DRAFT TANZANIA STANDARD

TBS/CDC 7(5421) P3 Ethanol for Industrial use - Specification

TANZANIA BUREAU OF STANDARDS

First Edition 2019

Foreword

This Draft Tanzania Standard is being developed by the Industrial and Laboratory Chemicals Technical Committee under supervision of the Chemicals Divisional Standards Committee and it is in accordance with the procedures of the Bureau.

This Draft Tanzania Standard has been prepared with assistance drawn from:
BS 507: 1985 (Current, confirmed June 2016) Specification for ethanol for industrial use, published by British Standards Institution.

In reporting the test results of a test or analysis made in accordance with this standard, if final value, calculated or observed is to be rounded off, it shall be done in accordance with TZS 4 *Rounding off numerical values*.

First Edition 2019

DRAFT TANZANIA STANDARD   **TBS/CDC 7(5421) P3**

Ethanol for Industrial use – Specification

1. Scope
This Draft Tanzania Standard specifies requirements, methods of sampling and test for ethanol suitable for industrial use. It does not apply to material for medicinal and food purposes.

2. Normative References
The following referenced documents are indispensable for the application of this document; the latest edition of the referenced document (including any amendments) applies;

2.1 TBS/CDC 7 (5772) P3/ISO 758 *Liquid chemical products for industrial use – Determination of density at 20 ^{0}C;*

2.2 TBS/CDC 7 (5773) P3/ISO 759 *Volatile organic liquids for industrial use – Determination of dry residue after evaporation on water bath – General method;*

2.3 TBS/CDC 7 (5776) P3/ISO 1388-2 *Ethanol for industrial use – Methods of test – Part 2: Detection of alkalinity or acidity to phenolphthalein;*

2.4 TBS/CDC 7 (5777) P3/ISO 1388-5 *Ethanol for industrial use – Methods of test – Part 5: Determination of aldehyde content – Visual colorimetric method;*

2.5 TBS/CDC 7 (5778) P3/ISO 1388-6 *Ethanol for industrial use – Methods of test – Part 6: Test for miscibility with water;*

2.6 TBS/CDC 7 (5779) P3/ISO 1388-7 *Ethanol for industrial use – Methods of test – Part 7: Determination of methanol content (methanol contents between 0.01 and 0.20 % (v/v)) - Photometric method;*

2.7 TBS/CDC 7 (5780) P3/ISO 1388/8 *Ethanol for industrial use – Methods of test – Part 8: Determination of methanol content (methanol contents between 0.10 and 1.5 % (v/v)) -Visual colorimetric method;*

2.8 TBS/CDC 7 (5781) P3/ISO 1388-12 *Ethanol for industrial use – Determination of permanganate time;*

2.9 TBS/CDC 7 (5774) P3/ISO 2211 *Liquid chemical products - Measurement of colour in Hazen units (Platinum-cobalt scale);*

2.10 TBS/CDC 7 (5775) P3/ISO 3165 *Sampling of chemical product for industrial use – Safety in sampling;*

3. Terms and definitions

<<Not applicable>>

                                        First Edition 2019

4. Requirements

4.1 General requirement

The material shall be clear and free from matter in suspension, as assessed by visual inspection, and shall consist, apart from water, essentially of ethanol, C_2H_5OH.

4.2 Specific requirements

The material shall comply with specific requirements in Table 1 when tested as methods specified in clause 2.

Table 1: Requirements of ethanol for industrial use

S/L No.	Characteristics	Requirements	Method of Test
1.	Colour, in Hazen units, *max*	15	ISO 2211
2.	Density, in air at 20 ºC, g/mL, *max*	0.8103	ISO 758
3.	Ethanolic strength, % (v/v), min	95	Annex A
4.	Miscibility with water (ethanol:water), 1: 19 (v/v)	No opalescence	ISO 1388-6
5.	Acidity (as CH_3COOH), % (m/m), *max*	0.005	ISO 1388-2
6.	Residue on evaporation, % (m/m), *max*	0.01	ISO 759
7.	Carbonyl compounds content, (as acetaldehydes), % (m/m), *max*	0.10	ISO 1388-5
8.	Alkalinity	Negative	ISO 1388-2
9.	Permanganate time, minutes, *min*	15	ISO 1388-12
10.	Methanol content (CH_3OH), % (v/v), *max*	0.05	ISO 1388-7

5. Sampling

The material shall be sampled according to the method specified in ISO 3165 (see clause 2).

6. Packing and labelling

6.1 Packaging

The material shall be supplied in clean, dry and tight containers, without faults, made of material which does not react with alcohol. The method of closing the containers shall prevent the contents from contamination and evaporation.

6.2 Labelling

Each container shall bear the following information given in prominent, legible and durable labelling:
  a) Manufacturer's name.
  b) Recognized trade mark, if any.
  c) Name of the material as "ethanol - industrial grade"
  d) Nominal volume
  e) Nominal value for material strength.
  f) Batch number.
  g) Manufacturing date
  h) Pictorial symbols to show flammability and toxicity nature.

7. Storage

The material shall be stored in suitable container which shall not affect integrity of the product in terms of quality.

First Edition 2019

Annex A
(Normative)

Relationship between density in air and ethanolic strength

Table 2 gives the relation between density in air and ethanolic strength, expressed in either percentage by volume, or as a percentage by mass, at a 20 ºC.

Table 2: **Relationship between density in air and ethanolic strength**

Density in air (g/mL)	Ethanolic strength at 20 ºC	
20 ºC	% (m/m)	% (v/v)
0.8281	85.66	90.00
0.8264	86.31	90.50
0.8248	86.97	91.00
0.8231	87.63	91.50
0.8213	88.29	92.00
0.8196	88.96	92.50
0.8178	89.64	93.00
0.8160	90.32	93.50
0.8141	91.01	94.00
0.8122	91.70	94.50
0.8103	92.41	95.00
0.8083	93.12	95.50
0.8063	93.84	96.00
0.8043	94.57	96.50
0.8022	95.31	97.00
0.8000	96.05	97.50
0.7978	96.81	98.00
0.7955	97.59	98.50
0.7932	98.38	99.00
0.7907	99.18	99.50
0.7882	100.00	100.00

Note: For comprehensive ethanolic strength table refer Annex B

First Edition 2019

4

Annex B
(Informative)

Comprehensive alcoholimetric table

First Edition 2019

310

ρ^*	t = $q = q(\rho^*,t)$					
	20.0	20.5	21.0	21.5	22	22.5
790.0	99.9	99.8	99.7	99.6	99.5	99.4
790.2	99.9	99.8	99.7	99.6	99.5	99.4
790.4	99.8	99.7	99.6	99.5	99.4	99.3
790.6	99.8	99.7	99.6	99.5	99.4	99.3
790.8	99.7	99.6	99.5	99.4	99.3	99.2
791.0	99.7	99.6	99.5	99.4	99.3	99.2
791.2	99.6	99.5	99.4	99.3	99.2	99.1
791.4	99.6	99.5	99.4	99.3	99.2	99.1
791.6	99.6	99.5	99.4	99.3	99.2	99.1
791.8	99.5	99.4	99.3	99.2	99.1	99.0
792.0	99.5	99.4	99.3	99.2	99.1	99.0
792.2	99.4	99.3	99.2	99.1	99.0	98.9
792.4	99.4	99.3	99.2	99.1	99.0	98.9
792.6	99.4	99.3	99.2	99.1	99.0	98.9
792.8	99.3	99.2	99.1	99.0	98.9	98.8
793.0	99.3	99.2	99.1	99.0	98.9	98.8
793.2	99.2	99.1	99.0	98.9	98.8	98.7
793.4	99.2	99.1	99.0	98.9	98.8	98.7
793.6	99.1	99.0	98.9	98.8	98.7	98.6
793.8	99.1	99.0	98.9	98.8	98.7	98.6
794.0	99.1	99.0	98.9	98.8	98.7	98.6
794.2	99.0	98.9	98.8	98.7	98.6	98.5
794.4	99.0	98.9	98.8	98.7	98.6	98.5
794.6	98.9	98.8	98.7	98.6	98.5	98.4
794.8	98.9	98.8	98.7	98.6	98.5	98.4
795.0	98.9	98.8	98.7	98.6	98.5	98.4
795.2	98.8	98.7	98.6	98.5	98.4	98.3
795.4	98.8	98.7	98.6	98.5	98.4	98.3
795.6	98.7	98.6	98.5	98.4	98.3	98.2
795.8	98.7	98.6	98.5	98.4	98.3	98.2
796.0	98.6	98.5	98.4	98.3	98.2	98.1
796.2	98.6	98.5	98.4	98.3	98.2	98.1
796.4	98.6	98.5	98.4	98.3	98.2	98.1
796.6	98.5	98.4	98.3	98.2	98.1	98.0
796.8	98.5	98.4	98.3	98.2	98.1	98.0
797.0	98.4	98.3	98.2	98.1	98.0	97.9
797.2	98.4	98.3	98.2	98.1	98.0	97.9
797.4	98.3	98.2	98.1	98.0	97.9	97.8
797.6	98.3	98.2	98.1	98.0	97.9	97.8
797.8	98.3	98.2	98.1	98.0	97.9	97.8
798.0	98.2	98.1	98.0	97.9	97.8	97.7
798.2	98.2	98.1	98.0	97.9	97.8	97.7
798.4	98.1	98.0	97.9	97.8	97.7	97.6
798.6	98.1	98.0	97.9	97.8	97.7	97.6
798.8	98.1	98.0	97.9	97.8	97.7	97.6
799.0	98.0	97.9	97.8	97.7	97.6	97.5
799.2	98.0	97.9	97.8	97.7	97.6	97.5
799.4	97.9	97.8	97.7	97.6	97.5	97.4
799.6	97.9	97.8	97.7	97.6	97.5	97.4
799.8	97.8	97.7	97.6	97.5	97.4	97.3
800.0	97.8	97.7	97.6	97.5	97.4	97.3

ρ^*	t = $q = q(\rho^*,t)$					
	20.0	20.5	21.0	21.5	22.0	22.5
800.0	97.8	97.7	97.6	97.5	97.4	97.3
800.2	97.8	97.7	97.6	97.5	97.4	97.3
800.4	97.7	97.6	97.5	97.4	97.3	97.2
800.6	97.7	97.6	97.5	97.4	97.3	97.2
800.8	97.6	97.5	97.4	97.3	97.2	97.1
801.0	97.6	97.5	97.4	97.3	97.2	97.1
801.2	97.5	97.4	97.3	97.2	97.1	97.0
801.4	97.5	97.4	97.3	97.2	97.1	97.0
801.6	97.4	97.3	97.2	97.1	97.0	96.9
801.8	97.4	97.3	97.2	97.1	97.0	96.9
802.0	97.3	97.2	97.1	97.0	96.9	96.8
802.2	97.3	97.2	97.1	97.0	96.9	96.8
802.4	97.2	97.1	97.0	96.9	96.8	96.7
802.6	97.2	97.1	97.0	96.9	96.8	96.7
802.8	97.1	97.0	96.9	96.8	96.7	96.6
803.0	97.1	97.0	96.9	96.8	96.7	96.6
803.2	97.0	96.9	96.8	96.7	96.6	96.5
803.4	97.0	96.9	96.8	96.7	96.6	96.5
803.6	96.9	96.8	96.7	96.6	96.5	96.4
803.8	96.9	96.8	96.7	96.6	96.5	96.4
804.0	96.8	96.7	96.6	96.5	96.4	96.3
804.2	96.8	96.7	96.6	96.5	96.4	96.3
804.4	96.7	96.6	96.5	96.4	96.3	96.2
804.6	96.7	96.6	96.5	96.4	96.3	96.2
804.8	96.6	96.5	96.4	96.3	96.2	96.1
805.0	96.6	96.5	96.4	96.3	96.2	96.1
805.2	96.6	96.5	96.4	96.3	96.2	96.1
805.4	96.5	96.4	96.3	96.2	96.1	96.0
805.6	96.5	96.4	96.3	96.2	96.1	96.0
805.8	96.4	96.3	96.2	96.1	96.0	95.9
806.0	96.4	96.3	96.2	96.1	96.0	95.9
806.2	96.3	96.2	96.1	96.0	95.9	95.8
806.4	96.3	96.2	96.1	96.0	95.9	95.8
806.6	96.2	96.1	96.0	95.9	95.8	95.7
806.8	96.2	96.1	96.0	95.9	95.8	95.7
807.0	96.1	96.0	95.9	95.8	95.7	95.6
807.2	96.1	96.0	95.9	95.8	95.7	95.6
807.4	96.0	95.9	95.8	95.7	95.6	95.5
807.6	96.0	95.9	95.8	95.7	95.6	95.5
807.8	95.9	95.8	95.7	95.6	95.5	95.4
808.0	95.9	95.8	95.7	95.6	95.5	95.4
808.2	95.8	95.7	95.6	95.5	95.4	95.3
808.4	95.8	95.7	95.6	95.5	95.4	95.3
808.6	95.7	95.6	95.5	95.4	95.3	95.2
808.8	95.7	95.6	95.5	95.4	95.3	95.2
809.0	95.6	95.5	95.4	95.3	95.2	95.1
809.2	95.6	95.5	95.4	95.3	95.2	95.1
809.4	95.5	95.4	95.3	95.2	95.1	95.0
809.6	95.5	95.4	95.3	95.2	95.1	95.0
809.8	95.4	95.3	95.2	95.1	95.0	94.9
810.0	95.4	95.3	95.2	95.1	95.0	94.9

311

First Edition 2019

312

$q = q(\rho^*, t)$

ρ^*	t=20.0	20.5	21.0	21.5	22.0	22.5
810.0	95.4	95.2	95.1	95.0	94.9	94.8
810.2	95.3	95.2	95.0	95.0	94.8	94.7
810.4	95.3	95.1	95.0	94.9	94.8	94.7
810.6	95.2	95.1	94.9	94.9	94.7	94.6
810.8	95.2	95.0	94.9	94.8	94.7	94.6
811.0	95.1	95.0	94.8	94.8	94.6	94.5
811.2	95.1	94.9	94.8	94.7	94.6	94.5
811.4	95.0	94.9	94.7	94.7	94.5	94.4
811.6	95.0	94.8	94.7	94.6	94.5	94.4
811.8	94.9	94.8	94.6	94.6	94.4	94.3
812.0	94.9	94.7	94.6	94.5	94.4	94.3
812.2	94.8	94.7	94.5	94.5	94.3	94.2
812.4	94.8	94.6	94.5	94.4	94.3	94.2
812.6	94.7	94.6	94.4	94.4	94.2	94.1
812.8	94.7	94.5	94.4	94.3	94.2	94.1
813.0	94.6	94.5	94.3	94.3	94.1	94.0
813.2	94.6	94.4	94.3	94.2	94.1	94.0
813.4	94.5	94.4	94.2	94.2	94.0	93.9
813.6	94.5	94.3	94.2	94.1	94.0	93.9
813.8	94.4	94.3	94.1	94.1	93.9	93.8
814.0	94.4	94.2	94.1	94.0	93.9	93.8
814.2	94.3	94.2	94.0	94.0	93.8	93.7
814.4	94.3	94.1	94.0	93.9	93.8	93.7
814.6	94.2	94.1	93.9	93.9	93.7	93.6
814.8	94.2	94.0	93.9	93.8	93.7	93.6
815.0	94.1	94.0	93.8	93.8	93.6	93.5
815.2	94.1	93.9	93.8	93.7	93.6	93.5
815.4	94.0	93.9	93.7	93.7	93.5	93.4
815.6	94.0	93.8	93.7	93.6	93.5	93.4
815.8	93.9	93.8	93.6	93.6	93.4	93.3
816.0	93.9	93.7	93.6	93.5	93.4	93.3
816.2	93.8	93.7	93.5	93.5	93.3	93.2
816.4	93.8	93.6	93.5	93.4	93.3	93.2
816.6	93.7	93.6	93.4	93.4	93.2	93.1
816.8	93.7	93.5	93.4	93.3	93.2	93.1
817.0	93.6	93.5	93.3	93.3	93.1	93.0
817.2	93.6	93.4	93.3	93.2	93.1	93.0
817.4	93.5	93.4	93.2	93.2	93.0	92.9
817.6	93.5	93.3	93.2	93.1	93.0	92.9
817.8	93.3	93.2	93.1	93.0	92.8	92.7
818.0	93.2	93.1	93.0	92.9	92.8	92.7
818.2	93.2	93.1	92.9	92.9	92.7	92.6
818.4	93.1	93.0	92.9	92.8	92.7	92.6
818.6	93.1	93.0	92.8	92.8	92.6	92.5
818.8	93.0	92.9	92.8	92.7	92.6	92.5
819.0	93.0	92.9	92.7	92.7	92.5	92.4
819.2	92.9	92.8	92.7	92.6	92.5	92.4
819.4	92.8	92.8	92.6	92.6	92.4	92.3
819.6	92.8	92.7	92.6	92.5	92.4	92.3
819.8	92.7	92.7	92.5	92.4	92.3	92.2
820.0	92.7	92.6	92.4	92.3	92.2	92.1

313

$q = q(\rho^*, t)$

ρ^*	t=20.0	20.5	21.0	21.5	22.0	22.5
820.0	92.7	92.6	92.4	92.3	92.2	92.1
820.2	92.6	92.5	92.3	92.3	92.1	92.0
820.4	92.6	92.4	92.3	92.2	92.1	92.0
820.6	92.5	92.4	92.2	92.2	92.0	91.9
820.8	92.5	92.3	92.2	92.1	92.0	91.9
821.0	92.4	92.3	92.1	92.1	91.9	91.8
821.2	92.3	92.2	92.1	92.0	91.9	91.8
821.4	92.3	92.2	92.0	92.0	91.8	91.7
821.6	92.2	92.1	92.0	91.9	91.8	91.7
821.8	92.2	92.0	91.9	91.8	91.7	91.6
822.0	92.1	92.0	91.8	91.8	91.6	91.5
822.2	92.1	91.9	91.8	91.7	91.6	91.5
822.4	92.0	91.9	91.7	91.7	91.5	91.4
822.6	91.9	91.8	91.7	91.6	91.5	91.4
822.8	91.9	91.8	91.6	91.6	91.4	91.3
823.0	91.8	91.7	91.6	91.5	91.4	91.3
823.2	91.8	91.6	91.5	91.4	91.3	91.2
823.4	91.7	91.6	91.4	91.4	91.3	91.2
823.6	91.7	91.5	91.4	91.3	91.2	91.1
823.8	91.6	91.5	91.3	91.3	91.1	91.0
824.0	91.5	91.4	91.3	91.2	91.1	91.0
824.2	91.5	91.4	91.2	91.1	91.0	90.9
824.4	91.4	91.3	91.1	91.1	90.9	90.8
824.6	91.3	91.2	91.1	91.0	90.9	90.8
824.8	91.3	91.2	91.0	91.0	90.8	90.7
825.0	91.2	91.1	91.0	90.9	90.8	90.7
825.2	91.2	91.1	90.9	90.9	90.7	90.6
825.4	91.1	91.0	90.8	90.8	90.7	90.6
825.6	91.1	90.9	90.8	90.7	90.6	90.5
825.8	91.0	90.9	90.8	90.7	90.5	90.4
826.0	91.0	90.8	90.7	90.6	90.4	90.3
826.2	90.9	90.8	90.6	90.6	90.4	90.3
826.4	90.8	90.7	90.6	90.5	90.3	90.2
826.6	90.8	90.6	90.5	90.5	90.3	90.2
826.8	90.7	90.6	90.5	90.4	90.2	90.1
827.0	90.7	90.5	90.4	90.3	90.2	90.1
827.2	90.6	90.5	90.3	90.3	90.1	90.0
827.4	90.5	90.4	90.3	90.2	90.1	90.0
827.6	90.5	90.4	90.2	90.2	90.0	89.9
827.8	90.4	90.3	90.2	90.1	89.9	89.8
828.0	90.4	90.3	90.1	90.0	89.9	89.8
828.2	90.3	90.2	90.0	90.0	89.8	89.7
828.4	90.2	90.1	90.0	89.9	89.7	89.6
828.6	90.2	90.1	89.9	89.8	89.7	89.6
828.8	90.1	90.0	89.9	89.8	89.6	89.5
829.0	90.1	89.9	89.8	89.7	89.6	89.5
829.2	90.0	89.9	89.7	89.7	89.5	89.4
829.4	90.0	89.8	89.7	89.6	89.4	89.3
829.6	89.9	89.8	89.6	89.5	89.4	89.3
829.8	89.8	89.7	89.6	89.5	89.3	89.2
830.0	89.8	89.6	89.5	89.4	89.2	89.1

First Edition 2019

314

X b q = q (p*, t)

p*	t = 20.0	20.5	21.0	21.5	22.0	22.5
830.0	89.8	89.6	89.5	89.4	89.2	89.1
830.2	89.7	89.6	89.4	89.3	89.2	89.0
830.4	89.6	89.5	89.4	89.2	89.1	89.0
830.6	89.6	89.4	89.3	89.2	89.0	88.9
830.8	89.5	89.4	89.2	89.1	89.0	88.8
831.0	89.4	89.3	89.2	89.1	88.9	88.8
831.2	89.4	89.3	89.1	89.0	88.9	88.7
831.4	89.3	89.2	89.1	88.9	88.8	88.6
831.6	89.3	89.1	89.0	88.9	88.7	88.6
831.8	89.2	89.1	88.9	88.8	88.7	88.5
832.0	89.1	89.0	88.9	88.7	88.6	88.4
832.2	89.1	89.0	88.8	88.7	88.5	88.4
832.4	89.0	88.9	88.7	88.6	88.5	88.3
832.6	89.0	88.8	88.7	88.5	88.4	88.2
832.8	88.9	88.8	88.6	88.5	88.3	88.2
833.0	88.9	88.7	88.5	88.4	88.2	88.1
833.2	88.8	88.6	88.5	88.3	88.2	88.0
833.4	88.8	88.6	88.4	88.3	88.1	88.0
833.6	88.7	88.5	88.3	88.2	88.1	87.9
833.8	88.6	88.4	88.3	88.2	88.0	87.8
834.0	88.6	88.4	88.2	88.1	87.9	87.8
834.2	88.5	88.3	88.1	88.0	87.9	87.7
834.4	88.5	88.3	88.1	88.0	87.8	87.7
834.6	88.4	88.2	88.0	87.9	87.7	87.6
834.8	88.3	88.1	87.9	87.8	87.7	87.5
835.0	88.3	88.1	87.9	87.8	87.6	87.5
835.2	88.2	88.0	87.8	87.7	87.5	87.4
835.4	88.1	87.9	87.7	87.6	87.5	87.3
835.6	88.1	87.9	87.7	87.6	87.4	87.3
835.8	88.0	87.8	87.6	87.5	87.3	87.2
836.0	87.9	87.7	87.5	87.4	87.3	87.1
836.2	87.9	87.7	87.5	87.4	87.2	87.1
836.4	87.8	87.6	87.4	87.3	87.1	87.0
836.6	87.8	87.6	87.4	87.2	87.1	86.9
836.8	87.7	87.5	87.3	87.2	87.0	86.9
837.0	87.6	87.4	87.2	87.1	86.9	86.8
837.2	87.6	87.4	87.2	87.0	86.9	86.7
837.4	87.5	87.3	87.1	87.0	86.8	86.7
837.6	87.4	87.2	87.0	86.9	86.8	86.6
837.8	87.4	87.2	87.0	86.8	86.7	86.5
838.0	87.3	87.1	86.9	86.8	86.6	86.5
838.2	87.2	87.0	86.9	86.7	86.6	86.4
838.4	87.2	87.0	86.8	86.6	86.5	86.3
838.6	87.1	86.9	86.7	86.6	86.4	86.3
838.8	87.1	86.9	86.7	86.5	86.4	86.2
839.0	87.0	86.8	86.6	86.4	86.3	86.2
839.2	86.9	86.7	86.5	86.4	86.2	86.1
839.4	86.9	86.7	86.5	86.3	86.2	86.0
839.6	86.8	86.6	86.4	86.3	86.1	86.0
839.8	86.7	86.5	86.4	86.2	86.0	85.9
840.0	86.6	86.5	86.3	86.2	86.0	85.9

315

X b q = q (p*, t)

p*	t = 20.0	20.5	21.0	21.5	22.0	22.5
840.0	86.6	86.5	86.3	86.2	86.0	85.9
840.2	86.5	86.4	86.2	86.1	86.0	85.8
840.4	86.5	86.3	86.2	86.0	85.9	85.7
840.6	86.4	86.3	86.1	86.0	85.8	85.7
840.8	86.3	86.2	86.1	85.9	85.8	85.6
841.0	86.3	86.1	86.0	85.8	85.7	85.6
841.2	86.2	86.1	85.9	85.8	85.6	85.5
841.4	86.1	86.0	85.9	85.7	85.6	85.4
841.6	86.1	85.9	85.8	85.6	85.5	85.4
841.8	86.0	85.9	85.7	85.6	85.4	85.3
842.0	85.9	85.8	85.7	85.5	85.4	85.2
842.2	85.9	85.7	85.6	85.4	85.3	85.1
842.4	85.8	85.7	85.5	85.3	85.2	85.1
842.6	85.7	85.6	85.5	85.3	85.1	85.0
842.8	85.7	85.5	85.4	85.2	85.1	84.9
843.0	85.6	85.5	85.3	85.1	85.0	84.9
843.2	85.5	85.4	85.3	85.1	84.9	84.8
843.4	85.5	85.3	85.2	85.0	84.9	84.7
843.6	85.4	85.3	85.1	84.9	84.8	84.6
843.8	85.4	85.2	85.1	84.9	84.7	84.6
844.0	85.3	85.1	85.0	84.8	84.7	84.5
844.2	85.2	85.1	84.9	84.7	84.6	84.4
844.4	85.2	85.0	84.9	84.7	84.5	84.4
844.6	85.1	84.9	84.8	84.6	84.5	84.3
844.8	85.0	84.9	84.7	84.5	84.4	84.2
845.0	85.0	84.8	84.7	84.5	84.3	84.2
845.2	84.9	84.7	84.6	84.4	84.2	84.1
845.4	84.8	84.7	84.5	84.3	84.2	84.0
845.6	84.8	84.6	84.5	84.3	84.1	84.0
845.8	84.7	84.5	84.4	84.2	84.0	83.9
846.0	84.6	84.5	84.3	84.1	84.0	83.8
846.2	84.5	84.4	84.3	84.1	83.9	83.7
846.4	84.5	84.3	84.2	84.0	83.8	83.7
846.6	84.4	84.3	84.1	83.9	83.8	83.6
846.8	84.3	84.2	84.1	83.9	83.7	83.6
847.0	84.3	84.1	84.0	83.8	83.6	83.5
847.2	84.2	84.1	83.9	83.7	83.6	83.4
847.4	84.1	84.0	83.9	83.7	83.5	83.3
847.6	84.1	83.9	83.8	83.6	83.4	83.3
847.8	84.0	83.9	83.7	83.5	83.3	83.2
848.0	83.9	83.8	83.7	83.5	83.3	83.1
848.2	83.9	83.7	83.6	83.4	83.2	83.1
848.4	83.8	83.7	83.5	83.3	83.1	83.0
848.6	83.7	83.6	83.5	83.3	83.1	82.9
848.8	83.7	83.5	83.4	83.2	83.0	82.9
849.0	83.6	83.5	83.3	83.1	83.0	82.8
849.2	83.5	83.4	83.3	83.1	82.9	82.7
849.4	83.5	83.3	83.2	83.0	82.8	82.7
849.6	83.4	83.3	83.1	83.0	82.8	82.6
849.8	83.3	83.2	83.1	82.9	82.7	82.6
850.0	83.3	83.1	83.0	82.8	82.7	82.5

First Edition 2019

Table 322 — $q = q(\rho^*, t)$

ρ^*	t = 20.0	20.5	21.0	21.5	22.0	22.5
911.8	58.8	58.6	58.4	58.3	58.1	57.9
911.6	58.9	58.7	58.5	58.4	58.2	58.1
911.4	59.0	58.8	58.6	58.5	58.4	58.3
911.2	59.1	58.9	58.7	58.6	58.5	58.4
911.0	59.2	59.0	58.8	58.7	58.6	58.5
910.8	59.2	59.1	58.9	58.8	58.7	58.6
910.6	59.3	59.2	59.0	58.9	58.8	58.7
910.4	59.4	59.2	59.1	59.0	58.9	58.7
910.2	59.5	59.3	59.2	59.1	59.0	58.8
910.0	59.6	59.4	59.3	59.1	59.0	58.9
912.0	58.7	58.5	58.3	58.2	58.0	57.8
912.2	58.6	58.4	58.2	58.1	57.9	57.7
912.4	58.5	58.3	58.1	58.0	57.8	57.6
912.6	58.4	58.2	58.0	57.9	57.7	57.5
912.8	58.3	58.2	57.9	57.8	57.6	57.4
913.0	58.2	58.1	57.8	57.7	57.6	57.3
913.2	58.2	58.0	57.7	57.6	57.4	57.3
913.4	58.1	57.9	57.6	57.5	57.3	57.2
913.6	58.0	57.8	57.6	57.4	57.3	57.1
913.8	57.9	57.7	57.5	57.3	57.2	57.0
914.0	57.8	57.6	57.4	57.3	57.1	56.9
914.2	57.7	57.5	57.3	57.2	57.0	56.9
914.4	57.6	57.4	57.2	57.1	56.9	56.8
914.6	57.5	57.3	57.1	57.0	56.8	56.7
914.8	57.4	57.2	57.0	56.9	56.7	56.6
915.0	57.3	57.1	57.0	56.8	56.6	56.6
915.2	57.2	57.1	56.9	56.7	56.6	56.4
915.4	57.1	57.0	56.8	56.6	56.5	56.3
915.6	57.0	56.9	56.7	56.6	56.4	56.2
915.8	57.0	56.8	56.6	56.5	56.3	56.1
916.0	56.9	56.7	56.5	56.4	56.2	56.1
916.2	56.8	56.6	56.4	56.3	56.1	56.0
916.4	56.7	56.5	56.4	56.2	56.0	55.9
916.6	56.6	56.4	56.3	56.1	55.9	55.8
916.8	56.5	56.3	56.2	56.0	55.8	55.7
917.0	56.4	56.2	56.1	55.9	55.7	55.6
917.2	56.3	56.2	56.0	55.9	55.7	55.6
917.4	56.2	56.1	55.9	55.8	55.6	55.4
917.6	56.1	56.0	55.8	55.7	55.5	55.3
917.8	56.0	55.9	55.7	55.6	55.4	55.3
918.0	55.9	55.8	55.6	55.5	55.3	55.1
918.2	55.8	55.7	55.5	55.4	55.2	55.0
918.4	55.7	55.6	55.4	55.3	55.1	55.0
918.6	55.6	55.5	55.3	55.2	55.0	54.9
918.8	55.5	55.4	55.3	55.1	54.9	54.8
919.0	55.5	55.3	55.2	55.0	54.8	54.7
919.2	55.4	55.2	55.1	54.9	54.7	54.6
919.4	55.3	55.1	55.0	54.8	54.6	54.5
919.6	55.2	55.0	54.9	54.7	54.5	54.4
919.8	55.1	54.9	54.7	54.6	54.4	54.3
920.0	55.0	54.8	54.6	54.4	54.3	54.1

Table 323 — $q = q(\rho^*, t)$

ρ^*	t = 20.0	20.5	21.0	21.5	22.0	22.5
921.8	54.1	53.9	53.8	53.6	53.4	53.2
921.6	54.2	54.0	53.9	53.7	53.5	53.3
921.4	54.3	54.1	54.0	53.8	53.6	53.4
921.2	54.4	54.2	54.1	53.9	53.7	53.6
921.0	54.5	54.3	54.2	54.0	53.8	53.7
920.8	54.6	54.4	54.3	54.1	53.9	53.8
920.6	54.7	54.5	54.4	54.2	54.0	53.9
920.4	54.8	54.6	54.5	54.3	54.1	54.0
920.2	54.9	54.7	54.6	54.4	54.2	54.1
920.0	55.0	54.8	54.7	54.5	54.3	54.2
922.0	54.0	53.8	53.7	53.5	53.3	53.1
922.2	53.9	53.7	53.6	53.4	53.2	53.0
922.4	53.8	53.7	53.5	53.3	53.1	52.9
922.6	53.7	53.6	53.4	53.2	53.0	52.8
922.8	53.6	53.5	53.3	53.1	52.9	52.8
923.0	53.5	53.4	53.2	53.0	52.8	52.6
923.2	53.4	53.3	53.1	53.0	52.7	52.6
923.4	53.3	53.2	53.0	52.9	52.6	52.5
923.6	53.3	53.1	52.9	52.8	52.6	52.4
923.8	53.2	53.0	52.8	52.7	52.5	52.2
924.0	53.1	52.9	52.7	52.5	52.4	52.1
924.2	53.0	52.8	52.6	52.5	52.2	52.0
924.4	52.9	52.7	52.5	52.4	52.2	52.0
924.6	52.8	52.6	52.4	52.3	52.1	51.9
924.8	52.7	52.5	52.3	52.1	51.9	51.7
925.0	52.6	52.4	52.2	52.0	51.8	51.6
925.2	52.5	52.3	52.1	51.9	51.7	51.6
925.4	52.4	52.2	52.0	51.9	51.6	51.5
925.6	52.3	52.1	51.9	51.7	51.6	51.4
925.8	52.2	52.1	51.8	51.6	51.5	51.3
926.0	52.2	52.0	51.8	51.6	51.4	51.2
926.2	52.1	51.9	51.7	51.5	51.3	51.1
926.4	52.0	51.8	51.6	51.4	51.2	51.0
926.6	51.9	51.7	51.5	51.4	51.1	51.0
926.8	51.8	51.6	51.4	51.2	51.0	50.9
927.0	51.7	51.5	51.3	51.1	50.9	50.8
927.2	51.6	51.4	51.2	51.0	50.8	50.7
927.4	51.5	51.3	51.1	50.9	50.7	50.6
927.6	51.4	51.2	51.0	50.8	50.6	50.5
927.8	51.2	51.0	50.8	50.6	50.4	50.3
928.0	51.1	50.9	50.7	50.4	50.3	50.2
928.2	51.0	50.7	50.5	50.3	50.1	50.0
928.4	50.9	50.6	50.4	50.2	50.0	49.8
928.6	50.8	50.6	50.3	50.2	49.9	49.7
928.8	50.7	50.5	50.3	50.1	49.9	49.7
929.0	50.6	50.4	50.2	50.0	49.8	49.6
929.2	50.5	50.3	50.1	49.9	49.7	49.5
929.4	50.4	50.2	50.0	49.8	49.6	49.4
929.6	50.3	50.1	49.9	49.7	49.5	49.3
929.8	50.2	50.1	49.8	49.6	49.4	49.2
930.0	50.1	49.9	49.7	49.5	49.3	49.1

First Edition 2019

320

IX b q = q (ρ*, t)

ρ*	t 20.0	20.5	21.0	21.5	22.0	22.5
890.0	68.2	68.0	67.9	67.7	67.5	67.4
890.2	68.1	67.9	67.8	67.6	67.4	67.3
890.4	68.0	67.9	67.6	67.5	67.4	67.2
890.6	67.9	67.7	67.5	67.4	67.3	67.1
890.8	67.8	67.6	67.5	67.3	67.2	67.0
891.0	67.7	67.5	67.4	67.2	67.1	67.0
891.2	67.6	67.5	67.3	67.1	67.0	66.9
891.4	67.5	67.4	67.2	67.0	66.9	66.7
891.6	67.5	67.3	67.1	66.9	66.8	66.6
891.8	67.4	67.2	67.0	66.9	66.7	66.6
892.0	67.4	67.1	67.0	66.8	66.6	66.5
892.2	67.3	67.0	66.9	66.7	66.5	66.4
892.4	67.2	67.0	66.8	66.6	66.4	66.3
892.6	67.1	66.9	66.7	66.6	66.4	66.2
892.8	67.0	66.8	66.6	66.5	66.3	66.1
893.0	67.0	66.7	66.6	66.4	66.2	66.0
893.2	66.9	66.6	66.5	66.3	66.1	66.0
893.4	66.8	66.6	66.4	66.3	66.1	65.9
893.6	66.7	66.5	66.3	66.2	66.0	65.8
893.8	66.6	66.5	66.3	66.1	65.9	65.8
894.0	66.5	66.4	66.2	66.0	65.9	65.7
894.2	66.5	66.3	66.2	66.0	65.8	65.6
894.4	66.4	66.2	66.0	65.9	65.7	65.5
894.6	66.3	66.1	65.9	65.8	65.6	65.5
894.8	66.2	66.0	65.9	65.7	65.5	65.4
895.0	66.1	66.0	65.7	65.6	65.4	65.3
895.2	66.1	65.9	65.7	65.5	65.4	65.2
895.4	66.0	65.8	65.6	65.5	65.3	65.1
895.6	65.9	65.7	65.5	65.4	65.2	65.2
895.8	65.8	65.7	65.4	65.3	65.1	64.9
896.0	65.7	65.5	65.4	65.2	65.0	64.9
896.2	65.6	65.4	65.3	65.1	64.9	64.8
896.4	65.5	65.4	65.2	65.0	64.9	64.7
896.6	65.5	65.3	65.1	65.0	64.8	64.6
896.8	65.4	65.2	65.0	64.9	64.7	64.5
897.0	65.4	65.1	65.0	64.8	64.6	64.4
897.2	65.3	65.0	64.9	64.7	64.5	64.4
897.4	65.1	64.9	64.8	64.6	64.4	64.3
897.6	65.1	64.9	64.7	64.5	64.4	64.2
897.8	64.9	64.8	64.6	64.5	64.3	64.1
898.0	64.9	64.7	64.6	64.4	64.2	64.0
898.2	64.8	64.6	64.4	64.3	64.1	63.9
898.4	64.7	64.5	64.3	64.2	64.0	63.9
898.6	64.6	64.4	64.3	64.1	63.9	63.7
898.8	64.5	64.4	64.2	64.0	63.8	63.7
899.0	64.4	64.3	64.1	63.9	63.7	63.6
899.2	64.3	64.2	64.0	63.8	63.7	63.5
899.4	64.3	64.0	63.9	63.7	63.6	63.4
899.6	64.2	63.9	63.8	63.6	63.5	63.3
899.8	64.1	63.9	63.7	63.6	63.4	63.2
900.0	64.0	63.8	63.7	63.5	63.3	63.1

IX b q = q (ρ*, t)

ρ*	t 20.0	20.5	21.0	21.5	22.0	22.5
900.0	64.0	63.8	63.7	63.5	63.3	63.1
900.2	63.9	63.7	63.5	63.4	63.2	63.0
900.4	63.8	63.7	63.5	63.3	63.2	63.0
900.6	63.7	63.6	63.4	63.2	63.1	62.9
900.8	63.6	63.5	63.3	63.1	63.0	62.8
901.0	63.5	63.4	63.2	63.0	62.9	62.7
901.2	63.5	63.3	63.1	63.0	62.8	62.6
901.4	63.4	63.2	63.0	62.9	62.7	62.5
901.6	63.3	63.1	63.0	62.8	62.6	62.5
901.8	63.2	63.0	62.9	62.7	62.5	62.4
902.0	63.2	62.9	62.8	62.6	62.4	62.3
902.2	63.1	62.9	62.7	62.6	62.4	62.2
902.4	63.0	62.8	62.7	62.5	62.3	62.1
902.6	62.9	62.7	62.6	62.4	62.2	62.0
902.8	62.8	62.6	62.5	62.3	62.1	61.9
903.0	62.7	62.5	62.4	62.2	62.0	61.9
903.2	62.6	62.5	62.3	62.1	62.0	61.8
903.4	62.5	62.4	62.2	62.1	61.9	61.7
903.6	62.5	62.3	62.1	62.0	61.8	61.7
903.8	62.4	62.2	62.0	61.9	61.7	61.6
904.0	62.3	62.1	61.9	61.7	61.6	61.4
904.2	62.2	62.0	61.9	61.7	61.5	61.3
904.4	62.1	62.0	61.8	61.6	61.4	61.3
904.6	62.0	61.9	61.7	61.5	61.3	61.2
904.8	61.9	61.8	61.6	61.4	61.2	61.1
905.0	61.9	61.7	61.5	61.3	61.1	61.0
905.2	61.7	61.6	61.4	61.2	61.1	61.0
905.4	61.7	61.5	61.3	61.2	61.0	60.8
905.6	61.6	61.4	61.3	61.1	60.9	60.8
905.8	61.5	61.3	61.1	61.0	60.8	60.6
906.0	61.4	61.2	61.0	60.9	60.7	60.5
906.2	61.3	61.1	60.9	60.8	60.6	60.4
906.4	61.2	61.0	60.9	60.7	60.5	60.4
906.6	61.1	60.9	60.8	60.6	60.4	60.2
906.8	61.0	60.9	60.7	60.5	60.3	60.2
907.0	60.9	60.8	60.6	60.4	60.2	60.1
907.2	60.9	60.7	60.5	60.3	60.2	60.0
907.4	60.7	60.6	60.4	60.2	60.1	59.9
907.6	60.7	60.5	60.3	60.2	60.0	59.8
907.8	60.6	60.4	60.2	60.1	59.9	59.7
908.0	60.5	60.3	60.1	60.0	59.8	59.6
908.2	60.3	60.2	60.1	59.9	59.7	59.5
908.4	60.3	60.1	59.9	59.8	59.6	59.4
908.6	60.2	60.1	59.8	59.7	59.5	59.4
908.8	60.1	60.0	59.7	59.6	59.4	59.2
909.0	60.1	59.9	59.7	59.5	59.3	59.1
909.2	60.0	59.8	59.6	59.4	59.2	59.1
909.4	59.9	59.7	59.5	59.4	59.2	59.0
909.6	59.8	59.6	59.4	59.3	59.1	58.9
909.8	59.7	59.5	59.3	59.2	59.0	58.8
910.0	59.6	59.4	59.3	59.1	58.9	58.7

321

First Edition 2019

326

IX b q = q (ρ*, t)

ρ*	20.0	20.5	21.0	21.5	22.0	22.5
960.0	31.7	31.5	31.3	31.1	30.9	30.7
959.8	31.9	31.7	31.5	31.3	31.1	30.9
959.6	32.0	31.8	31.6	31.4	31.2	31.0
959.4	32.2	32.0	31.8	31.6	31.4	31.2
959.2	32.4	32.1	31.9	31.7	31.5	31.3
959.0	32.5	32.3	32.1	31.9	31.7	31.5
958.8	32.7	32.5	32.3	32.0	31.8	31.6
958.6	32.8	32.6	32.4	32.2	32.0	31.8
958.4	33.0	32.8	32.5	32.3	32.1	31.9
958.2	33.1	32.9	32.7	32.5	32.3	32.1
958.0	33.3	33.0	32.8	32.6	32.4	32.2
957.8	33.4	33.2	33.0	32.8	32.6	32.4
957.6	33.5	33.3	33.1	32.9	32.7	32.5
957.4	33.7	33.5	33.3	33.1	32.9	32.6
957.2	33.8	33.6	33.4	33.2	33.0	32.8
957.0	34.0	33.8	33.5	33.3	33.1	32.9
956.8	34.1	33.9	33.7	33.5	33.3	33.1
956.6	34.3	34.1	33.9	33.6	33.4	33.3
956.4	34.4	34.2	34.0	33.8	33.6	33.4
956.2	34.6	34.4	34.2	34.0	33.8	33.6
956.0	34.7	34.5	34.3	34.1	33.9	33.7
955.8	34.8	34.6	34.4	34.2	34.0	33.8
955.6	35.0	34.8	34.6	34.4	34.2	34.0
955.4	35.1	34.9	34.7	34.5	34.3	34.1
955.2	35.3	35.1	34.9	34.7	34.5	34.3
955.0	35.4	35.2	35.0	34.8	34.6	34.4
954.8	35.6	35.4	35.2	35.0	34.8	34.6
954.6	35.7	35.5	35.3	35.1	34.9	34.7
954.4	35.9	35.7	35.5	35.3	35.1	34.9
954.2	36.0	35.8	35.6	35.4	35.2	35.0
954.0	36.1	35.9	35.7	35.5	35.3	35.1
953.8	36.2	36.0	35.8	35.6	35.4	35.2
953.6	36.3	36.1	35.9	35.7	35.5	35.3
953.4	36.5	36.3	36.1	35.9	35.7	35.5
953.2	36.6	36.4	36.2	36.0	35.8	35.6
953.0	36.8	36.6	36.3	36.1	35.9	35.7
952.8	36.9	36.7	36.5	36.3	36.1	35.9
952.6	37.1	36.9	36.6	36.4	36.2	36.0
952.4	37.2	37.0	36.8	36.6	36.4	36.2
952.2	37.3	37.1	36.9	36.7	36.5	36.3
952.0	37.5	37.3	37.1	36.8	36.6	36.4
951.8	37.6	37.4	37.2	37.0	36.8	36.6
951.6	37.7	37.5	37.3	37.1	36.9	36.7
951.4	37.8	37.6	37.4	37.2	37.0	36.8
951.2	38.0	37.8	37.5	37.3	37.1	36.9
951.0	38.1	37.9	37.7	37.5	37.3	37.1
950.8	38.2	38.0	37.8	37.6	37.4	37.2
950.6	38.4	38.2	38.0	37.8	37.6	37.4
950.4	38.5	38.3	38.1	37.9	37.7	37.5
950.2	38.6	38.4	38.2	38.0	37.8	37.6
950.0	38.8	38.6	38.4	38.2	38.0	37.8

327

IX b q = q (ρ*, t)

ρ*	20.0	20.5	21.0	21.5	22.0	22.5
970.0	23.3	23.1	22.9	22.8	22.6	22.4
969.8	23.5	23.3	23.1	22.9	22.8	22.6
969.6	23.6	23.3	23.1	22.9	22.8	22.6
969.4	23.8	23.7	23.5	23.3	23.1	22.9
969.2	24.0	23.8	23.6	23.4	23.2	23.0
969.0	24.2	24.0	23.8	23.6	23.4	23.2
968.8	24.4	24.2	24.0	23.8	23.6	23.4
968.6	24.7	24.5	24.2	24.0	23.8	23.5
968.4	24.7	24.5	24.4	24.2	24.0	23.8
968.2	24.9	24.7	24.5	24.3	24.2	24.0
968.0	25.1	24.9	24.7	24.5	24.3	24.2
967.8	25.3	25.1	24.9	24.7	24.5	24.3
967.6	25.4	25.3	25.1	24.9	24.7	24.5
967.4	25.6	25.4	25.2	25.1	24.9	24.7
967.2	25.8	25.6	25.4	25.2	25.0	24.9
967.0	26.0	25.8	25.6	25.4	25.2	25.0
966.8	26.1	26.0	25.8	25.6	25.4	25.2
966.6	26.3	26.1	25.9	25.8	25.6	25.4
966.4	26.5	26.3	26.1	25.9	25.7	25.5
966.2	26.7	26.5	26.3	26.1	25.9	25.7
966.0	26.8	26.6	26.5	26.3	26.1	25.9
965.8	27.0	26.8	26.6	26.4	26.2	26.1
965.6	27.2	27.0	26.8	26.6	26.4	26.2
965.4	27.4	27.2	27.0	26.8	26.6	26.4
965.2	27.5	27.3	27.1	26.9	26.8	26.6
965.0	27.7	27.5	27.3	27.1	26.9	26.7
964.8	27.9	27.7	27.5	27.3	27.1	26.9
964.6	28.1	27.9	27.6	27.4	27.3	27.1
964.4	28.2	28.0	27.8	27.6	27.4	27.2
964.2	28.4	28.2	28.0	27.8	27.6	27.4
964.0	28.5	28.3	28.1	27.9	27.7	27.6
963.8	28.7	28.5	28.3	28.1	27.9	27.7
963.6	28.9	28.7	28.5	28.3	28.1	27.9
963.4	29.0	28.8	28.6	28.4	28.2	28.0
963.2	29.2	29.0	28.8	28.6	28.4	28.2
963.0	29.4	29.2	29.0	28.8	28.6	28.4
962.8	29.5	29.3	29.1	28.8	28.7	28.5
962.6	29.7	29.5	29.3	29.1	28.9	28.7
962.4	29.9	29.7	29.4	29.2	29.0	28.8
962.2	30.0	29.8	29.6	29.4	29.2	29.0
962.0	30.2	30.0	29.8	29.6	29.4	29.2
961.8	30.3	30.1	29.9	29.7	29.5	29.3
961.6	30.5	30.3	30.1	29.9	29.7	29.5
961.4	30.6	30.4	30.2	30.0	29.8	29.6
961.2	30.8	30.6	30.4	30.2	30.0	29.8
961.0	31.0	30.8	30.6	30.3	30.1	29.9
960.8	31.0	30.8	30.6	30.4	30.2	30.0
960.6	31.1	30.9	30.7	30.5	30.3	30.1
960.4	31.4	31.2	31.0	30.8	30.6	30.4
960.2	31.6	31.4	31.2	30.8	30.6	30.4
960.0	31.7	31.5	31.3	30.9	30.7	30.5

First Edition 2019

330

p^*	$q = q\,(p^*,t)$					
t	**20.0**	**20.5**	**21.0**	**21.5**	**22.0**	**22.5**
990.0	5.8	5.7	5.6	5.6	5.5	5.4
990.2	5.6	5.6	5.5	5.4	5.3	5.3
990.4	5.5	5.4	5.3	5.3	5.2	5.1
990.6	5.3	5.3	5.2	5.1	5.0	5.0
990.8	5.2	5.1	5.0	5.0	4.9	4.8
991.0	5.0	5.0	4.9	4.8	4.7	4.7
991.2	4.9	4.8	4.7	4.7	4.6	4.5
991.4	4.7	4.7	4.6	4.5	4.5	4.4
991.6	4.6	4.7	4.5	4.5	4.3	4.2
991.8	4.4	4.4	4.3	4.2	4.2	4.1
992.0	4.3	4.2	4.2	4.1	4.0	3.9
992.2	4.2	4.1	4.0	3.9	3.9	3.8
992.4	4.0	3.9	3.9	3.8	3.7	3.7
992.6	3.9	3.8	3.7	3.7	3.6	3.5
992.8	3.7	3.7	3.6	3.5	3.4	3.4
993.0	3.6	3.5	3.4	3.4	3.3	3.2
993.2	3.4	3.2	3.3	3.2	3.2	3.1
993.4	3.3	3.2	3.2	3.1	3.0	3.0
993.6	3.1	3.1	3.0	2.9	2.9	2.8
993.8	3.0	2.9	2.9	2.8	2.7	2.7
994.0	2.9	2.8	2.7	2.7	2.6	2.5
994.2	2.7	2.7	2.6	2.5	2.5	2.4
994.4	2.6	2.5	2.4	2.4	2.3	2.2
994.6	2.4	2.4	2.3	2.2	2.2	2.1
994.8	2.3	2.2	2.2	2.1	2.0	2.0
995.0	2.2	2.1	2.0	2.0	1.9	1.8
995.2	2.0	2.0	1.9	1.8	1.8	1.7
995.4	1.9	1.8	1.8	1.7	1.6	1.6
995.6	1.7	1.7	1.6	1.7	1.6	1.6
995.8	1.6	1.5	1.5	1.4	1.3	1.3
996.0	1.5	1.4	1.3	1.3	1.2	1.1
996.2	1.3	1.3	1.2	1.1	1.1	1.0
996.4	1.2	1.1	1.1	1.0	0.9	0.9
996.6	1.1	1.0	0.9	0.9	0.8	0.7
996.8	0.9	0.9	0.8	0.7	0.7	0.6
997.0	0.8	0.7	0.7	0.6	0.6	0.6
997.2	0.7	0.6	0.5	0.5	0.5	0.5
997.4	0.5	0.5	0.4	0.5	0.4	0.3
997.6	0.4	0.3	0.3	0.2	0.3	0.3
997.8	0.3	0.2	0.1	0.1	0.1	0.2
998.0					0.0	0.1
998.2	0.1	0.1	0.0			
998.4	0.0					
998.6						
998.8						
999.0						
999.2						
999.4						
999.6						
999.8						
1000.0						

p^*	$q = q\,(p^*,t)$					
t	**22.5**	**23.0**	**23.5**	**24.0**	**24.5**	**25.0**
780.0						
780.2						
780.4						
780.6						
780.8						
781.0						
781.2						100.0
781.4					100.0	99.9
781.6				100.0	99.9	99.9
781.8			100.0	99.9	99.9	99.8
782.0	99.9	100.0	99.9	99.9	99.8	99.8
782.2	100.0	99.9	99.9	99.8	99.8	99.7
782.4	100.0	99.9	99.8	99.8	99.7	99.7
782.6	99.9	99.8	99.8	99.7	99.6	99.6
782.8	99.8	99.8	99.7	99.6	99.6	99.5
783.0	99.8	99.7	99.6	99.6	99.5	99.4
783.2	99.7	99.6	99.5	99.5	99.4	99.3
783.4		99.5	99.5	99.4	99.3	99.2
783.6		99.5	99.4	99.3	99.3	99.2
783.8			99.3	99.2	99.2	99.1
784.0				99.2	99.1	
784.2					99.1	
784.4						
784.6						
784.8						
785.0						
785.2						
785.4						
785.6						
785.8						
786.0						
786.2						
786.4						
786.6						
786.8						
787.0						
787.2						
787.4						
787.6						
787.8						
788.0	99.8	99.7	99.6	99.5		
788.2	99.8	99.6	99.5	99.4		
788.4	99.7	99.6	99.5	99.4		
788.6	99.7	99.6	99.5	99.3		
788.8	99.6	99.6	99.4	99.3		
789.0	99.6	99.5	99.5	99.2		
789.2	99.6	99.5	99.3	99.3		
789.4	99.5	99.5	99.4	99.2		
789.6	99.5	99.4	99.4	99.2		
789.8	99.5	99.4	99.3	99.3		
790.0	99.4	99.4	99.3	99.2	99.1	

331

First Edition 2019

12