Table 2 Most probable values and additional recommended values for the compressibility factor of ethene

Pressure		Temperature K (℃)						
10^5 Pa	(atm)	273.15 (0)	298.15 (25)	323.15 (50)	348.15 (75)	373.15 (100)	398.15 (125)	423.15 (150)
1.01325	(1)	0.99242 (0.00030)	0.99443 (0.00030)	0.99571 (0.00030)	0.99661 (0.00030)	0.99727 (0.00030)	0.99779 (0.00030)	0.99822 (0.00030)
10.132	(10)	0.9215 (0.0015)	0.9406 (0.0011)	0.9546	0.9647	0.9720 (0.0001)	0.9778	0.9821
20.265	(20)	0.8284 (0.0005)	0.8749 (0.0006)	0.9066	0.9283	0.9438 (0.0002)	0.9555	0.9645
30.398	(30)		0.8030 (0.0010)	0.8552 (0.0009)	0.8904 (0.0004)	0.9153 (0.0002)	0.9334	0.9471
40.530	(40)		0.7195 (0.0018)	0.8013 (0.0013)	0.8518 (0.0005)	0.8866 (0.0002)	0.9114	0.9302
50.662	(50)		0.6190 (0.0003)	0.7436 (0.0014)	0.8124 (0.0006)	0.8579 (0.0003)	0.8898	0.9136
60.795	(60)		0.4844 (0.0003)	0.6818 (0.0016)	0.7723 (0.0009)	0.8295 (0.0004)	0.8688	0.8977
70.928	(70)		0.3409 (0.0003)	0.6171 (0.0019)	0.7323 (0.0011)	0.8017 (0.0006)	0.8484	0.8825
81.060	(80)		0.3170	0.5541 (0.0022)	0.6934 (0.0013)	0.7749 (0.0007)	0.8290	0.8682
91.192	(90)		0.3273	0.5017 (0.0023)	0.6572 (0.0015)	0.7497 (0.0007)	0.8108	0.8548
101.32	(100)		0.3451	0.4706 (0.0026)	0.6255 (0.0016)	0.7268 (0.0006)	0.7942	0.8425
111.46	(110)		0.3656	0.4605	0.6012 (0.0020)	0.7074 (0.0005)	0.7793	0.8314
121.59	(120)		0.3872	0.4622	0.5847 (0.0022)	0.6913 (0.0005)	0.7665	0.8218
131.72	(130)		0.4096	0.4711	0.5756 (0.0022)	0.6793 (0.0008)	0.7559	0.8136
141.86	(140)		0.4321	0.4841	0.5731 (0.0021)	0.6712 (0.0009)	0.7478	0.8070
151.99	(150)		0.4549	0.4996	0.5770	0.6668 (0.0010)	0.7421	0.8020
162.12	(160)		0.4777	0.5166	0.5839	0.6657 (0.0009)	0.7388	0.7987
172.25	(170)		0.5005	0.5346	0.5937	0.6679 (0.0009)	0.7379	0.7969
182.38	(180)		0.5233	0.5533	0.6055	0.6728 (0.0008)	0.7391	0.7969
192.52	(190)		0.5460	0.5724	0.6188	0.6801 (0.0010)	0.7422	0.7980
202.65	(200)		0.5687	0.5906 (0.0036)	0.6333	0.6889 (0.0008)	0.7470	0.8007
253.31	(250)		0.6798 (0.0033)	0.6898 (0.0039)	0.7149 (0.0013)	0.7494 (0.0008)	0.7896	0.8309
303.98	(300)		0.7889 (0.0040)	0.7888 (0.0044)	0.8027 (0.0018)	0.8233 (0.0008)	0.8503	0.8800
354.64	(350)		0.8962 (0.0049)	0.8880 (0.0055)	0.8916 (0.0025)	0.9027 (0.0009)	0.9189	0.9390
405.30	(400)		1.0015 (0.0058)	0.9851 (0.0063)	0.9802 (0.0029)	0.9839 (0.0009)	0.9913	1.0033
455.96	(450)		1.1046 (0.0064)	1.0813 (0.0071)	1.0684 (0.0032)	1.0653 (0.0006)	1.0652	1.0702
506.62	(500)		1.2063 (0.0070)	1.1758 (0.0077)	1.1560 (0.0034)			
607.95	(600)		1.4058 (0.0082)	1.3615 (0.0089)	1.3293 (0.0035)			
709.28	(700)		1.6008 (0.0088)	1.5430 (0.0099)	1.4995 (0.0037)			
810.60	(800)		1.7920 (0.0086)	1.7208 (0.0107)				

( ) : Value of standard deviation

: The most probable values

Table 3 The estimated uncertainties of compressibility factor of ethane

Pressure 10^5Pa (atm)	Temperature K (℃)									
	273.15 (0)	298.15 (25)	323.15 (50)	348.15 (75)	373.15 (100)	398.15 (125)	423.15 (150)	448.15 (175)	473.15 (200)	498.15 (225)
1.01325 (1)	0.030%	0.030%	0.030%	0.030%	0.030%	0.030%	0.030%	0.030%	0.030%	0.030%
10.132 (10)	0.10	0.12	0.09	0.17	0.20	0.15	0.17	0.20	0.30	0.30
20.265 (20)	0.10	0.12	0.10	0.17	0.20	0.14	0.16	0.20	0.30	0.30
30.398 (30)		0.12	0.10	0.17	0.17	0.12	0.16	0.25	0.35	0.40
40.530 (40)		0.12	0.10	0.16	0.15	0.12	0.15	0.30	0.40	0.45
50.662 (50)			0.10	0.15	0.15	0.11	0.15	0.30	0.40	0.55
60.795 (60)			0.11	0.14	0.14	0.11	0.15	0.35	0.40	0.55
70.928 (70)				0.13	0.13	0.11	0.15	0.35	0.40	0.55
81.060 (80)				0.12	0.12	0.11	0.15	0.35	0.40	0.55
91.192 (90)				0.11	0.12	0.11	0.15	0.35	0.40	0.50
101.32 (100)				0.10	0.13	0.11	0.15	0.35	0.40	0.50
111.46 (110)					0.15	0.11	0.15	0.35	0.40	0.50
121.59 (120)					0.17	0.11	0.14	0.40	0.40	0.50
131.72 (130)					0.19	0.11	0.14	0.35	0.40	0.45
141.86 (140)					0.23	0.12	0.14	0.25	0.40	0.45
151.99 (150)					0.27	0.13	0.13	0.20	0.40	0.45
162.12 (160)					0.32	0.16	0.13	0.20	0.40	0.45
172.25 (170)					0.35	0.18	0.13	0.20	0.30	0.40
182.38 (180)					0.39	0.20	0.13	0.20	0.25	0.25
192.52 (190)					0.44	0.20	0.13	0.20	0.25	0.25
202.65 (200)						0.20	0.13	0.20	0.25	0.25
253.31 (250)							0.20	0.20	0.25	0.25
303.98 (300)								0.20	0.25	0.25
354.64 (350)								0.20		

in which the number of sources available is very restricted. In the case of ethene, there was only one source by Michels *et al.*[9] for the grid-points outside of the broken line in the table, and the mean values could not be obtained by the grid-point method. Thus, for these ranges, the values obtained by the correlation method are presented as the additional recommended values in Table 2. They are reconciled well with the adjacent values obtained by the grid-point method.

For ethane and ethene, the reliable values of Z at low pressure cannot be obtained by extrapolating the experimental values of Z at high pressures to the low pressures. The authors collected the reliable data of the experimental second and third virial coefficients, B_T and C_T, at low pressure for ethane[2,24~30] and ethene[10~13,18,24,25,31~36]. Then using the expression : $Z=1+B_TP+C_TP^2$, each value of Z at 1 atm and at each experimental temperature was calculated. Their equally weighted mean values at the grid-points on 1 atm were calculated developing to the power series of temperature using the least square method. In Tables 1 and 2, those values are given as the recommended values of Z at the normal pressure, 1.01325×10^5 Pa (=1 atm), together with the standard deviations shown in the parentheses.

The original data sources are few at most of the grid-points for ethane and ethene. Thus the standard deviations calculated have little significance in regard to the statistical meaning and they showed some unreasonable irregularities at some local grid-points practically. From these viewpoints,