	16.189	1.081	-0.345	151.41	48.94	76.39	1110.9	103.12	134.7
280.	16.023	1.072	0.038	152.79	49.36	76.94	1089.0	99.60	132.0
285.	15.856	1.065	0.425	154.15	49.80	77.50	1067.5	96.26	129.4
290.	15.690	1.057	0.814	155.51	50.24	78.07	1046.5	93.08	126.9
295.	15.523	1.051	1.205	156.85	50.70	78.64	1025.9	90.06	124.5

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 40.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
300.	15.355	1.044	1.600	158.17	51.17	79.22	1005.7	87.18	122.1
310.	15.020	1.033	2.398	160.79	52.13	80.39	966.8	81.83	117.7
320.	14.683	1.024	3.208	163.36	53.12	81.57	929.9	76.97	113.6
330.	14.347	1.016	4.030	165.89	54.14	82.76	894.8	72.54	109.9
340.	14.010	1.010	4.863	168.38	55.19	83.94	861.7	68.52	106.5
350.	13.675	1.005	5.708	170.83	56.26	85.10	830.6	64.85	103.4
360.	13.340	1.002	6.565	173.24	57.34	86.25	801.5	61.50	100.6
370.	13.008	1.000	7.433	175.62	58.44	87.36	774.5	58.45	98.1
380.	12.678	0.999	8.312	177.96	59.55	88.44	749.4	55.68	95.9
390.	12.353	0.999	9.202	180.27	60.66	89.47	726.4	53.15	94.0
400.	12.031	1.000	10.101	182.55	61.78	90.45	705.3	50.85	92.3
410.	11.715	1.002	11.010	184.80	62.90	91.37	686.1	48.76	90.9
420.	11.406	1.004	11.928	187.01	64.01	92.24	668.8	46.86	89.7
430.	11.104	1.008	12.855	189.19	65.13	93.05	653.3	45.14	88.8
440.	10.809	1.012	13.789	191.34	66.24	93.80	639.5	43.58	88.0
450.	10.523	1.016	14.731	193.45	67.35	94.51	627.3	42.17	87.5
460.	10.246	1.021	15.679	195.54	68.45	95.17	616.6	40.90	87.1
470.	9.979	1.026	16.634	197.59	69.55	95.79	607.3	39.75	86.9
480.	9.721	1.031	17.595	199.61	70.63	96.37	599.2	38.72	86.9
490.	9.473	1.036	18.561	201.61	71.71	96.94	592.4	37.78	87.0
500.	9.234	1.042	19.533	203.57	72.79	97.48	586.5	36.95	87.2
520.	8.787	1.053	21.494	207.41	74.91	98.53	577.6		88.0
540.	8.376	1.064	23.475	211.15	77.00	99.56	571.7		89.3
560.	8.000	1.074	25.476	214.79	79.05	100.60	568.2		90.9
580.	7.656	1.083	27.499	218.34	81.06	101.67	566.6		92.8
600.	7.341	1.092	29.543	221.81	83.05	102.76	566.5		94.9
625.	6.984	1.102	32.130	226.03	85.48	104.18	568.0		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 45.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
100.	21.845	2.478	-12.464	80.38	48.77	68.46	2116.8	1298.34	267.9
105.	21.688	2.377	-12.119	83.74	48.95	69.28	2083.5	1067.81	264.7
110.	21.531	2.285	-11.772	86.97	48.72	69.50	2050.4	897.94	261.2
115.	21.374	2.202	-11.425	90.06	48.29	69.39	2017.8	769.36	257.5
120.	21.217	2.126	-11.079	93.01	47.76	69.13	1985.6	669.70	253.7
125.	21.061	2.056	-10.734	95.82	47.23	68.82	1953.8	590.81	249.8
130.	20.905	1.991	-10.390	98.52	46.71	68.51	1922.4	527.19	245.8
135.	20.750	1.932	-10.049	101.10	46.25	68.24	1891.4	475.03	241.7
140.	20.595	1.877	-9.708	103.57	45.84	68.02	1860.7	431.63	237.6
145.	20.440	1.826	-9.368	105.96	45.49	67.85	1830.3	395.03	233.4
150.	20.286	1.779	-9.029	108.26	45.19	67.75	1800.2	363.80	229.3
155.	20.132	1.734	-8.691	110.48	44.96	67.71	1770.4	336.87	225.1
160.	19.978	1.693	-8.352	112.63	44.77	67.72	1740.9	313.41	220.9
165.	19.824	1.655	-8.013	114.71	44.64	67.78	1711.7	292.79	216.7
170.	19.669	1.619	-7.674	116.74	44.55	67.88	1682.8	274.53	212.6
175.	19.515	1.585	-7.335	118.71	44.50	68.02	1654.1	258.24	208.4
180.	19.361	1.553	-6.994	120.63	44.49	68.20	1625.8	243.61	204.3
185.	19.207	1.523	-6.652	122.50	44.51	68.42	1597.8	230.39	200.3
190.	19.052	1.495	-6.310	124.32	44.57	68.66	1570.1	218.38	196.3
195.	18.897	1.469	-5.966	126.11	44.66	68.93	1542.7	207.42	192.3
200.	18.742	1.444	-5.620	127.86	44.77	69.23	1515.6	197.38	188.4
205.	18.587	1.420	-5.273	129.57	44.92	69.55	1488.9	188.13	184.6
210.	18.432	1.398	-4.925	131.25	45.09	69.89	1462.4	179.59	180.8
215.	18.276	1.377	-4.575	132.90	45.28	70.25	1436.3	171.67	177.2
220.	18.120	1.358	-4.222	134.52	45.49	70.62	1410.5	164.31	173.5
225.	17.964	1.339	-3.868	136.11	45.73	71.02	1385.1	157.44	170.0
230.	17.808	1.321	-3.512	137.68	45.99	71.43	1360.0	151.03	166.5
235.	17.651	1.305	-3.154	139.22	46.27	71.85	1335.2	145.03	163.1
240.	17.495	1.289	-2.794	140.74	46.56	72.29	1310.9	139.39	159.8
245.	17.337	1.274	-2.431	142.23	46.88	72.74	1286.9	134.09	156.5
250.	17.180	1.260	-2.066	143.71	47.21	73.20	1263.3	129.10	153.4
255.	17.023	1.247	-1.699	145.16	47.56	73.68	1240.1	124.39	150.3
260.	16.865	1.234	-1.329	146.60	47.92	74.16	1217.2	119.94	147.3
265.	16.707	1.222	-0.957	148.01	48.30	74.65	1194.8	115.74	144.4
270.	16.549	1.211	-0.583	149.41	48.70	75.16	1172.8	111.76	141.6
275.	16.390	1.201	-0.206	150.80	49.10	75.67	1151.2	107.98	138.9
280.	16.232	1.191	0.174	152.16	49.52	76.19	1130.1	104.40	136.2
285.	16.073	1.181	0.556	153.52	49.96	76.72	1109.3	101.00	133.7
290.	15.915	1.173	0.941	154.86	50.40	77.25	1089.0	97.76	131.2
295.	15.756	1.164	1.329	156.18	50.86	77.79	1069.2	94.69	128.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 45.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
300.	15.597	1.157	1.719	157.49	51.32	78.33	1049.8	91.76	126.5
310.	15.280	1.143	2.508	160.08	52.28	79.43	1012.3	86.32	122.1
320.	14.962	1.130	3.307	162.62	53.27	80.54	976.6	81.38	118.1
330.	14.645	1.120	4.118	165.11	54.29	81.65	942.8	76.88	114.4
340.	14.330	1.111	4.940	167.57	55.33	82.76	910.8	72.78	111.0
350.	14.015	1.103	5.774	169.98	56.40	83.87	880.6	69.04	108.0
360.	13.703	1.097	6.618	172.36	57.48	84.96	852.4	65.63	105.2
370.	13.393	1.092	7.473	174.70	58.57	86.03	825.9	62.51	102.7
380.	13.085	1.088	8.338	177.01	59.67	87.07	801.3	59.66	100.5
390.	12.782	1.086	9.214	179.29	60.78	88.09	778.5	57.06	98.5
400.	12.483	1.084	10.100	181.53	61.90	89.07	757.5	54.69	96.8
410.	12.188	1.083	10.995	183.74	63.01	90.01	738.2	52.53	95.4
420.	11.899	1.083	11.900	185.92	64.13	90.92	720.5	50.55	94.1
430.	11.615	1.084	12.813	188.07	65.24	91.78	704.5	48.75	93.1
440.	11.338	1.085	13.735	190.19	66.36	92.61	689.9	47.11	92.3
450.	11.069	1.087	14.665	192.28	67.46	93.39	676.9	45.61	91.7
460.	10.806	1.089	15.603	194.34	68.57	94.14	665.2	44.25	91.2
470.	10.551	1.091	16.548	196.37	69.66	94.86	654.8	43.02	91.0
480.	10.304	1.094	17.500	198.38	70.75	95.55	645.6	41.89	90.8
490.	10.065	1.097	18.459	200.35	71.83	96.22	637.6	40.87	90.9
500.	9.834	1.101	19.424	202.30	72.91	96.86	630.5	39.94	91.0
520.	9.396	1.108	21.374	206.13	75.03	98.10	619.1		91.7
540.	8.990	1.115	23.348	209.85	77.12	99.31	610.8		92.8
560.	8.615	1.122	25.346	213.49	79.17	100.49	605.1		94.2
580.	8.268	1.129	27.368	217.03	81.19	101.68	601.4		95.9
600.	7.947	1.135	29.414	220.50	83.17	102.87	599.4		97.9
625.	7.580	1.142	32.004	224.73	85.60	104.38	598.8		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 50.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
100.	21.896	2.746	-12.268	80.05	48.84	68.32	2134.9	1364.46	270.0
105.	21.742	2.634	-11.924	83.41	49.06	69.17	2101.7	1117.04	266.9
110.	21.587	2.533	-11.577	86.64	48.86	69.40	2068.8	936.09	263.5
115.	21.432	2.440	-11.230	89.72	48.44	69.30	2036.5	799.94	259.9
120.	21.277	2.355	-10.885	92.66	47.92	69.04	2004.7	694.92	256.2
125.	21.124	2.277	-10.540	95.48	47.39	68.72	1973.3	612.11	252.3
130.	20.970	2.206	-10.197	98.17	46.88	68.40	1942.3	545.55	248.4
135.	20.818	2.140	-9.856	100.74	46.42	68.12	1911.7	491.14	244.4
140.	20.665	2.079	-9.516	103.21	46.01	67.89	1881.4	445.97	240.3
145.	20.513	2.022	-9.177	105.59	45.66	67.72	1851.5	407.96	236.3
150.	20.362	1.969	-8.839	107.89	45.36	67.60	1822.0	375.59	232.1
155.	20.210	1.920	-8.501	110.10	45.13	67.54	1792.7	347.72	228.0
160.	20.059	1.874	-8.163	112.25	44.94	67.54	1763.8	323.48	223.9
165.	19.908	1.831	-7.825	114.33	44.81	67.58	1735.1	302.20	219.8
170.	19.757	1.790	-7.487	116.34	44.72	67.67	1706.8	283.38	215.7
175.	19.606	1.753	-7.149	118.31	44.67	67.80	1678.8	266.61	211.6
180.	19.456	1.717	-6.809	120.22	44.66	67.97	1651.1	251.56	207.6
185.	19.305	1.684	-6.469	122.08	44.68	68.17	1623.7	237.98	203.6
190.	19.154	1.652	-6.128	123.91	44.74	68.39	1596.6	225.66	199.6
195.	19.003	1.623	-5.785	125.69	44.82	68.65	1569.9	214.41	195.7
200.	18.852	1.595	-5.441	127.43	44.94	68.93	1543.4	204.12	191.9
205.	18.701	1.569	-5.096	129.13	45.08	69.23	1517.3	194.64	188.1
210.	18.550	1.544	-4.749	130.80	45.25	69.55	1491.5	185.90	184.4
215.	18.398	1.520	-4.400	132.45	45.44	69.90	1466.1	177.79	180.7
220.	18.247	1.498	-4.050	134.06	45.66	70.26	1441.0	170.27	177.2
225.	18.095	1.477	-3.697	135.64	45.89	70.63	1416.2	163.25	173.7
230.	17.944	1.457	-3.343	137.20	46.15	71.02	1391.8	156.70	170.2
235.	17.792	1.438	-2.987	138.73	46.43	71.43	1367.8	150.57	166.9
240.	17.640	1.420	-2.629	140.24	46.72	71.84	1344.1	144.81	163.6
245.	17.488	1.404	-2.269	141.72	47.04	72.27	1320.8	139.40	160.4
250.	17.337	1.387	-1.906	143.19	47.37	72.71	1297.8	134.31	157.3
255.	17.185	1.372	-1.542	144.63	47.72	73.17	1275.3	129.51	154.2
260.	17.033	1.358	-1.175	146.06	48.08	73.63	1253.1	124.97	151.3
265.	16.881	1.344	-0.805	147.46	48.46	74.10	1231.4	120.69	148.4
270.	16.728	1.331	-0.434	148.85	48.85	74.58	1210.1	116.63	145.6
275.	16.576	1.319	-0.060	150.23	49.26	75.07	1189.1	112.78	142.9
280.	16.424	1.308	0.317	151.58	49.68	75.56	1168.6	109.13	140.3
285.	16.273	1.297	0.696	152.92	50.11	76.06	1148.5	105.66	137.8
290.	16.121	1.286	1.078	154.25	50.55	76.57	1128.8	102.37	135.3
295.	15.969	1.277	1.462	155.56	51.01	77.09	1109.6	99.24	133.0

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 50.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
300.	15.817	1.267	1.849	156.86	51.47	77.60	1090.8	96.26	130.7
310.	15.515	1.250	2.630	159.43	52.42	78.65	1054.4	90.71	126.4
320.	15.213	1.235	3.422	161.94	53.41	79.71	1019.9	85.67	122.4
330.	14.912	1.222	4.224	164.41	54.43	80.77	987.0	81.09	118.7
340.	14.613	1.210	5.037	166.84	55.47	81.84	955.9	76.90	115.3
350.	14.316	1.200	5.861	169.22	56.53	82.90	926.6	73.08	112.3
360.	14.021	1.191	6.695	171.57	57.61	83.96	899.0	69.59	109.5
370.	13.729	1.184	7.540	173.89	58.70	85.00	873.1	66.40	107.0
380.	13.439	1.178	8.395	176.17	59.80	86.02	848.9	63.48	104.8
390.	13.153	1.172	9.260	178.42	60.91	87.02	826.4	60.80	102.8
400.	12.872	1.168	10.135	180.63	62.02	88.00	805.5	58.36	101.1
410.	12.594	1.165	11.020	182.82	63.13	88.96	786.1	56.12	99.6
420.	12.321	1.162	11.914	184.97	64.25	89.88	768.3	54.06	98.3
430.	12.054	1.160	12.818	187.10	65.36	90.78	751.9	52.19	97.2
440.	11.792	1.159	13.730	189.19	66.47	91.64	737.0	50.47	96.4
450.	11.536	1.158	14.651	191.26	67.58	92.48	723.4	48.89	95.7
460.	11.286	1.158	15.579	193.30	68.68	93.29	711.0	47.46	95.2
470.	11.042	1.159	16.516	195.32	69.78	94.07	699.9	46.14	94.8
480.	10.805	1.159	17.461	197.31	70.87	94.83	689.9	44.94	94.6
490.	10.575	1.160	18.413	199.27	71.95	95.56	680.9	43.84	94.6
500.	10.352	1.162	19.372	201.21	73.02	96.28	672.9	42.83	94.6
520.	9.927	1.165	21.311	205.01	75.15	97.66	659.6		95.2
540.	9.529	1.169	23.278	208.72	77.24	98.99	649.4		96.1
560.	9.157	1.173	25.271	212.35	79.29	100.30	641.8		97.4
580.	8.811	1.177	27.290	215.89	81.31	101.58	636.3		99.0
600.	8.489	1.181	29.334	219.35	83.29	102.86	632.6		100.8
625.	8.118	1.185	31.926	223.59	85.71	104.46	630.0		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 55.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
100.	21.947	3.014	-12.072	79.74	48.90	68.19	2152.7	1436.49	272.1
105.	21.794	2.891	-11.728	83.09	49.17	69.06	2119.6	1170.08	269.0
110.	21.641	2.779	-11.382	86.31	48.99	69.31	2086.9	976.84	265.7
115.	21.488	2.677	-11.036	89.39	48.58	69.22	2054.9	832.37	262.2
120.	21.336	2.584	-10.690	92.33	48.08	68.95	2023.4	721.50	258.6
125.	21.185	2.498	-10.346	95.14	47.56	68.63	1992.3	634.45	254.8
130.	21.034	2.419	-10.004	97.82	47.05	68.31	1961.7	564.73	251.0
135.	20.883	2.346	-9.663	100.39	46.59	68.02	1931.6	507.90	247.0
140.	20.734	2.279	-9.324	102.86	46.18	67.77	1901.8	460.84	243.0
145.	20.584	2.216	-8.985	105.24	45.82	67.59	1872.4	421.34	239.0
150.	20.435	2.158	-8.648	107.53	45.53	67.46	1843.3	387.76	235.0
155.	20.287	2.104	-8.311	109.74	45.29	67.39	1814.5	358.89	230.9
160.	20.138	2.053	-7.974	111.88	45.11	67.38	1786.1	333.82	226.9
165.	19.990	2.006	-7.637	113.95	44.97	67.41	1758.0	311.85	222.8
170.	19.842	1.961	-7.300	115.96	44.88	67.48	1730.2	292.44	218.8
175.	19.694	1.919	-6.962	117.92	44.83	67.60	1702.8	275.16	214.8
180.	19.547	1.880	-6.624	119.83	44.82	67.75	1675.7	259.67	210.8
185.	19.399	1.843	-6.284	121.69	44.84	67.94	1648.8	245.71	206.8
190.	19.252	1.808	-5.944	123.50	44.89	68.16	1622.3	233.05	202.9
195.	19.104	1.776	-5.603	125.27	44.98	68.40	1596.2	221.51	199.1
200.	18.957	1.745	-5.260	127.01	45.10	68.66	1570.3	210.94	195.3
205.	18.809	1.716	-4.916	128.71	45.24	68.95	1544.8	201.23	191.5
210.	18.662	1.688	-4.571	130.37	45.40	69.26	1519.6	192.27	187.8
215.	18.515	1.662	-4.223	132.01	45.60	69.59	1494.8	183.97	184.2
220.	18.367	1.637	-3.875	133.61	45.81	69.93	1470.3	176.27	180.7
225.	18.220	1.614	-3.524	135.19	46.05	70.29	1446.1	169.09	177.2
230.	18.072	1.591	-3.172	136.74	46.30	70.67	1422.3	162.39	173.8
235.	17.925	1.570	-2.817	138.26	46.58	71.05	1398.9	156.12	170.5
240.	17.778	1.550	-2.461	139.76	46.88	71.46	1375.8	150.24	167.3
245.	17.631	1.531	-2.103	141.24	47.19	71.87	1353.1	144.72	164.1
250.	17.484	1.513	-1.742	142.69	47.52	72.29	1330.8	139.52	161.0
255.	17.337	1.496	-1.380	144.13	47.87	72.73	1308.8	134.62	158.0
260.	17.190	1.480	-1.015	145.55	48.23	73.17	1287.3	129.99	155.1
265.	17.043	1.465	-0.648	146.94	48.61	73.63	1266.1	125.61	152.3
270.	16.896	1.450	-0.279	148.32	49.00	74.09	1245.3	121.47	149.5
275.	16.750	1.436	0.093	149.69	49.41	74.56	1225.0	117.54	146.8
280.	16.603	1.423	0.467	151.04	49.82	75.04	1205.0	113.82	144.2
285.	16.457	1.410	0.843	152.37	50.25	75.52	1185.5	110.28	141.7
290.	16.311	1.398	1.222	153.69	50.70	76.01	1166.3	106.92	139.3
295.	16.165	1.387	1.603	154.99	51.15	76.50	1147.6	103.73	136.9

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 55.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
300.	16.020	1.376	1.987	156.28	51.61	77.00	1129.3	100.69	134.7
310.	15.730	1.357	2.762	158.82	52.56	78.01	1094.0	95.03	130.4
320.	15.441	1.339	3.547	161.31	53.55	79.04	1060.3	89.88	126.4
330.	15.154	1.323	4.343	163.76	54.56	80.07	1028.3	85.20	122.8
340.	14.869	1.309	5.149	166.17	55.60	81.10	998.0	80.92	119.4
350.	14.586	1.296	5.965	168.53	56.66	82.13	969.3	77.01	116.4
360.	14.305	1.284	6.791	170.86	57.74	83.16	942.3	73.44	113.6
370.	14.027	1.275	7.628	173.15	58.83	84.18	916.9	70.17	111.1
380.	13.753	1.266	8.475	175.41	59.92	85.19	893.1	67.17	108.8
390.	13.481	1.258	9.332	177.64	61.03	86.18	870.8	64.41	106.8
400.	13.214	1.252	10.198	179.83	62.14	87.16	850.1	61.89	105.1
410.	12.951	1.246	11.075	182.00	63.25	88.12	830.7	59.57	103.5
420.	12.691	1.241	11.961	184.13	64.37	89.05	812.8	57.45	102.2
430.	12.437	1.237	12.856	186.24	65.48	89.97	796.3	55.49	101.1
440.	12.188	1.234	13.760	188.32	66.59	90.86	781.0	53.70	100.2
450.	11.943	1.231	14.673	190.37	67.69	91.72	767.0	52.05	99.4
460.	11.705	1.229	15.594	192.39	68.80	92.57	754.2	50.54	98.9
470.	11.471	1.227	16.524	194.39	69.89	93.39	742.5	49.15	98.5
480.	11.244	1.226	17.462	196.37	70.98	94.20	731.9	47.87	98.2
490.	11.023	1.225	18.408	198.32	72.06	94.98	722.3	46.70	98.1
500.	10.807	1.224	19.362	200.24	73.14	95.75	713.6	45.62	98.1
520.	10.394	1.224	21.292	204.03	75.26	97.23	698.8		98.5
540.	10.005	1.224	23.251	207.72	77.35	98.67	687.0		99.3
560.	9.640	1.225	25.238	211.34	79.40	100.06	677.8		100.5
580.	9.297	1.227	27.253	214.87	81.41	101.43	670.7		101.9
600.	8.976	1.228	29.295	218.34	83.39	102.79	665.6		103.6
625.	8.604	1.230	31.886	222.57	85.81	104.46	661.3		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 60.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
100.	21.996	3.281	-11.876	79.42	48.97	68.06	2170.3	1515.28	274.1
105.	21.846	3.146	-11.533	82.77	49.27	68.97	2137.2	1227.42	271.2
110.	21.695	3.024	-11.187	85.98	49.12	69.23	2104.8	1020.48	267.9
115.	21.544	2.913	-10.841	89.06	48.73	69.14	2073.0	866.85	264.5
120.	21.394	2.811	-10.496	92.00	48.24	68.88	2041.7	749.59	261.0
125.	21.244	2.717	-10.152	94.80	47.71	68.55	2011.1	657.93	257.3
130.	21.096	2.631	-9.810	97.48	47.21	68.22	1980.9	584.80	253.5
135.	20.948	2.552	-9.470	100.05	46.75	67.92	1951.1	525.37	249.6
140.	20.800	2.478	-9.131	102.52	46.34	67.67	1921.7	476.29	245.7
145.	20.653	2.410	-8.793	104.89	45.99	67.47	1892.7	435.19	241.8
150.	20.507	2.346	-8.456	107.17	45.69	67.34	1864.1	400.32	237.8
155.	20.361	2.287	-8.120	109.38	45.46	67.26	1835.8	370.39	233.8
160.	20.215	2.231	-7.784	111.52	45.27	67.23	1807.9	344.45	229.8
165.	20.070	2.179	-7.447	113.58	45.13	67.25	1780.3	321.75	225.8
170.	19.924	2.130	-7.111	115.59	45.04	67.32	1753.1	301.71	221.8
175.	19.780	2.085	-6.774	117.55	44.99	67.42	1726.1	283.90	217.8
180.	19.635	2.042	-6.437	119.45	44.97	67.56	1699.5	267.95	213.9
185.	19.490	2.001	-6.099	121.30	44.99	67.74	1673.2	253.58	210.0
190.	19.346	1.963	-5.759	123.11	45.05	67.94	1647.3	240.56	206.1
195.	19.202	1.927	-5.419	124.88	45.13	68.17	1621.7	228.71	202.3
200.	19.057	1.893	-5.078	126.61	45.25	68.42	1596.4	217.87	198.6
205.	18.913	1.861	-4.735	128.30	45.39	68.70	1571.4	207.90	194.9
210.	18.769	1.831	-4.391	129.96	45.55	69.00	1546.8	198.72	191.2
215.	18.626	1.802	-4.045	131.59	45.74	69.31	1522.5	190.22	187.7
220.	18.482	1.775	-3.698	133.18	45.96	69.64	1498.5	182.33	184.2
225.	18.338	1.749	-3.348	134.75	46.19	69.99	1474.9	174.98	180.7
230.	18.195	1.724	-2.998	136.29	46.45	70.35	1451.7	168.12	177.4
235.	18.052	1.701	-2.645	137.81	46.73	70.73	1428.8	161.71	174.1
240.	17.908	1.679	-2.290	139.30	47.02	71.12	1406.2	155.70	170.9
245.	17.765	1.658	-1.934	140.77	47.33	71.52	1384.1	150.05	167.7
250.	17.623	1.638	-1.575	142.22	47.66	71.93	1362.3	144.73	164.7
255.	17.480	1.619	-1.214	143.65	48.01	72.35	1340.9	139.72	161.7
260.	17.337	1.601	-0.852	145.06	48.37	72.78	1319.8	134.99	158.8
265.	17.195	1.584	-0.487	146.45	48.75	73.22	1299.2	130.52	156.0
270.	17.053	1.567	-0.119	147.82	49.14	73.67	1278.9	126.29	153.3
275.	16.911	1.552	0.250	149.18	49.55	74.12	1259.1	122.28	150.6
280.	16.770	1.537	0.622	150.52	49.96	74.59	1239.6	118.48	148.0
285.	16.629	1.523	0.996	151.84	50.39	75.06	1220.5	114.87	145.5
290.	16.488	1.509	1.372	153.15	50.83	75.53	1201.9	111.44	143.1
295.	16.347	1.496	1.751	154.45	51.29	76.01	1183.6	108.17	140.8

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 60.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
300.	16.207	1.484	2.133	155.73	51.75	76.50	1165.7	105.07	138.6
310.	15.928	1.461	2.902	158.25	52.70	77.48	1131.3	99.29	134.3
320.	15.651	1.441	3.682	160.73	53.68	78.48	1098.4	94.03	130.3
330.	15.375	1.422	4.472	163.16	54.70	79.48	1067.1	89.24	126.7
340.	15.102	1.405	5.272	165.55	55.73	80.49	1037.5	84.87	123.4
350.	14.831	1.390	6.082	167.90	56.79	81.50	1009.4	80.86	120.3
360.	14.562	1.377	6.902	170.21	57.86	82.51	982.9	77.20	117.5
370.	14.297	1.364	7.732	172.48	58.95	83.52	957.9	73.84	115.0
380.	14.034	1.353	8.572	174.72	60.05	84.51	934.4	70.76	112.7
390.	13.775	1.343	9.422	176.93	61.15	85.50	912.4	67.93	110.7
400.	13.520	1.334	10.282	179.11	62.26	86.47	891.8	65.33	108.9
410.	13.268	1.327	11.152	181.25	63.37	87.43	872.5	62.93	107.3
420.	13.021	1.320	12.031	183.37	64.48	88.38	854.6	60.73	106.0
430.	12.778	1.313	12.919	185.46	65.59	89.30	838.0	58.70	104.8
440.	12.539	1.308	13.817	187.53	66.70	90.21	822.5	56.84	103.9
450.	12.305	1.303	14.723	189.56	67.81	91.10	808.3	55.12	103.1
460.	12.076	1.299	15.639	191.57	68.91	91.97	795.1	53.53	102.4
470.	11.852	1.295	16.563	193.56	70.00	92.82	783.0	52.07	102.0
480.	11.633	1.292	17.495	195.52	71.09	93.66	771.9	50.73	101.7
490.	11.419	1.290	18.436	197.46	72.17	94.48	761.8	49.49	101.5
500.	11.211	1.287	19.385	199.38	73.24	95.28	752.5	48.34	101.4
520.	10.810	1.284	21.306	203.15	75.36	96.84	736.5		101.7
540.	10.431	1.281	23.258	206.83	77.45	98.35	723.4		102.4
560.	10.073	1.279	25.240	210.44	79.50	99.82	712.9		103.4
580.	9.735	1.278	27.251	213.96	81.51	101.26	704.6		104.8
600.	9.417	1.277	29.290	217.42	83.49	102.67	698.1		106.4
625.	9.046	1.276	31.879	221.65	85.90	104.41	692.3		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 65.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
105.	21.896	3.400	-11.337	82.45	49.37	68.87	2154.6	1289.63	273.3
110.	21.747	3.268	-10.992	85.67	49.25	69.15	2122.3	1067.36	270.1
115.	21.598	3.147	-10.646	88.74	48.87	69.07	2090.7	903.58	266.8
120.	21.450	3.037	-10.301	91.67	48.39	68.80	2059.8	779.32	263.3
125.	21.303	2.936	-9.958	94.48	47.87	68.47	2029.5	682.66	259.7
130.	21.156	2.842	-9.617	97.15	47.37	68.14	1999.6	605.83	256.0
135.	21.010	2.756	-9.277	99.72	46.91	67.83	1970.2	543.60	252.2
140.	20.865	2.676	-8.938	102.18	46.50	67.57	1941.3	492.37	248.4
145.	20.720	2.602	-8.601	104.55	46.15	67.37	1912.7	449.55	244.5
150.	20.576	2.533	-8.264	106.83	45.85	67.22	1884.5	413.31	240.5
155.	20.433	2.468	-7.929	109.03	45.61	67.13	1856.7	382.27	236.6
160.	20.289	2.408	-7.593	111.16	45.42	67.09	1829.2	355.40	232.6
165.	20.147	2.352	-7.258	113.23	45.29	67.11	1802.1	331.92	228.7
170.	20.004	2.299	-6.922	115.23	45.19	67.16	1775.3	311.22	224.8
175.	19.862	2.249	-6.586	117.18	45.14	67.26	1748.9	292.84	220.9
180.	19.720	2.202	-6.249	119.08	45.12	67.39	1722.8	276.41	217.0
185.	19.578	2.158	-5.912	120.93	45.14	67.55	1697.0	261.61	213.1
190.	19.437	2.117	-5.574	122.73	45.20	67.74	1671.5	248.22	209.3
195.	19.295	2.078	-5.234	124.49	45.28	67.96	1646.4	236.04	205.5
200.	19.154	2.041	-4.894	126.22	45.39	68.21	1621.6	224.90	201.8
205.	19.013	2.006	-4.552	127.90	45.53	68.47	1597.2	214.67	198.2
210.	18.873	1.973	-4.209	129.56	45.70	68.76	1573.1	205.25	194.6
215.	18.732	1.941	-3.865	131.18	45.89	69.06	1549.3	196.53	191.0
220.	18.592	1.911	-3.519	132.77	46.10	69.38	1525.8	188.45	187.6
225.	18.452	1.883	-3.171	134.33	46.33	69.72	1502.7	180.92	184.2
230.	18.312	1.856	-2.821	135.87	46.59	70.07	1480.0	173.90	180.8
235.	18.172	1.831	-2.470	137.38	46.87	70.44	1457.6	167.34	177.6
240.	18.033	1.806	-2.117	138.87	47.16	70.82	1435.5	161.18	174.4
245.	17.893	1.783	-1.762	140.33	47.47	71.20	1413.9	155.40	171.3
250.	17.754	1.761	-1.405	141.77	47.80	71.61	1392.6	149.97	168.3
255.	17.616	1.740	-1.046	143.20	48.15	72.02	1371.6	144.84	165.3
260.	17.477	1.720	-0.685	144.60	48.51	72.44	1351.1	140.01	162.4
265.	17.339	1.701	-0.322	145.98	48.88	72.86	1330.9	135.44	159.6
270.	17.201	1.683	0.044	147.35	49.28	73.30	1311.1	131.11	156.9
275.	17.064	1.666	0.412	148.70	49.68	73.75	1291.7	127.02	154.3
280.	16.927	1.649	0.781	150.03	50.10	74.20	1272.6	123.13	151.7
285.	16.790	1.634	1.154	151.35	50.53	74.66	1254.0	119.44	149.3
290.	16.654	1.619	1.528	152.65	50.97	75.12	1235.7	115.93	146.9
295.	16.518	1.604	1.905	153.94	51.42	75.59	1217.9	112.59	144.5
300.	16.382	1.591	2.284	155.21	51.88	76.07	1200.4	109.42	142.3

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 65.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
310.	16.112	1.565	3.049	157.72	52.83	77.03	1166.7	103.51	138.1
320.	15.845	1.542	3.825	160.18	53.81	78.00	1134.5	98.13	134.1
330.	15.579	1.521	4.609	162.60	54.82	78.99	1103.9	93.23	130.5
340.	15.316	1.501	5.404	164.97	55.86	79.98	1074.8	88.75	127.1
350.	15.055	1.484	6.209	167.30	56.91	80.98	1047.3	84.65	124.1
360.	14.797	1.468	7.024	169.60	57.98	81.98	1021.2	80.90	121.3
370.	14.542	1.453	7.849	171.86	59.07	82.97	996.6	77.45	118.7
380.	14.290	1.440	8.683	174.08	60.16	83.96	973.4	74.28	116.5
390.	14.042	1.428	9.528	176.28	61.26	84.94	951.6	71.37	114.4
400.	13.797	1.417	10.382	178.44	62.37	85.91	931.1	68.68	112.6
410.	13.555	1.407	11.246	180.57	63.48	86.87	912.0	66.21	111.0
420.	13.318	1.398	12.119	182.68	64.59	87.82	894.1	63.94	109.6
430.	13.084	1.389	13.002	184.76	65.70	88.75	877.3	61.84	108.4
440.	12.855	1.382	13.894	186.81	66.81	89.67	861.8	59.90	107.4
450.	12.630	1.375	14.796	188.83	67.91	90.58	847.3	58.11	106.5
460.	12.409	1.370	15.706	190.83	69.01	91.46	833.9	56.45	105.9
470.	12.194	1.364	16.625	192.81	70.10	92.34	821.5	54.93	105.4
480.	11.982	1.359	17.553	194.76	71.19	93.20	810.1	53.51	105.0
490.	11.776	1.355	18.489	196.69	72.27	94.04	799.6	52.21	104.8
500.	11.574	1.351	19.433	198.60	73.34	94.87	789.9	51.00	104.7
520.	11.185	1.344	21.347	202.35	75.46	96.49	772.9		104.8
540.	10.815	1.339	23.293	206.02	77.54	98.06	758.8		105.4
560.	10.464	1.334	25.269	209.62	79.59	99.58	747.1		106.3
580.	10.132	1.330	27.276	213.14	81.60	101.08	737.7		107.6
600.	9.818	1.327	29.312	216.59	83.58	102.54	730.1		109.0
625.	9.449	1.324	31.898	220.81	85.99	104.34	722.9		

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 70.0000 MPa

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
105.	21.945	3.654	-11.141	82.15	49.48	68.78	2171.7	1357.39	275.4
110.	21.798	3.511	-10.796	85.35	49.37	69.08	2139.6	1117.87	272.3
115.	21.651	3.381	-10.451	88.42	49.01	69.00	2108.2	942.83	269.1
120.	21.505	3.262	-10.107	91.35	48.54	68.74	2077.6	810.87	265.7
125.	21.360	3.153	-9.764	94.15	48.03	68.41	2047.6	708.74	262.1
130.	21.215	3.053	-9.423	96.83	47.53	68.07	2018.0	627.91	258.5
135.	21.072	2.960	-9.083	99.39	47.07	67.75	1989.0	562.67	254.7
140.	20.928	2.873	-8.745	101.85	46.66	67.48	1960.4	509.11	251.0
145.	20.786	2.793	-8.408	104.22	46.30	67.27	1932.3	464.47	247.1
150.	20.644	2.719	-8.072	106.49	46.01	67.12	1904.5	426.77	243.3
155.	20.503	2.649	-7.737	108.69	45.77	67.02	1877.1	394.53	239.4
160.	20.362	2.584	-7.402	110.82	45.58	66.97	1850.1	366.68	235.5
165.	20.221	2.523	-7.067	112.88	45.44	66.97	1823.4	342.37	231.6
170.	20.081	2.466	-6.732	114.88	45.34	67.02	1797.1	320.98	227.7
175.	19.942	2.412	-6.397	116.83	45.28	67.11	1771.1	302.01	223.8
180.	19.802	2.362	-6.061	118.72	45.27	67.23	1745.4	285.06	220.0
185.	19.663	2.314	-5.725	120.56	45.29	67.38	1720.1	269.82	216.2
190.	19.524	2.270	-5.387	122.36	45.34	67.57	1695.1	256.03	212.4
195.	19.386	2.227	-5.049	124.12	45.42	67.78	1670.5	243.50	208.7
200.	19.247	2.187	-4.709	125.84	45.53	68.01	1646.2	232.05	205.0
205.	19.109	2.149	-4.369	127.52	45.67	68.27	1622.2	221.55	201.4
210.	18.972	2.113	-4.027	129.17	45.84	68.55	1598.5	211.88	197.8
215.	18.834	2.079	-3.683	130.78	46.03	68.84	1575.2	202.93	194.3
220.	18.697	2.047	-3.338	132.37	46.24	69.15	1552.3	194.64	190.9
225.	18.560	2.016	-2.992	133.93	46.47	69.48	1529.6	186.93	187.5
230.	18.423	1.987	-2.643	135.46	46.73	69.82	1507.3	179.73	184.2
235.	18.287	1.959	-2.293	136.96	47.00	70.18	1485.4	173.01	181.0
240.	18.151	1.933	-1.942	138.45	47.29	70.55	1463.8	166.71	177.8
245.	18.015	1.907	-1.588	139.90	47.60	70.93	1442.6	160.79	174.8
250.	17.880	1.883	-1.232	141.34	47.93	71.32	1421.7	155.23	171.8
255.	17.745	1.861	-0.875	142.76	48.28	71.72	1401.2	149.99	168.8
260.	17.610	1.839	-0.515	144.15	48.64	72.13	1381.1	145.04	166.0
265.	17.475	1.818	-0.153	145.53	49.01	72.55	1361.3	140.37	163.2
270.	17.341	1.798	0.211	146.89	49.40	72.98	1341.9	135.94	160.5
275.	17.208	1.779	0.577	148.24	49.81	73.42	1322.9	131.75	157.9
280.	17.075	1.761	0.945	149.56	50.22	73.86	1304.3	127.78	155.3
285.	16.942	1.744	1.315	150.87	50.65	74.31	1286.0	124.00	152.9
290.	16.809	1.727	1.688	152.17	51.09	74.77	1268.1	120.41	150.5
295.	16.678	1.711	2.063	153.45	51.54	75.23	1250.6	117.00	148.2
300.	16.546	1.696	2.440	154.72	52.00	75.70	1233.5	113.75	146.0

Table B3. Properties in the single-phase region along isobars (continued)

ETHANE ISOBAR AT P = 70.0000 MPa (continued)

T	ρ	Z	H	S	C_v	C_p	W	η	λ
K	$mol \cdot dm^{-3}$		kJ/mol	J/(mol•K)	J/(mol•K)		$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
310.	16.285	1.668	3.202	157.22	52.95	76.64	1200.5	107.71	141.7
320.	16.026	1.642	3.973	159.67	53.93	77.60	1168.9	102.21	137.8
330.	15.769	1.618	4.754	162.07	54.94	78.57	1138.8	97.19	134.2
340.	15.515	1.596	5.545	164.43	55.97	79.55	1110.3	92.60	130.8
350.	15.263	1.576	6.345	166.75	57.03	80.54	1083.2	88.40	127.7
360.	15.014	1.558	7.155	169.03	58.10	81.52	1057.5	84.55	124.9
370.	14.768	1.541	7.975	171.28	59.18	82.51	1033.2	81.00	122.4
380.	14.525	1.525	8.806	173.49	60.27	83.49	1010.3	77.75	120.1
390.	14.286	1.511	9.645	175.67	61.37	84.47	988.7	74.75	118.0
400.	14.050	1.498	10.495	177.82	62.48	85.44	968.4	71.99	116.1
410.	13.817	1.486	11.354	179.95	63.59	86.40	949.4	69.44	114.5
420.	13.588	1.475	12.223	182.04	64.70	87.35	931.5	67.08	113.1
430.	13.363	1.465	13.101	184.11	65.80	88.29	914.7	64.91	111.8
440.	13.142	1.456	13.989	186.15	66.91	89.22	899.1	62.90	110.8
450.	12.925	1.448	14.885	188.16	68.01	90.13	884.5	61.04	109.9
460.	12.712	1.440	15.791	190.15	69.11	91.04	870.9	59.32	109.2
470.	12.503	1.433	16.706	192.12	70.20	91.92	858.3	57.72	108.6
480.	12.299	1.426	17.630	194.06	71.29	92.80	846.6	56.25	108.2
490.	12.098	1.420	18.562	195.99	72.37	93.66	835.7	54.88	107.9
500.	11.903	1.415	19.503	197.89	73.44	94.51	825.7	53.61	107.8
520.	11.524	1.405	21.410	201.63	75.55	96.17	807.9		107.8
540.	11.163	1.397	23.349	205.29	77.64	97.79	792.9		108.3
560.	10.820	1.389	25.321	208.87	79.68	99.36	780.4		109.1
580.	10.494	1.383	27.323	212.39	81.69	100.90	770.0		110.3
600.	10.184	1.378	29.356	215.83	83.66	102.40	761.4		111.6
625.	9.819	1.372	31.940	220.05	86.07	104.25	753.0		

Table B4. Properties in the single-phase region along isotherms

ETHANE ISOTHERM AT T = 95.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
0.458E-05	0.362E-05	0.3807E-07	0.790	27.08	185.3	3.17	3.2
21.503	0.362E-05	2.870	81.417	47.93	1970.1	1057.13	252.1
21.55	3.883	2.891	83.060	47.91	1987.1	1092.60	253.8
21.60	8.079	2.913	84.823	47.90	2005.0	1132.97	255.6
21.65	12.365	2.935	86.611	47.89	2023.0	1176.59	257.5
21.70	16.741	2.956	88.425	47.88	2041.0	1223.88	259.3
21.75	21.208	2.978	90.266	47.87	2059.0	1275.32	261.2
21.80	25.768	3.000	92.133	47.86	2077.1	1331.50	263.1

ETHANE ISOTHERM AT T = 100.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
0.133E-04	0.111E-04	0.1108E-06	0.832	27.30	189.9	3.32	3.5
21.325	0.111E-04	2.784	77.575	48.15	1938.3	877.99	248.2
21.35	1.964	2.794	78.406	48.17	1946.8	891.78	249.1
21.40	5.926	2.815	80.071	48.23	1963.8	920.52	250.9
21.45	9.972	2.836	81.760	48.28	1980.7	951.26	252.7
21.50	14.103	2.857	83.472	48.34	1997.8	984.21	254.6
21.55	18.320	2.878	85.210	48.40	2014.8	1019.63	256.5
21.60	22.624	2.899	86.972	48.46	2032.0	1057.82	258.3
21.65	27.017	2.921	88.761	48.52	2049.2	1099.13	260.3
21.70	31.501	2.942	90.576	48.58	2066.4	1143.94	262.2
21.75	36.075	2.963	92.418	48.65	2083.7	1192.76	264.2
21.80	40.743	2.984	94.287	48.71	2101.2	1246.14	266.2
21.85	45.504	3.005	96.185	48.78	2118.6	1304.76	268.2
21.90	50.362	3.027	98.111	48.84	2136.2	1369.47	270.2
21.95	55.316	3.048	100.065	48.91	2153.8	1441.26	272.2
22.00	60.369	3.070	102.049	48.97	2171.6		274.3

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 105.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	μPa•s	mW/(m•K)
0.347E-04	0.303E-04	0.2876E-06	0.873	27.48	194.4	3.46	3.7
21.144	0.303E-04	2.678	73.838	47.89	1903.9	742.08	243.9
21.15	0.417	2.680	74.015	47.90	1905.7	744.41	244.1
21.20	4.157	2.700	75.593	48.00	1921.9	765.73	246.0
21.25	7.977	2.720	77.192	48.09	1938.2	788.34	247.8
21.30	11.877	2.740	78.814	48.18	1954.6	812.38	249.6
21.35	15.858	2.760	80.460	48.28	1970.9	838.00	251.5
21.40	19.923	2.780	82.128	48.38	1987.4	865.34	253.4
21.45	24.072	2.801	83.822	48.48	2003.9	894.60	255.3
21.50	28.306	2.821	85.539	48.57	2020.5	925.99	257.2
21.55	32.626	2.841	87.283	48.67	2037.1	959.77	259.2
21.60	37.034	2.862	89.051	48.77	2053.9	996.21	261.2
21.65	41.532	2.883	90.846	48.87	2070.7	1035.67	263.2
21.70	46.119	2.903	92.668	48.97	2087.6	1078.52	265.2
21.75	50.799	2.924	94.516	49.08	2104.5	1125.25	267.2
21.80	55.571	2.945	96.392	49.18	2121.6	1176.41	269.3
21.85	60.438	2.966	98.295	49.28	2138.7		271.4
21.90	65.401	2.986	100.227	49.38	2155.9		273.5

ETHANE ISOTHERM AT T = 110.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	μPa•s	mW/(m•K)
0.816E-04	0.747E-04	0.6763E-06	0.915	27.59	198.8	3.60	4.0
20.962	0.747E-04	2.564	70.231	47.39	1868.3	637.04	239.5
21.00	2.662	2.578	71.359	47.47	1880.1	649.42	240.9
21.05	6.268	2.598	72.878	47.59	1895.8	666.67	242.7
21.10	9.951	2.617	74.417	47.70	1911.6	684.88	244.5
21.15	13.710	2.636	75.979	47.82	1927.5	704.14	246.4
21.20	17.549	2.655	77.562	47.94	1943.4	724.54	248.3
21.25	21.467	2.675	79.168	48.05	1959.3	746.20	250.2
21.30	25.466	2.694	80.798	48.17	1975.4	769.24	252.1
21.35	29.547	2.714	82.450	48.29	1991.5	793.79	254.0
21.40	33.711	2.734	84.127	48.41	2007.7	820.03	256.0
21.45	37.960	2.754	85.829	48.53	2024.0	848.12	258.0
21.50	42.295	2.773	87.555	48.65	2040.3	878.28	260.0
21.55	46.716	2.793	89.306	48.77	2056.8	910.76	262.0
21.60	51.226	2.814	91.083	48.89	2073.3	945.83	264.0
21.65	55.825	2.834	92.886	49.01	2089.9	983.83	266.1
21.70	60.515	2.854	94.715	49.13	2106.6		268.2
21.75	65.297	2.874	96.571	49.25	2123.3		270.3

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 115.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
0.177E-03	0.169E-03	0.1460E-05	0.957	27.62	203.1	3.75	4.3
20.779	0.169E-03	2.450	66.761	46.78	1832.0	554.36	235.0
20.80	1.383	2.457	67.350	46.83	1838.3	559.76	235.7
20.85	4.787	2.476	68.794	46.95	1853.7	573.31	237.5
20.90	8.263	2.494	70.257	47.08	1869.0	587.54	239.3
20.95	11.813	2.512	71.741	47.20	1884.4	602.50	241.2
21.00	15.437	2.531	73.246	47.33	1899.9	618.25	243.0
21.05	19.138	2.550	74.771	47.46	1915.5	634.86	244.9
21.10	22.915	2.568	76.319	47.58	1931.1	652.41	246.8
21.15	26.770	2.587	77.889	47.71	1946.7	670.98	248.7
21.20	30.704	2.606	79.481	47.84	1962.5	690.67	250.6
21.25	34.718	2.625	81.096	47.97	1978.3	711.58	252.6
21.30	38.814	2.644	82.734	48.10	1994.2	733.83	254.6
21.35	42.992	2.664	84.396	48.22	2010.2	757.56	256.6
21.40	47.254	2.683	86.082	48.35	2026.3	782.93	258.6
21.45	51.601	2.702	87.792	48.48	2042.4	810.12	260.6
21.50	56.034	2.722	89.527	48.61	2058.6	839.33	262.7
21.55	60.554	2.741	91.287	48.75	2074.9		264.8
21.60	65.163	2.761	93.072	48.88	2091.3		266.9
21.65	69.861	2.781	94.883	49.01	2107.8		269.0

ETHANE ISOTHERM AT T = 120.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
0.355E-03	0.355E-03	0.2925E-05	0.999	27.57	207.4	3.90	4.7
20.595	0.355E-03	2.338	63.427	46.14	1795.5	488.15	230.3
20.60	0.286	2.340	63.550	46.15	1796.8	489.11	230.5
20.65	3.498	2.357	64.923	46.28	1811.8	500.02	232.2
20.70	6.779	2.375	66.316	46.41	1826.8	511.43	234.0
20.75	10.130	2.393	67.727	46.54	1841.8	523.37	235.8
20.80	13.552	2.410	69.159	46.67	1857.0	535.88	237.7
20.85	17.046	2.428	70.610	46.80	1872.1	549.00	239.5
20.90	20.613	2.446	72.081	46.93	1887.4	562.79	241.4
20.95	24.255	2.464	73.573	47.06	1902.7	577.29	243.3
21.00	27.971	2.483	75.087	47.19	1918.0	592.58	245.2
21.05	31.764	2.501	76.621	47.32	1933.5	608.70	247.1
21.10	35.634	2.519	78.178	47.45	1949.0	625.74	249.1
21.15	39.582	2.538	79.757	47.59	1964.6	643.78	251.0

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 120.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
21.20	43.610	2.556	81.359	47.72	1980.3	662.91	253.0
21.25	47.718	2.575	82.983	47.85	1996.0	683.25	255.0
21.30	51.908	2.594	84.630	47.98	2011.8	704.89	257.1
21.35	56.182	2.612	86.301	48.12	2027.7	728.00	259.1
21.40	60.539	2.631	87.996	48.25	2043.7		261.2
21.45	64.982	2.650	89.715	48.39	2059.7		263.3
21.50	69.511	2.669	91.458	48.52	2075.9		265.4

ETHANE ISOTHERM AT T = 130.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.120E-02	0.129E-02	0.9749E-05	1.082	27.30	215.7	4.19	5.3
20.225	0.129E-02	2.128	57.151	44.97	1721.8	389.76	220.7
20.25	1.431	2.136	57.773	45.03	1729.0	393.54	221.6
20.30	4.352	2.152	59.037	45.16	1743.4	401.35	223.3
20.35	7.335	2.169	60.317	45.29	1757.9	409.47	225.0
20.40	10.384	2.185	61.615	45.41	1772.4	417.90	226.8
20.45	13.497	2.202	62.930	45.54	1787.0	426.69	228.6
20.50	16.677	2.218	64.263	45.67	1801.6	435.84	230.4
20.55	19.924	2.235	65.615	45.80	1816.3	445.39	232.2
20.60	23.239	2.252	66.985	45.92	1831.0	455.35	234.1
20.65	26.623	2.269	68.375	46.05	1845.8	465.76	236.0
20.70	30.076	2.286	69.784	46.18	1860.7	476.65	237.8
20.75	33.601	2.303	71.212	46.31	1875.6	488.06	239.8
20.80	37.198	2.320	72.661	46.44	1890.7	500.03	241.7
20.85	40.868	2.337	74.130	46.57	1905.7	512.59	243.6
20.90	44.611	2.355	75.619	46.70	1920.9	525.80	245.6
20.95	48.430	2.372	77.130	46.83	1936.1	539.70	247.6
21.00	52.325	2.389	78.661	46.96	1951.4	554.36	249.6
21.05	56.296	2.407	80.214	47.09	1966.7	569.84	251.6
21.10	60.346	2.425	81.789	47.22	1982.2		253.7
21.15	64.476	2.443	83.386	47.35	1997.7		255.7
21.20	68.685	2.460	85.004	47.49	2013.2		257.8

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 140.00 K

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
0.330E-02	0.383E-02	0.2667E-04	1.162	27.05	223.5	4.50	6.0
19.850	0.383E-02	1.938	51.358	44.04	1647.8	320.91	210.9
19.90	2.576	1.953	52.495	44.16	1661.6	326.56	212.5
19.95	5.229	1.968	53.658	44.28	1675.6	332.46	214.2
20.00	7.942	1.983	54.837	44.40	1689.6	338.56	215.9
20.05	10.713	1.999	56.031	44.52	1703.7	344.87	217.7
20.10	13.545	2.014	57.242	44.64	1717.8	351.41	219.4
20.15	16.438	2.030	58.468	44.76	1732.0	358.19	221.1
20.20	19.392	2.045	59.712	44.88	1746.2	365.22	222.9
20.25	22.409	2.061	60.972	45.00	1760.5	372.51	224.7
20.30	25.490	2.077	62.250	45.12	1774.8	380.09	226.5
20.35	28.634	2.093	63.546	45.24	1789.2	387.98	228.4
20.40	31.845	2.108	64.859	45.36	1803.7	396.18	230.2
20.45	35.121	2.124	66.190	45.48	1818.2	404.72	232.1
20.50	38.464	2.140	67.540	45.60	1832.8	413.63	234.0
20.55	41.875	2.157	68.909	45.73	1847.4	422.92	235.9
20.60	45.355	2.173	70.296	45.85	1862.2	432.63	237.8
20.65	48.905	2.189	71.703	45.97	1876.9	442.78	239.7
20.70	52.526	2.206	73.129	46.09	1891.8	453.41	241.7
20.75	56.218	2.222	74.575	46.22	1906.7	464.55	243.7
20.80	59.984	2.239	76.041	46.34	1921.7	476.24	245.7
20.85	63.823	2.255	77.527	46.46	1936.7		247.7
20.90	67.737	2.272	79.034	46.59	1951.8		249.8

ETHANE ISOTHERM AT T = 150.00 K
Second virial coefficient is -719.2 cm^3•mol^{-1}

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
0.779E-02	0.967E-02	0.6281E-04	1.239	27.13	230.6	4.80	6.7
19.470	0.967E-02	1.765	46.002	43.38	1573.3	270.37	201.0
19.50	1.389	1.774	46.626	43.44	1581.4	272.98	201.9
19.55	3.747	1.788	47.683	43.55	1595.0	277.48	203.6
19.60	6.158	1.802	48.755	43.66	1608.6	282.12	205.2
19.65	8.622	1.817	49.840	43.77	1622.3	286.90	206.8
19.70	11.142	1.831	50.940	43.88	1636.0	291.83	208.5
19.75	13.717	1.846	52.055	43.99	1649.7	296.91	210.2
19.80	16.348	1.860	53.184	44.10	1663.5	302.16	211.9
19.85	19.035	1.875	54.329	44.21	1677.3	307.58	213.6

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 150.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
19.90	21.781	1.890	55.490	44.32	1691.2	313.19	215.3
19.95	24.585	1.904	56.666	44.44	1705.1	318.99	217.0
20.00	27.448	1.919	57.858	44.55	1719.1	324.99	218.8
20.05	30.371	1.934	59.067	44.66	1733.1	331.20	220.6
20.10	33.355	1.949	60.292	44.77	1747.2	337.64	222.4
20.15	36.400	1.964	61.534	44.89	1761.4	344.32	224.2
20.20	39.508	1.979	62.793	45.00	1775.6	351.25	226.1
20.25	42.680	1.995	64.069	45.11	1789.9	358.45	227.9
20.30	45.915	2.010	65.363	45.22	1804.2	365.94	229.8
20.35	49.216	2.025	66.675	45.34	1818.6	373.72	231.7
20.40	52.583	2.041	68.005	45.45	1833.0	381.83	233.6
20.45	56.017	2.056	69.353	45.57	1847.5	390.28	235.6
20.50	59.519	2.072	70.719	45.68	1862.1	399.09	237.5
20.55	63.089	2.088	72.104	45.79	1876.8		239.5
20.60	66.730	2.104	73.508	45.91	1891.5		241.5

ETHANE ISOTHERM AT T = 160.00 K
Second virial coefficient is -647.7 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.163E-01	0.215E-01	0.1319E-03	1.308	27.72	236.9	5.11	7.4
19.083	0.215E-01	1.609	41.042	42.95	1498.5	231.74	191.1
19.10	0.732	1.613	41.370	42.98	1503.0	232.94	191.6
19.15	2.824	1.627	42.332	43.08	1516.3	236.51	193.1
19.20	4.965	1.640	43.306	43.18	1529.6	240.16	194.7
19.25	7.155	1.654	44.293	43.28	1542.8	243.92	196.2
19.30	9.395	1.667	45.293	43.38	1556.2	247.79	197.8
19.35	11.684	1.681	46.307	43.48	1569.5	251.76	199.4
19.40	14.025	1.695	47.333	43.58	1582.9	255.85	201.0
19.45	16.418	1.708	48.374	43.68	1596.3	260.06	202.7
19.50	18.863	1.722	49.429	43.79	1609.8	264.39	204.3
19.55	21.361	1.736	50.497	43.89	1623.3	268.86	206.0
19.60	23.913	1.750	51.581	43.99	1636.9	273.46	207.6
19.65	26.519	1.764	52.679	44.09	1650.5	278.20	209.3
19.70	29.181	1.778	53.792	44.20	1664.1	283.10	211.1
19.75	31.899	1.792	54.920	44.30	1677.8	288.16	212.8
19.80	34.673	1.806	56.063	44.40	1691.6	293.38	214.5
19.85	37.505	1.820	57.223	44.51	1705.4	298.77	216.3

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 160.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
19.90	40.396	1.835	58.398	44.61	1719.2	304.36	218.1
19.95	43.346	1.849	59.589	44.72	1733.2	310.13	219.9
20.00	46.355	1.863	60.797	44.82	1747.1	316.11	221.7
20.05	49.425	1.878	62.021	44.92	1761.2	322.31	223.6
20.10	52.557	1.893	63.262	45.03	1775.3	328.73	225.4
20.15	55.752	1.907	64.519	45.13	1789.4	335.40	227.3
20.20	59.010	1.922	65.794	45.24	1803.6	342.32	229.2
20.25	62.332	1.937	67.087	45.34	1817.9		231.1
20.30	65.719	1.952	68.397	45.45	1832.2		233.1
20.35	69.172	1.967	69.724	45.55	1846.6		235.0

ETHANE ISOTHERM AT T = 170.00 K
Second virial coefficient is -580.1 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.308E-01	0.429E-01	0.2530E-03	1.368	28.79	242.3	5.42	8.2
18.686	0.429E-01	1.465	36.440	42.71	1423.3	201.21	181.2
18.70	0.539	1.469	36.676	42.74	1426.8	201.98	181.6
18.75	2.395	1.481	37.550	42.83	1439.7	204.88	183.1
18.80	4.294	1.494	38.436	42.92	1452.6	207.85	184.5
18.85	6.238	1.507	39.333	43.01	1465.6	210.90	186.0
18.90	8.228	1.519	40.242	43.10	1478.5	214.02	187.5
18.95	10.263	1.532	41.164	43.19	1491.5	217.23	189.0
19.00	12.344	1.545	42.097	43.28	1504.6	220.51	190.5
19.05	14.473	1.558	43.043	43.38	1517.6	223.88	192.1
19.10	16.649	1.571	44.002	43.47	1530.7	227.35	193.6
19.15	18.873	1.584	44.973	43.56	1543.8	230.90	195.2
19.20	21.146	1.597	45.958	43.66	1557.0	234.56	196.8
19.25	23.469	1.610	46.956	43.75	1570.2	238.31	198.4
19.30	25.842	1.623	47.967	43.85	1583.4	242.18	200.0
19.35	28.266	1.636	48.993	43.94	1596.7	246.15	201.7
19.40	30.742	1.650	50.032	44.03	1610.0	250.24	203.3
19.45	33.269	1.663	51.086	44.13	1623.4	254.46	205.0
19.50	35.850	1.676	52.153	44.22	1636.8	258.80	206.7
19.55	38.485	1.690	53.236	44.32	1650.3	263.27	208.4
19.60	41.174	1.704	54.333	44.42	1663.9	267.88	210.1

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 170.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
19.65	43.919	1.717	55.446	44.51	1677.5	272.64	211.9
19.70	46.719	1.731	56.573	44.61	1691.1	277.55	213.7
19.75	49.576	1.745	57.716	44.70	1704.8	282.63	215.4
19.80	52.491	1.759	58.875	44.80	1718.6	287.87	217.2
19.85	55.464	1.773	60.050	44.89	1732.4	293.29	219.1
19.90	58.496	1.787	61.240	44.99	1746.3	298.90	220.9
19.95	61.588	1.801	62.447	45.09	1760.2		222.7
20.00	64.741	1.815	63.670	45.18	1774.2		224.6
20.05	67.956	1.829	64.910	45.28	1788.2		226.5

ETHANE ISOTHERM AT T = 180.00 K
Second virial coefficient is -519.6 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.541E-01	0.787E-01	0.4519E-03	1.416	30.26	246.8	5.74	9.1
18.279	0.787E-01	1.333	32.167	42.65	1347.7	176.39	171.5
18.30	0.745	1.338	32.492	42.68	1352.9	177.37	172.1
18.35	2.389	1.350	33.286	42.76	1365.5	179.78	173.4
18.40	4.074	1.362	34.091	42.84	1378.1	182.25	174.8
18.45	5.799	1.374	34.907	42.93	1390.7	184.78	176.2
18.50	7.565	1.386	35.733	43.01	1403.3	187.36	177.6
18.55	9.372	1.398	36.570	43.09	1415.9	190.00	179.0
18.60	11.222	1.410	37.419	43.17	1428.6	192.70	180.5
18.65	13.114	1.422	38.279	43.26	1441.3	195.47	181.9
18.70	15.050	1.434	39.150	43.34	1454.0	198.31	183.4
18.75	17.030	1.446	40.033	43.43	1466.8	201.22	184.9
18.80	19.054	1.458	40.928	43.51	1479.5	204.20	186.4
18.85	21.123	1.471	41.835	43.60	1492.4	207.26	187.9
18.90	23.237	1.483	42.755	43.68	1505.2	210.39	189.4
18.95	25.398	1.496	43.687	43.77	1518.1	213.61	191.0
19.00	27.606	1.508	44.631	43.86	1531.0	216.91	192.5
19.05	29.862	1.521	45.589	43.94	1544.0	220.30	194.1
19.10	32.165	1.533	46.560	44.03	1557.1	223.78	195.7
19.15	34.518	1.546	47.544	44.12	1570.1	227.35	197.3
19.20	36.920	1.559	48.541	44.21	1583.2	231.03	199.0
19.25	39.372	1.571	49.552	44.29	1596.4	234.81	200.6
19.30	41.875	1.584	50.578	44.38	1609.6	238.70	202.3
19.35	44.430	1.597	51.617	44.47	1622.9	242.71	204.0
19.40	47.037	1.610	52.670	44.56	1636.2	246.83	205.7

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 180.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
19.45	49.697	1.623	53.738	44.65	1649.6	251.08	207.4
19.50	52.411	1.637	54.820	44.73	1663.0	255.45	209.1
19.55	55.180	1.650	55.918	44.82	1676.5	259.97	210.9
19.60	58.003	1.663	57.030	44.91	1690.1	264.62	212.7
19.65	60.883	1.677	58.158	45.00	1703.7		214.4
19.70	63.819	1.690	59.300	45.09	1717.3		216.3
19.75	66.813	1.704	60.459	45.18	1731.0		218.1
19.80	69.865	1.717	61.633	45.26	1744.8		219.9

ETHANE ISOTHERM AT T = 190.00 K
Second virial coefficient is -466.7 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
0.889E-01	0.135	0.7611E-03	1.450	32.01	250.4	6.06	10.0
17.860	0.135	1.210	28.196	42.73	1271.6	155.75	161.9
17.90	1.285	1.219	28.772	42.79	1281.5	157.37	163.0
17.95	2.741	1.231	29.493	42.86	1293.7	159.41	164.3
18.00	4.234	1.242	30.224	42.93	1306.0	161.49	165.6
18.05	5.764	1.253	30.965	43.00	1318.3	163.62	166.9
18.10	7.331	1.264	31.715	43.08	1330.6	165.79	168.2
18.15	8.936	1.276	32.476	43.15	1342.9	168.01	169.5
18.20	10.579	1.287	33.247	43.23	1355.2	170.28	170.9
18.25	12.261	1.298	34.028	43.30	1367.5	172.60	172.3
18.30	13.982	1.310	34.820	43.38	1379.9	174.97	173.6
18.35	15.743	1.321	35.622	43.46	1392.3	177.39	175.0
18.40	17.544	1.333	36.435	43.53	1404.7	179.88	176.5
18.45	19.386	1.344	37.260	43.61	1417.1	182.41	177.9
18.50	21.270	1.356	38.095	43.69	1429.6	185.01	179.3
18.55	23.196	1.368	38.942	43.77	1442.1	187.67	180.8
18.60	25.165	1.379	39.801	43.85	1454.7	190.40	182.2
18.65	27.176	1.391	40.671	43.92	1467.3	193.19	183.7
18.70	29.232	1.403	41.553	44.00	1479.9	196.05	185.2
18.75	31.332	1.415	42.448	44.08	1492.6	198.98	186.7
18.80	33.477	1.427	43.355	44.16	1505.3	201.98	188.3
18.85	35.668	1.439	44.274	44.24	1518.0	205.07	189.8
18.90	37.905	1.451	45.206	44.32	1530.9	208.23	191.4
18.95	40.188	1.463	46.151	44.41	1543.7	211.48	193.0
19.00	42.520	1.475	47.109	44.49	1556.6	214.81	194.6

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 190.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
19.05	44.899	1.488	48.080	44.57	1569.6	218.24	196.2
19.10	47.328	1.500	49.064	44.65	1582.6	221.75	197.9
19.15	49.806	1.512	50.062	44.73	1595.6	225.37	199.5
19.20	52.334	1.525	51.074	44.81	1608.7	229.09	201.2
19.25	54.914	1.538	52.099	44.89	1621.9	232.92	202.9
19.30	57.545	1.550	53.139	44.97	1635.1	236.86	204.6
19.35	60.228	1.563	54.193	45.05	1648.4		206.3
19.40	62.964	1.576	55.261	45.14	1661.7		208.0
19.45	65.754	1.589	56.344	45.22	1675.1		209.8
19.50	68.599	1.602	57.442	45.30	1688.6		211.6

ETHANE ISOTHERM AT T = 200.00 K
Second virial coefficient is -420.8 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
0.10	0.159	0.8651E-03	1.523	33.99	255.5	6.38	10.8
0.139	0.217	0.1222E-02	1.467	33.92	253.0	6.39	11.0
17.425	0.217	1.096	24.505	42.94	1194.8	138.23	152.6
17.45	0.839	1.101	24.827	42.97	1200.9	139.09	153.2
17.50	2.097	1.112	25.473	43.03	1212.8	140.80	154.4
17.55	3.386	1.122	26.127	43.10	1224.7	142.55	155.6
17.60	4.709	1.133	26.790	43.16	1236.6	144.33	156.8
17.65	6.066	1.143	27.462	43.22	1248.6	146.15	158.0
17.70	7.456	1.154	28.143	43.29	1260.5	148.01	159.3
17.75	8.880	1.165	28.833	43.35	1272.5	149.90	160.5
17.80	10.339	1.175	29.533	43.42	1284.4	151.83	161.8
17.85	11.834	1.186	30.242	43.49	1296.4	153.80	163.1
17.90	13.364	1.197	30.961	43.56	1308.4	155.81	164.4
17.95	14.930	1.207	31.689	43.63	1320.5	157.87	165.7
18.00	16.533	1.218	32.428	43.69	1332.5	159.96	167.0
18.05	18.173	1.229	33.177	43.76	1344.6	162.11	168.4
18.10	19.850	1.240	33.936	43.84	1356.7	164.30	169.7
18.15	21.566	1.251	34.705	43.91	1368.8	166.54	171.1
18.20	23.321	1.262	35.485	43.98	1381.0	168.82	172.5
18.25	25.115	1.273	36.276	44.05	1393.2	171.16	173.9
18.30	26.949	1.284	37.078	44.12	1405.5	173.56	175.3
18.35	28.823	1.295	37.891	44.19	1417.7	176.01	176.7
18.40	30.738	1.307	38.715	44.27	1430.1	178.51	178.2
18.45	32.695	1.318	39.550	44.34	1442.4	181.08	179.6

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 200.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
18.50	34.693	1.329	40.398	44.41	1454.8	183.70	181.1
18.55	36.735	1.341	41.256	44.49	1467.3	186.39	182.6
18.60	38.819	1.352	42.127	44.56	1479.8	189.14	184.1
18.65	40.948	1.364	43.010	44.64	1492.3	191.97	185.6
18.70	43.120	1.375	43.905	44.71	1504.9	194.86	187.1
18.75	45.338	1.387	44.813	44.79	1517.5	197.83	188.7
18.80	47.602	1.399	45.733	44.86	1530.2	200.87	190.2
18.85	49.912	1.411	46.666	44.94	1543.0	204.00	191.8
18.90	52.269	1.422	47.612	45.01	1555.8	207.20	193.4
18.95	54.673	1.434	48.570	45.09	1568.6	210.49	195.0
19.00	57.126	1.446	49.542	45.16	1581.5	213.87	196.7
19.05	59.628	1.459	50.528	45.24	1594.5	217.35	198.3
19.10	62.179	1.471	51.527	45.31	1607.5		200.0
19.15	64.781	1.483	52.540	45.39	1620.5		201.7
19.20	67.433	1.495	53.566	45.46	1633.7		203.4

ETHANE ISOTHERM AT T = 210.00 K
Second virial coefficient is -381.0 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
0.10	0.168	0.8642E-03	1.613	35.25	261.6	6.69	11.7
0.15	0.247	0.1324E-02	1.546	35.49	258.3	6.71	11.9
0.20	0.323	0.1808E-02	1.477	35.85	255.0	6.73	12.1
0.208	0.334	0.1886E-02	1.466	35.93	254.5	6.73	12.1
16.972	0.334	0.9887	21.074	43.27	1117.4	123.12	143.4
17.00	0.926	0.9941	21.392	43.30	1123.8	123.93	144.0
17.05	2.010	1.004	21.969	43.35	1135.4	125.39	145.1
17.10	3.123	1.014	22.554	43.40	1147.0	126.88	146.2
17.15	4.265	1.024	23.146	43.46	1158.6	128.39	147.4
17.20	5.438	1.033	23.747	43.51	1170.1	129.93	148.5
17.25	6.640	1.043	24.356	43.57	1181.7	131.50	149.7
17.30	7.873	1.053	24.973	43.62	1193.3	133.11	150.8
17.35	9.138	1.063	25.599	43.68	1204.9	134.74	152.0
17.40	10.433	1.073	26.233	43.74	1216.5	136.40	153.2
17.45	11.761	1.083	26.876	43.80	1228.1	138.10	154.4
17.50	13.121	1.093	27.528	43.86	1239.8	139.82	155.6
17.55	14.514	1.104	28.189	43.92	1251.4	141.59	156.9
17.60	15.940	1.114	28.860	43.98	1263.1	143.38	158.1
17.65	17.400	1.124	29.539	44.05	1274.8	145.22	159.4

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 210.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
17.70	18.894	1.134	30.228	44.11	1286.6	147.09	160.6
17.75	20.423	1.144	30.927	44.17	1298.3	149.00	161.9
17.80	21.987	1.155	31.635	44.24	1310.1	150.95	163.2
17.85	23.587	1.165	32.353	44.30	1322.0	152.94	164.5
17.90	25.223	1.176	33.081	44.37	1333.8	154.97	165.9
17.95	26.895	1.186	33.820	44.43	1345.7	157.04	167.2
18.00	28.605	1.197	34.568	44.50	1357.6	159.16	168.6
18.05	30.352	1.207	35.328	44.57	1369.6	161.33	169.9
18.10	32.138	1.218	36.097	44.63	1381.6	163.55	171.3
18.15	33.962	1.229	36.878	44.70	1393.6	165.81	172.7
18.20	35.826	1.239	37.669	44.77	1405.7	168.13	174.1
18.25	37.729	1.250	38.472	44.84	1417.9	170.49	175.5
18.30	39.673	1.261	39.285	44.91	1430.0	172.92	177.0
18.35	41.658	1.272	40.110	44.97	1442.3	175.40	178.4
18.40	43.684	1.283	40.947	45.04	1454.5	177.93	179.9
18.45	45.753	1.294	41.795	45.11	1466.9	180.53	181.4
18.50	47.864	1.305	42.656	45.18	1479.2	183.19	182.9
18.55	50.019	1.317	43.528	45.25	1491.7	185.92	184.4
18.60	52.217	1.328	44.412	45.32	1504.1	188.71	185.9
18.65	54.460	1.339	45.309	45.39	1516.7	191.58	187.5
18.70	56.748	1.351	46.218	45.46	1529.2	194.52	189.0
18.75	59.082	1.362	47.139	45.53	1541.9	197.53	190.6
18.80	61.462	1.374	48.074	45.60	1554.5		192.2
18.85	63.890	1.385	49.021	45.67	1567.3		193.8
18.90	66.365	1.397	49.981	45.74	1580.1		195.5
18.95	68.888	1.409	50.955	45.81	1592.9		197.1

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 220.00 K
Second virial coefficient is -346.5 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.177	0.8618E-03	1.703	36.24	267.6	7.01	12.6
0.15	0.260	0.1317E-02	1.639	36.54	264.5	7.03	12.8
0.20	0.341	0.1792E-02	1.575	36.91	261.3	7.05	12.9
0.25	0.418	0.2289E-02	1.511	37.38	258.2	7.07	13.1
0.30	0.492	0.2813E-02	1.445	37.98	255.0	7.09	13.3
0.301	0.492	0.2819E-02	1.445	37.99	254.9	7.09	13.3
16.498	0.492	0.8877	17.889	43.71	1039.0	109.90	134.5
16.50	0.526	0.8880	17.908	43.71	1039.4	109.94	134.5
16.55	1.434	0.8972	18.414	43.75	1050.6	111.18	135.5
16.60	2.368	0.9063	18.928	43.79	1061.8	112.44	136.6
16.65	3.327	0.9155	19.449	43.84	1073.0	113.72	137.6
16.70	4.313	0.9246	19.978	43.88	1084.2	115.02	138.6
16.75	5.325	0.9339	20.513	43.93	1095.4	116.34	139.7
16.80	6.364	0.9431	21.057	43.97	1106.6	117.69	140.8
16.85	7.431	0.9524	21.608	44.02	1117.8	119.06	141.8
16.90	8.525	0.9617	22.166	44.07	1129.0	120.46	142.9
16.95	9.647	0.9710	22.733	44.12	1140.3	121.88	144.0
17.00	10.798	0.9804	23.308	44.17	1151.5	123.32	145.2
17.05	11.978	0.9898	23.890	44.22	1162.8	124.80	146.3
17.10	13.188	0.9992	24.481	44.28	1174.0	126.30	147.4
17.15	14.427	1.009	25.080	44.33	1185.3	127.82	148.6
17.20	15.696	1.018	25.688	44.38	1196.6	129.38	149.7
17.25	16.996	1.028	26.304	44.44	1208.0	130.96	150.9
17.30	18.326	1.037	26.929	44.50	1219.3	132.58	152.1
17.35	19.689	1.047	27.562	44.55	1230.7	134.23	153.3
17.40	21.083	1.057	28.205	44.61	1242.1	135.91	154.5
17.45	22.509	1.066	28.857	44.67	1253.6	137.62	155.8
17.50	23.969	1.076	29.518	44.73	1265.0	139.36	157.0
17.55	25.461	1.086	30.188	44.79	1276.5	141.14	158.3
17.60	26.987	1.096	30.867	44.85	1288.1	142.96	159.5
17.65	28.548	1.106	31.557	44.91	1299.6	144.82	160.8
17.70	30.143	1.116	32.256	44.97	1311.2	146.71	162.1
17.75	31.774	1.126	32.965	45.03	1322.9	148.64	163.4
17.80	33.440	1.136	33.684	45.09	1334.6	150.61	164.7
17.85	35.142	1.146	34.413	45.15	1346.3	152.63	166.1
17.90	36.881	1.156	35.152	45.22	1358.1	154.68	167.4
17.95	38.658	1.167	35.902	45.28	1369.9	156.78	168.8
18.00	40.472	1.177	36.662	45.34	1381.7	158.93	170.1
18.05	42.324	1.187	37.433	45.41	1393.7	161.13	171.5
18.10	44.215	1.198	38.215	45.47	1405.6	163.37	172.9

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 220.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
18.15	46.146	1.208	39.008	45.53	1417.6	165.67	174.4
18.20	48.116	1.219	39.812	45.60	1429.6	168.02	175.8
18.25	50.127	1.230	40.628	45.66	1441.7	170.42	177.3
18.30	52.179	1.240	41.454	45.72	1453.9	172.88	178.7
18.35	54.273	1.251	42.293	45.79	1466.1	175.39	180.2
18.40	56.409	1.262	43.143	45.85	1478.3	177.97	181.7
18.45	58.587	1.273	44.005	45.92	1490.7	180.61	183.2
18.50	60.809	1.284	44.879	45.98	1503.0		184.7
18.55	63.075	1.295	45.766	46.05	1515.4		186.3
18.60	65.386	1.306	46.664	46.11	1527.9		187.8
18.65	67.742	1.318	47.575	46.18	1540.4		189.4

ETHANE ISOTHERM AT T = 240.00 K
Second virial coefficient is -290.1 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.194	0.8569E-03	1.880	38.12	279.1	7.63	14.5
0.20	0.376	0.1767E-02	1.766	38.68	273.6	7.67	14.8
0.30	0.547	0.2735E-02	1.652	39.35	268.0	7.72	15.1
0.40	0.707	0.3772E-02	1.539	40.17	262.4	7.78	15.5
0.50	0.855	0.4888E-02	1.425	41.20	256.7	7.83	15.9
0.582	0.967	0.5870E-02	1.331	42.24	252.0	7.88	16.2
15.466	0.967	0.7015	12.202	44.93	878.2	87.65	117.4
15.50	1.381	0.7068	12.458	44.94	885.2	88.26	117.9
15.60	2.666	0.7224	13.237	44.97	906.0	90.10	119.6
15.70	4.029	0.7381	14.040	45.02	926.7	92.00	121.4
15.80	5.475	0.7539	14.867	45.07	947.4	93.95	123.1
15.90	7.004	0.7699	15.720	45.12	968.2	95.97	125.0
16.00	8.619	0.7859	16.598	45.19	989.0	98.05	126.8
16.10	10.324	0.8021	17.503	45.25	1009.9	100.20	128.7
16.20	12.121	0.8184	18.434	45.33	1030.7	102.42	130.6
16.30	14.012	0.8349	19.394	45.40	1051.7	104.71	132.6
16.40	16.001	0.8514	20.381	45.49	1072.7	107.08	134.6
16.50	18.089	0.8682	21.398	45.57	1093.9	109.53	136.7
16.60	20.281	0.8851	22.445	45.66	1115.1	112.07	138.8
16.70	22.579	0.9022	23.523	45.75	1136.4	114.70	141.0
16.80	24.987	0.9195	24.633	45.85	1157.8	117.42	143.2
16.90	27.507	0.9369	25.775	45.95	1179.4	120.24	145.4

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 240.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
17.00	30.143	0.9545	26.950	46.04	1201.1	123.16	147.7
17.10	32.898	0.9724	28.159	46.15	1223.0	126.20	150.0
17.20	35.776	0.9904	29.404	46.25	1245.0	129.35	152.4
17.30	38.780	1.009	30.685	46.36	1267.2	132.63	154.9
17.40	41.914	1.027	32.003	46.46	1289.6	136.04	157.4
17.50	45.182	1.046	33.360	46.57	1312.1	139.59	159.9
17.60	48.588	1.065	34.755	46.68	1334.9	143.28	162.5
17.70	52.134	1.084	36.191	46.79	1357.8	147.13	165.2
17.80	55.827	1.104	37.668	46.90	1380.9	151.14	167.9
17.90	59.669	1.123	39.187	47.01	1404.3	155.34	170.6
18.00	63.666	1.143	40.750	47.12	1427.8		173.5
18.10	67.821	1.164	42.357	47.24	1451.6		176.4

ETHANE ISOTHERM AT T = 260.00 K
Second virial coefficient is -246.2 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
0.10	0.211	0.8531E-03	2.056	40.14	289.9	8.24	16.6
0.20	0.411	0.1750E-02	1.952	40.58	285.0	8.29	16.9
0.30	0.601	0.2692E-02	1.848	41.05	280.1	8.35	17.2
0.40	0.781	0.3682E-02	1.747	41.56	275.2	8.40	17.5
0.50	0.951	0.4722E-02	1.646	42.12	270.3	8.47	17.8
0.60	1.110	0.5816E-02	1.547	42.75	265.4	8.53	18.1
0.70	1.260	0.6967E-02	1.448	43.46	260.5	8.60	18.5
0.80	1.400	0.8181E-02	1.351	44.26	255.7	8.68	18.9
0.90	1.530	0.9462E-02	1.255	45.17	250.8	8.75	19.3
1.00	1.651	0.1082E-01	1.160	46.18	245.9	8.83	19.8
1.054	1.713	0.1159E-01	1.108	46.79	243.3	8.88	20.1
14.267	1.713	0.5317	7.370	46.65	708.9	69.27	101.2
14.30	1.957	0.5358	7.544	46.64	715.0	69.70	101.6
14.40	2.738	0.5487	8.087	46.62	733.6	71.03	103.0
14.50	3.575	0.5617	8.651	46.61	752.4	72.40	104.3
14.60	4.469	0.5747	9.233	46.60	771.1	73.80	105.7
14.70	5.422	0.5879	9.836	46.61	789.9	75.24	107.2
14.80	6.437	0.6013	10.460	46.62	808.7	76.72	108.6
14.90	7.515	0.6147	11.104	46.63	827.5	78.24	110.1
15.00	8.658	0.6283	11.769	46.66	846.5	79.81	111.7

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 260.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
15.10	9.869	0.6420	12.457	46.69	865.4	81.42	113.2
15.20	11.150	0.6558	13.166	46.73	884.5	83.08	114.8
15.30	12.503	0.6697	13.899	46.77	903.6	84.79	116.5
15.40	13.931	0.6838	14.654	46.82	922.8	86.54	118.2
15.50	15.435	0.6980	15.434	46.87	942.0	88.36	119.9
15.60	17.019	0.7124	16.238	46.93	961.4	90.22	121.6
15.70	18.684	0.7269	17.067	46.99	980.8	92.15	123.4
15.80	20.433	0.7416	17.921	47.05	1000.4	94.14	125.2
15.90	22.269	0.7565	18.802	47.12	1020.1	96.19	127.1
16.00	24.194	0.7715	19.710	47.19	1039.9	98.31	129.0
16.10	26.212	0.7866	20.645	47.27	1059.8	100.49	131.0
16.20	28.324	0.8020	21.609	47.35	1079.9	102.75	133.0
16.30	30.534	0.8175	22.601	47.43	1100.1	105.09	135.0
16.40	32.845	0.8333	23.624	47.51	1120.5	107.51	137.1
16.50	35.260	0.8492	24.677	47.60	1141.0	110.02	139.2
16.60	37.782	0.8653	25.762	47.69	1161.6	112.61	141.4
16.70	40.414	0.8816	26.879	47.77	1182.5	115.30	143.6
16.80	43.159	0.8982	28.029	47.86	1203.5	118.08	145.8
16.90	46.020	0.9150	29.213	47.96	1224.7	120.97	148.1
17.00	49.002	0.9320	30.432	48.05	1246.1	123.97	150.5
17.10	52.108	0.9492	31.686	48.14	1267.7	127.09	152.9
17.20	55.341	0.9667	32.978	48.24	1289.5	130.33	155.4
17.30	58.705	0.9844	34.307	48.34	1311.5	133.70	157.9
17.40	62.203	1.002	35.674	48.43	1333.8		160.4
17.50	65.841	1.021	37.081	48.53	1356.2		163.0
17.60	69.621	1.039	38.529	48.63	1378.8		165.7

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 273.15 K
Second virial coefficient is -222.5 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.222	0.8511E-03	2.171	41.56	296.7	8.64	18.1
0.20	0.434	0.1742E-02	2.072	41.93	292.1	8.69	18.3
0.30	0.637	0.2673E-02	1.974	42.32	287.6	8.75	18.6
0.40	0.829	0.3645E-02	1.879	42.73	283.1	8.81	18.9
0.50	1.012	0.4659E-02	1.784	43.16	278.6	8.88	19.2
0.60	1.186	0.5716E-02	1.691	43.62	274.1	8.94	19.5
0.70	1.351	0.6818E-02	1.600	44.11	269.7	9.02	19.9
0.80	1.506	0.7965E-02	1.510	44.64	265.3	9.09	20.2
0.90	1.653	0.9161E-02	1.421	45.22	260.9	9.17	20.6
1.00	1.790	0.1041E-01	1.334	45.83	256.6	9.26	21.0
1.10	1.919	0.1170E-01	1.248	46.50	252.3	9.34	21.4
1.20	2.040	0.1306E-01	1.164	47.23	248.0	9.44	21.9
1.30	2.152	0.1447E-01	1.081	48.02	243.7	9.53	22.4
1.40	2.256	0.1594E-01	1.000	48.87	239.5	9.63	22.9
1.50	2.352	0.1748E-01	0.920	49.80	235.3	9.73	23.5
1.539	2.387	0.1810E-01	0.889	50.18	233.6	9.77	23.7
13.321	2.387	0.4253	4.641	48.17	588.7	58.45	90.9
13.40	2.766	0.4339	4.946	48.11	602.0	59.27	91.7
13.50	3.280	0.4448	5.348	48.05	618.9	60.34	92.8
13.60	3.836	0.4559	5.766	47.99	635.9	61.43	94.0
13.70	4.434	0.4671	6.200	47.94	653.0	62.55	95.1
13.80	5.076	0.4784	6.651	47.91	670.1	63.70	96.3
13.90	5.765	0.4898	7.119	47.88	687.3	64.87	97.5
14.00	6.501	0.5014	7.605	47.85	704.6	66.08	98.8
14.10	7.286	0.5131	8.109	47.84	721.9	67.31	100.1
14.20	8.123	0.5249	8.632	47.83	739.3	68.58	101.4
14.30	9.013	0.5369	9.173	47.83	756.8	69.89	102.7
14.40	9.958	0.5490	9.733	47.84	774.4	71.23	104.1
14.50	10.960	0.5612	10.312	47.85	792.0	72.60	105.5
14.60	12.021	0.5736	10.911	47.87	809.8	74.01	106.9
14.70	13.143	0.5860	11.531	47.89	827.6	75.46	108.4
14.80	14.328	0.5987	12.172	47.92	845.5	76.96	109.9
14.90	15.578	0.6114	12.833	47.96	863.6	78.49	111.4
15.00	16.896	0.6243	13.516	48.00	881.7	80.07	113.0
15.10	18.282	0.6374	14.222	48.04	899.9	81.70	114.6
15.20	19.741	0.6506	14.950	48.09	918.3	83.37	116.2
15.30	21.273	0.6639	15.702	48.14	936.8	85.10	117.9
15.40	22.882	0.6774	16.477	48.20	955.3	86.87	119.6
15.50	24.569	0.6911	17.277	48.26	974.1	88.71	121.3
15.60	26.338	0.7050	18.101	48.32	992.9	90.59	123.1

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 273.15 K (continued)
Second virial coefficient is -222.5 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
15.70	28.190	0.7190	18.952	48.38	1011.9	92.54	124.9
15.80	30.129	0.7331	19.828	48.45	1031.0	94.56	126.8
15.90	32.157	0.7475	20.732	48.52	1050.3	96.63	128.7
16.00	34.276	0.7621	21.663	48.60	1069.8	98.78	130.6
16.10	36.490	0.7768	22.623	48.67	1089.4	101.00	132.6
16.20	38.802	0.7917	23.611	48.75	1109.2	103.29	134.6
16.30	41.214	0.8069	24.630	48.83	1129.1	105.66	136.7
16.40	43.729	0.8222	25.679	48.91	1149.2	108.12	138.8
16.50	46.351	0.8378	26.760	48.99	1169.6	110.66	141.0
16.60	49.082	0.8535	27.873	49.08	1190.1	113.30	143.2
16.70	51.926	0.8695	29.019	49.16	1210.8	116.03	145.4
16.80	54.887	0.8858	30.199	49.25	1231.7	118.86	147.7
16.90	57.967	0.9022	31.413	49.34	1252.8	121.80	150.1
17.00	61.171	0.9190	32.664	49.43	1274.1		152.5
17.10	64.501	0.9359	33.951	49.52	1295.6		154.9
17.20	67.962	0.9531	35.275	49.60	1317.4		157.4

ETHANE ISOTHERM AT T = 280.00 K
Second virial coefficient is -211.4 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.228	0.8502E-03	2.230	42.32	300.1	8.85	18.9
0.20	0.446	0.1738E-02	2.134	42.67	295.7	8.90	19.1
0.30	0.655	0.2664E-02	2.039	43.02	291.4	8.96	19.4
0.40	0.854	0.3629E-02	1.946	43.39	287.0	9.02	19.7
0.50	1.044	0.4633E-02	1.855	43.78	282.7	9.09	20.0
0.60	1.225	0.5676E-02	1.765	44.18	278.5	9.16	20.3
0.70	1.397	0.6760E-02	1.676	44.60	274.2	9.23	20.6
0.80	1.560	0.7886E-02	1.589	45.05	270.0	9.31	20.9
0.90	1.715	0.9053E-02	1.504	45.53	265.9	9.39	21.3
1.00	1.861	0.1026E-01	1.420	46.03	261.8	9.47	21.7
1.10	1.999	0.1152E-01	1.337	46.57	257.7	9.56	22.1
1.20	2.129	0.1282E-01	1.257	47.14	253.7	9.66	22.5
1.30	2.250	0.1417E-01	1.178	47.74	249.7	9.75	23.0
1.40	2.364	0.1557E-01	1.100	48.39	245.7	9.85	23.5
1.50	2.470	0.1701E-01	1.024	49.09	241.8	9.95	24.0

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 280.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
1.60	2.569	0.1852E-01	0.949	49.83	237.9	10.06	24.5
1.70	2.660	0.2007E-01	0.876	50.63	234.0	10.17	25.2
1.80	2.744	0.2169E-01	0.804	51.48	230.2	10.29	25.8
1.882	2.808	0.2305E-01	0.747	52.22	227.2	10.38	26.4
12.742	2.808	0.3699	3.361	49.18	520.9	52.96	85.5
12.80	3.008	0.3756	3.540	49.12	530.1	53.49	86.1
12.90	3.378	0.3855	3.860	49.01	545.9	54.42	87.0
13.00	3.781	0.3954	4.194	48.92	561.8	55.37	88.0
13.10	4.217	0.4055	4.543	48.84	577.7	56.34	89.0
13.20	4.690	0.4157	4.906	48.77	593.8	57.33	90.1
13.30	5.199	0.4261	5.285	48.71	609.9	58.35	91.1
13.40	5.747	0.4365	5.679	48.65	626.1	59.39	92.2
13.50	6.335	0.4471	6.089	48.61	642.3	60.46	93.4
13.60	6.965	0.4578	6.516	48.57	658.7	61.56	94.5
13.70	7.639	0.4686	6.959	48.54	675.2	62.68	95.7
13.80	8.358	0.4796	7.419	48.52	691.8	63.83	96.9
13.90	9.123	0.4907	7.896	48.51	708.4	65.01	98.1
14.00	9.938	0.5020	8.391	48.50	725.2	66.22	99.4
14.10	10.802	0.5133	8.904	48.50	742.0	67.46	100.7
14.20	11.719	0.5248	9.435	48.50	759.0	68.73	102.0
14.30	12.690	0.5365	9.985	48.51	776.0	70.04	103.4
14.40	13.717	0.5483	10.554	48.53	793.2	71.38	104.8
14.50	14.801	0.5602	11.143	48.55	810.4	72.76	106.2
14.60	15.946	0.5722	11.752	48.57	827.8	74.18	107.6
14.70	17.152	0.5844	12.381	48.61	845.3	75.64	109.1
14.80	18.423	0.5967	13.031	48.64	862.9	77.14	110.6
14.90	19.759	0.6092	13.703	48.68	880.6	78.68	112.1
15.00	21.164	0.6219	14.396	48.73	898.4	80.27	113.7
15.10	22.639	0.6347	15.112	48.78	916.4	81.91	115.3
15.20	24.187	0.6476	15.851	48.83	934.5	83.59	117.0
15.30	25.810	0.6607	16.613	48.88	952.7	85.32	118.7
15.40	27.511	0.6740	17.400	48.94	971.1	87.11	120.4
15.50	29.291	0.6874	18.211	49.00	989.6	88.95	122.2
15.60	31.154	0.7010	19.047	49.07	1008.3	90.86	123.9
15.70	33.101	0.7148	19.910	49.13	1027.1	92.82	125.8
15.80	35.136	0.7288	20.799	49.20	1046.1	94.84	127.7
15.90	37.262	0.7430	21.715	49.27	1065.3	96.94	129.6
16.00	39.480	0.7573	22.659	49.35	1084.6	99.10	131.5
16.10	41.795	0.7719	23.632	49.42	1104.1	101.33	133.5
16.20	44.208	0.7866	24.635	49.50	1123.7	103.64	135.6

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 280.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
16.30	46.723	0.8016	25.668	49.58	1143.6	106.04	137.6
16.40	49.342	0.8168	26.732	49.66	1163.7	108.51	139.8
16.50	52.070	0.8322	27.828	49.74	1183.9	111.08	141.9
16.60	54.909	0.8478	28.956	49.82	1204.4	113.73	144.2
16.70	57.862	0.8637	30.118	49.90	1225.0	116.49	146.4
16.80	60.934	0.8798	31.314	49.99	1245.9		148.7
16.90	64.126	0.8961	32.546	50.07	1267.0		151.1
17.00	67.444	0.9127	33.813	50.16	1288.3		153.5

ETHANE ISOTHERM AT T = 298.15 K
Second virial coefficient is -185.5 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.243	0.8483E-03	2.388	44.43	309.0	9.39	21.1
0.20	0.478	0.1730E-02	2.298	44.71	305.0	9.44	21.4
0.30	0.703	0.2646E-02	2.210	44.99	301.1	9.51	21.6
0.40	0.920	0.3596E-02	2.123	45.28	297.2	9.57	21.9
0.50	1.128	0.4579E-02	2.038	45.58	293.3	9.64	22.1
0.60	1.327	0.5596E-02	1.955	45.88	289.5	9.71	22.4
0.70	1.519	0.6647E-02	1.873	46.19	285.7	9.79	22.7
0.80	1.702	0.7732E-02	1.793	46.51	282.0	9.87	23.0
0.90	1.877	0.8850E-02	1.714	46.84	278.3	9.96	23.3
1.00	2.045	0.1000E-01	1.637	47.17	274.7	10.04	23.7
1.10	2.205	0.1119E-01	1.562	47.51	271.2	10.13	24.0
1.20	2.357	0.1241E-01	1.488	47.87	267.6	10.23	24.4
1.30	2.502	0.1366E-01	1.416	48.23	264.2	10.33	24.8
1.40	2.640	0.1495E-01	1.346	48.60	260.8	10.43	25.2
1.50	2.772	0.1627E-01	1.277	48.99	257.4	10.54	25.6
1.60	2.896	0.1762E-01	1.210	49.39	254.1	10.64	26.1
1.70	3.014	0.1901E-01	1.145	49.80	250.9	10.76	26.5
1.80	3.125	0.2043E-01	1.081	50.23	247.7	10.87	27.0
1.90	3.230	0.2188E-01	1.019	50.67	244.6	10.99	27.5
2.00	3.329	0.2337E-01	0.959	51.13	241.6	11.12	28.1
2.10	3.422	0.2489E-01	0.900	51.60	238.6	11.24	28.7
2.20	3.509	0.2645E-01	0.843	52.09	235.7	11.37	29.3
2.30	3.590	0.2803E-01	0.787	52.60	232.8	11.51	29.9
2.40	3.666	0.2965E-01	0.734	53.12	230.0	11.65	30.6
2.50	3.737	0.3131E-01	0.682	53.67	227.3	11.79	31.4

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 298.15 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
2.60	3.803	0.3299E-01	0.631	54.23	224.6	11.93	32.2
2.70	3.863	0.3471E-01	0.583	54.81	222.0	12.08	33.0
2.80	3.919	0.3646E-01	0.536	55.42	219.5	12.23	33.9
2.90	3.971	0.3824E-01	0.491	56.04	217.0	12.39	34.8
3.00	4.018	0.4006E-01	0.447	56.69	214.6	12.55	35.9
3.10	4.060	0.4190E-01	0.405	57.36	212.2	12.71	37.0
3.20	4.099	0.4377E-01	0.365	58.05	210.0	12.87	38.2
3.30	4.133	0.4567E-01	0.326	58.77	207.8	13.04	39.5
3.40	4.164	0.4759E-01	0.290	59.50	205.6	13.22	41.0
3.496	4.190	0.4946E-01	0.256	60.23	203.6	13.39	42.5
10.468	4.190	0.2084	0.626	54.94	303.9	36.98	71.9
10.50	4.211	0.2104	0.655	54.79	307.4	37.17	72.0
10.60	4.281	0.2167	0.750	54.36	318.1	37.75	72.1
10.70	4.361	0.2231	0.852	53.97	328.9	38.34	72.4
10.80	4.452	0.2296	0.962	53.62	339.9	38.94	72.7
10.90	4.554	0.2361	1.079	53.29	351.0	39.56	73.1
11.00	4.668	0.2428	1.205	52.99	362.3	40.18	73.6
11.10	4.795	0.2496	1.338	52.72	373.7	40.82	74.1
11.20	4.936	0.2565	1.481	52.47	385.2	41.47	74.6
11.30	5.091	0.2635	1.632	52.24	396.9	42.13	75.2
11.40	5.263	0.2706	1.794	52.04	408.7	42.80	75.8
11.50	5.450	0.2779	1.965	51.85	420.7	43.49	76.5
11.60	5.656	0.2852	2.146	51.68	432.8	44.20	77.2
11.70	5.880	0.2927	2.338	51.52	445.2	44.91	77.9
11.80	6.124	0.3003	2.540	51.38	457.7	45.65	78.6
11.90	6.388	0.3080	2.754	51.25	470.3	46.40	79.4
12.00	6.675	0.3158	2.980	51.13	483.2	47.16	80.2
12.10	6.985	0.3238	3.217	51.02	496.2	47.94	81.0
12.20	7.319	0.3319	3.467	50.92	509.3	48.74	81.8
12.30	7.679	0.3401	3.729	50.83	522.7	49.55	82.7
12.40	8.065	0.3485	4.004	50.75	536.2	50.38	83.6
12.50	8.480	0.3570	4.292	50.68	549.8	51.23	84.5
12.60	8.924	0.3657	4.593	50.61	563.7	52.10	85.5
12.70	9.399	0.3744	4.908	50.55	577.7	52.99	86.4
12.80	9.906	0.3833	5.237	50.50	591.8	53.91	87.4
12.90	10.447	0.3924	5.580	50.46	606.1	54.84	88.4
13.00	11.022	0.4016	5.937	50.42	620.5	55.79	89.4
13.10	11.635	0.4109	6.310	50.39	635.1	56.77	90.5
13.20	12.285	0.4203	6.697	50.37	649.9	57.77	91.6
13.30	12.975	0.4299	7.100	50.35	664.7	58.79	92.7

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 298.15 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
13.40	13.705	0.4397	7.518	50.34	679.8	59.84	93.8
13.50	14.479	0.4495	7.953	50.33	694.9	60.92	95.0
13.60	15.296	0.4595	8.403	50.33	710.2	62.02	96.2
13.70	16.160	0.4697	8.871	50.33	725.6	63.15	97.4
13.80	17.071	0.4800	9.356	50.34	741.2	64.31	98.6
13.90	18.032	0.4904	9.858	50.35	756.9	65.50	99.9
14.00	19.043	0.5009	10.377	50.37	772.7	66.72	101.2
14.10	20.108	0.5116	10.916	50.39	788.7	67.98	102.5
14.20	21.227	0.5225	11.472	50.42	804.9	69.26	103.9
14.30	22.403	0.5335	12.048	50.45	821.1	70.59	105.3
14.40	23.637	0.5446	12.643	50.48	837.5	71.95	106.7
14.50	24.932	0.5559	13.258	50.52	854.1	73.34	108.1
14.60	26.290	0.5674	13.894	50.56	870.8	74.78	109.6
14.70	27.712	0.5790	14.551	50.60	887.6	76.26	111.1
14.80	29.200	0.5907	15.229	50.65	904.6	77.78	112.7
14.90	30.758	0.6026	15.929	50.70	921.8	79.34	114.3
15.00	32.387	0.6147	16.651	50.75	939.1	80.96	115.9
15.10	34.089	0.6270	17.397	50.80	956.6	82.62	117.5
15.20	35.867	0.6394	18.166	50.86	974.2	84.33	119.2
15.30	37.723	0.6520	18.959	50.92	992.0	86.09	120.9
15.40	39.660	0.6648	19.777	50.98	1010.0	87.91	122.7
15.50	41.679	0.6778	20.621	51.04	1028.2	89.78	124.5
15.60	43.785	0.6909	21.491	51.11	1046.5	91.72	126.3
15.70	45.979	0.7043	22.388	51.18	1065.1	93.72	128.2
15.80	48.263	0.7178	23.312	51.24	1083.8	95.78	130.1
15.90	50.642	0.7316	24.264	51.31	1102.7	97.92	132.0
16.00	53.117	0.7456	25.246	51.39	1121.8	100.12	134.0
16.10	55.692	0.7597	26.257	51.46	1141.2	102.41	136.1
16.20	58.369	0.7741	27.298	51.53	1160.7	104.77	138.1
16.30	61.153	0.7887	28.371	51.61	1180.4		140.3
16.40	64.045	0.8036	29.476	51.68	1200.4		142.4
16.50	67.049	0.8187	30.613	51.76	1220.5		144.6

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 300.00 K
Second virial coefficient is -183.1 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.245	0.8481E-03	2.404	44.65	309.9	9.44	21.3
0.20	0.481	0.1730E-02	2.315	44.92	305.9	9.50	21.6
0.30	0.708	0.2645E-02	2.227	45.20	302.0	9.56	21.8
0.40	0.926	0.3593E-02	2.141	45.49	298.2	9.63	22.1
0.50	1.136	0.4575E-02	2.057	45.78	294.3	9.70	22.4
0.60	1.338	0.5589E-02	1.974	46.07	290.6	9.77	22.6
0.70	1.531	0.6638E-02	1.893	46.37	286.8	9.85	22.9
0.80	1.716	0.7719E-02	1.813	46.68	283.2	9.93	23.2
0.90	1.894	0.8834E-02	1.735	47.00	279.6	10.01	23.5
1.00	2.063	0.9981E-02	1.659	47.32	276.0	10.10	23.9
1.10	2.225	0.1116E-01	1.584	47.65	272.5	10.19	24.2
1.20	2.380	0.1238E-01	1.511	47.99	269.0	10.29	24.6
1.30	2.528	0.1362E-01	1.440	48.34	265.6	10.39	25.0
1.40	2.668	0.1490E-01	1.370	48.70	262.2	10.49	25.4
1.50	2.802	0.1621E-01	1.302	49.07	258.9	10.59	25.8
1.60	2.928	0.1756E-01	1.235	49.45	255.7	10.70	26.2
1.70	3.049	0.1893E-01	1.171	49.84	252.5	10.82	26.7
1.80	3.163	0.2034E-01	1.107	50.24	249.4	10.93	27.2
1.90	3.270	0.2178E-01	1.046	50.66	246.3	11.05	27.7
2.00	3.372	0.2326E-01	0.986	51.08	243.3	11.18	28.2
2.10	3.468	0.2476E-01	0.928	51.53	240.4	11.30	28.8
2.20	3.558	0.2630E-01	0.872	51.99	237.5	11.43	29.4
2.30	3.642	0.2787E-01	0.817	52.46	234.7	11.57	30.0
2.40	3.721	0.2947E-01	0.764	52.95	232.0	11.71	30.7
2.50	3.795	0.3110E-01	0.712	53.45	229.3	11.85	31.4
2.60	3.864	0.3276E-01	0.663	53.97	226.7	11.99	32.1
2.70	3.927	0.3446E-01	0.615	54.51	224.2	12.14	32.9
2.80	3.987	0.3618E-01	0.568	55.06	221.7	12.29	33.8
2.90	4.041	0.3793E-01	0.524	55.63	219.3	12.45	34.7
3.00	4.091	0.3971E-01	0.480	56.23	216.9	12.61	35.6
3.10	4.137	0.4151E-01	0.439	56.83	214.7	12.77	36.6
3.20	4.179	0.4334E-01	0.399	57.46	212.5	12.94	37.7
3.30	4.217	0.4520E-01	0.361	58.11	210.3	13.11	38.9
3.40	4.252	0.4708E-01	0.325	58.77	208.2	13.28	40.2
3.50	4.282	0.4899E-01	0.291	59.45	206.2	13.46	41.6
3.60	4.310	0.5091E-01	0.258	60.15	204.3	13.64	43.2
3.70	4.334	0.5286E-01	0.226	60.87	202.4	13.82	44.9
3.80	4.355	0.5482E-01	0.197	61.61	200.6	14.01	46.8
3.808	4.357	0.5497E-01	0.194	61.67	200.5	14.02	46.9
10.084	4.357	0.1892	0.433	56.47	276.8	34.92	71.4

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 300.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
10.10	4.364	0.1901	0.444	56.39	278.3	35.00	71.3
10.20	4.412	0.1957	0.516	55.87	287.9	35.54	71.2
10.30	4.467	0.2014	0.594	55.39	297.7	36.09	71.2
10.40	4.531	0.2073	0.678	54.95	307.7	36.65	71.3
10.50	4.603	0.2133	0.769	54.54	317.8	37.22	71.5
10.60	4.684	0.2194	0.866	54.16	328.1	37.80	71.8
10.70	4.776	0.2256	0.970	53.82	338.6	38.39	72.2
10.80	4.879	0.2319	1.081	53.50	349.2	38.99	72.6
10.90	4.993	0.2383	1.201	53.21	359.9	39.60	73.0
11.00	5.119	0.2448	1.328	52.94	370.9	40.23	73.5
11.10	5.259	0.2515	1.464	52.70	381.9	40.86	74.1
11.20	5.412	0.2583	1.608	52.47	393.2	41.51	74.6
11.30	5.581	0.2652	1.762	52.27	404.6	42.18	75.2
11.40	5.765	0.2722	1.925	52.08	416.2	42.85	75.9
11.50	5.966	0.2793	2.098	51.91	427.9	43.54	76.6
11.60	6.185	0.2865	2.282	51.75	439.9	44.24	77.3
11.70	6.423	0.2939	2.476	51.61	452.0	44.96	78.0
11.80	6.680	0.3014	2.681	51.47	464.3	45.69	78.7
11.90	6.959	0.3090	2.897	51.35	476.8	46.44	79.5
12.00	7.260	0.3168	3.125	51.24	489.5	47.21	80.3
12.10	7.585	0.3247	3.365	51.14	502.4	47.99	81.1
12.20	7.934	0.3327	3.617	51.05	515.4	48.78	82.0
12.30	8.309	0.3409	3.882	50.97	528.6	49.60	82.8
12.40	8.711	0.3492	4.159	50.89	542.0	50.43	83.7
12.50	9.141	0.3577	4.450	50.83	555.6	51.28	84.7
12.60	9.601	0.3662	4.754	50.77	569.3	52.15	85.6
12.70	10.092	0.3749	5.071	50.72	583.2	53.04	86.6
12.80	10.616	0.3838	5.402	50.67	597.2	53.96	87.6
12.90	11.173	0.3928	5.748	50.63	611.4	54.89	88.6
13.00	11.766	0.4019	6.108	50.60	625.8	55.84	89.6
13.10	12.395	0.4112	6.483	50.57	640.3	56.82	90.7
13.20	13.063	0.4206	6.873	50.55	654.9	57.82	91.8
13.30	13.770	0.4301	7.278	50.54	669.7	58.85	92.9
13.40	14.519	0.4398	7.699	50.53	684.6	59.90	94.0
13.50	15.310	0.4496	8.136	50.52	699.7	60.97	95.2
13.60	16.147	0.4595	8.589	50.52	714.9	62.08	96.4
13.70	17.029	0.4696	9.059	50.53	730.3	63.21	97.6
13.80	17.959	0.4798	9.547	50.54	745.8	64.37	98.8
13.90	18.939	0.4902	10.051	50.55	761.4	65.56	100.1
14.00	19.970	0.5007	10.574	50.57	777.2	66.78	101.4

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 300.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
14.10	21.054	0.5113	11.114	50.59	793.1	68.04	102.7
14.20	22.193	0.5221	11.674	50.62	809.1	69.33	104.1
14.30	23.389	0.5331	12.252	50.65	825.3	70.65	105.5
14.40	24.644	0.5442	12.850	50.69	841.7	72.01	106.9
14.50	25.960	0.5554	13.468	50.72	858.2	73.41	108.4
14.60	27.339	0.5668	14.107	50.76	874.8	74.85	109.8
14.70	28.782	0.5784	14.766	50.81	891.6	76.33	111.4
14.80	30.293	0.5901	15.447	50.86	908.6	77.85	112.9
14.90	31.872	0.6019	16.150	50.91	925.7	79.42	114.5
15.00	33.524	0.6140	16.876	50.96	943.0	81.04	116.1
15.10	35.248	0.6262	17.625	51.01	960.4	82.70	117.8
15.20	37.049	0.6386	18.397	51.07	978.1	84.41	119.4
15.30	38.929	0.6511	19.194	51.13	995.8	86.18	121.2
15.40	40.889	0.6639	20.015	51.19	1013.8	88.00	122.9
15.50	42.932	0.6768	20.862	51.26	1032.0	89.88	124.7
15.60	45.062	0.6899	21.736	51.32	1050.3	91.82	126.5
15.70	47.281	0.7033	22.636	51.39	1068.8	93.82	128.4
15.80	49.590	0.7168	23.564	51.46	1087.5	95.89	130.3
15.90	51.994	0.7305	24.520	51.53	1106.4	98.03	132.3
16.00	54.495	0.7444	25.506	51.60	1125.5	100.24	134.3
16.10	57.096	0.7586	26.521	51.67	1144.8	102.53	136.3
16.20	59.801	0.7729	27.566	51.74	1164.3	104.89	138.4
16.30	62.611	0.7875	28.643	51.82	1184.1		140.5
16.40	65.530	0.8023	29.752	51.89	1204.0		142.7
16.50	68.562	0.8174	30.894	51.97	1224.2		144.9

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 305.33
Second virial coefficient is -176.5 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.249	0.8477E-03	2.450	45.29	312.4	9.60	22.0
0.20	0.490	0.1728E-02	2.362	45.55	308.5	9.66	22.3
0.30	0.722	0.2640E-02	2.277	45.81	304.8	9.72	22.5
0.40	0.945	0.3585E-02	2.192	46.08	301.0	9.79	22.8
0.50	1.160	0.4562E-02	2.110	46.35	297.3	9.86	23.0
0.60	1.367	0.5571E-02	2.029	46.62	293.7	9.93	23.3
0.70	1.566	0.6612E-02	1.949	46.90	290.1	10.01	23.6
0.80	1.757	0.7685E-02	1.871	47.19	286.5	10.09	23.9
0.90	1.941	0.8790E-02	1.795	47.48	283.0	10.18	24.2
1.00	2.116	0.9926E-02	1.720	47.77	279.6	10.27	24.5
1.10	2.285	0.1109E-01	1.647	48.07	276.2	10.36	24.8
1.20	2.446	0.1229E-01	1.576	48.38	272.8	10.45	25.2
1.30	2.600	0.1352E-01	1.506	48.69	269.6	10.55	25.6
1.40	2.747	0.1478E-01	1.438	49.01	266.3	10.66	26.0
1.50	2.888	0.1607E-01	1.372	49.33	263.2	10.76	26.4
1.60	3.022	0.1739E-01	1.307	49.67	260.1	10.87	26.8
1.70	3.149	0.1875E-01	1.244	50.01	257.0	10.99	27.2
1.80	3.270	0.2013E-01	1.183	50.35	254.0	11.10	27.7
1.90	3.386	0.2154E-01	1.123	50.71	251.1	11.22	28.2
2.00	3.495	0.2298E-01	1.065	51.07	248.3	11.35	28.7
2.10	3.599	0.2444E-01	1.008	51.45	245.5	11.47	29.2
2.20	3.697	0.2594E-01	0.953	51.83	242.8	11.61	29.7
2.30	3.789	0.2746E-01	0.900	52.22	240.1	11.74	30.3
2.40	3.877	0.2902E-01	0.849	52.62	237.5	11.88	30.9
2.50	3.959	0.3059E-01	0.799	53.03	235.0	12.02	31.5
2.60	4.037	0.3220E-01	0.750	53.45	232.6	12.17	32.2
2.70	4.109	0.3383E-01	0.704	53.88	230.2	12.31	32.9
2.80	4.177	0.3548E-01	0.659	54.32	227.9	12.47	33.6
2.90	4.241	0.3716E-01	0.615	54.77	225.6	12.62	34.4
3.00	4.301	0.3887E-01	0.574	55.23	223.5	12.78	35.2
3.10	4.356	0.4059E-01	0.534	55.71	221.4	12.94	36.0
3.20	4.407	0.4234E-01	0.495	56.19	219.3	13.11	36.9
3.30	4.455	0.4411E-01	0.458	56.68	217.4	13.28	37.9
3.40	4.499	0.4589E-01	0.423	57.18	215.5	13.45	38.9
3.50	4.540	0.4770E-01	0.390	57.70	213.6	13.63	39.9
3.60	4.577	0.4952E-01	0.358	58.22	211.9	13.81	41.0
3.70	4.611	0.5135E-01	0.327	58.75	210.2	14.00	42.2
3.80	4.643	0.5320E-01	0.298	59.29	208.5	14.18	43.4
3.90	4.671	0.5506E-01	0.271	59.83	207.0	14.38	44.7
4.00	4.697	0.5693E-01	0.245	60.39	205.5	14.57	46.1

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 305.33 (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
4.10	4.720	0.5880E-01	0.221	60.95	204.0	14.77	47.6
4.20	4.741	0.6068E-01	0.198	61.51	202.6	14.97	49.2
4.30	4.760	0.6257E-01	0.177	62.08	201.3	15.18	50.9
4.40	4.777	0.6445E-01	0.157	62.65	200.0	15.39	52.7
4.50	4.791	0.6633E-01	0.139	63.22	198.8	15.60	54.7
4.60	4.804	0.6820E-01	0.122	63.79	197.6	15.82	56.8
4.70	4.816	0.7007E-01	0.106	64.35	196.5	16.04	59.1
4.80	4.826	0.7192E-01	0.092	64.91	195.4	16.26	61.6
4.90	4.834	0.7376E-01	0.079	65.47	194.3	16.49	64.4
5.00	4.841	0.7557E-01	0.067	66.01	193.3	16.73	67.4
5.10	4.848	0.7737E-01	0.056	66.54	192.3	16.96	70.8
5.20	4.853	0.7914E-01	0.047	67.06	191.4	17.20	74.7
5.30	4.857	0.8089E-01	0.039	67.56	190.5	17.45	79.0
5.40	4.860	0.8260E-01	0.031	68.05	189.6	17.70	83.9
5.50	4.863	0.8429E-01	0.025	68.51	188.8	17.95	89.6
5.60	4.866	0.8594E-01	0.020	68.94	188.0	18.21	96.3
5.70	4.867	0.8755E-01	0.015	69.35	187.2	18.47	104.1
5.80	4.869	0.8912E-01	0.012	69.73	186.5	18.73	113.6
5.90	4.870	0.9066E-01	0.009	70.07	185.8	19.00	125.2
6.00	4.870	0.9216E-01	0.006	70.38	185.1	19.27	139.7
6.10	4.871	0.9363E-01	0.004	70.65	184.4	19.55	158.3
6.20	4.871	0.9505E-01	0.003	70.88	183.8	19.83	182.6
6.30	4.872	0.9645E-01	0.002	71.07	183.2	20.12	215.8
6.40	4.872	0.9782E-01	0.001	71.21	182.6	20.41	263.0
6.50	4.872	0.9916E-01	0.001	71.30	182.1	20.71	335.0
6.60	4.872	0.1005	0.000	71.35	181.6	21.01	457.6
6.70	4.872	0.1018	0.000	71.35	181.3	21.31	716.2
6.80	4.872	0.1031	0.000	71.30	180.9	21.62	1677.7
6.870	4.872	0.1040	0.000				
6.90	4.872	0.1044	0.000	71.20	180.7	21.93	3794.3
7.00	4.872	0.1057	0.000	71.04	180.5	22.25	912.1
7.10	4.872	0.1070	0.000	70.84	180.5	22.58	520.4
7.20	4.872	0.1084	0.000	70.59	180.6	22.91	360.3
7.30	4.872	0.1098	0.001	70.30	180.9	23.24	272.5
7.40	4.872	0.1113	0.002	69.96	181.3	23.58	217.5
7.50	4.872	0.1128	0.003	69.57	181.9	23.93	180.4
7.60	4.873	0.1144	0.004	69.14	182.7	24.28	154.3
7.70	4.873	0.1161	0.006	68.68	183.8	24.63	135.3
7.80	4.874	0.1178	0.009	68.18	185.2	24.99	121.2
7.90	4.875	0.1197	0.013	67.65	186.8	25.36	110.5

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 305.33 (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
8.00	4.876	0.1217	0.017	67.09	188.7	25.73	102.2
8.10	4.878	0.1239	0.024	66.51	191.0	26.11	95.7
8.20	4.881	0.1261	0.031	65.90	193.6	26.50	90.6
8.30	4.885	0.1285	0.041	65.28	196.6	26.89	86.5
8.40	4.889	0.1311	0.052	64.65	199.9	27.28	83.2
8.50	4.895	0.1338	0.065	64.02	203.6	27.69	80.4
8.60	4.902	0.1366	0.081	63.37	207.7	28.10	78.2
8.70	4.911	0.1397	0.099	62.73	212.2	28.52	76.3
8.80	4.922	0.1428	0.121	62.10	217.0	28.94	74.7
8.90	4.936	0.1462	0.145	61.47	222.2	29.37	73.5
9.00	4.951	0.1497	0.172	60.85	227.8	29.81	72.4
9.10	4.970	0.1534	0.203	60.25	233.7	30.25	71.5
9.20	4.992	0.1572	0.237	59.66	239.9	30.71	70.8
9.30	5.018	0.1611	0.274	59.09	246.4	31.17	70.2
9.40	5.047	0.1653	0.316	58.54	253.2	31.63	69.8
9.50	5.081	0.1695	0.362	58.01	260.3	32.11	69.5
9.60	5.120	0.1740	0.411	57.51	267.7	32.59	69.3
9.70	5.163	0.1785	0.465	57.03	275.3	33.09	69.2
9.80	5.213	0.1832	0.524	56.58	283.1	33.59	69.2
9.90	5.268	0.1880	0.587	56.15	291.1	34.10	69.2
10.00	5.330	0.1930	0.655	55.75	299.4	34.62	69.4
10.10	5.399	0.1981	0.729	55.37	307.9	35.15	69.6
10.20	5.476	0.2033	0.807	55.01	316.5	35.68	69.9
10.30	5.561	0.2086	0.892	54.68	325.4	36.23	70.2
10.40	5.655	0.2141	0.982	54.37	334.4	36.79	70.5
10.50	5.758	0.2197	1.079	54.08	343.6	37.36	71.0
10.60	5.871	0.2254	1.183	53.81	353.1	37.94	71.4
10.70	5.995	0.2313	1.293	53.57	362.7	38.53	71.9
10.80	6.130	0.2372	1.411	53.34	372.5	39.13	72.4
10.90	6.277	0.2433	1.537	53.12	382.6	39.74	72.9
11.00	6.437	0.2496	1.671	52.92	392.8	40.37	73.5
11.10	6.611	0.2559	1.813	52.74	403.3	41.00	74.1
11.20	6.800	0.2624	1.964	52.57	413.9	41.65	74.8
11.30	7.005	0.2690	2.125	52.42	424.8	42.31	75.4
11.40	7.225	0.2758	2.295	52.27	435.9	42.99	76.1
11.50	7.464	0.2827	2.475	52.14	447.2	43.68	76.8
11.60	7.721	0.2897	2.666	52.02	458.7	44.38	77.5
11.70	7.997	0.2969	2.867	51.90	470.4	45.10	78.3
11.80	8.295	0.3042	3.079	51.80	482.3	45.83	79.1
11.90	8.614	0.3116	3.303	51.70	494.5	46.58	79.9

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 305.33 (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
12.00	8.955	0.3192	3.538	51.61	506.8	47.35	80.7
12.10	9.321	0.3269	3.785	51.53	519.3	48.13	81.5
12.20	9.713	0.3348	4.044	51.46	532.0	48.93	82.4
12.30	10.131	0.3428	4.316	51.40	544.9	49.74	83.3
12.40	10.577	0.3509	4.601	51.34	558.0	50.58	84.2
12.50	11.051	0.3592	4.899	51.29	571.3	51.43	85.1
12.60	11.557	0.3676	5.210	51.24	584.8	52.30	86.1
12.70	12.094	0.3762	5.535	51.20	598.4	53.19	87.0
12.80	12.664	0.3848	5.873	51.17	612.1	54.10	88.0
12.90	13.269	0.3937	6.226	51.14	626.1	55.04	89.1
13.00	13.910	0.4026	6.594	51.12	640.2	56.00	90.1
13.10	14.588	0.4117	6.976	51.10	654.4	56.97	91.2
13.20	15.306	0.4210	7.373	51.09	668.8	57.98	92.3
13.30	16.063	0.4304	7.785	51.08	683.4	59.01	93.4
13.40	16.863	0.4399	8.214	51.08	698.1	60.06	94.6
13.50	17.707	0.4495	8.658	51.08	713.0	61.14	95.7
13.60	18.595	0.4593	9.119	51.09	728.0	62.24	96.9
13.70	19.531	0.4692	9.596	51.10	743.1	63.38	98.2
13.80	20.515	0.4793	10.091	51.11	758.4	64.54	99.4
13.90	21.550	0.4895	10.603	51.13	773.9	65.74	100.7
14.00	22.636	0.4999	11.133	51.16	789.5	66.97	102.0
14.10	23.777	0.5104	11.682	51.19	805.2	68.23	103.3
14.20	24.973	0.5210	12.249	51.22	821.1	69.52	104.7
14.30	26.227	0.5318	12.836	51.25	837.2	70.85	106.1
14.40	27.541	0.5428	13.442	51.29	853.4	72.22	107.5
14.50	28.916	0.5539	14.068	51.33	869.8	73.62	109.0
14.60	30.355	0.5652	14.715	51.37	886.3	75.07	110.5
14.70	31.860	0.5766	15.383	51.42	903.0	76.55	112.0
14.80	33.433	0.5882	16.072	51.47	919.8	78.08	113.6
14.90	35.075	0.5999	16.784	51.52	936.8	79.66	115.2
15.00	36.790	0.6118	17.519	51.57	954.0	81.28	116.8
15.10	38.580	0.6239	18.277	51.63	971.4	82.95	118.4
15.20	40.447	0.6362	19.059	51.69	988.9	84.67	120.1
15.30	42.392	0.6486	19.865	51.75	1006.6	86.45	121.9
15.40	44.420	0.6613	20.697	51.81	1024.5	88.28	123.6
15.50	46.533	0.6741	21.554	51.87	1042.6	90.17	125.4
15.60	48.732	0.6871	22.438	51.94	1060.9	92.12	127.3
15.70	51.021	0.7003	23.349	52.00	1079.4	94.13	129.2
15.80	53.403	0.7138	24.287	52.07	1098.0	96.21	131.1
15.90	55.880	0.7274	25.255	52.14	1116.9	98.36	133.1

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 305.33 (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
16.00	58.455	0.7412	26.251	52.21	1136.0	100.59	135.1
16.10	61.131	0.7553	27.278	52.28	1155.2		137.1
16.20	63.911	0.7696	28.336	52.35	1174.7		139.2
16.30	66.799	0.7841	29.425	52.42	1194.4		141.3
16.40	69.797	0.7988	30.546	52.50	1214.4		143.5

ETHANE ISOTHERM AT T = 320.00 K
Second virial coefficient is -159.8 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.262	0.8466E-03	2.576	47.08	319.2	10.03	24.0
0.20	0.515	0.1723E-02	2.494	47.31	315.6	10.09	24.2
0.40	0.998	0.3567E-02	2.333	47.76	308.7	10.22	24.7
0.60	1.449	0.5528E-02	2.178	48.21	301.9	10.37	25.2
0.80	1.869	0.7607E-02	2.029	48.68	295.4	10.54	25.7
1.00	2.261	0.9801E-02	1.887	49.15	289.1	10.71	26.3
1.20	2.625	0.1211E-01	1.752	49.63	283.0	10.91	27.0
1.40	2.962	0.1452E-01	1.622	50.12	277.1	11.11	27.7
1.60	3.274	0.1705E-01	1.499	50.61	271.5	11.33	28.4
1.80	3.562	0.1968E-01	1.383	51.11	266.2	11.56	29.2
2.00	3.828	0.2240E-01	1.273	51.62	261.1	11.81	30.1
2.20	4.072	0.2523E-01	1.169	52.13	256.3	12.07	31.0
2.40	4.296	0.2814E-01	1.071	52.65	251.8	12.35	32.0
2.60	4.501	0.3114E-01	0.980	53.18	247.6	12.64	33.0
2.80	4.688	0.3422E-01	0.894	53.70	243.6	12.94	34.1
3.00	4.859	0.3738E-01	0.815	54.24	239.9	13.26	35.3
3.20	5.014	0.4060E-01	0.742	54.77	236.6	13.59	36.5
3.40	5.156	0.4389E-01	0.675	55.30	233.5	13.93	37.8
3.60	5.285	0.4724E-01	0.613	55.83	230.7	14.29	39.2
3.80	5.402	0.5063E-01	0.558	56.36	228.2	14.66	40.6
4.00	5.508	0.5406E-01	0.507	56.88	225.9	15.05	42.1
4.20	5.605	0.5753E-01	0.462	57.38	223.9	15.45	43.6
4.40	5.693	0.6103E-01	0.421	57.87	222.2	15.87	45.1
4.60	5.774	0.6455E-01	0.386	58.34	220.8	16.30	46.7
4.80	5.848	0.6808E-01	0.355	58.78	219.6	16.74	48.3
5.00	5.916	0.7163E-01	0.328	59.19	218.7	17.20	49.8
5.20	5.979	0.7519E-01	0.306	59.57	218.0	17.68	51.3
5.40	6.039	0.7875E-01	0.287	59.90	217.6	18.17	52.8
5.60	6.094	0.8233E-01	0.272	60.18	217.4	18.68	54.2

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 320.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
5.80	6.148	0.8593E-01	0.260	60.40	217.5	19.20	55.5
6.00	6.199	0.8956E-01	0.252	60.56	218.0	19.74	56.7
6.20	6.249	0.9323E-01	0.247	60.67	218.8	20.30	57.8
6.40	6.298	0.9697E-01	0.245	60.70	220.0	20.88	58.7
6.60	6.347	0.1008	0.247	60.67	221.6	21.47	59.6
6.80	6.397	0.1047	0.252	60.57	223.7	22.08	60.3
7.00	6.448	0.1088	0.260	60.40	226.3	22.71	61.0
7.20	6.501	0.1131	0.273	60.17	229.5	23.36	61.5
7.40	6.557	0.1175	0.290	59.89	233.4	24.03	61.9
7.60	6.617	0.1222	0.313	59.56	238.0	24.72	62.3
7.80	6.683	0.1272	0.342	59.18	243.3	25.44	62.6
8.00	6.755	0.1325	0.378	58.78	249.5	26.17	62.9
8.20	6.835	0.1381	0.422	58.35	256.4	26.94	63.2
8.40	6.924	0.1440	0.475	57.91	264.2	27.72	63.4
8.60	7.025	0.1503	0.538	57.47	272.8	28.53	63.8
8.80	7.140	0.1569	0.612	57.03	282.3	29.37	64.2
9.00	7.271	0.1639	0.698	56.60	292.5	30.23	64.7
9.20	7.420	0.1713	0.797	56.18	303.6	31.13	65.3
9.40	7.591	0.1790	0.911	55.79	315.4	32.05	65.9
9.60	7.785	0.1872	1.041	55.42	328.1	33.01	66.7
9.80	8.008	0.1958	1.188	55.08	341.5	34.00	67.5
10.00	8.262	0.2048	1.355	54.76	355.7	35.03	68.4
10.20	8.551	0.2142	1.543	54.47	370.8	36.10	69.4
10.40	8.881	0.2242	1.755	54.20	386.8	37.20	70.5
10.60	9.255	0.2347	1.993	53.95	403.7	38.35	71.7
10.80	9.680	0.2457	2.261	53.73	421.5	39.54	72.9
11.00	10.162	0.2572	2.560	53.53	440.3	40.77	74.3
11.20	10.706	0.2693	2.895	53.36	460.0	42.06	75.6
11.40	11.322	0.2820	3.266	53.20	480.7	43.40	77.1
11.60	12.016	0.2952	3.679	53.06	502.2	44.80	78.6
11.80	12.796	0.3090	4.134	52.95	524.7	46.25	80.2
12.00	13.672	0.3234	4.634	52.85	548.0	47.77	81.9
12.20	14.653	0.3383	5.181	52.77	572.1	49.35	83.7
12.40	15.748	0.3537	5.778	52.71	597.0	51.01	85.6
12.60	16.968	0.3697	6.428	52.67	622.7	52.74	87.5
12.80	18.323	0.3863	7.131	52.65	649.0	54.56	89.5
13.00	19.824	0.4034	7.891	52.64	676.1	56.46	91.7
13.20	21.483	0.4210	8.711	52.65	703.8	58.46	93.9
13.40	23.312	0.4392	9.592	52.68	732.1	60.55	96.2
13.60	25.324	0.4579	10.539	52.71	761.1	62.76	98.6

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 320.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
13.80	27.532	0.4772	11.553	52.76	790.8	65.08	101.1
14.00	29.950	0.4971	12.638	52.83	821.1	67.53	103.8
14.20	32.592	0.5176	13.797	52.90	852.1	70.11	106.5
14.40	35.474	0.5387	15.035	52.99	883.8	72.83	109.4
14.60	38.612	0.5604	16.355	53.08	916.2	75.71	112.4
14.80	42.022	0.5829	17.762	53.18	949.2	78.77	115.5
15.00	45.723	0.6060	19.259	53.29	983.0	82.01	118.7
15.20	49.732	0.6298	20.852	53.40	1017.6	85.45	122.1
15.40	54.070	0.6544	22.545	53.53	1053.0	89.11	125.7
15.60	58.757	0.6797	24.344	53.65	1089.1	93.00	129.4
15.80	63.815	0.7059	26.255	53.78	1126.1		133.2
16.00	69.267	0.7330	28.282	53.91	1164.0		137.3

ETHANE ISOTHERM AT T = 340.00 K
Second virial coefficient is -140.1 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
0.10	0.279	0.8453E-03	2.748	49.59	328.2	10.60	26.8
0.20	0.550	0.1718E-02	2.671	49.78	325.0	10.67	27.0
0.40	1.069	0.3547E-02	2.522	50.14	318.7	10.81	27.4
0.60	1.559	0.5483E-02	2.378	50.51	312.7	10.96	27.9
0.80	2.021	0.7527E-02	2.241	50.88	306.9	11.13	28.4
1.00	2.456	0.9674E-02	2.110	51.25	301.3	11.31	29.0
1.20	2.865	0.1192E-01	1.984	51.62	296.0	11.51	29.6
1.40	3.250	0.1427E-01	1.865	52.00	290.9	11.72	30.2
1.60	3.612	0.1672E-01	1.753	52.36	286.1	11.94	30.9
1.80	3.951	0.1926E-01	1.646	52.73	281.5	12.18	31.6
2.00	4.270	0.2189E-01	1.545	53.09	277.3	12.43	32.3
2.20	4.569	0.2460E-01	1.450	53.45	273.2	12.70	33.1
2.40	4.850	0.2740E-01	1.360	53.80	269.5	12.98	34.0
2.60	5.114	0.3028E-01	1.277	54.15	266.0	13.27	34.9
2.80	5.362	0.3323E-01	1.199	54.48	262.9	13.57	35.8
3.00	5.594	0.3626E-01	1.127	54.81	260.0	13.89	36.7
3.20	5.813	0.3935E-01	1.060	55.13	257.4	14.22	37.7
3.40	6.019	0.4251E-01	0.999	55.43	255.2	14.57	38.7
3.60	6.213	0.4572E-01	0.943	55.72	253.2	14.93	39.8
3.80	6.396	0.4900E-01	0.892	56.00	251.5	15.30	40.8

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 340.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
mol•dm^{-3}	MPa	MPa•K^{-1}	MPa•dm^3•mol^{-1}	J/(mol•K)	m•s^{-1}	μPa•s	mW/(m•K)
4.00	6.570	0.5233E-01	0.846	56.26	250.1	15.69	41.9
4.20	6.735	0.5572E-01	0.805	56.50	249.0	16.09	43.0
4.40	6.892	0.5916E-01	0.769	56.73	248.2	16.51	44.1
4.60	7.043	0.6265E-01	0.737	56.93	247.7	16.94	45.1
4.80	7.188	0.6620E-01	0.710	57.11	247.6	17.39	46.2
5.00	7.327	0.6981E-01	0.688	57.27	247.7	17.85	47.3
5.20	7.463	0.7348E-01	0.669	57.41	248.2	18.32	48.3
5.40	7.595	0.7722E-01	0.655	57.51	249.0	18.81	49.3
5.60	7.725	0.8104E-01	0.645	57.60	250.1	19.32	50.3
5.80	7.854	0.8494E-01	0.640	57.66	251.7	19.84	51.3
6.00	7.982	0.8893E-01	0.640	57.69	253.6	20.38	52.2
6.20	8.110	0.9304E-01	0.644	57.70	256.0	20.94	53.1
6.40	8.239	0.9726E-01	0.653	57.68	258.8	21.51	54.0
6.60	8.371	0.1016	0.667	57.64	262.1	22.10	54.8
6.80	8.507	0.1061	0.687	57.59	265.9	22.71	55.6
7.00	8.647	0.1108	0.713	57.51	270.2	23.34	56.4
7.20	8.792	0.1157	0.745	57.42	275.0	23.99	57.1
7.40	8.945	0.1207	0.784	57.31	280.3	24.66	57.9
7.60	9.107	0.1260	0.831	57.20	286.3	25.35	58.6
7.80	9.278	0.1315	0.885	57.07	292.8	26.06	59.4
8.00	9.461	0.1372	0.948	56.94	299.9	26.79	60.2
8.20	9.658	0.1432	1.020	56.81	307.6	27.55	60.9
8.40	9.870	0.1494	1.102	56.67	315.9	28.33	61.7
8.60	10.099	0.1560	1.195	56.54	324.8	29.14	62.6
8.80	10.349	0.1628	1.301	56.40	334.4	29.97	63.4
9.00	10.621	0.1699	1.420	56.27	344.7	30.84	64.3
9.20	10.918	0.1773	1.553	56.14	355.6	31.73	65.3
9.40	11.243	0.1851	1.704	56.01	367.3	32.66	66.3
9.60	11.600	0.1932	1.872	55.88	379.7	33.61	67.3
9.80	11.993	0.2017	2.060	55.76	392.9	34.60	68.4
10.00	12.426	0.2106	2.269	55.64	406.9	35.63	69.5
10.20	12.902	0.2199	2.503	55.53	421.8	36.70	70.7
10.40	13.429	0.2297	2.763	55.42	437.5	37.80	71.9
10.60	14.009	0.2400	3.051	55.31	454.1	38.95	73.2
10.80	14.651	0.2507	3.370	55.22	471.6	40.14	74.6
11.00	15.360	0.2619	3.723	55.13	490.0	41.38	76.0
11.20	16.143	0.2736	4.111	55.05	509.2	42.68	77.5
11.40	17.007	0.2859	4.537	54.99	529.3	44.02	79.0
11.60	17.960	0.2986	5.003	54.93	550.3	45.42	80.6
11.80	19.011	0.3119	5.512	54.89	572.0	46.89	82.3

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 340.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
12.00	20.167	0.3257	6.065	54.86	594.6	48.41	84.0
12.20	21.440	0.3400	6.666	54.84	617.9	50.01	85.9
12.40	22.837	0.3548	7.316	54.83	642.0	51.68	87.8
12.60	24.370	0.3701	8.019	54.84	666.8	53.43	89.8
12.80	26.048	0.3860	8.776	54.86	692.3	55.26	91.8
13.00	27.884	0.4024	9.590	54.89	718.5	57.18	94.0
13.20	29.888	0.4193	10.464	54.93	745.4	59.20	96.3
13.40	32.074	0.4367	11.401	54.98	773.0	61.32	98.6
13.60	34.453	0.4548	12.403	55.04	801.4	63.55	101.1
13.80	37.040	0.4734	13.476	55.11	830.4	65.90	103.7
14.00	39.848	0.4926	14.620	55.19	860.1	68.38	106.4
14.20	42.893	0.5124	15.842	55.27	890.6	71.00	109.2
14.40	46.190	0.5329	17.144	55.36	921.8	73.77	112.1
14.60	49.756	0.5540	18.530	55.46	953.8	76.70	115.1
14.80	53.608	0.5758	20.006	55.57	986.6	79.81	118.3
15.00	57.765	0.5983	21.575	55.68	1020.1	83.11	121.6
15.20	62.245	0.6216	23.243	55.79	1054.5		125.1
15.40	67.069	0.6457	25.015	55.90	1089.7		128.7

ETHANE ISOTHERM AT T = 360.00 K
Second virial coefficient is -123.4 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.296	0.8444E-03	2.920	52.15	336.9	11.16	29.8
0.20	0.584	0.1715E-02	2.848	52.30	334.0	11.23	30.0
0.40	1.140	0.3531E-02	2.709	52.61	328.4	11.38	30.4
0.60	1.668	0.5449E-02	2.576	52.91	323.0	11.54	30.8
0.80	2.171	0.7465E-02	2.449	53.21	317.9	11.71	31.3
1.00	2.648	0.9578E-02	2.328	53.51	312.9	11.90	31.8
1.20	3.102	0.1179E-01	2.212	53.81	308.3	12.10	32.4
1.40	3.533	0.1409E-01	2.103	54.11	303.8	12.31	32.9
1.60	3.943	0.1648E-01	1.999	54.40	299.7	12.54	33.6
1.80	4.333	0.1896E-01	1.901	54.69	295.8	12.78	34.2
2.00	4.704	0.2152E-01	1.808	54.97	292.2	13.04	34.9
2.20	5.057	0.2417E-01	1.722	55.25	288.8	13.31	35.6
2.40	5.393	0.2690E-01	1.640	55.51	285.7	13.59	36.4
2.60	5.714	0.2971E-01	1.565	55.77	283.0	13.88	37.2
2.80	6.019	0.3259E-01	1.494	56.02	280.5	14.19	38.0

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 360.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
3.00	6.312	0.3555E-01	1.429	56.26	278.2	14.51	38.8
3.20	6.591	0.3858E-01	1.370	56.49	276.3	14.85	39.7
3.40	6.860	0.4168E-01	1.315	56.71	274.7	15.20	40.6
3.60	7.118	0.4485E-01	1.265	56.91	273.4	15.56	41.5
3.80	7.366	0.4809E-01	1.221	57.11	272.3	15.93	42.4
4.00	7.606	0.5139E-01	1.181	57.28	271.6	16.32	43.3
4.20	7.839	0.5477E-01	1.146	57.45	271.2	16.72	44.2
4.40	8.065	0.5822E-01	1.117	57.60	271.1	17.14	45.2
4.60	8.286	0.6173E-01	1.091	57.73	271.4	17.57	46.1
4.80	8.502	0.6533E-01	1.071	57.85	271.9	18.02	47.0
5.00	8.715	0.6900E-01	1.055	57.95	272.8	18.48	47.9
5.20	8.925	0.7276E-01	1.045	58.03	274.1	18.95	48.9
5.40	9.133	0.7660E-01	1.039	58.10	275.7	19.45	49.8
5.60	9.341	0.8055E-01	1.039	58.16	277.7	19.95	50.7
5.80	9.549	0.8460E-01	1.044	58.20	280.1	20.47	51.6
6.00	9.759	0.8876E-01	1.054	58.22	282.9	21.01	52.4
6.20	9.971	0.9304E-01	1.070	58.24	286.2	21.57	53.3
6.40	10.187	0.9745E-01	1.093	58.24	289.8	22.14	54.2
6.60	10.408	0.1020	1.122	58.23	294.0	22.73	55.0
6.80	10.636	0.1067	1.158	58.20	298.6	23.34	55.9
7.00	10.872	0.1116	1.201	58.18	303.7	23.97	56.7
7.20	11.117	0.1166	1.251	58.14	309.3	24.61	57.5
7.40	11.373	0.1219	1.310	58.10	315.4	25.28	58.4
7.60	11.642	0.1273	1.378	58.05	322.0	25.97	59.2
7.80	11.925	0.1329	1.454	58.00	329.1	26.68	60.1
8.00	12.224	0.1388	1.540	57.94	336.8	27.42	61.0
8.20	12.542	0.1449	1.637	57.89	345.0	28.17	61.9
8.40	12.880	0.1513	1.746	57.83	353.8	28.95	62.8
8.60	13.241	0.1579	1.866	57.77	363.2	29.76	63.8
8.80	13.627	0.1648	2.001	57.71	373.2	30.60	64.8
9.00	14.042	0.1720	2.150	57.65	383.8	31.46	65.8
9.20	14.488	0.1795	2.316	57.59	395.2	32.36	66.8
9.40	14.970	0.1873	2.501	57.53	407.2	33.28	67.9
9.60	15.490	0.1955	2.705	57.47	419.9	34.24	69.0
9.80	16.053	0.2040	2.931	57.41	433.4	35.23	70.2
10.00	16.664	0.2129	3.181	57.35	447.7	36.26	71.4
10.20	17.327	0.2223	3.457	57.30	462.8	37.33	72.7
10.40	18.049	0.2320	3.761	57.25	478.7	38.44	74.0
10.60	18.834	0.2422	4.094	57.20	495.4	39.59	75.3
10.80	19.688	0.2527	4.460	57.16	512.9	40.79	76.7

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 360.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
11.00	20.620	0.2638	4.860	57.13	531.2	42.04	78.2
11.20	21.635	0.2753	5.296	57.10	550.2	43.33	79.7
11.40	22.741	0.2872	5.770	57.08	570.1	44.69	81.3
11.60	23.945	0.2996	6.285	57.07	590.8	46.10	82.9
11.80	25.258	0.3125	6.843	57.07	612.2	47.57	84.7
12.00	26.686	0.3259	7.447	57.07	634.3	49.11	86.5
12.20	28.239	0.3398	8.097	57.09	657.2	50.72	88.3
12.40	29.928	0.3541	8.798	57.11	680.8	52.41	90.3
12.60	31.762	0.3689	9.552	57.15	705.2	54.17	92.3
12.80	33.753	0.3843	10.361	57.19	730.2	56.02	94.4
13.00	35.910	0.4002	11.228	57.24	756.0	57.97	96.6
13.20	38.248	0.4166	12.156	57.30	782.5	60.01	98.9
13.40	40.777	0.4335	13.148	57.36	809.7	62.16	101.3
13.60	43.512	0.4510	14.208	57.44	837.7	64.42	103.9
13.80	46.465	0.4691	15.340	57.51	866.4	66.80	106.5
14.00	49.652	0.4878	16.546	57.60	895.9	69.32	109.2
14.20	53.089	0.5072	17.830	57.69	926.1	71.98	112.0
14.40	56.790	0.5272	19.198	57.78	957.1	74.79	115.0
14.60	60.774	0.5478	20.653	57.88	989.0		118.1
14.80	65.058	0.5692	22.200	57.98	1021.6		121.3
15.00	69.660	0.5913	23.844	58.09	1055.1		124.7

ETHANE ISOTHERM AT T = 380.00 K
Second virial coefficient is -108.9 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.313	0.8436E-03	3.091	54.73	345.3	11.72	32.9
0.20	0.618	0.1712E-02	3.025	54.85	342.7	11.79	33.1
0.40	1.210	0.3519E-02	2.895	55.11	337.7	11.94	33.5
0.60	1.777	0.5422E-02	2.772	55.37	332.9	12.10	33.9
0.80	2.319	0.7417E-02	2.654	55.62	328.3	12.28	34.3
1.00	2.839	0.9504E-02	2.542	55.87	324.0	12.47	34.8
1.20	3.337	0.1168E-01	2.436	56.12	319.9	12.68	35.3
1.40	3.814	0.1395E-01	2.335	56.36	316.1	12.90	35.9
1.60	4.271	0.1630E-01	2.240	56.60	312.5	13.13	36.5
1.80	4.710	0.1873E-01	2.151	56.83	309.2	13.37	37.1
2.00	5.132	0.2125E-01	2.067	57.06	306.2	13.63	37.7
2.20	5.537	0.2385E-01	1.988	57.29	303.4	13.90	38.4

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 380.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
2.40	5.927	0.2653E-01	1.915	57.50	300.9	14.19	39.1
2.60	6.303	0.2929E-01	1.847	57.71	298.7	14.48	39.8
2.80	6.666	0.3213E-01	1.784	57.91	296.8	14.79	40.6
3.00	7.017	0.3504E-01	1.727	58.10	295.1	15.12	41.3
3.20	7.357	0.3803E-01	1.674	58.28	293.8	15.46	42.1
3.40	7.687	0.4109E-01	1.627	58.45	292.7	15.81	42.9
3.60	8.008	0.4423E-01	1.584	58.62	292.0	16.17	43.7
3.80	8.321	0.4745E-01	1.547	58.77	291.5	16.55	44.6
4.00	8.627	0.5074E-01	1.515	58.91	291.4	16.94	45.4
4.20	8.928	0.5411E-01	1.487	59.04	291.5	17.34	46.3
4.40	9.223	0.5756E-01	1.465	59.16	292.0	17.76	47.1
4.60	9.514	0.6109E-01	1.448	59.26	292.9	18.19	48.0
4.80	9.802	0.6471E-01	1.436	59.36	294.0	18.64	48.8
5.00	10.089	0.6843E-01	1.429	59.44	295.5	19.10	49.7
5.20	10.374	0.7223E-01	1.428	59.52	297.4	19.58	50.6
5.40	10.660	0.7614E-01	1.432	59.58	299.7	20.07	51.4
5.60	10.948	0.8015E-01	1.442	59.63	302.3	20.58	52.3
5.80	11.238	0.8428E-01	1.458	59.67	305.3	21.10	53.2
6.00	11.531	0.8853E-01	1.481	59.71	308.7	21.64	54.0
6.20	11.830	0.9290E-01	1.510	59.73	312.6	22.19	54.9
6.40	12.136	0.9741E-01	1.546	59.75	316.9	22.77	55.7
6.60	12.450	0.1021	1.590	59.75	321.7	23.36	56.6
6.80	12.773	0.1069	1.642	59.76	326.9	23.97	57.5
7.00	13.107	0.1118	1.702	59.75	332.5	24.59	58.3
7.20	13.454	0.1170	1.770	59.74	338.7	25.24	59.2
7.40	13.816	0.1223	1.848	59.73	345.3	25.91	60.1
7.60	14.194	0.1278	1.936	59.71	352.5	26.60	61.0
7.80	14.590	0.1335	2.034	59.69	360.1	27.31	61.9
8.00	15.008	0.1395	2.143	59.66	368.3	28.04	62.8
8.20	15.448	0.1457	2.263	59.64	377.0	28.80	63.8
8.40	15.914	0.1521	2.397	59.61	386.3	29.58	64.8
8.60	16.408	0.1587	2.545	59.58	396.1	30.39	65.8
8.80	16.933	0.1657	2.708	59.55	406.6	31.23	66.8
9.00	17.492	0.1729	2.887	59.52	417.6	32.09	67.9
9.20	18.089	0.1805	3.085	59.49	429.4	32.99	69.0
9.40	18.728	0.1883	3.302	59.46	441.8	33.92	70.1
9.60	19.412	0.1965	3.542	59.43	454.9	34.88	71.3
9.80	20.146	0.2051	3.804	59.40	468.7	35.87	72.5

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 380.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
10.00	20.935	0.2140	4.092	59.38	483.2	36.91	73.7
10.20	21.784	0.2233	4.406	59.36	498.5	37.98	75.0
10.40	22.699	0.2329	4.750	59.34	514.6	39.10	76.4
10.60	23.686	0.2430	5.125	59.33	531.4	40.25	77.7
10.80	24.752	0.2534	5.533	59.32	548.9	41.46	79.2
11.00	25.902	0.2643	5.976	59.32	567.2	42.71	80.7
11.20	27.145	0.2755	6.456	59.32	586.2	44.02	82.2
11.40	28.487	0.2872	6.975	59.33	606.0	45.38	83.9
11.60	29.937	0.2994	7.536	59.34	626.5	46.81	85.6
11.80	31.504	0.3120	8.140	59.37	647.7	48.29	87.3
12.00	33.196	0.3250	8.790	59.40	669.6	49.84	89.1
12.20	35.023	0.3385	9.489	59.43	692.3	51.47	91.0
12.40	36.995	0.3525	10.238	59.48	715.7	53.17	93.0
12.60	39.122	0.3670	11.041	59.53	739.8	54.95	95.1
12.80	41.416	0.3819	11.901	59.58	764.6	56.83	97.2
13.00	43.887	0.3974	12.821	59.64	790.2	58.79	99.5
13.20	46.548	0.4134	13.803	59.71	816.5	60.86	101.8
13.40	49.412	0.4300	14.851	59.78	843.5	63.04	104.3
13.60	52.493	0.4471	15.969	59.86	871.4	65.33	106.8
13.80	55.805	0.4649	17.160	59.94	899.9	67.75	109.5
14.00	59.362	0.4832	18.428	60.03	929.3	70.31	112.2
14.20	63.182	0.5022	19.778	60.12	959.5		115.1
14.40	67.279	0.5218	21.213	60.21	990.5		118.1

ETHANE ISOTHERM AT T = 400.00 K
Second virial coefficient is -96.3 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
0.10	0.329	0.8430E-03	3.262	57.30	353.5	12.26	36.1
0.20	0.653	0.1709E-02	3.200	57.41	351.2	12.33	36.3
0.40	1.281	0.3510E-02	3.080	57.63	346.7	12.49	36.7
0.60	1.885	0.5400E-02	2.966	57.85	342.4	12.66	37.1
0.80	2.467	0.7379E-02	2.857	58.06	338.4	12.84	37.5
1.00	3.028	0.9446E-02	2.754	58.28	334.6	13.03	38.0
1.20	3.569	0.1160E-01	2.657	58.49	331.0	13.24	38.5
1.40	4.091	0.1383E-01	2.564	58.69	327.7	13.47	39.0
1.60	4.596	0.1616E-01	2.478	58.89	324.7	13.70	39.5
1.80	5.083	0.1856E-01	2.397	59.09	321.9	13.95	40.1

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 400.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
2.00	5.555	0.2104E-01	2.321	59.28	319.4	14.21	40.7
2.20	6.012	0.2361E-01	2.250	59.46	317.2	14.48	41.4
2.40	6.455	0.2625E-01	2.185	59.64	315.2	14.77	42.0
2.60	6.886	0.2897E-01	2.125	59.82	313.5	15.07	42.7
2.80	7.305	0.3177E-01	2.070	59.98	312.1	15.39	43.4
3.00	7.714	0.3465E-01	2.020	60.14	310.9	15.71	44.1
3.20	8.114	0.3761E-01	1.975	60.29	310.1	16.05	44.8
3.40	8.505	0.4064E-01	1.935	60.43	309.5	16.40	45.6
3.60	8.888	0.4376E-01	1.901	60.57	309.3	16.77	46.4
3.80	9.265	0.4695E-01	1.872	60.70	309.4	17.15	47.1
4.00	9.637	0.5023E-01	1.847	60.82	309.7	17.54	47.9
4.20	10.004	0.5359E-01	1.828	60.93	310.4	17.95	48.7
4.40	10.369	0.5704E-01	1.815	61.03	311.4	18.37	49.6
4.60	10.731	0.6058E-01	1.806	61.12	312.8	18.80	50.4
4.80	11.092	0.6421E-01	1.803	61.20	314.4	19.25	51.2
5.00	11.452	0.6794E-01	1.806	61.28	316.5	19.71	52.0
5.20	11.814	0.7178E-01	1.815	61.35	318.9	20.19	52.9
5.40	12.179	0.7572E-01	1.830	61.41	321.6	20.68	53.7
5.60	12.547	0.7977E-01	1.851	61.46	324.8	21.19	54.5
5.80	12.920	0.8394E-01	1.880	61.50	328.3	21.71	55.4
6.00	13.299	0.8823E-01	1.915	61.54	332.3	22.25	56.2
6.20	13.686	0.9266E-01	1.957	61.57	336.7	22.81	57.1
6.40	14.083	0.9723E-01	2.008	61.60	341.5	23.38	57.9
6.60	14.490	0.1019	2.066	61.62	346.7	23.97	58.8
6.80	14.910	0.1068	2.134	61.63	352.4	24.58	59.7
7.00	15.344	0.1118	2.210	61.64	358.6	25.21	60.6
7.20	15.794	0.1170	2.296	61.65	365.2	25.86	61.5
7.40	16.263	0.1224	2.393	61.65	372.3	26.53	62.4
7.60	16.752	0.1280	2.500	61.65	379.9	27.22	63.3
7.80	17.264	0.1338	2.619	61.65	388.0	27.93	64.2
8.00	17.801	0.1397	2.750	61.64	396.6	28.67	65.2
8.20	18.365	0.1460	2.895	61.63	405.8	29.43	66.2
8.40	18.960	0.1524	3.054	61.62	415.5	30.21	67.2
8.60	19.587	0.1591	3.228	61.61	425.7	31.02	68.2
8.80	20.252	0.1661	3.418	61.60	436.6	31.86	69.3
9.00	20.956	0.1734	3.627	61.59	448.1	32.73	70.4
9.20	21.704	0.1809	3.855	61.58	460.1	33.63	71.5
9.40	22.500	0.1888	4.105	61.57	472.9	34.56	72.6
9.60	23.347	0.1969	4.377	61.57	486.3	35.53	73.8
9.80	24.252	0.2054	4.673	61.56	500.4	36.53	75.1

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 400.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
10.00	25.218	0.2143	4.997	61.56	515.2	37.56	76.3
10.20	26.252	0.2235	5.348	61.56	530.6	38.64	77.7
10.40	27.360	0.2330	5.729	61.56	546.8	39.76	79.0
10.60	28.546	0.2429	6.143	61.57	563.7	40.93	80.4
10.80	29.819	0.2532	6.590	61.59	581.3	42.14	81.9
11.00	31.185	0.2639	7.073	61.60	599.6	43.41	83.4
11.20	32.651	0.2750	7.595	61.63	618.6	44.72	85.0
11.40	34.225	0.2865	8.156	61.65	638.4	46.10	86.7
11.60	35.916	0.2984	8.760	61.69	658.8	47.53	88.4
11.80	37.732	0.3107	9.408	61.73	679.9	49.03	90.2
12.00	39.682	0.3235	10.103	61.77	701.8	50.60	92.0
12.20	41.777	0.3368	10.848	61.82	724.4	52.24	94.0
12.40	44.025	0.3504	11.645	61.87	747.7	53.96	96.0
12.60	46.438	0.3646	12.498	61.93	771.7	55.76	98.1
12.80	49.028	0.3793	13.408	62.00	796.4	57.66	100.3
13.00	51.806	0.3945	14.380	62.06	821.9	59.65	102.5
13.20	54.784	0.4102	15.416	62.13	848.2	61.74	104.9
13.40	57.977	0.4265	16.521	62.21	875.2	63.95	107.4
13.60	61.397	0.4433	17.697	62.29	903.0		109.9
13.80	65.061	0.4608	18.948	62.37	931.6		112.6
14.00	68.982	0.4788	20.279	62.46	961.0		115.4

ETHANE ISOTHERM AT T = 420.00 K
Second virial coefficient is -85.2 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.346	0.8425E-03	3.433	59.86	361.6	12.80	39.5
0.50	1.674	0.4431E-02	3.211	60.24	353.6	13.11	40.2
1.00	3.217	0.9398E-02	2.964	60.71	344.8	13.59	41.3
1.50	4.644	0.1488E-01	2.751	61.15	337.6	14.14	42.5
2.00	5.974	0.2087E-01	2.572	61.56	332.0	14.78	43.9
2.50	7.221	0.2736E-01	2.425	61.95	328.1	15.49	45.4
3.00	8.404	0.3434E-01	2.310	62.29	325.9	16.29	47.1
3.50	9.537	0.4182E-01	2.228	62.61	325.5	17.17	48.9
4.00	10.637	0.4982E-01	2.179	62.88	327.0	18.13	50.8
4.50	11.721	0.5837E-01	2.164	63.10	330.4	19.18	52.7

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 420.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
5.00	12.807	0.6752E-01	2.185	63.29	336.0	20.31	54.7
5.50	13.913	0.7734E-01	2.246	63.44	343.9	21.54	56.7
6.00	15.061	0.8791E-01	2.352	63.55	354.1	22.86	58.8
6.50	16.274	0.9932E-01	2.509	63.63	367.0	24.29	60.9
7.00	17.579	0.1117	2.723	63.69	382.6	25.83	63.2
7.50	19.008	0.1251	3.004	63.72	401.1	27.49	65.4
8.00	20.596	0.1397	3.362	63.74	422.7	29.29	67.8
8.50	22.385	0.1558	3.810	63.76	447.6	31.24	70.4
9.00	24.424	0.1734	4.367	63.77	475.9	33.37	73.1
9.50	26.773	0.1928	5.053	63.79	508.1	35.69	76.0
10.00	29.503	0.2141	5.894	63.82	544.4	38.23	79.2
10.50	32.697	0.2375	6.918	63.86	584.7	41.02	82.6
11.00	36.456	0.2631	8.153	63.94	629.4	44.11	86.4
11.50	40.891	0.2911	9.633	64.03	678.3	47.53	90.5
12.00	46.135	0.3217	11.392	64.16	731.7	51.36	95.1
12.50	52.337	0.3551	13.470	64.30	789.5	55.66	100.1
13.00	59.666	0.3916	15.913	64.47	851.9	60.51	105.7
13.50	68.319	0.4313	18.772	64.66	919.1		111.9

ETHANE ISOTHERM AT T = 450.00 K
Second virial coefficient is -70.9 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.372	0.8419E-03	3.689	63.65	373.3	13.58	44.7
0.50	1.807	0.4417E-02	3.492	63.96	366.6	13.91	45.4
1.00	3.498	0.9342E-02	3.276	64.34	359.5	14.39	46.4
1.50	5.089	0.1476E-01	3.093	64.70	353.9	14.96	47.6
2.00	6.597	0.2067E-01	2.943	65.04	349.9	15.60	48.9
2.50	8.038	0.2707E-01	2.826	65.35	347.6	16.33	50.3
3.00	9.428	0.3396E-01	2.741	65.64	347.0	17.14	51.9
3.50	10.785	0.4137E-01	2.690	65.89	348.1	18.02	53.6
4.00	12.124	0.4931E-01	2.673	66.12	351.2	18.99	55.4
4.50	13.464	0.5783E-01	2.694	66.31	356.2	20.05	57.2
5.00	14.824	0.6697E-01	2.754	66.48	363.3	21.19	59.1
5.50	16.225	0.7681E-01	2.858	66.62	372.6	22.42	61.1
6.00	17.690	0.8741E-01	3.012	66.73	384.4	23.75	63.2
6.50	19.246	0.9886E-01	3.222	66.83	398.7	25.18	65.3
7.00	20.923	0.1113	3.497	66.90	415.7	26.73	67.5

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 450.00 K (continued)

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
7.50	22.756	0.1248	3.847	66.97	435.6	28.40	69.8
8.00	24.784	0.1394	4.282	67.02	458.5	30.21	72.2
8.50	27.055	0.1555	4.818	67.07	484.6	32.18	74.8
9.00	29.622	0.1730	5.472	67.13	514.1	34.32	77.6
9.50	32.549	0.1922	6.265	67.19	547.3	36.65	80.6
10.00	35.914	0.2133	7.224	67.26	584.3	39.21	83.8
10.50	39.805	0.2363	8.374	67.34	625.3	42.04	87.3
11.00	44.325	0.2614	9.745	67.45	670.4	45.16	91.1
11.50	49.593	0.2889	11.372	67.57	719.7	48.63	95.4
12.00	55.745	0.3189	13.290	67.71	773.3	52.52	100.0
12.50	62.938	0.3516	15.541	67.87	831.5		105.1

ETHANE ISOTHERM AT T = 500.00 K
Second virial coefficient is -51.7 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	$J/(mol \cdot K)$	$m \cdot s^{-1}$	$\mu Pa \cdot s$	$mW/(m \cdot K)$
0.10	0.414	0.8412E-03	4.115	69.74	392.1	14.84	53.9
0.50	2.027	0.4399E-02	3.958	69.98	387.3	15.18	54.5
1.00	3.963	0.9273E-02	3.790	70.27	382.6	15.68	55.5
1.50	5.823	0.1462E-01	3.655	70.55	379.4	16.27	56.5
2.00	7.624	0.2043E-01	3.553	70.80	377.7	16.93	57.7
2.50	9.382	0.2673E-01	3.485	71.04	377.7	17.67	59.1
3.00	11.114	0.3352E-01	3.450	71.26	379.3	18.49	60.5
3.50	12.839	0.4082E-01	3.452	71.46	382.7	19.39	62.1
4.00	14.573	0.4868E-01	3.492	71.64	387.9	20.37	63.7
4.50	16.337	0.5713E-01	3.573	71.80	395.1	21.44	65.5
5.00	18.153	0.6622E-01	3.700	71.94	404.4	22.59	67.3
5.50	20.045	0.7602E-01	3.877	72.07	416.0	23.83	69.3
6.00	22.040	0.8660E-01	4.113	72.19	429.8	25.17	71.3
6.50	24.169	0.9803E-01	4.414	72.29	446.2	26.62	73.4
7.00	26.466	0.1104	4.789	72.39	465.2	28.18	75.6
7.50	28.972	0.1239	5.250	72.48	487.0	29.87	77.9
8.00	31.733	0.1385	5.811	72.56	511.8	31.71	80.4
8.50	34.802	0.1544	6.486	72.65	539.6	33.69	83.0
9.00	38.241	0.1717	7.294	72.74	570.8	35.86	85.8
9.50	42.122	0.1906	8.257	72.84	605.4	38.23	88.8
10.00	46.528	0.2112	9.399	72.94	643.6	40.84	92.1
10.50	51.556	0.2337	10.750	73.06	685.8	43.71	95.7
11.00	57.318	0.2583	12.339	73.19	731.8	46.89	99.7
11.50	63.941	0.2851	14.203	73.32	782.1		104.0

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 550.00 K
Second virial coefficient is -36.7 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.456	0.8406E-03	4.540	75.51	410.0		63.5
0.50	2.247	0.4386E-02	4.420	75.71	406.9		64.1
1.00	4.426	0.9225E-02	4.299	75.94	404.3		65.0
1.50	6.551	0.1452E-01	4.210	76.17	403.1		65.9
2.00	8.641	0.2026E-01	4.155	76.38	403.4		67.1
2.50	10.712	0.2648E-01	4.134	76.57	405.3		68.3
3.00	12.782	0.3319E-01	4.151	76.75	408.9		69.7
3.50	14.869	0.4042E-01	4.205	76.92	414.2		71.2
4.00	16.994	0.4819E-01	4.302	77.07	421.3		72.7
4.50	19.179	0.5657E-01	4.446	77.21	430.4		74.4
5.00	21.448	0.6560E-01	4.640	77.34	441.6		76.2
5.50	23.829	0.7533E-01	4.892	77.46	454.9		78.1
6.00	26.351	0.8584E-01	5.209	77.58	470.6		80.0
6.50	29.050	0.9720E-01	5.599	77.68	488.7		82.1
7.00	31.964	0.1095	6.074	77.79	509.5		84.3
7.50	35.140	0.1228	6.645	77.89	532.9		86.6
8.00	38.628	0.1373	7.327	77.99	559.2		89.1
8.50	42.488	0.1530	8.135	78.09	588.6		91.8
9.00	46.788	0.1701	9.090	78.19	621.2		94.6
9.50	51.606	0.1888	10.214	78.30	657.2		97.7
10.00	57.034	0.2090	11.533	78.42	696.8		101.1
10.50	63.177	0.2311	13.077	78.54	740.1		104.7

Table B4. Properties in the single-phase region along isotherms (continued)

ETHANE ISOTHERM AT T = 600.00 K
Second virial coefficient is -24.6 $cm^3 \cdot mol^{-1}$

ρ	P	$\partial P/\partial T\|_\rho$	$\partial P/\partial \rho\|_T$	C_v	W	η	λ
$mol \cdot dm^{-3}$	MPa	$MPa \cdot K^{-1}$	$MPa \cdot dm^3 \cdot mol^{-1}$	J/(mol•K)	$m \cdot s^{-1}$	$\mu Pa \cdot s$	mW/(m•K)
0.10	0.498	0.8402E-03	4.965	80.95	427.2		73.5
0.50	2.466	0.4376E-02	4.881	81.12	425.6		74.0
1.00	4.886	0.9188E-02	4.804	81.32	424.8		74.8
1.50	7.275	0.1444E-01	4.759	81.51	425.4		75.7
2.00	9.651	0.2013E-01	4.750	81.69	427.5		76.8
2.50	12.031	0.2629E-01	4.777	81.86	431.1		77.9
3.00	14.435	0.3294E-01	4.843	82.01	436.3		79.2
3.50	16.882	0.4010E-01	4.952	82.16	443.3		80.6
4.00	19.394	0.4781E-01	5.106	82.29	452.1		82.1
4.50	21.996	0.5611E-01	5.311	82.42	462.9		83.6
5.00	24.715	0.6507E-01	5.573	82.54	475.7		85.4
5.50	27.580	0.7473E-01	5.899	82.66	490.7		87.2
6.00	30.626	0.8515E-01	6.297	82.77	507.9		89.1
6.50	33.890	0.9643E-01	6.776	82.87	527.6		91.1
7.00	37.417	0.1086	7.349	82.98	549.8		93.3
7.50	41.257	0.1218	8.027	83.08	574.7		95.7
8.00	45.465	0.1362	8.826	83.18	602.5		98.2
8.50	50.106	0.1517	9.765	83.29	633.3		100.8
9.00	55.256	0.1686	10.862	83.39	667.2		103.7
9.50	60.999	0.1870	12.143	83.50	704.6		106.9
10.00	67.434	0.2070	13.635	83.62	745.4		110.3

Appendix C: Listing of a FORTRAN 77 program to calculate the thermophysical properties of ethane

In this Appendix, we give the complete listing for a FORTRAN 77 (FORTRAN V) program to calculate the thermophysical properties of ethane. Several aspects of this code must be mentioned. The program was written for a mainframe computer with very high precision; implementations for many personal computers will need to convert constants, functions, etc. to double precision. The program reflects the correlations as written in the body of this text; no systematic attempt was made to optimize the code. The comments interspersed throughout the code are meant to assist a programmer; however these are not complete. The program should be used in conjunction with this manuscript and [1], to assist in judging the uncertainties of the resulting properties and the applicable ranges of the correlations.

```
      PROGRAM C2PROPS
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               , CMW
C
        WRITE(*,5)
 5      FORMAT(
     C ' ********THIS PROGRAM ALLOWS INTERACTIVE CALCULATION*********'/
     C ' *********OF MANY ETHANE THERMOPHYSICAL PROPERTIES**********'/
     C ' ************************************************************'/
     C ' *IT IS BASED ON THE CORRELATIONS OF FRIEND, INGHAM, AND ELY*'/
     C ' *******AS SUBMITTED TO J. PHYS. CHEM. REF. DATA 1989********'/
     C ' ******************UNDER THE TITLE:*************************'/
     C ' ***********THERMOPHYSICAL PROPERTIES OF ETHANE*************'/
     C ' ************************************************************'/
     C ' ********* AND APPEARING IN THIS NBS TECHNICAL NOTE********'/)
        WRITE(*,6)
 6      FORMAT(
     C ' **THIS IMPLEMENTATION WAS WRITTEN FOR A MAIN FRAME COMPUTER*'/
     C ' ***************WITH 60 BIT WORD SIZE***********************'/
     C ' ************************************************************'/
     C ' ******THE UNITS FOR INPUT AND OUTPUT ARE:******************'/
     C ' ***PRESSURE-MEGAPASCALS, DENSITY-MOLES PER CUBIC DECIMETER,*'/
     C ' ***********TEMPERAURE-KELVINS, ENERGY-JOULES,**************'/
     C ' *************VISCOSITY-MICROPASCAL SECONDS,****************'/
     C' *****AND THERMAL CONDUCTIVITY-MILLIWATTS PER METER KELVIN****'/
     C' *****ALL NOMINALLY EXTENSIVE QUANTITIES ARE EXPRESSED *******'/
     C' **************ON A PER MOLE BASIS************************'//)
        PAUSE '*****PRESS ANY KEY TO CONTINUE*****'
        WRITE(*,7)
 7      FORMAT(
     C ' *****PLEASE CONSULT THE PAPER AND TEXT OF THIS TECH NOTE*****'/
     C ' ********FOR FURTHER DETAILS CONCERNING THE CORRELATIONS******'/
     C ' ************************************************************'////)
 10     WRITE(*,15)
 15     FORMAT('   PLEASE ENTER CODE FOR THE FOLLOWING CATEGORIES'/
     C '   OF THERMOPHYSICAL PROPERTIES:'/
     C '    1  ALONG THE SATURATION BOUNDARY'/
     C '    2  IN THE SINGLE PHASE GIVEN TEMPERATURE AND DENSITY'/
     C '    3  IN THE SINGLE PHASE GIVEN TEMPERATURE AND PRESSURE'/
     C '    4  OTHER STATE FUNCTIONS IN THE SINGLE PHASE'/
     C '    5  TRANSPORT PROPERTIES IN THE SINGLE PHASE'/
     C '    6  DILUTE AND IDEAL GAS PROPERTIES'/
     C '    7  TERMINATE THIS PROGRAM'/'    ')
        READ(*,*) ICAT
        IF(ICAT.EQ.1)THEN
          WRITE(*,20)
 20       FORMAT('     ENTER FUNCTION NUMBER AND STATE POINT'/
     C    '     1  SATURATION BOUNDARY (PRESSURE AND DENSITIES)'/
     C    '        FROM ANCILLARY EQUATIONS--GIVE T'/
     C    '     2  SATURATION BOUNDARY (PRESSURE AND DENSITIES)'/
     C    '        FROM MAXWELL CONSTRUCTION--GIVE T'/
     C    '     3  SATURATION TEMPERATURE FROM PRESSURE--GIVE P'/
     C    '     4  LIQUID HEAT CAPACITY ALONG SATURATION--GIVE T'/
     C    '     5  LIQUID SOUND SPEED   ALONG SATURATION--GIVE T'//'   ')
          READ(*,*)IFUNC,PROP1
          IF(IFUNC.EQ.1)THEN
            ANS=PSATF(PROP1)/10.
            ANS1=DSATL(PROP1)
            ANS2=DSATV(PROP1)
          END IF
          IF(IFUNC.EQ.2)CALL SATF(PROP1,ANS,ANS1,ANS2)
          IF(IFUNC.EQ.2)ANS=ANS/10.
          IF(IFUNC.EQ.3)ANS=TSAT(PROP1*10.)
          IF(IFUNC.EQ.4)ANS=CSAT(PROP1)
          IF(IFUNC.EQ.5)THEN
            CALL SATF(PROP1,PPP,PROP2,PPPP)
```

```
          ANS=WSF(PROP2,PROP1)
        END IF
        IF(IFUNC.LE.2)WRITE(*,80)PROP1,ANS,ANS1,ANS2
        IF(IFUNC.GT.2)WRITE(*,81)PROP1,ANS
      END IF
      IF(ICAT.EQ.2)THEN
        WRITE(*,25)
25      FORMAT('     ENTER FUNCTION NUMBER AND STATE POINT'/
    C   '      1  PRESSURE--GIVE T AND RHO'/
    C   '      2  ISOCHORIC HEAT CAPACITY--GIVE T AND RHO'/
    C   '      3  ISOBARIC HEAT CAPACITY--GIVE T AND RHO'/
    C   '      4  SOUND SPEED--GIVE T AND RHO'/
    C   '      5  ISOTHERMAL DP/DRHO--GIVE T AND RHO'/
    C   '      6  ISOCHORIC DP/DT--GIVE T AND RHO'/)
        READ(*,*)IFUNC,PROP1,PROP2
        IF(IFUNC.EQ.1)CALL PRESS(ANS,PROP2,PROP1,1)
        IF(IFUNC.EQ.1)ANS=ANS/10.
        IF(IFUNC.EQ.2)ANS= CVF(PROP2,PROP1)
        IF(IFUNC.EQ.3)ANS=CPEE(PROP2,PROP1)
        IF(IFUNC.EQ.4)ANS=WSF(PROP2,PROP1)
        IF(IFUNC.EQ.5)CALL DPDD(ANS,PROP2,PROP1,1)
        IF(IFUNC.EQ.5)ANS=ANS/10.
        IF(IFUNC.EQ.6)CALL DPDT(ANS,PROP2,PROP1,1)
        IF(IFUNC.EQ.6)ANS=ANS/10.
        WRITE(*,82)PROP1,PROP2,ANS
      END IF
      IF(ICAT.EQ.3)THEN
        WRITE(*,30)
30      FORMAT('     ENTER FUNCTION NUMBER AND STATE POINT'/
    C   '      1  DENSITY--GIVE T AND P'/
    C   '      2  ISOCHORIC HEAT CAPACITY--GIVE T AND P'/
    C   '      3  ISOBARIC HEAT CAPACITY--GIVE T AND P'/
    C   '      4  SOUND SPEED--GIVE T AND P'/
    C   '      5  ISOTHERMAL DP/DRHO--GIVE T AND P'/
    C   '      6  ISOCHORIC DP/DT--GIVE T AND P'/)
        READ(*,*)IFUNC,PROP1,PROP2
        RHO = RHOF(PROP2*10.,PROP1)
        IF(IFUNC.EQ.1)ANS=RHO
        IF(IFUNC.EQ.2)ANS= CVF(RHO,PROP1)
        IF(IFUNC.EQ.3)ANS=CPEE(RHO,PROP1)
        IF(IFUNC.EQ.4)ANS=WSF(RHO,PROP1)
        IF(IFUNC.EQ.5)CALL DPDD(ANS,RHO,PROP1,1)
        IF(IFUNC.EQ.6)CALL DPDT(ANS,RHO,PROP1,1)
        IF(IFUNC.GE.5)ANS=ANS/10.
        WRITE(*,82)PROP1,PROP2,ANS
      END IF
      IF(ICAT.EQ.4)THEN
        WRITE(*,35)
35      FORMAT('     ENTER FUNCTION NUMBER AND STATE POINT'/
    C   '      1  ENTROPY--GIVE T AND RHO'/
    C   '      2  HELMHOLTZ ENERGY--GIVE T AND RHO'/
    C   '      3  INTERNAL ENERGY--GIVE T AND RHO'/
    C   '      4  GIBBS ENERGY--GIVE T AND RHO'/
    C   '      5  ENTHALPY--GIVE T AND RHO'/)
        READ(*,*)IFUNC,PROP1,PROP2
        IF(IFUNC.EQ.1)ANS=ENTROPY(PROP2,PROP1)
        IF(IFUNC.EQ.2)ANS=HELM(PROP2,PROP1)
        IF(IFUNC.EQ.3)ANS=UNTERN(PROP2,PROP1)
        IF(IFUNC.GE.4)CALL PRESS(PPP,PROP2,PROP1,1)
        IF(IFUNC.EQ.4)ANS=GIBBS(PROP2,PROP1,PPP)
        IF(IFUNC.EQ.5)ANS=ENTHALP(PROP2,PROP1,PPP)
        WRITE(*,82)PROP1,PROP2,ANS
      END IF
      IF(ICAT.EQ.5)THEN
        WRITE(*,40)
40      FORMAT('     ENTER FUNCTION NUMBER AND STATE POINT'/
```

```
C     '      1  VISCOSITY--GIVE T AND RHO'/
C     '      2  THERMAL CONDUCTIVITY--GIVE T AND RHO'/
C     '      3  VISCOSITY--GIVE T AND P'/
C     '      4  THERMAL CONDUCTIVITY--GIVE T AND P'/)
        READ(*,*)IFUNC,PROP1,PROP2
        IF(IFUNC.EQ.1)ANS=VSCTY(PROP2,PROP1)
        IF(IFUNC.EQ.2)ANS=XLAMF(PROP2,PROP1)
        IF(IFUNC.GE.3) PROO=RHOF(PROP2*10.,PROP1)
        IF(IFUNC.EQ.3)ANS=VSCTY(PROO,PROP1)
        IF(IFUNC.EQ.4)ANS=XLAMF(PROO,PROP1)
        WRITE(*,82)PROP1,PROP2,ANS
      END IF
      IF(ICAT.EQ.6)THEN
        WRITE(*,45)
 45     FORMAT('      ENTER FUNCTION NUMBER AND STATE POINT'/
C     '      1  SECOND VIRIAL COEFFICIENT--GIVE T AND 0'/
C     '      2  IDEAL GAS ISCHORIC HEAT CAPACITY--GIVE T AND 0'/
C     '      3  IDEAL GAS ISOBARIC HEAT CAPACITY--GIVE T AND 0'/
C     '      4  IDEAL GAS ENTHALPY--GIVE T AND 0'/
C     '      5  IDEAL GAS INTERNAL ENERGY--GIVE T AND 0'/
C     '      6  IDEAL GAS ENTROPY--GIVE T AND RHO'/
C     '      7  IDEAL GAS HELMHOLTZ ENGERGY--GIVE T AND RHO'/
C     '      8  IDEAL GAS ENTROPY--GIVE T AND P'/
C     '      9  IDEAL GAS HELMHOLTZ ENERGY--GIVE T AND P'/
C     '     10  DILUTE GAS VISCOSTIY--GIVE T AND 0'/
C     '     11  DILUTE GAS THERMAL CONDUCTIVITY--GIVE T AND 0'/)
        READ(*,*)IFUNC,PROP1,PROP2
        IF (PROP2.EQ.0.)PROP2=0.000001
        IF(IFUNC.EQ.1)ANS=BVIR(PROP1)
        IF((IFUNC.EQ.8).OR.(IFUNC.EQ.9))PROP2=10.*PROP2/(R*PROP1)
        IF((IFUNC.GT.1).AND.(IFUNC.LT.10))CALL IDEAL1(
C     PROP1,PROP2,EID,HID,HEL,SID,CVID,CPID,3)
        IF(IFUNC.EQ.2)ANS=CVID
        IF(IFUNC.EQ.3)ANS=CPID
        IF(IFUNC.GE.4)ANS=HID
        IF(IFUNC.EQ.5)ANS=EID
        IF(IFUNC.EQ.6)ANS=SID
        IF(IFUNC.EQ.7)ANS=HEL
        IF(IFUNC.EQ.8)ANS=SID
        IF(IFUNC.EQ.9)ANS=HEL
        IF(IFUNC.EQ.10)ANS=ETA0(PROP1)
        IF(IFUNC.EQ.11)ANS=TCOND0(PROP1)
        IF(IFUNC.LE.5)WRITE(*,81)PROP1,ANS
        IF((IFUNC.GT.5).AND.(IFUNC.LT.10))WRITE(*,82)PROP1,PROP2,ANS
        IF(IFUNC.GE.10)WRITE(*,81)PROP1,ANS
      END IF
      IF(ICAT.EQ.7)STOP 'FINISH C2PROPS'
      GO TO 10
 80   FORMAT(1X,4G20.9)
 81   FORMAT(1X,2G20.9)
 82   FORMAT(1X,3G20.9)
      END
C
      FUNCTION CSAT(T)
C
C*********THIS FUNCTION CALCULATES THE HEAT CAPACITY OF THE LIQUID
C*********ALONG THE SATURATION BOUNDARY
C
      COMMON /DERIV/ DPSDT, DDSDT
      RHO=DSATL(T)
      CALL DPDT(DPD,RHO,T,1)
      CSAT=CVF(RHO,T)-100.*T/RHO**2*DPD*DDSDT
      RETURN
      END
C
```

```
      FUNCTION BVIR(T)
C
C*********THIS FUNCION CALCULATES THE SECOND VIRIAL COEFFICIENT
C*********USING THE SCHMIDT-WAGNER EQUATION OF STATE
C
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               , CMW
C
      TA = TC / T
      T15 = TA ** 1.5
      T25 = TA ** 2.5
      T5 = TA ** 5
      T6 = TA ** 6
      B = G(1) + G(2)*T15 + G(3)*T25 + G(14)*T5+ G(15)*T6
      BVIR = B / DC
      RETURN
      END
C
       SUBROUTINE SATF(TS,PS,DSL,DSV)
C      PURPOSE --- THIS ROUTINE CALCULATES THE SATURATION
C                  PRESSURE AND COEXISTING DENSITIES FROM
C                  AN EQUATION OF STATE.
C
C      VERSION 2.0  5/20/82
C
C      CODED BY -- J. F. ELY
C                  THERMOPHYSICAL PROPERTIES DIVISION
C                  NATIONAL BUREAU OF STANDARDS
C                  BOULDER, COLORADO  80303
C
C * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  **
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               , CMW
      LOGICAL ENTER
      DATA TOL, FTOL, ENTER / 1.0E-4, 1.0E-6, .FALSE. /
C
      IF(TS.LT.TC) GO TO 005
      PS = PC
      DSL = DC
      DSV = DC
      RETURN
C
  005 IF (ENTER) GO TO 010
      ENTER = .TRUE.
      BV = ALOG(PTRP/PC) / (1.0/TTRP - 1.0/TC)
      AV = ALOG(PC) - BV / TC
C                         INITIAL GUESS AT THE VAPOR PRESSURE
  010 PS = EXP(AV+BV/TS)
C
C                         INITAL GUESS AT THE VAPOR DENSITY
      DV = PS / (R*TS)
C                         INITIAL GUESS AT LIQUID DENSITY
C
      TR = TS /TC
      EPS = (1.0-TR)**(2.0/7.0)
      DL = DC / ZC**EPS
      IF (DL.GT.DTRP) DL = DTRP
C
C                         IMPROVE VAPOR GUESS NEAR CRITICAL
C
      IF (TR.LT.0.85) GO TO 015
      DV = DL - 3.75 * DC * (1.0-TR)**0.333
C                         NEWTON-RAPHSON ITERATION FOR DENSITIES
  015 DO 100 J = 1, 25
  020 CALL PVTF(PL,DL,TS,DPDL,D2PDD2,GL)
  030 IF (DPDL.GT.0.0.AND.PL.GT.0.0) GO TO 040
```

```
      DL = 1.02 * DL
      GO TO 020
  040 CALL PVTF(PV,DV,TS,DPDV,D2PDD2,GV)
      IF (DPDV.GT.0.0) GO TO 060
      DV = 0.98 * DV
      GO TO 040
  060 F1 = GL -GV
      F2 = PL - PV
      F2L = DPDL
      F2V = - DPDV
      F1L = F2L / DL
      F1V = F2V / DV
      DENOM = F1L * F2V - F2L * F1V
      IF (ABS(DENOM).LE.1.0E-10) GO TO 120
      DDL = -(F1*F2V-F2*F1V) / DENOM
      DDV = -(F1+DDL*F1L) / F1V
      DL = DL + DDL
      IF(DL.LT.DC) DL = DC
      DVS = DV
      DV = DV + DDV
      IF(DV.GT.DC) DV = DC
      IF(DV.LE.0.0) DV=DVS/2.0
      IF (ABS(DDL/DL).LT.TOL .AND. ABS(DDV/DV).LE.TOL) GO TO 110
      FNORM = F1*F1 + F2*F2
      IF(TR.LT.0.99 .AND. FNORM.LE.FTOL) GO TO 110
  100 CONTINUE
  110 PS = PV
      DSL = DL
      DSV = DV
      RETURN
  120 WRITE(6,340) DENOM
      GO TO 110
  300 FORMAT(I3,8G10.4)
  310 FORMAT(I3,2F12.8,G13.6)
  330 FORMAT(F8.2,G13.6,2F10.6,2G13.6)
  340 FORMAT('DENOM IS TOO SMALL IN SATF',G13.6)
      END
C
      FUNCTION RHOF(P1,P2)
C
C * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  **  *
C
C     PURPOSE -- THIS ROUTINE CALCULATES THE DENSITY OF A FLUID AT
C                T AND P GIVEN AN INITIAL GUESS IN FOP.  ON EXIT,
C                IT RETURNS THE FUGACITY COEFFICIENT IN FOP.  IT
C                REQUIRES A ROUTINE 'PVTF' WHICH CALCULATES P,
C                DPDD, AND GR = G(T,P)-G*(T,1)
C
C       CODED BY--J. F. ELY
C                THERMOPHYSICAL PROPERTIES DIVISION
C                NATIONAL ENGINEERING LABORATORY
C                NATIONAL BUREAU OF STANDARDS
C                BOULDER, COLORADO 80302
C
C       VERSION 2.0 -- 5/23/82
C
C * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  * * * *  **  *
C
C       REVISED 3/12/85 TO CHANGE BOUNDS AND AVOID CRITICAL REGION IN N-R.
C
      COMMON /REFDAT/ R, PC, DC, TC, ZC, A(32), PTRP, DTRP, TTRP
     *               , CMW
      DATA TOLERD, TOLERP / 1.0E-8, 1.0E-8/
C
C                        ESTABLISH BOUNDS AND START NEWTON-RAPHSON
      P = P1
```

```
      T = P2
      D = P / (R*T)
      IF (T.GT.TC) GO TO 019
      CALL SATF(T,PS,DSL,DSV)
      D = DSV
      IF (P.GE.PS) D = DSL
      IF ((P.GE.1.5*PS).AND.((TC-T).LE.7.)) D = 2.0 * DSL
      GO TO 020
  019 IF (P.GT.2.*PC) D = 1.5 * MAX(D,DC)
C
C                          ESTABLISH BOUNDS AND START NEWTON RAPHSON
  020 DLO=0.0
      DHI = 1.50 * DTRP
      DMAX = 1.2 * DHI
      DO 100 LAP=1,20
      CALL PVTF(PX,D,T,DPDD,D2PDD2,GR)
C
C                          IF DPDD IS ZERO OR NEGATIVE, TRY BISECTION
C
      IF(DPDD.LE.1.0E-3) GO TO 120
      DP=P-PX
      DD=DP/DPDD
C                          SAVE DENSITY FOR POSSIBLE BISECTION
      IF (DP) 040,300,060
  040 DHI=D
      GO TO 080
  060 DLO=D
  080 DN=D+DD
C                          KEEP D WITHIN BOUNDS OR GO TO BISECTION
      IF (DN.LT.0.0 .OR. DN.GT.DMAX) GO TO 120
      D=DN
      IF(LAP.EQ.1) GO TO 100
      IF(ABS(DP/P).LE.TOLERP) GO TO 300
      IF(ABS(DD/D).LE.TOLERD) GO TO 300
  100 CONTINUE
C                          NEWTON-RAPHSON FAILURE.  TRY BISECTION
  120 IF(T.GT.TC) GO TO 160
C
C                          SUB-CRITICAL.  MAKE SURE THAT WE HAVE THE
C                          PROPER BOUNDS ON THE DENSITY.
      IF(P.LT.PS) GO TO 140
      DLO = DSL
      IF(DHI.LE.DSL) DHI=DMAX
      GO TO 160
C
  140 IF(DLO.GE.DSV) DLO=0.0
      DHI = DSV
C
C                          START THE BISECTION
  160 D=0.50*(DLO+DHI)
      CALL PVTF(PX,D,T,DPDD,D2PDD2,GR)
      DP=PX-P
      IF(DP) 200,300,220
  200 DLO=D
      GO TO 240
  220 DHI=D
  240 IF(ABS(DP/P) .LE. TOLERP) GO TO 300
      IF(ABS(DLO/DHI-1.0).GT.TOLERD) GO TO 160
C
C                          BISECTION FAILED.  GIVE UP
  260 WRITE(6,400) T, P,D,DPDD,DLO,DHI,LAP,PX
C                          CONVERGENCE ! ! !
  300 RHOF=D
      RETURN
  400 FORMAT('RHOF FAILED AT T =',F9.3,' P =',G14.7,4G12.6,I4,G12.6)
      END
```

```
C
      SUBROUTINE PVTF(P0,D0,T0,DPDD,D2PD2,G0)
C
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
C     PURPOSE --- THIS ROUTINE CALCULATES THE  PRESSURE, ITS FIRST
C                 TWO DENSITY DERIVATIVES AND THE GIBBS ENERGY
C                 RELATIVE TO THE IDEAL GAS AT 1 BAR
C                 THIS ROUTINE IS FOR THE WAGNER EQUATION OF STATE
C
C      VERSION 1.0 - 2/18/85
C
C      CODED BY -- J. F. ELY
C                  CHEMICAL ENGINEERING SCIENCE DIVISION
C                  NATIONAL BUREAU OF STANDARDS
C                  BOULDER, COLORADO  80303
C
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
      DIMENSION S(4), P(10,3), Q(3), DQDD(3), D2QDD2(3), D3QDD3(3)
C
      COMMON /REFDAT/ RG, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               , CMW
C
      DATA P / 30*0. /, TLAST / -1.0 /
C
C
      T = TC / T0
      D = D0 / DC
      IF(T.EQ.TLAST) GO TO 040
      TLAST=T
      RT = RG * T0
      TS = SQRT(T)
      TTS = T * TS
      T2 = T * T
      T3 = T * T2
      T4 = T * T3
      T5 = T * T4
      T6 = T * T5
      T7 = T * T6
      T8 = T2 * T6
      T11 = T8 * T3
      T17 = T6 * T11
      T18 = T * T17
C
      P(1,1) = G(1) + (G(2) + G(3)*T) * TTS
      P(2,1) = G(4)/TS + G(5)*TTS + G(6)*T2
      P(3,1) = G(7) + (G(8) + G(9)*TTS) * T
      P(6,1) = G(10)
      P(7,1) = G(11)*T2 + G(12)*T5
      P(8,1) = G(13)*T2
C
      P(1,2) = G(14)*T5 + G(15)*T6
      P(2,2) = (G(16) + G(17)*T2) * T2 * TTS
      P(3,2) = G(18)*T3 + G(19)*T7
      P(5,2) = G(20) * T6
      P(6,2) = G(21) * T8 * TS
      P(7,2) = G(22) * T4
      P(8,2) = G(23) * T6 * TS
      P(10,2)= G(24) * T5 * TS
C
      P(2,3) = G(25) * T11 * T11
      P(3,3) = G(26) * T11 + G(27) * T18
      P(4,3) = (G(28) + G(29)*T11*T) * T11
      P(5,3) = (G(30) + T * (G(31) + G(32)*T5)) * T17
C
```

```
  040 DO 070 J = 1, 3
      DO 050 K = 1, 4
  050 S(K) = 0.
      DO 060 I = 1, 10
      S(1) = S(1) * D + P(11-I,J)
      S(2) = S(2) * D + S(1)
      IF (I.EQ.10) GO TO 060
      S(3) = S(3) * D + S(2)
      IF (I.EQ.9) GO TO 060
      S(4) = S(4) * D + S(3)
  060 CONTINUE
      Q(J) = S(1) * D
      DQDD(J) = S(2)
      D2QDD2(J) = S(3) * 2.0
  070 D3QDD3(J) = S(4) * 6.0
C
      D2 = D * D
      D3 = D * D2
      F2 = EXP(-D2)
      F3 = EXP(-D*D3)
      TWOD = 2.0 * D
      FORD = 4.0 * D3
      DRT = D0 * RT
C
      PHI = Q(1) + Q(2) * F2 + Q(3) * F3
C
      TRM2 = DQDD(2) - TWOD * Q(2)
      TRM3 = DQDD(3) - FORD * Q(3)
      DPHDD = DQDD(1) + TRM2 * F2 + TRM3 * F3
      P0 = DRT * (1.0 + D * DPHDD)
C
      TRM2P = D2QDD2(2) - 2.0 * Q(2) - TWOD * DQDD(2)
      TRM3P = D2QDD2(3) - 12.0 * D2 * Q(3) - FORD * DQDD(3)
      TRM22 = TRM2P - TWOD * TRM2
      TRM33 = TRM3P - FORD * TRM3
      D2PHD2 = D2QDD2(1) + TRM22 * F2 + TRM33 * F3
      DPDD = RT * (1.0 + TWOD * DPHDD + D2 * D2PHD2)
C
      TRM22P = D3QDD3(2) - 4.0 * DQDD(2) - TWOD * D2QDD2(2)
     *                   - 2.0 * TRM2    - TWOD * TRM2P
      TRM33P = D3QDD3(3) - 24.0 * D * (Q(3) + D * DQDD(3))
     *       - FORD * (D2QDD2(3) + TRM3P) - 12.0 * D2 * TRM3
      D3PHD3 = D3QDD3(1) + (TRM22P - TWOD * TRM22) * F2
     *                   + (TRM33P - FORD * TRM33) * F3
      D2PD2 = RT * (2.0*DPHDD + 4.0*D*D2PHD2 + D2*D3PHD3) / DC
C
      Z0 = P0 / DRT
      G0 = RT * (PHI + Z0 - 1.0 + ALOG(DRT))
      RETURN
      END
C
      FUNCTION CVF(D,T)
C
C************THIS FUNCTION CALCULATES THE ISOCHORIC HEAT CAPACITY
C
      CALL CVR(CVD,D,T,1)
      CALL IDEAL(T,CVI,SI)
      CVF = CVI + 100.0 * CVD
      RETURN
      END
```

```
      FUNCTION WSF(D,T)
C
C                          THIS ROUTINE CALCULATES THE SOUND VELOCITY
C                          GIVEN THE DENSITY AND TEMPERATURE
C
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               , CMW
C
      COMMON /DPDCAL/ CP, CV, DPD, DPT
C
      CV = CVF(D,T)
      CALL DPDT(DPT,D,T,1)
      CALL DPDD(DPD,D,T,1)
      DPT = DPT / D
      CP = CV + 100.0 * T * DPT * DPT / DPD
      WSS =  CP * DPD / (CMW * CV)
       IF(WSS.LT.0.)WSS=0.0
      WSF = SQRT(1.0E5 * WSS)
      RETURN
      END
C
      SUBROUTINE PROPSS(PP,DD,TT,IDD)
C************THIS SUBROUTINE CALCULATES MANY OF THE THERMODYNAMIC
C************PROPERTIES FROM THE SCHMIDT-WAGNER EQUATION OF STATE
      DIMENSION X(33),B(33)
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               , CMW
      EQUIVALENCE (B,X)
    1 CONTINUE
      D = DD/DC
      DEN = DD
      T = TC/TT
      TEMP = TT
      RT = R * TEMP
      DRT = DEN * RT
      DDRT = D * DRT
      RTD = RT / DC
      RD = DEN * R
      RTT = RD / TC
      D2 = D * D
      D3 = D2 * D
      D4 = D3 * D
      D5 = D4 * D
      D6 = D5 * D
      D7 = D6 * D
      D8 = D7 * D
      D9 = D8 * D
      D10 = D9 * D
      D11 = D10 * D
      D12 = D11 * D
      D13 = D12 * D
      D14 = D13 * D
      D15 = D14 * D
      D16 = D15 * D
      TS = SQRT (T)
      TMS = 1.0 / TS
      T15 = T * TS
      T2 = T * T
      T25 = T2 * TS
      T3 = T2 * T
      T35 = T3 * TS
      T4 = T3 * T
      T45 = T4 * TS
      T5 = T4 * T
      T55 = T5 * TS
      T6 = T5 * T
```

```
      T65 = T6 * TS
      T7 = T6 * T
      T75 = T7 * TS
      T8 = T7 * T
      T85 = T8 * TS
      T9 = T8 * T
      T95 = T9 * TS
      T11 = T8 * T3
      T12 = T11 * T
      T17 = T12*T5
      T18 = T17 * T
      T19 = T18 * T
      T22 = T18 * T4
      T23 = T22 * T
      T24 = T23 * T
      F1 = EXP ( -D2)
      F2 = EXP ( -D4)
      GO TO (100,200,300,400,500,600,700,800),K
      ENTRY PRESS(PP,DD,TT,IDD)
C********ENTRY TO CALCULATE PRESSURE
      K = 1
      GO TO 1
  100 CONTINUE
      B( 1) = DDRT *  1.0
      B( 2) = DDRT *  T15
      B( 3) = DDRT *  T25
      B( 4) = DDRT *  2.*D*TMS
      B( 5) = DDRT *  2.*D*T15
      B( 6) = DDRT *  2.*D*T2
      B( 7) = DDRT *  3.*D2
      B( 8) = DDRT *  3.*D2*T
      B( 9) = DDRT *  3.*D2*T25
      B(10) = DDRT *  6.*D5
      B(11) = DDRT *  7.*D6*T2
      B(12) = DDRT *  7.*D6*T5
      B(13) = DDRT *  8.*D7*T2
      B(14) = DDRT *  (1.-2.*D2)*T5*F1
      B(15) = DDRT *  (1.-2.*D2)*T6*F1
      B(16) = DDRT *  (2.*D-2.*D3)*T35*F1
      B(17) = DDRT *  (2.*D-2.*D3)*T55*F1
      B(18) = DDRT *  (3.*D2-2.*D4)*T3*F1
      B(19) = DDRT *  (3.*D2-2.*D4)*T7*F1
      B(20) = DDRT *  (5.*D4-2.*D6)*T6*F1
      B(21) = DDRT *  (6.*D5-2.*D7)*T85*F1
      B(22) = DDRT *  (7.*D6-2.*D8)*T4*F1
      B(23) = DDRT *  (8.*D7-2.*D9)*T65*F1
      B(24) = DDRT *  (10.*D9-2.*D11)*T55*F1
      B(25) = DDRT *  (2.*D-4.*D5)*T22*F2
      B(26) = DDRT *  (3.*D2-4.*D6)*T11*F2
      B(27) = DDRT *  (3.*D2-4.*D6)*T18*F2
      B(28) = DDRT *  (4.*D3-4.*D7)*T11*F2
      B(29) = DDRT *  (4.*D3-4.*D7)*T23*F2
      B(30) = DDRT *  (5.*D4-4.*D8)*T17*F2
      B(31) = DDRT *  (5.*D4-4.*D8)*T18*F2
      B(32) = DDRT *  (5.*D4-4.*D8)*T23*F2
      IF(IDD.GT.0)GO TO 102
      B(33) = PP-DRT
      RETURN
  102 P = 0
      M = 32
      DO 101 I = 1,M
      P = P+B(I) * G(I)
  101 CONTINUE
      P =  P + DRT
      PP = P
      RETURN
```

```
C
      ENTRY DPDD(PP,DD,TT,IDD)
C**********ENTRY TO CALCULATE ISOTHERMAL DENSITY DERIVATIVE OF PRESSURE
C
      K = 2
      GO TO 1
  200 CONTINUE
      B( 1) = RT *   2.00 * D
      B( 2) = RT *   2.00 * D * T15
      B( 3) = RT *   2.00 * D * T25
      B( 4) = RT *   6.00 * D2 *TMS
      B( 5) = RT *   6.00 * D2 * T15
      B( 6) = RT *   6.00 * D2 * T2
      B( 7) = RT *  12.00 * D3
      B( 8) = RT *  12.00 * D3 * T
      B( 9) = RT *  12.00 * D3 * T25
      B(10) = RT *  42.00 * D6
      B(11) = RT *  56.00 * D7 * T2
      B(12) = RT *  56.00 * D7 * T5
      B(13) = RT *  72.00 * D8 * T2
      B(14) = RT * F1 *  (2.00 * D  - 10.*D3 + 4.*D5) * T5
      B(15) = RT * F1 *  (2.00 * D  - 10.*D3 + 4.*D5) * T6
      B(16) = RT * F1 *  (6.00 * D2 - 14.*D4 + 4.*D6) * T35
      B(17) = RT * F1 *  (6.00 * D2 - 14.*D4 + 4.*D6) * T55
      B(18) = RT * F1 *  (12.0 * D3 - 18.*D5 + 4.*D7) * T3
      B(19) = RT * F1 *  (12.0 * D3 - 18.*D5 + 4.*D7) * T7
      B(20) = RT * F1 *  (30.00 *D5 - 26.*D7 + 4.*D9) * T6
      B(21) = RT * F1 *  (42.00 *D6 - 30.*D8 + 4.*D10) * T85
      B(22) = RT * F1 *  (56.00 *D7 - 34.*D9 + 4.*D11) * T4
      B(23) = RT * F1 *  (72.00 *D8 - 38.*D10 + 4.*D12) * T65
      B(24) = RT * F1 * (110.00 *D10 -46.*D12 + 4.*D14) * T55
      B(25) = RT * F2 *  (6.00 * D2 - 36.0 * D6 + 16.0 * D10) * T22
      B(26) = RT * F2 *  (12.0 * D3 - 44.0 * D7 + 16.0 * D11) * T11
      B(27) = RT * F2 *  (12.0 * D3 - 44.0 * D7 + 16.0 * D11) * T18
      B(28) = RT * F2 *  (20.0 * D4 - 52.0 * D8 + 16.0 * D12) * T11
      B(29) = RT * F2 *  (20.0 * D4 - 52.0 * D8 + 16.0 * D12) * T23
      B(30) = RT * F2 *  (30.0 * D5 - 60.0 * D9 + 16.0 * D13) * T17
      B(31) = RT * F2 *  (30.0 * D5 - 60.0 * D9 + 16.0 * D13) * T18
      B(32) = RT * F2 * (30.0 * D5 - 60.0 * D9 + 16.0 * D13) * T23
      M = 32
      IF(IDD.GT.0)GO TO 202
      B(33) = PP-RT
      RETURN
  202 P = 0
      DO 201 I = 1,M
      P = P+B(I) * G(I)
  201 CONTINUE
      P = P+RT
      PP = P
      RETURN
C
      ENTRY DPDT(PP,DD,TT,IDD)
C********ENTRY TO CALCULATE ISOCHORIC TEMPERATURE DERIVATIVE OF PRESSURE
C
      K = 3
      GO TO 1
  300 CONTINUE
      B( 1) = RD *  D
      B( 2) = -RD *  .5*D*T15
      B( 3) = -RD *  1.5*D*T25
      B( 4) = RD *  3.*D2*TMS
      B( 5) = -RD *  D2*T15
      B( 6) = -RD *  2.*D2*T2
      B( 7) = RD *  3.*D3
      B( 8) = 0.0
      B( 9) = -RD *  4.5*D3*T25
```

```
      B(10) = RD *  6.*D6
      B(11) = -RD *  7.*D7*T2
      B(12) = -RD *  28.*D7*T5
      B(13) = -RD *  8.*D8*T2
      B(14) = -RD * (4.0*D-8.*D3)*T5*F1
      B(15) = -RD * (5.0*D-10.*D3)*T6* F1
      B(16) = -RD *  5.0*(D2-D4)*T35*F1
      B(17) = -RD *  9.0*(D2-D4)*T55*F1
      B(18) = -RD * (6.*D3-4.*D5)*T3*F1
      B(19) = -RD * (18.*D3-12.*D5)*T7*F1
      B(20) = -RD * (25.*D5-10.*D7)*T6*F1
      B(21) = -RD * (45.0*D6-15.*D8)*T85*F1
      B(22) = -RD * (21.*D7-6.*D9)*T4*F1
      B(23) = -RD * (44.*D8-11.*D10)*T65*F1
      B(24) = -RD * (45.*D10-9.*D12)*T55*F1
      B(25) = -RD * (42.*D2-84.*D6)*T22*F2
      B(26) = -RD * (30.*D3-40.*D7)*T11*F2
      B(27) = -RD * (51.*D3-68.*D7)*T18*F2
      B(28) = -RD *  40.*(D4-D8)*T11*F2
      B(29) = -RD *  88.*(D4-D8)*T23*F2
      B(30) = -RD * (80.*D5-64.*D9)*T17*F2
      B(31) = -RD * (85.*D5-68.*D9)*T18*F2
      B(32) = -RD * (110.*D5-88.*D9)*T23*F2
      IF(IDD.GT.0)GO TO 302
      B(33) = PP-RD
      RETURN
  302 P = 0
      DO 301 I = 1,32
      P = P+G(I) * B(I)
  301 CONTINUE
      PP = P+RD
      RETURN
C
      ENTRY SR(PP,DD,TT,IDD)
C**********ENTRY TO CALCULATE RESIDUAL ENTROPY
C
      K = 4
      GO TO 1
  400 CONTINUE
      X( 1) = -R * D
      X( 2) = R * 0.50 * D * T15
      X( 3) = R * 1.50 * D * T25
      X( 4) = -R * 1.50 * D2 * TMS
      X( 5) = R * 0.50 * D2 * T15
      X( 6) = R  * D2 * T2
      X( 7) = -R * D3
      X( 8) = 0.0
      X( 9) = R * 1.5 * D3 * T25
      X(10) = -R * D6
      X(11) = R * D7 * T2
      X(12) = R * 4.00 * D7 * T5
      X(13) = R * D8 * T2
      X(14) = R * 4.00 * D * T5 * F1
      X(15) = R * 5.00 * D * T6 * F1
      X(16) = R * 2.5 * D2 *T35 * F1
      X(17) = R * 4.5 * D2 * T55 * F1
      X(18) = R * 2.00 * D3 * T3 * F1
      X(19) = R * 6.00 * D3 * T7 * F1
      X(20) = R * 5.00 * D5 * T6 * F1
      X(21) = R * 7.5 * D6 *T85 * F1
      X(22) = R * 3.0 * D7 * T4 * F1
      X(23) = R * 5.5 * D8 * T65 * F1
      X(24) = R * 4.5 * D10 * T55 * F1
      X(25) = R * 21.0 * D2 * T22 * F2
      X(26) = R * 10.0 * D3 * T11 * F2
      X(27) = R * 17.0 * D3 * T18 * F2
```

```
      X(28) = R * 10.0 * D4 * T11 * F2
      X(29) = R * 22.0 * D4 * T23 * F2
      X(30) = R * 16.0 * D5 * T17 * F2
      X(31) = R * 17.0 * D5 * T18 * F2
      X(32) = R * 22.0 * D5 * T23 * F2
      IF(IDD.GT.0)GO TO 402
      RETURN
  402 P = 0
      DO 401 I = 1,32
      P = P+G(I) * X(I)
  401 CONTINUE
      PP = P
      RETURN
C
      ENTRY AR(PP,DD,TT,IDD)
C************ENTRY TO CALCULATE RESUDUAL HELMHOLTZ FREE ENERGY
C
      K = 5
      GO TO 1
  500 CONTINUE
      B( 1) = RT * D
      B( 2) = RT * D * T15
      B( 3) = RT * D * T25
      B( 4) = RT * D2 *TMS
      B( 5) = RT * D2 * T15
      B( 6) = RT * D2 * T2
      B( 7) = RT * D3
      B( 8) = RT * D3 * T
      B( 9) = RT * D3 * T25
      B(10) = RT * D6
      B(11) = RT * D7 * T2
      B(12) = RT * D7 * T5
      B(13) = RT * D8 * T2
      B(14) = RT * D * T5 * F1
      B(15) = RT * D * T6 *F1
      B(16) = RT * D2 * T35 * F1
      B(17) = RT * D2 *T55 * F1
      B(18) = RT * D3 * T3 * F1
      B(19) = RT * D3 * T7 * F1
      B(20) = RT * D5 * T6 * F1
      B(21) = RT * D6 * T85 * F1
      B(22) = RT * D7 * T4 * F1
      B(23) = RT * D8 * T65 * F1
      B(24) = RT * D10 * T55 * F1
      B(25) = RT * D2 * T22 * F2
      B(26) = RT * D3 * T11 * F2
      B(27) = RT * D3 * T18 * F2
      B(28) = RT * D4 * T11  * F2
      B(29) = RT * D4 * T23 * F2
      B(30) = RT * D5 *T17 * F2
      B(31) = RT * D5 * T18 * F2
      B(32) = RT * D5 * T23 * F2
      IF(IDD.GT.0)GO TO 502
      RETURN
  502 P = 0
      DO 501 I = 1,32
      P = P+G(I) * B(I)
  501 CONTINUE
      PP = P
      RETURN
```

```
      ENTRY CVR(PP,DD,TT,IDD)
C**********ENTRY TO CALCULATE RESIDUAL ISOCHORIC HEAT CAPACITY
C
      K = 6
      GO TO 1
  600 CONTINUE
      X( 1) = 0.0
      X( 2) = -R * 0.75 * D * T15
      X( 3) = -R * 3.75 * D * T25
      X( 4) = -R * 0.75 * D2 * TMS
      X( 5) = -R * 0.75 * D2 * T15
      X( 6) = -R * 2.00 * D2 * T2
      X( 7) = 0.0
      X( 8) =  0.0
      X( 9) = -R * 3.75 * D3 * T25
      X(10) =  0.0
      X(11) = -R * 2.00 * D7 * T2
      X(12) = -R * 20.00 * D7 * T5
      X(13) = -R * 2.00 * D8 * T2
      X(14) = -R * 20.00 * D * T5 * F1
      X(15) = -R * 30.00 * D * T6 * F1
      X(16) = -R * 8.75 * D2 *T35 * F1
      X(17) = -R * 24.75 * D2 * T55 * F1
      X(18) = -R * 6.00 * D3 * T3 * F1
      X(19) = -R * 42.00 * D3 * T7 * F1
      X(20) = -R * 30.00 * D5 * T6 * F1
      X(21) = -R * 63.75 * D6 *T85 * F1
      X(22) = -R * 12.0 * D7 * T4 * F1
      X(23) = -R * 35.75 * D8 * T65 * F1
      X(24) = -R * 24.75 * D10 * T55 * F1
      X(25) = -R * 462.0 * D2 * T22 * F2
      X(26) = -R * 110.0 * D3 * T11 * F2
      X(27) = -R * 306.0 * D3 * T18 * F2
      X(28) = -R * 110.0 * D4 * T11 * F2
      X(29) = -R * 506.0 * D4 * T23 * F2
      X(30) = -R * 272.0 * D5 * T17 * F2
      X(31) = -R * 306.0 * D5 * T18 * F2
      X(32) = -R * 506.0 * D5 * T23 * F2
      IF(IDD.GT.0)GO TO 602
      RETURN
  602 P = 0
      DO 601 I = 1,32
      P = P+G(I) * X(I)
  601 CONTINUE
      PP = P
      RETURN
C
      ENTRY DP2D2(PP,DD,TT,IDD)
C*********ENTRY TO CALCULATE SECOND ISOTHERMAL DENSITY DERIVATIVE
C*********OF PRESSURE
C
      K = 7
      GO TO 1
  700 CONTINUE
      B( 1) = RTD * 2.0
      B( 2) =RTD * 2.0 * T15
      B( 3) =RTD * 2.0 * T25
      B( 4) =RTD * 12.0 * D * TMS
      B( 5) =RTD * 12.0 * D * T15
      B( 6) =RTD * 12.0 * D * T2
      B( 7) =RTD * 36.0 * D2
      B( 8) =RTD * 36.0 * D2 * T
      B( 9) =RTD * 36.0 * D2 * T25
      B(10) =RTD * 252. * D5
      B(11) =RTD * 392. * D6 * T2
      B(12) =RTD * 392. * D6 * T5
```

```
      B(13) =RTD * 576. * D7 * T2
      B(14) =RTD *(  2.0 -  34.0 * D2 +  40.0 * D4 - 8.0 * D6)*T5*F1
      B(15) =RTD *(  2.0 -  34.0 * D2 +  40.0 * D4 - 8.0 * D6)*T6*F1
      B(16) =RTD *(12.0*D - 68.0 * D3 + 52.0 * D5 - 8.0 * D7)*T35*F1
      B(17) =RTD *(12.0*D - 68.0 * D3 + 52.0 * D5 - 8.0 * D7)*T55*F1
      B(18) =RTD*(36.0*D2 -114.0 * D4 +  64.0 * D6 - 8.0 * D8)*T3*F1
      B(19) =RTD*(36.0*D2 -114.0 * D4 +  64.0 * D6 - 8.0 * D8)*T7*F1
      B(20) =RTD*(150.0*D4 -242.0*D6 +  88.0 * D8 - 8.0 * D10)*T6*F1
      B(21) =RTD*(252.0*D5 -324.0*D7 +100.0 * D9 - 8.0 * D11)*T85*F1
      B(22) =RTD*(392.0*D6-418.0 *D8 + 112.0 * D10- 8.0 * D12)*T4*F1
      B(23) =RTD*(576.0*D7-524.0*D9 + 124.0 * D11- 8.0 * D13)*T65*F1
      B(24) =RTD*(1100.0*D9-772.0*D11 +148.0 *D13- 8.0 * D15)*T55*F1
      B(25) =RTD*(12.0*D- 240.0 * D5 +304.0 * D9- 64.0 * D13)*T22*F2
      B(26) =RTD*(36.0*D2 -356.0*D6 +352.0 * D10- 64.0 * D14)*T11*F2
      B(27) =RTD*(36.0*D2 -356.0*D6 +352.0 * D10- 64.0 * D14)*T18*F2
      B(28) =RTD*(80.0*D3 -496.0*D7 +400.0 * D11- 64.0 * D15)*T11*F2
      B(29) =RTD*(80.0*D3 -496.0*D7 +400.0 * D11- 64.0 * D15)*T23*F2
      B(30) =RTD*(150.0*D4 -660.0*D8 +448.0 * D12-64.0 * D16)*T17*F2
      B(31) =RTD*(150.0*D4 -660.0*D8 +448.0* D12- 64.0 * D16)*T18*F2
      B(32) =RTD*(150.0*D4-660.0*D8 +448.0 * D12- 64.0 * D16)*T23*F2
      M = 32
      IF(IDD.GT.0)GO TO 702
      B(33) = PP
      RETURN
  702 PP = 0
      DO 701 I = 1,M
      PP = PP + B(I)*G(I)
  701 CONTINUE
      PP = PP
      RETURN
C
      ENTRY DP2DT2(PP,DD,TT,IDD)
C*********ENTRY TO CALCULATE SECOND ISOCHORIC TEMPERATURE DERIVATIVE
C*********OF PRESSURE
C
      K = 8
      GO TO 1
  800 CONTINUE
      B( 1) = 0.0
      B( 2) = RTT *  D * 0.75 * T25
      B( 3) = RTT *  D * 3.75 * T35
      B( 4) = RTT *  1.5 * D2 * TS
      B( 5) = RTT *  1.5 * D2 * T25
      B( 6) = RTT *  4.0*D2*T3
      B( 7) = 0.0
      B( 8) = 0.0
      B( 9) = RTT *  11.25*D3*T35
      B(10) = 0.0
      B(11) = RTT * 14.*D7 *T3
      B(12) = RTT *  140.*D7* T6
      B(13) = RTT * 16.*D8 *T3
      B(14) = RTT * (20.*D-40.*D3)*T6 * F1
      B(15) = RTT * (30.*D-60.0*D3) *T7*F1
      B(16) = RTT *  (D2-D4)*17.5*T45*F1
      B(17) = RTT *  (D2-D4)*49.50*T65*F1
      B(18) = RTT *  (18.0*D3-12.0*D5)* T4*F1
      B(19) = RTT *  (126.0*D3-84.0*D5)* T8*F1
      B(20) = RTT *  (150.0*D5-60.*D7) * T7*F1
      B(21) = RTT *  (382.5*D6-127.5*D8) * T95*F1
      B(22) = RTT *  (84.0*D7-24.0*D9) * T5*F1
      B(23) = RTT *  (286.0*D8-71.5*D10) * T75*F1
      B(24) = RTT *  (247.5*D10-49.5*D12) * T65*F1
      B(25) = RTT *  (924.0*D2-1848.0*D6) * T23*F2
      B(26) = RTT *  (330.0*D3-440.0*D7) * T12*F2
      B(27) = RTT *  (918.0*D3-1224.0*D7) * T19*F2
      B(28) = RTT *  (D4-D8)*440.0*T12*F2
```

```
      B(29) = RTT *  (D4-D8)* 2024.0*T24*F2
      B(30) = RTT *  (1360.0*D5-1088.0*D9) * T18*F2
      B(31) = RTT *  (1530.0*D5-1224.0*D9) * T19*F2
      B(32) = RTT *  (2530.0*D5-2024.0*D9) * T24*F2
      IF (IDD.GT.0) GO TO 801
      B(33) = PP
      RETURN
  801 PP = 0.0
      DO 802 I = 1,32
      PP = PP + G(I) * B(I)
  802 CONTINUE
      PP=PP
      RETURN
      END
C
       FUNCTION ENTROPY(DENS,TEMP)
C********FUNCTION TO CALCULATE ENTROPY FROM DENSITY AND TEMPERATURE
C
       CALL SR(EN,DENS,TEMP,1)
       CALL IDEAL1(TEMP,DENS,EID,HID,HEL,SID,CVID,CPID,1)
       ENTROPY=100.*EN+SID
       RETURN
       END
C
         SUBROUTINE IDEAL1(T,D,EID,HID,HEL,SID,CVID,CPID,IATM)
CC***********HAS EXPLICIT DENSITY DEPENDENCE; GOOD FOR ALL PROPERTIES
CC*******AT ANY PRESSURE (OR DENSITY RELATED TO P VIA IDEAL GAS EOS)*****
CC******THIS IS FOR ETHANE AT ANY DENSITY AND TEMPERATURE
CC
      COMMON /REFDAT/ R1,PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               ,CMW
       DIMENSION QS(7)
       DATA QS/-.285949905507E+02,
     A .381594759913E+01,
     B .860212992578E+01,
     C -.330757346034E+01,
     D -.559566778576E+00,
     E .507222665072E+01,
     F -.550748741700E+01/
       DATA Q0/-23.446765/
CC
       CALL IDEAL2(T,EID,HID,HEL,SID,CVID,CPID)
       IF(IATM.NE.0)THEN
       R = R1*100.
       TAU=TC/T
       DEL=D/DC
       ADD=R*(Q0-QS(1) + LOG(DEL/TAU))
       HEL=HEL+T*ADD
       SID=SID-ADD
       END IF
       RETURN
       END
CC
        SUBROUTINE IDEAL2(T,EID,HID,HEL,SID,CVID,CPID)
CC**************NEW IDEAL SUBROUTINE FOR 1986 VALUE OF GAS CONSTANT**********
CC******FORM OF HELMHOLTZ FREE ENERGY FOLLOWS GOODWIN WITH WAGNER VARIABLES**
CC**********GOOD ONLY AT 1 ATM; PROBLEM FOR HEL AND SID--SEE IDEAL1********
CC
      COMMON /REFDAT/ R1,PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *               , CMW
       DIMENSION QS(7)
C********COEFFICIENTS FOR ETHANE (C2)***************
       DATA QS/-.285949905507E+02,
     A .381594759913E+01,
     B .860212992578E+01,
     C -.330757346034E+01,
```

```
     D -.559566778576E+00,
     E .507222665072E+01,
     F -.550748741700E+01/
       DATA P1,P2/-.33333333,-.66666667/
       R = R1*100.
       TAU=TC/T
       TAU3=TAU**P1
       TAU23=TAU**P2
       EXTAU=EXP(QS(7)*TAU )
       PHID=QS(1)+(QS(2)+1.)*LOG(TAU)+QS(3)*TAU3+QS(4)*TAU23
     1 +QS(5)/TAU+QS(6)*LOG(1.-EXTAU)
       PHIDD1=QS(2)-QS(3)/3.*TAU3-2.*QS(4)/3.*TAU23-QS(5)/TAU
     1 -QS(6)*QS(7)*TAU/(1./EXTAU-1.)
       PHIDD2=-QS(2)+4.*QS(3)/9.*TAU3+10.*QS(4)/9.*TAU23
     1 +2.*QS(5)/TAU-QS(6)*QS(7)**2*TAU**2*EXTAU/(EXTAU-1.)**2
        HEL=R*T*PHID
        CPID=R*(1.-PHIDD2)
        EID=R*T*PHIDD1
       HID=R*T+EID
       CVID=-R*PHIDD2
       SID=-R*(PHID-PHIDD1)
       RETURN
        END
C
       FUNCTION HELM(DENS,TEMP)
C*********THIS FUNCTION IS FOR HELMHOLTZ FREE ENERGY
C
       CALL AR(HE,DENS,TEMP,1)
       HE=100.*HE
       CALL IDEAL1(TEMP,DENS,EID,HID,HEL,SID,CVID,CPID,1)
       HELM=HE+HEL
       RETURN
       END
C
       FUNCTION GIBBS(DENS,TEMP,PRES)
C**********THIS FUNCTION IS FOR GIBBS ENERGY
C
       HEL=HELM(DENS,TEMP)
       GIBBS=HEL+PRES*1.E05/(DENS*1000.)
       RETURN
       END
C
       FUNCTION UNTERN(DENS,TEMP)
C*********THIS FUNCTION IS FOR INTERNAL ENERGY
C
       HEL=HELM(DENS,TEMP)
       SS=ENTROPY(DENS,TEMP)
       UNTERN=HEL+SS*TEMP
       RETURN
       END
C
       FUNCTION ENTHALP(DENS,TEMP,PRES)
C*********THIS FUNCTION IS FOR ENTHALPY
C
       HEL=HELM(DENS,TEMP)
       UNT=UNTERN(DENS,TEMP)
       GIB=GIBBS(DENS,TEMP,PRES)
       ENTHALP=GIB+UNT-HEL
       RETURN
       END
```

```
       FUNCTION CPEE(RHO,TEE)
C*********THIS FUNCTION IS FOR ISOBARIC HEAT CAPACITY
C
      D = RHO
      CVCAL = CVF(D,TEE)
      CALL DPDT(P1,D,TEE,1)
      CALL DPDD(P2,D,TEE,1)
      CPCAL = CVCAL + 100.0 * TEE * P1 * P1 / (D * D * P2)
      CPEE=CPCAL
      RETURN
      END
C
      FUNCTION OM22S(TS)
C**********THIS FUNCTION IS FOR THE 11-6-8 GAMMMA EQUALS 3
C**********OMEGA 22 COLLISION INTEGRAL
C
      DIMENSION CO(9)
C
      DATA CO/-3.0328138281E+00, 1.6918880086E+01,-3.7189364917E+01,
     *         4.1288861858E+01,-2.4615921140E+01, 8.9488430959E+00,
     *        -1.8739245042E+00, 2.0966101390E-01,-9.6570437074E-03/
      TI = 1.0 / TS
      T1=TS**(1.0/3.0)
      ETA =0.0
      DO 020 J=1,9
      ETA =ETA +CO(J)*TI
  020 TI=TI*T1
      OM22S = 1.0 / ETA
      RETURN
      END
C
      FUNCTION VSCTY(D,T)
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C     PURPOSE - - THIS ROUTINE CALCULATES THE VISCOSITY OF ETHANE
C
C     VERSION 4.0  5/17/85 - - CODED BY J. F. ELY
C           WITH SUBSEQUENT REVISIONS
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
      COMMON /REFDAT/ R, PC, DC, TC, ZC, A(32), PTRP, DTRP, TTRP
     *               , CMW
C
      DIMENSION GV(11), F(11)
C
C     COEF FROM C2ETAWT TRANSFERRED 11/88 --CHANGED 12/88
C   UNITS ARE IN MICRO PA SEC MUST BE *10.
C
C*******THESE ARE TRUNCATED COEFFICIENTS AS IN PAPER************
       DATA GV,ETAS
     1/0.47177003,-0.23950311,0.39808301,-0.27343335,0.35192260,
     2-0.21101308,-0.004785797,0.073781299,-0.030425255,
     3  -0.30435286 , 0.001215675,15.977/
C
  020 DELTA = D / DC
      TAU = TC / T
      F(1) = DELTA
      F(2) = TAU*DELTA
C
C
      F(3) = DELTA**2
      F(4) =  TAU*DELTA**2
      F(5) = DELTA**2 * TAU * SQRT(TAU)
C
      F(6) = DELTA**3
      F(7) = DELTA**3 * TAU**2
C
```

```
      F(8) = DELTA**4
      F(9) = DELTA**4 * TAU
C
      F(10)= DELTA
      F(11)= DELTA  * TAU
C
         ETA = 0.
         DO 040 J = 1, 9
  040    ETA = ETA + F(J)*GV(J)
         DENOM = 1.0 + F(10)*GV(10) + F(11)*GV(11)
      ETAG = ETA0(T)
  060    ETA = ETAG + ETAS * ETA / DENOM
      VSCTY = ETA
      RETURN
      END
      FUNCTION ETA0(T)
C******THIS FUNCTION EVALUATES THE ZERO DENSITY VISCOSITY
C******OF ETHANE  (C2)
C
      COMMON /REFDAT/ R, PC, DC, TC, ZC, A(32), PTRP, DTRP, TTRP
     *               , CMW
      DATA  EOK/245.0/
      TS = T / EOK
       ETA0 = 12.0085*SQRT(TS)/OM22S(TS)
      RETURN
      END
C
      FUNCTION TCOND0(T)
C**********THIS FUNCTION EVALUATES THE ZERO DENSITY
C**********THERMAL CONDUCTIVITY OF ETHANE
C**********COEFFICIENTS FOR ETHANE FROM 12/88
C
      COMMON /REFDAT/ RT, PC, DC, TC, ZC, A9(32), PTRP, DTRP, TTRP
     *               , CMW
      DATA CON,EOK/0.276505,245.0/
C       NEW COEFFICIENTS FROM FIT OF 12/20/88
       DATA G1,G2/1.710414723,-0.6936482165/
      CALL IDEAL2(T,X1,X2,X3,X4,CV,X5)
      CVDIM=-CV/(100.*RT)
      TS=T/EOK
      TCC=-(G1+G2/(TS))*(CVDIM+1.5)
      ETAO=ETA0(T)
      TCOND0=CON*ETAO*(3.75+TCC)
      RETURN
      END
C
      FUNCTION XLAMF(D,T)
C
C*******THIS FUNCTION IS FOR THE THERMAL CONDUCTIVITY OF ETHANE
C********COEFFICIENTS ADDED 1/89 FROM HEP'S RUN OF 1/10/89
C
      COMMON /REFDAT/ R, PC, DC, TC, ZC, A(32), PTRP, DTRP, TTRP
     *               , CMW
C
C
       DIMENSION G(7),F(7)
C*****NEW COEFFICIENTS FROM 1/24/89 FIT
C
      DATA G,ES /.960843217927E+00, .275002352857E+01,
     1  -.266092886126E-01, -.781467287125E-01, .218813393267E+00,
     2  .238495630673E+01, -.751139710430E+00 ,4.41786/
C
C
  020 DELTA = D / DC
      TAU = TC / T
      TCO = TCOND0(T)
```

```
      TCCRIT = CRLAM(D,T)
C
      F(1) =DELTA
      F(2) = DELTA**2
      F(3)= DELTA**3
      F(4) = DELTA**4
      F(5)= DELTA**5
      F(6) = DELTA*TAU**1.5
      F(7)= DELTA**3*TAU
C
         TCX = 0.
         DO 040 J = 1, 7
  040    TCX = TCX + F(J)*G(J)
  060    TCX = TC0  + ES  * TCX  + TCCRIT
      XLAMF=TCX
      RETURN
      END
C
       FUNCTION CRLAM(D,T)
C    DGF CODING OF OLCHOWY-SENGERS SIMPLE THEORY--5/88
C    CONSTANTS FOR ETHANE FLUID
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *                , CMW
C    THIS FUNCTION DOES CALL THE DAMPING FCT, DAMP  AND
C     THE XICALC FUNCTION TO EVALUATE XI.
         DATA CON1,QDI/1.55E-09,0.545E-09/
       DEL=D/DC
       TAU=TC/T
       THI=2.*TC
      QD=1./QDI
      VISBK=VSCTY(D,T)
      CV = CVF(D,T)
      CALL DPDT(P1,D,T,1)
      CALL DPDD(P2,D,T,1)
      CALL DPDD(P3,D,THI,1)
      CP = CV + 100.0 * T * P1 * P1 / (D * D * P2)
       XI=XICALC(T,D,P2,P3)
       QDPSI=QD*XI
       CRLAM=CON1*DEL*CP/(TAU*VISBK*XI)
       CRLAM=CRLAM*DAMP(DEL,QDPSI,CP,CV)
       RETURN
       END
C
       FUNCTION DAMP(DEL,QDPSI,CP,CV)
       DATA PI/3.141592654/
       FAC1=EXP(-QDPSI/(1.+QDPSI**3/(3.*DEL**2)))
       FAC2=(CP-CV)/CP*(ATAN(QDPSI)+CV*QDPSI/(CP-CV))
       DAMP=2./PI*(FAC1-1.+FAC2)
       RETURN
       END
C
       FUNCTION XICALC(T,D,DPDD,HITDPDD)
C   THIS FUNCTION CALCULATES CORRELATION LENGTH
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *                , CMW
      DATA CON2,POWNG/4.28243E-10,0.50745E0/
       DEL=D/DC
       TAU=TC/T
       THI=2.*TC
      DIMINV=R*T/DPDD
      DIMHINV=R*THI/HITDPDD
      DELDER=DIMINV-DIMHINV
      IF(DELDER.LT.1.E-8)DELDER=1.E-8
      XICALC=CON2*(DEL*TAU*DELDER)**POWNG
      RETURN
      END
```

```
C
C
      FUNCTION TSAT(PRESS)
C********THIS FUNCTION CALCULATES THE SATURATION TEMPERATURE
C********GIVEN A PRESSURE BELOW ITS CRITICAL VALUE
C
     COMMON /DERIV/DF,DJUNK
     COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
    *              , CMW
      IF(PRESS.GT.PC)THEN
      PAUSE 'PRESSURE GREATER THAN CRITICAL IN TSAT'
      RETURN
      END IF
      IF(PRESS.LT.PTRP)THEN
      PAUSE 'PRESSURE LESS THAN TRIPLE POINT IN TSAT'
      RETURN
      END IF
      XL=TTRP
      XH=TC
      TSAT=.5*(XL+XH)
      DXOLD=ABS(XH-XL)
      DX=DXOLD
      F=PSATF(TSAT)-PRESS
      DO 11 J=1,100
        IF(((TSAT-XH)*DF-F)*((TSAT-XL)*DF-F).GE.0.
    C    .OR. ABS(2.*F).GT.ABS(DXOLD*DF))THEN
        DXOLD=DX
        DX=0.5*(XH-XL)
        TSAT=XL+DX
        IF(XL.EQ.TSAT)RETURN
        ELSE
         DXOLD=DX
         DX=F/DF
         TEMP=TSAT
         TSAT=TSAT-DX
         IF(TEMP.EQ.TSAT)RETURN
           ENDIF
      IF(ABS(DX).LT..00005)RETURN
      F=PSATF(TSAT)-PRESS
      IF(F.LT.0.)THEN
      XL=TSAT
      ELSE
      XH=TSAT
      ENDIF
11    CONTINUE
      PAUSE 'IN TSAT: EXCEEDES MAXIMUM ITERATIONS'
      RETURN
      END
```

```
       BLOCK DATA C2INIT
C*******THIS BLOCK DATA SUBROUTINE SUPPLIES THE FUNDAMENTAL CONSTANTS
C*******AND PARAMETERS NECESSARY FOR THE ETHANE FLUID IN
C*******ACCORDANCE WITH THE CORRELATIONS OF
C*******FRIEND, ELY, AND INGHAM, 'THERMOPHYSICAL PROPERTIES OF ETHANE'
      COMMON /REFDAT/ R, PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *              , CMW
C
      COMMON/SATBDY/TCC,PCC,DCC,ZCC,RC,EPP,BETA
C
      DATA TC, PC, DC, PTRP, DTRP, TTRP, CMW
     C/305.330, 48.7180, 06.870, 1.130E-05, 21.667, 90.352, 30.070/
      DATA TCC, PCC, DCC
     C/305.330, 48.7180, 06.870/
C********TRIPLE PT PRESSURE CHANGE TO 1.13 RATHER THAN 1.1308--11/88
C COEFFICIENTS FROM FIT OF 9/26/88
      DATA G/.462154305597E+00, -.192369363873E+01, .398786040031E+00,
     1 .160545323723E-01, .128952422187E+00, .354583204912E-01,
     2 .349278445395E-01, -.113061833802E-01, -.398090327788E-01,
     3 .830319368340E-03, .459215751833E-03, .175302879173E-06,
     4 -.709195161256E-04, -.234361622492E+00, .845746976449E-01,
     5 .148610520102E+00, -.100168578674E+00, -.592648243875E-01,
     6 -.412635142172E-01, .218551618688E-01, -.745527209579E-04,
     7 -.988590855721E-02, .102084164987E-02, -.521896558472E-03,
     8 .985921620300E-04, .468651408558E-01, -.195580116459E-01,
     9 -.465571616512E-01, .328779053755E-02, .135720901854E+00,
     A -.108464714554E+00, -.675028369034E-02/

C
       DATA R,EPP,BETA,ZC/0.08314510, 1.9, 0.355,0.27934000/
       DATA RC,ZCC/0.08314510,0.27934000/
C
      END
      FUNCTION PSATF(T)
C
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
C        PURPOSE --- THIS ROUTINE CALCULATES THE SATURATION PRESSURE AND
C                    ITS DERIVATIVE WITH RESPECT TO T, GIVEN T.
C
C
C           CODED BY--J. F. ELY
C                     CHEMICAL ENGINEERING SCIENCE DIVISION 773.20
C                     NATIONAL BUREAU OF STANDARDS
C                     BOULDER, COLORADO   80303
C
C
C           VERSION 1.0 -- 6/3/83
C
C
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C      REVISED 2/27/85 TO REJECT CALLS IF T .GT. TC
C*********************************************************************
C
C         NEW COEFFICIENTS FROM HEP'S FIT OF ETHANE DATA FROM JIM ELY
C                                  9/10/86
C       CHANGED 2/06/86 TO RETURN TO EPP=1.7
C
C      CHANGED 6/03/86 TO EPP=1.9 AND USES TSTAR AS VARIABLE
C      AND IS FORCED TO PC AT T = TC
C**********************************************************************
      COMMON /REFDAT/ R, PC, DC, TC, ZC, A(32), PTRP, DTRP, TTRP
     *              , CMW
      DIMENSION G(5)
      COMMON /DERIV/ DPSDT, DDSDT
      EPP = 1.9
```

```
C     THE FOLLOWING FOR PC = 48.718 AND TC = 305.33 3-4-88
        G( 1)= -.795531542571E+01
        G( 2)=  .147806828674E+02
        G( 3)=  .153282697603E+01
        G( 4)= -.134317917619E+02
        G( 5)=  .470489080510E+01
      X = 1. - T / TC
       IF(X) 1,2,2
 1     PRINT 4
 4     FORMAT(10X, 'T ABOVE TCRT IN PSATF(T). ' / )
       STOP
 2    PCAL = G(1)*X/(1.-X)+G(2)*X**EPP+G(3)*X+G(4)*X*X+G(5)*X*X*X
      PSATF= PC*EXP(PCAL)
      DPSDT=-PSATF/TC*(G(1)/(1.-X)**2+EPP*G(2)*X**(EPP-1.0)+G(3)
     * + 2.*G(4)*X+3.*G(5)*X**2)
      RETURN
      END
      FUNCTION DSATL(T)
C
C            THIS ROUTINE CALCULATES THE SATURATED LIQUID
C            DENSITY OF ETHANE USING NEW CORRELATION
C
C           REVISED 2/27/85 TO REJECT CALLS IF T .GT. TC
C
C***********************************************************************
C
C         NEW COEFFICIENTS FROM HEP'S FIT OF WAGNER AND ARMSTRONG DATA
C                                   1/31/86
C        REVISED COEFFICIENTS FROM 3/13/88
      COMMON /REFDAT/ R, PC, DC, TC, ZC, A(32), PTRP, DTRP, TTRP
     *               , CMW
      COMMON /DERIV/ DPSDT, DDSDT
      DIMENSION G(5)
C
C
      BETA = .355
C     TC = 305.33  AND DC = 6.870
       G( 1)=  .193074035545E+01
       G( 2)= -.653985599985E+00
       G( 3)=  .814136166546E+00
       G( 4)= -.383814110665E+00
       G( 5)= -.339743046787E+00
      X = 1.0 - T / TC
       IF (X) 1,2,3
 1     PRINT 4
 4     FORMAT(10X,'DSATL = 0, T EXCEEDS TCRT. ' / )
       STOP
 2     DSATL = DC
       DDSDT = -1.0E+10
       RETURN
 3    DENOM = 1.0 + G(5) * X**(1.0-BETA)
      X4 = X*X*X*X
      Y = (G(1) * X**BETA + G(2) * X*X + G(3) * X*X*X+G(4)*X4) / DENOM
      DYDX = BETA*G(1)*X**(BETA-1.0) + 2.0*G(2)*X + 3.0*G(3)*X*X
     *  + 4.0*G(4)*X*X*X
      DYDX = (DYDX - Y * G(5) * (1.0-BETA) / X**BETA) / DENOM
      DSATL = DC * (Y + 1.0)
      DDSDT = - DC * DYDX / TC
      RETURN
      END
```

```
      FUNCTION DSATV(T)
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
C       PURPOSE --- THIS ROUTINE CALCULATES THE SATURATED VAPOR DENSITY,
C                   AND ITS DERIVATIVE WITH RESPECT TO T, GIVEN T.  IT
C                   REQUIRES THE USE OF "PSATF" WHICH CALCULATES  THE
C                   SATURATIION PRESSURE AND ITS DERIVATIVE WRT T.
C
C          CODED BY--B. C. COOKE
C                    CHEMICAL ENGINEERING SCIENCE DIVISION 773.20
C                    NATIONAL BUREAU OF STANDARDS
C                    BOULDER, COLORADO 80303
C
C          VERSION 1.0 -- 6/3/83
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
C            REVISED 2/27/85 TO REJECT CALLS IF T .GT. TC
C
C*********************************************************************
C
C         NEW COEFFICIENTS FROM HEP'S FIT OF ETHANE DATA FROM ELY
C                                  9/10/86
C
C       REVISED 6/03/86. USES BETA =0.355 AND SCALING AMPLITUDE
C       IS SAME IN VAPOR AND LIQUID TO LOWEST ORDER
C*********************************************************************
      COMMON /DERIV/ DPSDT, DDSDT
      COMMON /REFDAT/ R, PC, DC, TC, ZC, A(32),  PTRP, DTRP, TTRP
     *               , CMW
      DIMENSION G(4)
C       THE FOLLOWING ARE FROM VAPOR AND LIQUID FIT OF 3-13-88
      BETA = .355
C*******CALCULATE G0 FROM UNROUNDED G(1) AND ZC, (THEN ROUND)
       G0 = -0.7483719
C    THESE COEFS FROM A FIT ON 9-21-88. ID 12 DATA OMITTED
       G( 1)= -.137289517553E+01
       G( 2)= -.119259688503E+01
       G( 3)=  .186150455934E+01
       G( 4)=  .131364937601E+01
C      ZC = PC / (R * TC * DC)
      X = T / TC
      TAU = 1.0 - X
       IF (TAU) 1,2,3
 1     PRINT 4
 4     FORMAT(10X,'T EXCEEDS TC IN DSATV. ' / )
       STOP
 2     DSATV=DC
       DDSDT=1.0E+100
       RETURN
 3    F = G0*TAU**BETA + G(1)*TAU**(2.*BETA)
       F = F + G(2)*(TAU + TAU**4) + G(3)*TAU**2
      Y = 1.0 + G(4)*TAU
      PS = PSATF(T)
      PRX = (ZC-1.0) * PS / (PC*X**8)
      FOY = F / Y
      Z = 1.0 + PRX * (1.0 + FOY)
      RTZ = 1.0 / (R * T * Z)
      DSATV = PS * RTZ
      DFDX=- BETA*G0*TAU**(BETA-1.0)-G(1)*2.*BETA*TAU**(2.*BETA-1.)
       DFDX=DFDX-G(2)*(1.+4.*TAU**3)-2.*G(3)*TAU
      DYDX = -G(4)
      DPDX = (ZC-1.0)*DPSDT*TC/(PC*X**8)- 8.0*PRX/X
      DZDX = DPDX*(1.0+FOY) + PRX*(DFDX/Y - FOY*DYDX/Y)
      DDSDT = DPSDT*RTZ - DSATV/T - DZDX*DSATV/(Z*TC)
      RETURN
      END
```

```
      SUBROUTINE IDEAL(T,CVID,SID)
C********IDEAL GAS PROPERTIES FOR ETHANE AT  0.101325 MPA (1 ATM)
C**************NEW IDEAL SUBROUTINE FOR 1986 VALUE OF GAS CONSTANT**********
C******NEW R FORCES SLIGHT DEVIATIONS IN OTHER PROPERTIES, SINCE NOT**********
C*******ALL EQS ARE DIRECTLY PROPORTIONAL TO R*****************************
C**************DATE OF CHANGE 4/14/87*************************************
C******************EVALUATED AT 1 ATM (PROBLEM FOR ARGUMENT SID ONLY*********
C***********HEP'S COEFFICIENTS FOR ETHANE ARE IN HERE 8/88****************
C*****************************************************************
      COMMON /REFDAT/ R1,PC, DC, TC, ZC, G(32), PTRP, DTRP, TTRP
     *              , CMW
      DIMENSION QS(7)
      DATA QS/-.285949905507E+02,
     A .381594759913E+01,
     B .860212992578E+01,
     C -.330757346034E+01,
     D -.559566778576E+00,
     E .507222665072E+01,
     F -.550748741700E+01/
CC
      DATA P1,P2/-.33333333,-.66666667/
      R = R1*100.
      TAU=TC/T
      TAU3=TAU**P1
      TAU23=TAU**P2
      EXTAU=EXP(QS(7)*TAU )
      PHID=QS(1)+(QS(2)+1.)*LOG(TAU)+QS(3)*TAU3+QS(4)*TAU23
     1 +QS(5)/TAU+QS(6)*LOG(1.-EXTAU)
      PHIDD1=QS(2)-QS(3)/3.*TAU3-2.*QS(4)/3.*TAU23-QS(5)/TAU
     1 -QS(6)*QS(7)*TAU/(1./EXTAU-1.)
      PHIDD2=-QS(2)+4.*QS(3)/9.*TAU3+10.*QS(4)/9.*TAU23
     1 +2.*QS(5)/TAU-QS(6)*QS(7)**2*TAU**2*EXTAU/(EXTAU-1.)**2
      CVID=-R*PHIDD2
      SID=-R*(PHID-PHIDD1)
      RETURN
      END
```


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