

# Manual of Petroleum Measurement Standards Chapter 11.1—Volume Correction Factors

## Volume VI

### TABLE 24C—Volume Correction Factors for Individual and Special Applications Volume Correction to 60°F Against Thermal Expansion Coefficients at 60°F

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|                                                                                     |                                          |                 |
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## **Volume VI**

### **TABLE 24C—Volume Correction Factors for Individual and Special Applications Volume Correction to 60°F Against Thermal Expansion Coefficients at 60°F**

**Measurement Coordination/Industry Affairs**

API STANDARD 2540  
FIRST EDITION, AUGUST 1980

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The tables included in this volume and the subroutines from which they were generated are voluntary standards and were developed under the auspices of the joint API/ASTM Committee on Static Petroleum Measurement in part from data generated by a project funded by the American Petroleum Institute at the U.S. National Bureau of Standards, Gaithersburg, Maryland.

Inquiries concerning application of the tables or the computer subroutines should be addressed to:

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### Manual of Petroleum Measurement Standards

#### Chapter 11—Physical Properties Data Section 1—Volume Correction Factors

##### Volume VI

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## FOREWORD

### The Objectives

The complete collection of the jointly issued API/ASTM-IP tables of which this volume is a part is the result of close cooperation between the American Petroleum Institute (API), the Institute of Petroleum (London) (IP), and the American Society for Testing and Materials (ASTM). The overall objective of this effort was to meet the worldwide need for a uniform and authoritative publication, based on the most accurate information available. This publication serves as a basis for standardized calculations of measured quantities of petroleum fluids regardless of point of origin, destination, or units of measure used by custom or statute. To meet the objective of worldwide standardized measurement practices, the American National Standards Institute (ANSI) and the British Standards Institute (BSI) have also been closely involved nationally, resulting in the acceptance of the revised tables as an American National Standard and as a British Standard. In addition, in their respective capacities as Secretariat of the International Organization for Standardization TC/28 and of TC/28 SC3, ANSI and BSI have been instrumental in progressing the revised tables towards their adoption as an international standard by the International Organization for Standardization.

### Historical Notes

The present collection supersedes all previous editions of the petroleum measurement Tables ANSI/ASTM D1250, IP200, and API Standard 2540. Action is being taken in ISO/TC 28 for the corresponding tables listed in ISO R91 and the tables in the addendum to R91 to be superseded by the present revised collection.

In view of the progress of metrication in countries formerly using the British system of weights and measures, demand for the revision of the British edition does not justify the considerable work involved. The present edition will therefore be withdrawn on the same date as the corresponding metric and American editions are published and will not be replaced.

For the metric edition the new standard covers products with densities in the range 610.0 to 1076.0 kg/m<sup>3</sup>. The tables for densities below this range, covering liquefied petroleum gases, have not been revised.

The original tables, which were developed in the late 1940s, were based on the 1916 data of Bearce and Pepper (1916) and represent thirty years of evolution. The history of this evolution is summarized by Hall et al. (1975).

### Present Development

Downer and Inkley (1972) demonstrated that the original tables were not satisfactory representations of many petroleum fluids of current importance. In 1974 the American Petroleum Institute (API) and the United States National Bureau of Standards (NBS) initiated a research program funded by the API which intended to provide the solid scientific base for the development of more accurate, consequently more equitable, measurement tables. The result of this program was precise density data on 349 different fluids representing a wide variety of refined products and 66.8 percent of the world crude production in 1974. The completion of this five-year, \$500,000 project in March 1979 opened the way for modernizing the tables. Using the NBS density data and taking advantage of publications of outstanding technical authorities, a Joint API-ASTM Physical Properties Working

Group produced this present collection of the Petroleum Measurement Tables. The development and results of the work are described by Hankinson et al. (1979).

## Conceptual Departure

A major conceptual departure from previous versions is inherent in the recognition of the present and future position of computers in the petroleum industry. The actual Standard represented by this volume and the companion volumes is neither the hardcopy printed tables nor the set of equations used to represent the density data but is an explicit implementation procedure used to develop computer subroutines. The standardization of an implementation procedure implies the standardization of the set of mathematical expressions, including calculational sequence and round-off procedures, used within the computer code. Absolute adherence to the outlined procedures will ensure that all computers and computer codes of the future, meeting the stated specifications and restrictions, will be able to produce identical results. Hence, the published implementation procedures are the primary Standard, the distributed subroutines are the secondary standard, and the published tables are produced for convenience.

## Acknowledgments

The task of completing this project could not have been accomplished without many substantial contributions by a considerable number of individuals and companies. It is impossible to single out any specific individuals for special mention. However, included in the introductory material are lists of the officers of the API's Committee on Petroleum Measurement (COPM), the officers of the Joint API/ASTM Committee on Static Petroleum Measurement (COSM), the major contributors from the Institute of Petroleum, and the members of the COSM Physical Properties Working Group.

## References

- Bearce, H. W., and E. L. Peffer, "Technology Papers of National Bureau of Standards—Density and Thermal Expansion of American Petroleum Oils," GPO, pp. 125-154, Washington, DC, 1916.  
 Downer, L., and F. A. Inkley, *Oil and Gas Journal*, Vol. 70, No. 25, p. 52-55, June 19, 1972.  
 Hall, A. H., J. A. Simpson, and J. R. Whetstone, "Investigation of Densities and Thermal Expansion Coefficients Applicable to Petroleum Measurement," SP 7, World Petroleum Congress, Tokyo, 1975.  
 Hankinson, R. W., R. G. Segers, T. Krolikowski Buck, and F. P. Gielzecki, *Oil and Gas Journal*, Vol. 77, No. 52, p. 66-70, December 24, 1979.

## PREFACE

The Petroleum Measurement Tables, Volume Correction Factors (Volumes I through X), are, with this edition, incorporated into API's *Manual of Petroleum Measurement Standards*. These tables form Section 1 of Chapter 11, "Physical Properties Data." To simplify the transition from the American Society for Testing and Materials' (ASTM) publication of the original tables to API's publication in 1980, the original ASTM numerical designations have been retained for the individual tables.

The numbering system used throughout Volumes I through X corresponds to the numbering system of the *Manual of Petroleum Measurement Standards*. The system consists of a series of fields separated by decimal points. The first two fields (11.1) indicate chapter and section of the manual; the third field gives the ASTM table number. Therefore, although not serial, 11.1.5, 11.1.6, 11.1.23, 11.1.24, 11.1.53, and 11.1.54 are the major headings used. All other headings are subordinate to the three field headings.

Volumes I through IX, which are designed for field use, are arranged on a functional basis rather than on a topical basis.

### First Series—Volumes I, II, and III

These three volumes contain TABLES 5 and 6, the tables for the °API, °F, 60°F base series, plus examples to guide the user. Each volume contains specific data as follows:

- Volume I —Generalized Crude Oils (TABLES 5A and 6A)
- Volume II —Generalized Products (TABLES 5B and 6B)
- Volume III —Individual and Special Applications (TABLE 6C) and an appendix describing the equations and constants used and the densities and coefficients of thermal expansion of each NBS sample.

### Second Series—Volumes IV, V, and VI

These three volumes contain TABLES 23 and 24, the tables for the relative density, °F, 60°F base series, plus examples to guide the user. Each volume contains specific data as follows:

- Volume IV —Generalized Crude Oils (TABLES 23A and 24A)
- Volume V —Generalized Products (TABLES 23B and 24B)
- Volume VI —Individual and Special Applications (TABLE 24C) and an appendix describing the equations and constants used and the densities and coefficients of thermal expansion of each NBS sample.

### Third Series—Volumes VII, VIII, and IX

These three volumes contain TABLES 53 and 54, the tables for the kilogram per cubic metre, °C, 15°C base series, plus examples to guide the user. Each volume contains specific data as follows:

- Volume VII —Generalized Crude Oils (TABLES 53A and 54A)
- Volume VIII—Generalized Products (TABLES 53B and 54B)
- Volume IX —Individual and Special Applications (TABLE 54C) and an appendix describing the equations and constants used and the densities and coefficients of thermal expansion for each NBS sample.

Volume X provides a complete breakdown of the Petroleum Measurement Tables, Volume Correction Factors, and references appropriate volumes for the location of specific tables. Volume X is the key volume of the entire set and contains the actual Standard, the implementation procedures, and the instructions for the

use of the computer subroutines. The history and development of the project are also included in Volume X under 11.1.6.

Inquiries concerning the application of the tables or the computer subroutines should be addressed to—

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COPM—API Committee on Petroleum Measurement

COSM—Joint API/ASTM Subcommittee on Static Petroleum Measurement

NBS—U.S. National Bureau of Standards

ISO—International Organization for Standardization

## Chapter 11—Physical Properties Data

## SECTION 1—VOLUME CORRECTION FACTORS

### 11.1.24 TABLES 24A, 24B, and 24C— Correction of Volume to 60°F Against Relative Density 60/60°F and Thermal Expansion Coefficients

Tables 24A, 24B, and 24C give the factors for converting liquid petroleum volumes measured at observed temperatures to the corresponding volumes at 60°F.

The data are presented in three tables to maximize accuracy while maintaining convenience of use:

TABLE 24A Generalized Crude Oils  
(see Volume IV)

TABLE 24B Generalized Products  
(see Volume V)

TABLE 24C Volume Correction Factors for  
Individual and Special Applications

TABLES 24A and 24B use relative density 60/60°F to obtain volume correction factors. TABLE 24C uses experimentally determined thermal expansion coefficients to obtain volume correction factors.

The development and intended use of these tables is described in 11.1.6 in Volume X. The parameters  $K_0$  and  $K_1$  may be found in 11.1.24.7.1

The limits of these tables are illustrated in Figures VI-1, VI-2, and VI-3.

### 11.1.24.7 TABLE 24C—VOLUME CORRECTION FACTORS FOR INDIVIDUAL AND SPECIAL APPLICATIONS, VOLUME CORRECTIONS TO 60°F AGAINST THERMAL EXPANSION COEFFICIENTS AT 60°F

TABLE 24C gives volume correction factors to convert petroleum liquid volumes to the corresponding volume at 60°F. The table presents tabular entries of volume correction factors against thermal expansion coefficients and temperature. The values were computed from the basic equation used to represent volume correction factors.

$$\text{VCF} = \text{EXP} [-\alpha_T \Delta t (1 + 0.8 \alpha_T \Delta t)] \quad (1)$$

$\alpha_T = \alpha$  at the base temperature

$\Delta t = t - T$

$t$  = any temperature

$T$  = base temperature

In this form the equation is independent of the group or substance. It can be used with any valid method of obtaining the thermal expansion coefficient for a given fluid as long as a statistically significant number of points are obtained. A minimum of ten such points is recommended. The appendix (11.1.24.7.1) to TABLE 24C presents values of the thermal expansion coefficient along with the base density for each of the NBS

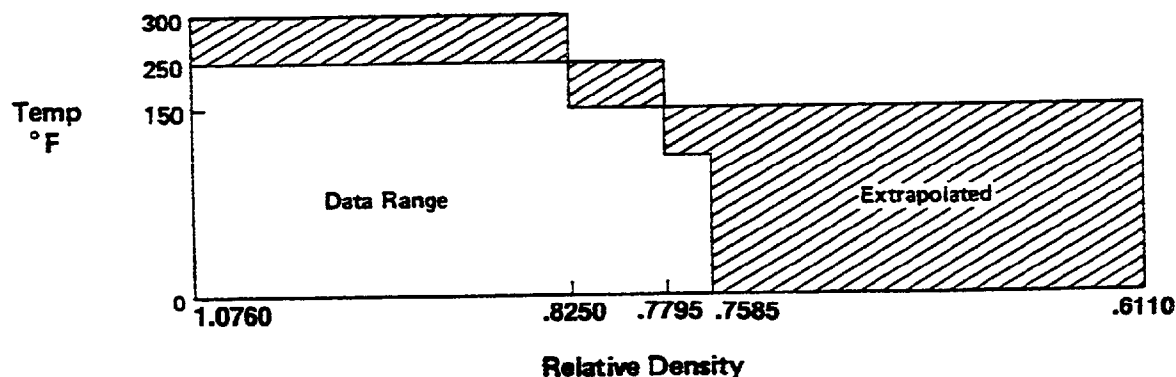


Figure VI-1 — Data Limits for TABLE 24A, Generalized Crude Oils

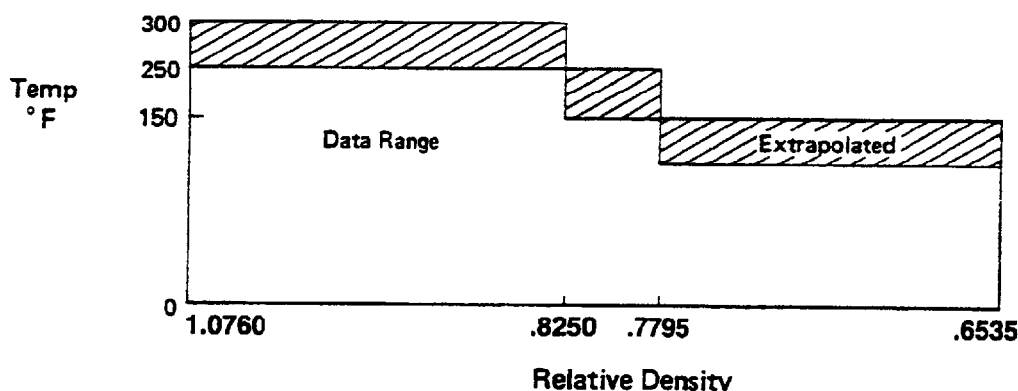


Figure VI-2 — Data Limits for TABLE 24B, Generalized Products

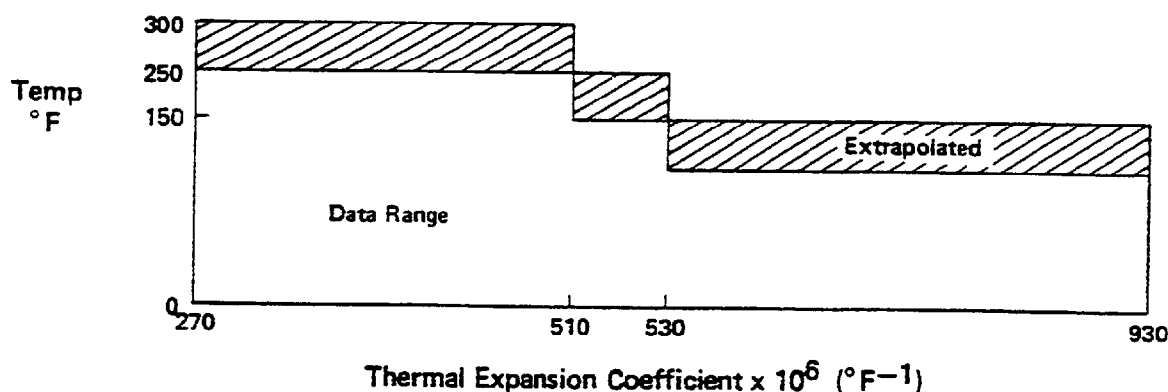


Figure VI-3 — Data Limits for TABLE 24C, Volume Correction Factors for Individual and Special Applications.

samples. In addition, values of the constants  $K_0$  and  $K_1$  are given for each major group. These constants relate the thermal expansion coefficient to base density by

$$\alpha_T = \frac{K_0 + K_1 \rho_T}{\rho_T^2} \quad (2)$$

This table and its primary subroutine allow the use of measured data for previously unstudied fluids to supplement those data included in the initial data base. High precision density data obtained from the laboratory for a fluid of interest may be reduced by Equation 1 to obtain  $\rho_T$  and  $\alpha_T$ . TABLE 24C may then be entered with the  $\alpha_T$  so determined.

TABLE 24C, when used with a minimum of ten data points, allows one to extract the highest degree of accuracy from the base data. It is suggested that TABLE 24C be used when:

1. TABLES 24A and 24B do not adequately represent the thermal expansion properties of the fluids of interest;
2. Precise thermal expansion coefficients may be obtained directly or indirectly by experiment (As an exam-

ple, high precision density data may be used to compute the coefficients.); and

3. Buyers and sellers agree that, for their use, a greater degree of equity can be obtained.

The temperature ranges of this table are:

| $\alpha \times 10^6$ | °F       |
|----------------------|----------|
| 270 to 510           | 0 to 300 |
| 510 to 530           | 0 to 250 |
| 530 to 930           | 0 to 200 |

The volume correction factors given in this table are based on data from the U.S. National Bureau of Standards (NBS) and from other published data. The appendix to this table presents values of the thermal expansion coefficients at 60°F for each of the samples included in the NBS data set. Portions of the temperature ranges represent areas beyond these data. Thus, mathematical techniques were employed to extrapolate beyond the temperature ranges of the given data to determine the volume correction factors for these areas. These factors are denoted by an asterisk (\*). Extension of this table beyond the ranges shown is not intended.

Increments used in this table for determining the volume correction factors are 0.5°F and 2 units for  $\alpha$ . Interpolation between either temperature or thermal expansion coefficient is not intended since there is no practical method of interpolation that will produce the accuracy obtainable from the Standard.

This table must be entered with a known thermal expansion coefficient at 60°F and with an observed temperature.

| °C     | kg/m <sup>3</sup> |
|--------|-------------------|
| 14.927 | 868.211           |
| 15.918 | 868.0219          |
| 20.212 | 864.5136          |
| 24.955 | 861.187           |
| 29.621 | 857.908           |
| 32.878 | 855.615           |
| 35.427 | 853.818           |
| 40.162 | 850.475           |
| 42.017 | 849.163           |
| 44.865 | 847.148           |

### Example 1

What is the net volume at 60°F of 165 000 barrels of gasoline at 45°F and a coefficient of thermal expansion of  $680.0 \times 10^{-6}$  at 60°F?

Enter the table in the column "Coefficient of Thermal Expansion," headed 680.0 at 45.0°F and note the volume correction factor 1.0102. Net volume at 60°F is

$$165\,000 \times 1.0102 = 166\,683.0$$

or

$$166\,683 \text{ net barrels of gasoline.}$$

### Example 2

The laboratory reports the following experimental data for a specific petroleum fluid:

From these data the thermal expansion coefficient at 60°F is  $447.482 \times 10^{-6}$  reciprocal °F. (Note: A minimum of ten data pairs is suggested if this type of procedure is utilized.)

What is the net volume at 60°F of 270 000 barrels of this petroleum fluid at 80°F?

Enter the table in the columns "Coefficient of Thermal Expansion," headed 447.0 at 80°F and note the volume correction factor 0.9910. Net volume at 60°F is

$$270\,000 \times 0.9910 = 267\,570.0$$

or

$$267\,570 \text{ net barrels.}$$

(Text continues on next page VI-7 following TABLE 24C)

## API/ASTM-IP PETROLEUM MEASUREMENT TABLE

TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 DEGREES F

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API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 °F

| TEMP.<br>°F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 °F |        |        |        |        |        |        |        |        |        | TEMP.<br>°F |      |
|-------------|------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|------|
|             | 270.0                                                                                          | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0       |      |
| 0.0         | 1.0161                                                                                         | 1.0162 | 1.0164 | 1.0165 | 1.0166 | 1.0167 | 1.0168 | 1.0169 | 1.0171 | 1.0172 | 1.0173      | 0.0  |
| 0.5         | 1.0160                                                                                         | 1.0161 | 1.0162 | 1.0163 | 1.0165 | 1.0166 | 1.0167 | 1.0168 | 1.0169 | 1.0170 | 1.0172      | 0.5  |
| 1.0         | 1.0159                                                                                         | 1.0160 | 1.0161 | 1.0162 | 1.0163 | 1.0164 | 1.0166 | 1.0167 | 1.0168 | 1.0169 | 1.0170      | 1.0  |
| 1.5         | 1.0157                                                                                         | 1.0158 | 1.0159 | 1.0161 | 1.0162 | 1.0163 | 1.0164 | 1.0165 | 1.0166 | 1.0168 | 1.0169      | 1.5  |
| 2.0         | 1.0156                                                                                         | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0162 | 1.0163 | 1.0164 | 1.0165 | 1.0166 | 1.0167      | 2.0  |
| 2.5         | 1.0155                                                                                         | 1.0156 | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0161 | 1.0162 | 1.0164 | 1.0165 | 1.0166      | 2.5  |
| 3.0         | 1.0153                                                                                         | 1.0154 | 1.0155 | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0161 | 1.0162 | 1.0163 | 1.0164      | 3.0  |
| 3.5         | 1.0152                                                                                         | 1.0153 | 1.0154 | 1.0155 | 1.0156 | 1.0157 | 1.0159 | 1.0160 | 1.0161 | 1.0162 | 1.0163      | 3.5  |
| 4.0         | 1.0150                                                                                         | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0156 | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0162      | 4.0  |
| 4.5         | 1.0149                                                                                         | 1.0150 | 1.0151 | 1.0152 | 1.0154 | 1.0155 | 1.0156 | 1.0157 | 1.0158 | 1.0159 | 1.0160      | 4.5  |
| 5.0         | 1.0148                                                                                         | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0157 | 1.0158 | 1.0159      | 5.0  |
| 5.5         | 1.0146                                                                                         | 1.0148 | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0156 | 1.0157      | 5.5  |
| 6.0         | 1.0145                                                                                         | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0156      | 6.0  |
| 6.5         | 1.0144                                                                                         | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153 | 1.0154      | 6.5  |
| 7.0         | 1.0142                                                                                         | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153      | 7.0  |
| 7.5         | 1.0141                                                                                         | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0152      | 7.5  |
| 8.0         | 1.0140                                                                                         | 1.0141 | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150      | 8.0  |
| 8.5         | 1.0138                                                                                         | 1.0139 | 1.0140 | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149      | 8.5  |
| 9.0         | 1.0137                                                                                         | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147      | 9.0  |
| 9.5         | 1.0136                                                                                         | 1.0137 | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146      | 9.5  |
| 10.0        | 1.0134                                                                                         | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0142 | 1.0143 | 1.0144      | 10.0 |
| 10.5        | 1.0133                                                                                         | 1.0134 | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0142 | 1.0143      | 10.5 |
| 11.0        | 1.0132                                                                                         | 1.0133 | 1.0134 | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0141      | 11.0 |
| 11.5        | 1.0130                                                                                         | 1.0131 | 1.0132 | 1.0133 | 1.0134 | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 1.0140      | 11.5 |
| 12.0        | 1.0129                                                                                         | 1.0130 | 1.0131 | 1.0132 | 1.0133 | 1.0134 | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139      | 12.0 |
| 12.5        | 1.0128                                                                                         | 1.0129 | 1.0130 | 1.0131 | 1.0132 | 1.0132 | 1.0133 | 1.0134 | 1.0135 | 1.0136 | 1.0137      | 12.5 |
| 13.0        | 1.0126                                                                                         | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 1.0131 | 1.0132 | 1.0133 | 1.0134 | 1.0135 | 1.0136      | 13.0 |
| 13.5        | 1.0125                                                                                         | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 1.0131 | 1.0132 | 1.0132 | 1.0133 | 1.0134      | 13.5 |
| 14.0        | 1.0124                                                                                         | 1.0125 | 1.0126 | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 1.0131 | 1.0132 | 1.0133      | 14.0 |
| 14.5        | 1.0122                                                                                         | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 1.0131 | 1.0131      | 14.5 |
| 15.0        | 1.0121                                                                                         | 1.0122 | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 1.0130      | 15.0 |

ALPHA = 270.0 TO 290.0

\* DENOTES EXTRAPOLATED VALUE

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        |        | TEMP.<br>F |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|
|            | 270.0                                                                                         | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |            |
| 15.0       | 1.0121                                                                                        | 1.0122 | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 15.0       |
| 15.5       | 1.0120                                                                                        | 1.0121 | 1.0121 | 1.0122 | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 15.5       |
| 16.0       | 1.0118                                                                                        | 1.0119 | 1.0120 | 1.0121 | 1.0122 | 1.0123 | 1.0124 | 1.0124 | 1.0125 | 1.0126 | 1.0127 | 16.0       |
| 16.5       | 1.0117                                                                                        | 1.0118 | 1.0119 | 1.0120 | 1.0121 | 1.0121 | 1.0122 | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 16.5       |
| 17.0       | 1.0116                                                                                        | 1.0117 | 1.0117 | 1.0118 | 1.0119 | 1.0120 | 1.0121 | 1.0122 | 1.0123 | 1.0123 | 1.0124 | 17.0       |
| 17.5       | 1.0114                                                                                        | 1.0115 | 1.0116 | 1.0117 | 1.0118 | 1.0119 | 1.0119 | 1.0120 | 1.0121 | 1.0122 | 1.0123 | 17.5       |
| 18.0       | 1.0113                                                                                        | 1.0114 | 1.0115 | 1.0116 | 1.0116 | 1.0117 | 1.0118 | 1.0119 | 1.0120 | 1.0121 | 1.0121 | 18.0       |
| 18.5       | 1.0112                                                                                        | 1.0112 | 1.0113 | 1.0114 | 1.0115 | 1.0116 | 1.0117 | 1.0117 | 1.0118 | 1.0119 | 1.0120 | 18.5       |
| 19.0       | 1.0110                                                                                        | 1.0111 | 1.0112 | 1.0113 | 1.0114 | 1.0114 | 1.0115 | 1.0116 | 1.0117 | 1.0118 | 1.0118 | 19.0       |
| 19.5       | 1.0109                                                                                        | 1.0110 | 1.0111 | 1.0111 | 1.0112 | 1.0113 | 1.0114 | 1.0115 | 1.0115 | 1.0116 | 1.0117 | 19.5       |
| 20.0       | 1.0108                                                                                        | 1.0108 | 1.0109 | 1.0110 | 1.0111 | 1.0112 | 1.0112 | 1.0113 | 1.0114 | 1.0115 | 1.0116 | 20.0       |
| 20.5       | 1.0106                                                                                        | 1.0107 | 1.0108 | 1.0109 | 1.0109 | 1.0110 | 1.0111 | 1.0112 | 1.0113 | 1.0113 | 1.0114 | 20.5       |
| 21.0       | 1.0105                                                                                        | 1.0106 | 1.0107 | 1.0107 | 1.0108 | 1.0109 | 1.0110 | 1.0110 | 1.0111 | 1.0112 | 1.0113 | 21.0       |
| 21.5       | 1.0104                                                                                        | 1.0104 | 1.0105 | 1.0106 | 1.0107 | 1.0107 | 1.0108 | 1.0109 | 1.0110 | 1.0111 | 1.0111 | 21.5       |
| 22.0       | 1.0102                                                                                        | 1.0103 | 1.0104 | 1.0105 | 1.0105 | 1.0106 | 1.0107 | 1.0108 | 1.0108 | 1.0109 | 1.0110 | 22.0       |
| 22.5       | 1.0101                                                                                        | 1.0102 | 1.0102 | 1.0103 | 1.0104 | 1.0105 | 1.0105 | 1.0106 | 1.0107 | 1.0108 | 1.0108 | 22.5       |
| 23.0       | 1.0100                                                                                        | 1.0100 | 1.0101 | 1.0102 | 1.0103 | 1.0103 | 1.0104 | 1.0105 | 1.0105 | 1.0106 | 1.0107 | 23.0       |
| 23.5       | 1.0098                                                                                        | 1.0099 | 1.0100 | 1.0100 | 1.0101 | 1.0102 | 1.0103 | 1.0103 | 1.0104 | 1.0105 | 1.0106 | 23.5       |
| 24.0       | 1.0097                                                                                        | 1.0098 | 1.0098 | 1.0099 | 1.0100 | 1.0100 | 1.0101 | 1.0102 | 1.0103 | 1.0103 | 1.0104 | 24.0       |
| 24.5       | 1.0096                                                                                        | 1.0096 | 1.0097 | 1.0098 | 1.0098 | 1.0099 | 1.0100 | 1.0101 | 1.0101 | 1.0102 | 1.0103 | 24.5       |
| 25.0       | 1.0094                                                                                        | 1.0095 | 1.0096 | 1.0096 | 1.0097 | 1.0098 | 1.0098 | 1.0099 | 1.0100 | 1.0100 | 1.0101 | 25.0       |
| 25.5       | 1.0093                                                                                        | 1.0094 | 1.0094 | 1.0095 | 1.0096 | 1.0096 | 1.0097 | 1.0098 | 1.0098 | 1.0099 | 1.0100 | 25.5       |
| 26.0       | 1.0092                                                                                        | 1.0092 | 1.0093 | 1.0094 | 1.0094 | 1.0095 | 1.0096 | 1.0096 | 1.0097 | 1.0098 | 1.0098 | 26.0       |
| 26.5       | 1.0090                                                                                        | 1.0091 | 1.0092 | 1.0092 | 1.0093 | 1.0094 | 1.0094 | 1.0095 | 1.0096 | 1.0096 | 1.0097 | 26.5       |
| 27.0       | 1.0089                                                                                        | 1.0090 | 1.0090 | 1.0091 | 1.0091 | 1.0092 | 1.0093 | 1.0093 | 1.0094 | 1.0095 | 1.0095 | 27.0       |
| 27.5       | 1.0088                                                                                        | 1.0088 | 1.0089 | 1.0089 | 1.0090 | 1.0091 | 1.0091 | 1.0092 | 1.0093 | 1.0093 | 1.0094 | 27.5       |
| 28.0       | 1.0086                                                                                        | 1.0087 | 1.0087 | 1.0088 | 1.0089 | 1.0089 | 1.0090 | 1.0091 | 1.0091 | 1.0092 | 1.0093 | 28.0       |
| 28.5       | 1.0085                                                                                        | 1.0085 | 1.0086 | 1.0087 | 1.0087 | 1.0088 | 1.0089 | 1.0089 | 1.0090 | 1.0090 | 1.0091 | 28.5       |
| 29.0       | 1.0083                                                                                        | 1.0084 | 1.0085 | 1.0085 | 1.0086 | 1.0087 | 1.0087 | 1.0088 | 1.0088 | 1.0089 | 1.0090 | 29.0       |
| 29.5       | 1.0082                                                                                        | 1.0083 | 1.0083 | 1.0084 | 1.0085 | 1.0085 | 1.0086 | 1.0086 | 1.0087 | 1.0088 | 1.0088 | 29.5       |
| 30.0       | 1.0081                                                                                        | 1.0081 | 1.0082 | 1.0083 | 1.0083 | 1.0084 | 1.0084 | 1.0085 | 1.0086 | 1.0086 | 1.0087 | 30.0       |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 270.0                                                                                         | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  |            | 290.0 |
| 30.0       | 1.0081                                                                                        | 1.0081 | 1.0082 | 1.0083 | 1.0083 | 1.0084 | 1.0084 | 1.0085 | 1.0086 | 1.0086 | 1.0087     | 30.0  |
| 30.5       | 1.0079                                                                                        | 1.0080 | 1.0081 | 1.0081 | 1.0082 | 1.0082 | 1.0083 | 1.0084 | 1.0084 | 1.0085 | 1.0085     | 30.5  |
| 31.0       | 1.0078                                                                                        | 1.0079 | 1.0079 | 1.0080 | 1.0080 | 1.0081 | 1.0082 | 1.0082 | 1.0083 | 1.0083 | 1.0084     | 31.0  |
| 31.5       | 1.0077                                                                                        | 1.0077 | 1.0078 | 1.0078 | 1.0079 | 1.0080 | 1.0080 | 1.0081 | 1.0081 | 1.0082 | 1.0082     | 31.5  |
| 32.0       | 1.0075                                                                                        | 1.0076 | 1.0077 | 1.0077 | 1.0078 | 1.0078 | 1.0079 | 1.0079 | 1.0080 | 1.0080 | 1.0081     | 32.0  |
| 32.5       | 1.0074                                                                                        | 1.0075 | 1.0075 | 1.0076 | 1.0076 | 1.0077 | 1.0077 | 1.0078 | 1.0078 | 1.0079 | 1.0080     | 32.5  |
| 33.0       | 1.0073                                                                                        | 1.0073 | 1.0074 | 1.0074 | 1.0075 | 1.0075 | 1.0076 | 1.0077 | 1.0077 | 1.0078 | 1.0078     | 33.0  |
| 33.5       | 1.0071                                                                                        | 1.0072 | 1.0072 | 1.0073 | 1.0074 | 1.0074 | 1.0075 | 1.0075 | 1.0076 | 1.0076 | 1.0077     | 33.5  |
| 34.0       | 1.0070                                                                                        | 1.0071 | 1.0071 | 1.0072 | 1.0072 | 1.0073 | 1.0073 | 1.0074 | 1.0074 | 1.0075 | 1.0075     | 34.0  |
| 34.5       | 1.0069                                                                                        | 1.0069 | 1.0070 | 1.0070 | 1.0071 | 1.0071 | 1.0072 | 1.0072 | 1.0073 | 1.0073 | 1.0074     | 34.5  |
| 35.0       | 1.0067                                                                                        | 1.0068 | 1.0068 | 1.0069 | 1.0069 | 1.0070 | 1.0070 | 1.0071 | 1.0071 | 1.0072 | 1.0072     | 35.0  |
| 35.5       | 1.0066                                                                                        | 1.0067 | 1.0067 | 1.0067 | 1.0068 | 1.0068 | 1.0069 | 1.0069 | 1.0070 | 1.0070 | 1.0071     | 35.5  |
| 36.0       | 1.0065                                                                                        | 1.0065 | 1.0066 | 1.0066 | 1.0067 | 1.0067 | 1.0068 | 1.0068 | 1.0068 | 1.0069 | 1.0069     | 36.0  |
| 36.5       | 1.0063                                                                                        | 1.0064 | 1.0064 | 1.0065 | 1.0065 | 1.0066 | 1.0066 | 1.0067 | 1.0067 | 1.0068 | 1.0068     | 36.5  |
| 37.0       | 1.0062                                                                                        | 1.0062 | 1.0063 | 1.0063 | 1.0064 | 1.0064 | 1.0065 | 1.0065 | 1.0066 | 1.0066 | 1.0067     | 37.0  |
| 37.5       | 1.0061                                                                                        | 1.0061 | 1.0062 | 1.0062 | 1.0062 | 1.0063 | 1.0063 | 1.0064 | 1.0064 | 1.0065 | 1.0065     | 37.5  |
| 38.0       | 1.0059                                                                                        | 1.0060 | 1.0060 | 1.0061 | 1.0061 | 1.0061 | 1.0062 | 1.0062 | 1.0063 | 1.0063 | 1.0064     | 38.0  |
| 38.5       | 1.0058                                                                                        | 1.0058 | 1.0059 | 1.0059 | 1.0060 | 1.0060 | 1.0061 | 1.0061 | 1.0061 | 1.0062 | 1.0062     | 38.5  |
| 39.0       | 1.0057                                                                                        | 1.0057 | 1.0057 | 1.0058 | 1.0058 | 1.0059 | 1.0059 | 1.0060 | 1.0060 | 1.0060 | 1.0061     | 39.0  |
| 39.5       | 1.0055                                                                                        | 1.0056 | 1.0056 | 1.0056 | 1.0057 | 1.0057 | 1.0058 | 1.0058 | 1.0059 | 1.0059 | 1.0059     | 39.5  |
| 40.0       | 1.0054                                                                                        | 1.0054 | 1.0055 | 1.0055 | 1.0056 | 1.0056 | 1.0056 | 1.0057 | 1.0057 | 1.0057 | 1.0058     | 40.0  |
| 40.5       | 1.0053                                                                                        | 1.0053 | 1.0053 | 1.0054 | 1.0054 | 1.0055 | 1.0055 | 1.0055 | 1.0056 | 1.0056 | 1.0056     | 40.5  |
| 41.0       | 1.0051                                                                                        | 1.0052 | 1.0052 | 1.0052 | 1.0053 | 1.0053 | 1.0053 | 1.0054 | 1.0054 | 1.0055 | 1.0055     | 41.0  |
| 41.5       | 1.0050                                                                                        | 1.0050 | 1.0051 | 1.0051 | 1.0051 | 1.0052 | 1.0052 | 1.0052 | 1.0053 | 1.0053 | 1.0054     | 41.5  |
| 42.0       | 1.0049                                                                                        | 1.0049 | 1.0049 | 1.0050 | 1.0050 | 1.0050 | 1.0051 | 1.0051 | 1.0051 | 1.0052 | 1.0052     | 42.0  |
| 42.5       | 1.0047                                                                                        | 1.0048 | 1.0048 | 1.0048 | 1.0049 | 1.0049 | 1.0049 | 1.0050 | 1.0050 | 1.0050 | 1.0051     | 42.5  |
| 43.0       | 1.0046                                                                                        | 1.0046 | 1.0047 | 1.0047 | 1.0047 | 1.0048 | 1.0048 | 1.0048 | 1.0049 | 1.0049 | 1.0049     | 43.0  |
| 43.5       | 1.0044                                                                                        | 1.0045 | 1.0045 | 1.0045 | 1.0046 | 1.0046 | 1.0046 | 1.0047 | 1.0047 | 1.0047 | 1.0048     | 43.5  |
| 44.0       | 1.0043                                                                                        | 1.0043 | 1.0044 | 1.0044 | 1.0044 | 1.0045 | 1.0045 | 1.0045 | 1.0046 | 1.0046 | 1.0046     | 44.0  |
| 44.5       | 1.0042                                                                                        | 1.0042 | 1.0042 | 1.0043 | 1.0043 | 1.0043 | 1.0044 | 1.0044 | 1.0044 | 1.0045 | 1.0045     | 44.5  |
| 45.0       | 1.0040                                                                                        | 1.0041 | 1.0041 | 1.0041 | 1.0042 | 1.0042 | 1.0042 | 1.0043 | 1.0043 | 1.0043 | 1.0043     | 45.0  |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |      |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|------|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |  |            |      |
| 45.0       | 1.0041                                                                                        | 1.0041 | 1.0042 | 1.0042 | 1.0042 | 1.0043 | 1.0043 | 1.0043 | 1.0043 |  | 290.0      | 45.0 |
| 45.5       | 1.0040                                                                                        | 1.0040 | 1.0040 | 1.0041 | 1.0041 | 1.0041 | 1.0041 | 1.0041 | 1.0042 |  |            | 45.5 |
| 46.0       | 1.0038                                                                                        | 1.0038 | 1.0039 | 1.0039 | 1.0039 | 1.0040 | 1.0040 | 1.0040 | 1.0040 |  |            | 46.0 |
| 46.5       | 1.0037                                                                                        | 1.0037 | 1.0037 | 1.0038 | 1.0038 | 1.0038 | 1.0039 | 1.0039 | 1.0039 |  |            | 46.5 |
| 47.0       | 1.0036                                                                                        | 1.0036 | 1.0036 | 1.0036 | 1.0037 | 1.0037 | 1.0037 | 1.0037 | 1.0038 |  |            | 47.0 |
| 47.5       | 1.0034                                                                                        | 1.0034 | 1.0035 | 1.0035 | 1.0035 | 1.0035 | 1.0036 | 1.0036 | 1.0036 |  |            | 47.5 |
| 48.0       | 1.0033                                                                                        | 1.0033 | 1.0033 | 1.0034 | 1.0034 | 1.0034 | 1.0034 | 1.0035 | 1.0035 |  |            | 48.0 |
| 48.5       | 1.0031                                                                                        | 1.0031 | 1.0032 | 1.0032 | 1.0032 | 1.0033 | 1.0033 | 1.0033 | 1.0033 |  |            | 48.5 |
| 49.0       | 1.0030                                                                                        | 1.0030 | 1.0031 | 1.0031 | 1.0031 | 1.0031 | 1.0031 | 1.0032 | 1.0032 |  |            | 49.0 |
| 49.5       | 1.0029                                                                                        | 1.0029 | 1.0029 | 1.0029 | 1.0030 | 1.0030 | 1.0030 | 1.0030 | 1.0030 |  |            | 49.5 |
| 50.0       | 1.0027                                                                                        | 1.0027 | 1.0028 | 1.0028 | 1.0028 | 1.0028 | 1.0029 | 1.0029 | 1.0029 |  |            | 50.0 |
| 50.5       | 1.0026                                                                                        | 1.0026 | 1.0026 | 1.0027 | 1.0027 | 1.0027 | 1.0027 | 1.0027 | 1.0027 |  |            | 50.5 |
| 51.0       | 1.0024                                                                                        | 1.0024 | 1.0025 | 1.0025 | 1.0025 | 1.0026 | 1.0026 | 1.0026 | 1.0026 |  |            | 51.0 |
| 51.5       | 1.0023                                                                                        | 1.0023 | 1.0023 | 1.0024 | 1.0024 | 1.0024 | 1.0024 | 1.0024 | 1.0024 |  |            | 51.5 |
| 52.0       | 1.0022                                                                                        | 1.0022 | 1.0022 | 1.0022 | 1.0023 | 1.0023 | 1.0023 | 1.0023 | 1.0023 |  |            | 52.0 |
| 52.5       | 1.0020                                                                                        | 1.0020 | 1.0021 | 1.0021 | 1.0021 | 1.0021 | 1.0021 | 1.0021 | 1.0021 |  |            | 52.5 |
| 53.0       | 1.0019                                                                                        | 1.0019 | 1.0019 | 1.0019 | 1.0020 | 1.0020 | 1.0020 | 1.0020 | 1.0020 |  |            | 53.0 |
| 53.5       | 1.0018                                                                                        | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0019 | 1.0019 |  |            | 53.5 |
| 54.0       | 1.0016                                                                                        | 1.0016 | 1.0017 | 1.0017 | 1.0017 | 1.0017 | 1.0017 | 1.0017 | 1.0017 |  |            | 54.0 |
| 54.5       | 1.0015                                                                                        | 1.0015 | 1.0015 | 1.0015 | 1.0016 | 1.0016 | 1.0016 | 1.0016 | 1.0016 |  |            | 54.5 |
| 55.0       | 1.0013                                                                                        | 1.0013 | 1.0014 | 1.0014 | 1.0014 | 1.0014 | 1.0014 | 1.0014 | 1.0014 |  |            | 55.0 |
| 55.5       | 1.0012                                                                                        | 1.0012 | 1.0013 | 1.0013 | 1.0013 | 1.0013 | 1.0013 | 1.0013 | 1.0013 |  |            | 55.5 |
| 56.0       | 1.0011                                                                                        | 1.0011 | 1.0011 | 1.0011 | 1.0011 | 1.0011 | 1.0011 | 1.0012 | 1.0012 |  |            | 56.0 |
| 56.5       | 1.0009                                                                                        | 1.0010 | 1.0010 | 1.0010 | 1.0010 | 1.0010 | 1.0010 | 1.0010 | 1.0010 |  |            | 56.5 |
| 57.0       | 1.0008                                                                                        | 1.0008 | 1.0008 | 1.0008 | 1.0008 | 1.0009 | 1.0009 | 1.0009 | 1.0009 |  |            | 57.0 |
| 57.5       | 1.0007                                                                                        | 1.0007 | 1.0007 | 1.0007 | 1.0007 | 1.0007 | 1.0007 | 1.0007 | 1.0007 |  |            | 57.5 |
| 58.0       | 1.0005                                                                                        | 1.0005 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 |  |            | 58.0 |
| 58.5       | 1.0004                                                                                        | 1.0004 | 1.0004 | 1.0004 | 1.0004 | 1.0004 | 1.0004 | 1.0004 | 1.0004 |  |            | 58.5 |
| 59.0       | 1.0003                                                                                        | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 |  |            | 59.0 |
| 59.5       | 1.0001                                                                                        | 1.0001 | 1.0001 | 1.0001 | 1.0001 | 1.0001 | 1.0001 | 1.0001 | 1.0001 |  |            | 59.5 |
| 60.0       | 1.0000                                                                                        | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |  |            | 60.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C. VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 270.0                                                                                         | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  |            | 290.0 |
| 60.0       | 1.0000                                                                                        | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000     | 60.0  |
| 60.5       | 0.9999                                                                                        | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999     | 60.5  |
| 61.0       | 0.9997                                                                                        | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997     | 61.0  |
| 61.5       | 0.9996                                                                                        | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996     | 61.5  |
| 62.0       | 0.9995                                                                                        | 0.9995 | 0.9995 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994     | 62.0  |
| 62.5       | 0.9993                                                                                        | 0.9993 | 0.9993 | 0.9993 | 0.9993 | 0.9993 | 0.9993 | 0.9993 | 0.9993 | 0.9993 | 0.9993     | 62.5  |
| 63.0       | 0.9992                                                                                        | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9991 | 0.9991 | 0.9991 | 0.9991 | 0.9991     | 63.0  |
| 63.5       | 0.9991                                                                                        | 0.9990 | 0.9990 | 0.9990 | 0.9990 | 0.9990 | 0.9990 | 0.9990 | 0.9990 | 0.9990 | 0.9990     | 63.5  |
| 64.0       | 0.9989                                                                                        | 0.9989 | 0.9989 | 0.9989 | 0.9989 | 0.9989 | 0.9989 | 0.9989 | 0.9989 | 0.9988 | 0.9988     | 64.0  |
| 64.5       | 0.9988                                                                                        | 0.9988 | 0.9988 | 0.9987 | 0.9987 | 0.9987 | 0.9987 | 0.9987 | 0.9987 | 0.9987 | 0.9987     | 64.5  |
| 65.0       | 0.9986                                                                                        | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9985     | 65.0  |
| 65.5       | 0.9985                                                                                        | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9984 | 0.9984 | 0.9984 | 0.9984 | 0.9984     | 65.5  |
| 66.0       | 0.9984                                                                                        | 0.9984 | 0.9984 | 0.9983 | 0.9983 | 0.9983 | 0.9983 | 0.9983 | 0.9983 | 0.9983 | 0.9983     | 66.0  |
| 66.5       | 0.9982                                                                                        | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9981 | 0.9981 | 0.9981     | 66.5  |
| 67.0       | 0.9981                                                                                        | 0.9981 | 0.9981 | 0.9981 | 0.9981 | 0.9980 | 0.9980 | 0.9980 | 0.9980 | 0.9980 | 0.9980     | 67.0  |
| 67.5       | 0.9980                                                                                        | 0.9980 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9978 | 0.9978     | 67.5  |
| 68.0       | 0.9978                                                                                        | 0.9978 | 0.9978 | 0.9978 | 0.9978 | 0.9978 | 0.9977 | 0.9977 | 0.9977 | 0.9977 | 0.9977     | 68.0  |
| 68.5       | 0.9977                                                                                        | 0.9977 | 0.9977 | 0.9977 | 0.9976 | 0.9976 | 0.9976 | 0.9976 | 0.9976 | 0.9976 | 0.9975     | 68.5  |
| 69.0       | 0.9976                                                                                        | 0.9976 | 0.9975 | 0.9975 | 0.9975 | 0.9975 | 0.9975 | 0.9974 | 0.9974 | 0.9974 | 0.9974     | 69.0  |
| 69.5       | 0.9974                                                                                        | 0.9974 | 0.9974 | 0.9974 | 0.9974 | 0.9973 | 0.9973 | 0.9973 | 0.9973 | 0.9973 | 0.9972     | 69.5  |
| 70.0       | 0.9973                                                                                        | 0.9973 | 0.9973 | 0.9972 | 0.9972 | 0.9972 | 0.9972 | 0.9972 | 0.9971 | 0.9971 | 0.9971     | 70.0  |
| 70.5       | 0.9972                                                                                        | 0.9971 | 0.9971 | 0.9971 | 0.9971 | 0.9971 | 0.9970 | 0.9970 | 0.9970 | 0.9970 | 0.9970     | 70.5  |
| 71.0       | 0.9970                                                                                        | 0.9970 | 0.9970 | 0.9970 | 0.9969 | 0.9969 | 0.9969 | 0.9969 | 0.9969 | 0.9968 | 0.9968     | 71.0  |
| 71.5       | 0.9969                                                                                        | 0.9969 | 0.9968 | 0.9968 | 0.9968 | 0.9968 | 0.9968 | 0.9967 | 0.9967 | 0.9967 | 0.9967     | 71.5  |
| 72.0       | 0.9968                                                                                        | 0.9967 | 0.9967 | 0.9967 | 0.9967 | 0.9966 | 0.9966 | 0.9966 | 0.9966 | 0.9965 | 0.9965     | 72.0  |
| 72.5       | 0.9966                                                                                        | 0.9966 | 0.9966 | 0.9965 | 0.9965 | 0.9965 | 0.9965 | 0.9964 | 0.9964 | 0.9964 | 0.9964     | 72.5  |
| 73.0       | 0.9965                                                                                        | 0.9965 | 0.9964 | 0.9964 | 0.9964 | 0.9964 | 0.9963 | 0.9963 | 0.9963 | 0.9963 | 0.9962     | 73.0  |
| 73.5       | 0.9964                                                                                        | 0.9963 | 0.9963 | 0.9963 | 0.9962 | 0.9962 | 0.9962 | 0.9962 | 0.9961 | 0.9961 | 0.9961     | 73.5  |
| 74.0       | 0.9962                                                                                        | 0.9962 | 0.9961 | 0.9961 | 0.9961 | 0.9961 | 0.9960 | 0.9960 | 0.9960 | 0.9960 | 0.9959     | 74.0  |
| 74.5       | 0.9961                                                                                        | 0.9961 | 0.9960 | 0.9960 | 0.9960 | 0.9959 | 0.9959 | 0.9959 | 0.9958 | 0.9958 | 0.9958     | 74.5  |
| 75.0       | 0.9959                                                                                        | 0.9959 | 0.9959 | 0.9959 | 0.9958 | 0.9958 | 0.9958 | 0.9957 | 0.9957 | 0.9957 | 0.9956     | 75.0  |

ALPHA = 270.0 TO 290.0

ALPHA = 270.0 TO 290.0

\* DENOTES EXTRAPOLATED VALUE

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|
|            | 270.0                                                                                         | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  |            |
| 75.0       | 0.9959                                                                                        | 0.9959 | 0.9959 | 0.9959 | 0.9958 | 0.9958 | 0.9958 | 0.9957 | 0.9957 | 0.9957 | 0.9956     |
| 75.5       | 0.9958                                                                                        | 0.9958 | 0.9957 | 0.9957 | 0.9957 | 0.9957 | 0.9956 | 0.9956 | 0.9956 | 0.9955 | 0.9955     |
| 76.0       | 0.9957                                                                                        | 0.9956 | 0.9956 | 0.9956 | 0.9955 | 0.9955 | 0.9955 | 0.9954 | 0.9954 | 0.9954 | 0.9954     |
| 76.5       | 0.9955                                                                                        | 0.9955 | 0.9955 | 0.9954 | 0.9954 | 0.9954 | 0.9953 | 0.9953 | 0.9953 | 0.9952 | 0.9952     |
| 77.0       | 0.9954                                                                                        | 0.9954 | 0.9953 | 0.9953 | 0.9953 | 0.9952 | 0.9952 | 0.9952 | 0.9951 | 0.9951 | 0.9951     |
| 77.5       | 0.9953                                                                                        | 0.9952 | 0.9952 | 0.9952 | 0.9951 | 0.9951 | 0.9951 | 0.9950 | 0.9950 | 0.9950 | 0.9949     |
| 78.0       | 0.9951                                                                                        | 0.9951 | 0.9951 | 0.9950 | 0.9950 | 0.9950 | 0.9949 | 0.9949 | 0.9948 | 0.9948 | 0.9948     |
| 78.5       | 0.9950                                                                                        | 0.9950 | 0.9949 | 0.9949 | 0.9948 | 0.9948 | 0.9948 | 0.9947 | 0.9947 | 0.9947 | 0.9946     |
| 79.0       | 0.9949                                                                                        | 0.9948 | 0.9948 | 0.9947 | 0.9947 | 0.9947 | 0.9946 | 0.9946 | 0.9946 | 0.9945 | 0.9945     |
| 79.5       | 0.9947                                                                                        | 0.9947 | 0.9946 | 0.9946 | 0.9946 | 0.9945 | 0.9945 | 0.9945 | 0.9944 | 0.9944 | 0.9943     |
| 80.0       | 0.9946                                                                                        | 0.9946 | 0.9945 | 0.9945 | 0.9944 | 0.9944 | 0.9944 | 0.9943 | 0.9943 | 0.9942 | 0.9942     |
| 80.5       | 0.9945                                                                                        | 0.9944 | 0.9944 | 0.9943 | 0.9943 | 0.9943 | 0.9942 | 0.9942 | 0.9941 | 0.9941 | 0.9940     |
| 81.0       | 0.9943                                                                                        | 0.9943 | 0.9942 | 0.9942 | 0.9942 | 0.9941 | 0.9941 | 0.9940 | 0.9940 | 0.9939 | 0.9939     |
| 81.5       | 0.9942                                                                                        | 0.9941 | 0.9941 | 0.9941 | 0.9940 | 0.9940 | 0.9939 | 0.9939 | 0.9938 | 0.9938 | 0.9938     |
| 82.0       | 0.9940                                                                                        | 0.9940 | 0.9940 | 0.9939 | 0.9939 | 0.9938 | 0.9938 | 0.9937 | 0.9937 | 0.9937 | 0.9936     |
| 82.5       | 0.9939                                                                                        | 0.9939 | 0.9938 | 0.9938 | 0.9937 | 0.9937 | 0.9936 | 0.9936 | 0.9936 | 0.9935 | 0.9935     |
| 83.0       | 0.9938                                                                                        | 0.9937 | 0.9937 | 0.9936 | 0.9936 | 0.9935 | 0.9935 | 0.9935 | 0.9934 | 0.9934 | 0.9933     |
| 83.5       | 0.9936                                                                                        | 0.9936 | 0.9935 | 0.9935 | 0.9935 | 0.9934 | 0.9934 | 0.9933 | 0.9933 | 0.9932 | 0.9932     |
| 84.0       | 0.9935                                                                                        | 0.9935 | 0.9934 | 0.9934 | 0.9933 | 0.9933 | 0.9932 | 0.9932 | 0.9931 | 0.9931 | 0.9930     |
| 84.5       | 0.9934                                                                                        | 0.9933 | 0.9933 | 0.9932 | 0.9932 | 0.9931 | 0.9931 | 0.9930 | 0.9930 | 0.9929 | 0.9929     |
| 85.0       | 0.9932                                                                                        | 0.9932 | 0.9931 | 0.9931 | 0.9930 | 0.9930 | 0.9929 | 0.9929 | 0.9928 | 0.9928 | 0.9927     |
| 85.5       | 0.9931                                                                                        | 0.9930 | 0.9930 | 0.9929 | 0.9929 | 0.9928 | 0.9928 | 0.9927 | 0.9927 | 0.9926 | 0.9926     |
| 86.0       | 0.9930                                                                                        | 0.9929 | 0.9929 | 0.9928 | 0.9928 | 0.9927 | 0.9927 | 0.9926 | 0.9925 | 0.9925 | 0.9924     |
| 86.5       | 0.9928                                                                                        | 0.9928 | 0.9927 | 0.9927 | 0.9926 | 0.9926 | 0.9925 | 0.9925 | 0.9924 | 0.9924 | 0.9923     |
| 87.0       | 0.9927                                                                                        | 0.9926 | 0.9926 | 0.9925 | 0.9925 | 0.9924 | 0.9924 | 0.9923 | 0.9923 | 0.9922 | 0.9922     |
| 87.5       | 0.9926                                                                                        | 0.9925 | 0.9924 | 0.9924 | 0.9923 | 0.9923 | 0.9922 | 0.9922 | 0.9921 | 0.9921 | 0.9920     |
| 88.0       | 0.9924                                                                                        | 0.9924 | 0.9923 | 0.9923 | 0.9922 | 0.9921 | 0.9921 | 0.9920 | 0.9920 | 0.9919 | 0.9919     |
| 88.5       | 0.9923                                                                                        | 0.9922 | 0.9922 | 0.9921 | 0.9921 | 0.9920 | 0.9919 | 0.9919 | 0.9918 | 0.9918 | 0.9917     |
| 89.0       | 0.9922                                                                                        | 0.9921 | 0.9920 | 0.9920 | 0.9919 | 0.9919 | 0.9918 | 0.9917 | 0.9917 | 0.9916 | 0.9916     |
| 89.5       | 0.9920                                                                                        | 0.9920 | 0.9919 | 0.9918 | 0.9918 | 0.9917 | 0.9917 | 0.9916 | 0.9915 | 0.9915 | 0.9914     |
| 90.0       | 0.9919                                                                                        | 0.9918 | 0.9918 | 0.9917 | 0.9916 | 0.9916 | 0.9915 | 0.9915 | 0.9914 | 0.9913 | 0.9913     |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 270.0                                                                                         | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  |            |       |
| 90.0       | 0.9919                                                                                        | 0.9918 | 0.9918 | 0.9917 | 0.9916 | 0.9916 | 0.9915 | 0.9915 | 0.9914 | 0.9913 | 0.9913     | 90.0  |
| 90.5       | 0.9917                                                                                        | 0.9917 | 0.9916 | 0.9916 | 0.9915 | 0.9914 | 0.9914 | 0.9913 | 0.9913 | 0.9912 | 0.9911     | 90.5  |
| 91.0       | 0.9916                                                                                        | 0.9915 | 0.9915 | 0.9914 | 0.9914 | 0.9913 | 0.9912 | 0.9912 | 0.9911 | 0.9910 | 0.9910     | 91.0  |
| 91.5       | 0.9915                                                                                        | 0.9914 | 0.9913 | 0.9913 | 0.9912 | 0.9912 | 0.9911 | 0.9910 | 0.9910 | 0.9909 | 0.9908     | 91.5  |
| 92.0       | 0.9913                                                                                        | 0.9913 | 0.9912 | 0.9911 | 0.9911 | 0.9910 | 0.9910 | 0.9909 | 0.9908 | 0.9908 | 0.9907     | 92.0  |
| 92.5       | 0.9912                                                                                        | 0.9911 | 0.9911 | 0.9910 | 0.9909 | 0.9909 | 0.9908 | 0.9907 | 0.9907 | 0.9906 | 0.9905     | 92.5  |
| 93.0       | 0.9911                                                                                        | 0.9910 | 0.9909 | 0.9909 | 0.9908 | 0.9907 | 0.9907 | 0.9906 | 0.9905 | 0.9905 | 0.9904     | 93.0  |
| 93.5       | 0.9909                                                                                        | 0.9909 | 0.9908 | 0.9907 | 0.9907 | 0.9906 | 0.9905 | 0.9905 | 0.9904 | 0.9903 | 0.9903     | 93.5  |
| 94.0       | 0.9908                                                                                        | 0.9907 | 0.9907 | 0.9906 | 0.9905 | 0.9905 | 0.9904 | 0.9903 | 0.9902 | 0.9902 | 0.9901     | 94.0  |
| 94.5       | 0.9907                                                                                        | 0.9906 | 0.9905 | 0.9905 | 0.9904 | 0.9903 | 0.9902 | 0.9902 | 0.9901 | 0.9900 | 0.9900     | 94.5  |
| 95.0       | 0.9905                                                                                        | 0.9905 | 0.9904 | 0.9903 | 0.9902 | 0.9902 | 0.9901 | 0.9900 | 0.9900 | 0.9899 | 0.9898     | 95.0  |
| 95.5       | 0.9904                                                                                        | 0.9903 | 0.9902 | 0.9902 | 0.9901 | 0.9900 | 0.9900 | 0.9899 | 0.9898 | 0.9897 | 0.9897     | 95.5  |
| 96.0       | 0.9903                                                                                        | 0.9902 | 0.9901 | 0.9900 | 0.9900 | 0.9899 | 0.9898 | 0.9897 | 0.9897 | 0.9896 | 0.9895     | 96.0  |
| 96.5       | 0.9901                                                                                        | 0.9900 | 0.9900 | 0.9899 | 0.9898 | 0.9897 | 0.9897 | 0.9896 | 0.9895 | 0.9895 | 0.9894     | 96.5  |
| 97.0       | 0.9900                                                                                        | 0.9899 | 0.9898 | 0.9898 | 0.9897 | 0.9896 | 0.9895 | 0.9895 | 0.9894 | 0.9893 | 0.9892     | 97.0  |
| 97.5       | 0.9898                                                                                        | 0.9898 | 0.9897 | 0.9896 | 0.9895 | 0.9895 | 0.9894 | 0.9893 | 0.9892 | 0.9892 | 0.9891     | 97.5  |
| 98.0       | 0.9897                                                                                        | 0.9896 | 0.9896 | 0.9895 | 0.9894 | 0.9893 | 0.9893 | 0.9892 | 0.9891 | 0.9890 | 0.9889     | 98.0  |
| 98.5       | 0.9896                                                                                        | 0.9895 | 0.9894 | 0.9893 | 0.9893 | 0.9892 | 0.9891 | 0.9890 | 0.9890 | 0.9889 | 0.9888     | 98.5  |
| 99.0       | 0.9894                                                                                        | 0.9894 | 0.9893 | 0.9892 | 0.9891 | 0.9890 | 0.9890 | 0.9889 | 0.9888 | 0.9887 | 0.9887     | 99.0  |
| 99.5       | 0.9893                                                                                        | 0.9892 | 0.9891 | 0.9891 | 0.9890 | 0.9889 | 0.9888 | 0.9887 | 0.9887 | 0.9886 | 0.9885     | 99.5  |
| 100.0      | 0.9892                                                                                        | 0.9891 | 0.9890 | 0.9889 | 0.9888 | 0.9888 | 0.9887 | 0.9886 | 0.9885 | 0.9884 | 0.9884     | 100.0 |
| 100.5      | 0.9890                                                                                        | 0.9889 | 0.9889 | 0.9888 | 0.9887 | 0.9886 | 0.9885 | 0.9885 | 0.9884 | 0.9883 | 0.9882     | 100.5 |
| 101.0      | 0.9889                                                                                        | 0.9888 | 0.9888 | 0.9887 | 0.9886 | 0.9885 | 0.9884 | 0.9883 | 0.9882 | 0.9882 | 0.9881     | 101.0 |
| 101.5      | 0.9888                                                                                        | 0.9887 | 0.9886 | 0.9885 | 0.9884 | 0.9883 | 0.9883 | 0.9882 | 0.9881 | 0.9880 | 0.9879     | 101.5 |
| 102.0      | 0.9886                                                                                        | 0.9885 | 0.9885 | 0.9884 | 0.9883 | 0.9882 | 0.9881 | 0.9880 | 0.9879 | 0.9878 | 0.9878     | 102.0 |
| 102.5      | 0.9885                                                                                        | 0.9884 | 0.9883 | 0.9882 | 0.9881 | 0.9881 | 0.9880 | 0.9879 | 0.9878 | 0.9877 | 0.9876     | 102.5 |
| 103.0      | 0.9884                                                                                        | 0.9883 | 0.9882 | 0.9881 | 0.9880 | 0.9879 | 0.9878 | 0.9877 | 0.9876 | 0.9875 | 0.9875     | 103.0 |
| 103.5      | 0.9882                                                                                        | 0.9881 | 0.9880 | 0.9880 | 0.9879 | 0.9878 | 0.9877 | 0.9876 | 0.9875 | 0.9874 | 0.9873     | 103.5 |
| 104.0      | 0.9881                                                                                        | 0.9880 | 0.9879 | 0.9878 | 0.9877 | 0.9876 | 0.9875 | 0.9875 | 0.9874 | 0.9873 | 0.9872     | 104.0 |
| 104.5      | 0.9879                                                                                        | 0.9879 | 0.9878 | 0.9877 | 0.9876 | 0.9875 | 0.9874 | 0.9873 | 0.9872 | 0.9871 | 0.9870     | 104.5 |
| 105.0      | 0.9878                                                                                        | 0.9877 | 0.9876 | 0.9875 | 0.9874 | 0.9874 | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869     | 105.0 |

ALPHA = 270.0 TO 290.0

\* DENOTES EXTRAPOLATED VALUE

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        |        | TEMP.<br>F |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|
|            | 270.0                                                                                         | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |            |
| 105.0      | 0.9878                                                                                        | 0.9877 | 0.9876 | 0.9875 | 0.9874 | 0.9874 | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869 | 105.0      |
| 105.5      | 0.9877                                                                                        | 0.9876 | 0.9875 | 0.9874 | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869 | 0.9868 | 0.9868 | 105.5      |
| 106.0      | 0.9875                                                                                        | 0.9874 | 0.9873 | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9866 | 106.0      |
| 106.5      | 0.9874                                                                                        | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9866 | 0.9866 | 0.9865 | 106.5      |
| 107.0      | 0.9873                                                                                        | 0.9872 | 0.9871 | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9863 | 107.0      |
| 107.5      | 0.9871                                                                                        | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9866 | 0.9866 | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 107.5      |
| 108.0      | 0.9870                                                                                        | 0.9869 | 0.9868 | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860 | 108.0      |
| 108.5      | 0.9869                                                                                        | 0.9868 | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 108.5      |
| 109.0      | 0.9867                                                                                        | 0.9866 | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 109.0      |
| 109.5      | 0.9866                                                                                        | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 109.5      |
| 110.0      | 0.9864                                                                                        | 0.9863 | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 110.0      |
| 110.5      | 0.9863                                                                                        | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 0.9853 | 110.5      |
| 111.0      | 0.9862                                                                                        | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 0.9852 | 0.9851 | 111.0      |
| 111.5      | 0.9860                                                                                        | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 111.5      |
| 112.0      | 0.9859                                                                                        | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 112.0      |
| 112.5      | 0.9858                                                                                        | 0.9857 | 0.9856 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 112.5      |
| 113.0      | 0.9856                                                                                        | 0.9855 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 0.9846 | 113.0      |
| 113.5      | 0.9855                                                                                        | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 113.5      |
| 114.0      | 0.9854                                                                                        | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 0.9843 | 114.0      |
| 114.5      | 0.9852                                                                                        | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9843 | 0.9842 | 0.9841 | 114.5      |
| 115.0      | 0.9851                                                                                        | 0.9850 | 0.9849 | 0.9848 | 0.9846 | 0.9845 | 0.9844 | 0.9843 | 0.9842 | 0.9841 | 0.9840 | 115.0      |
| 115.5      | 0.9849                                                                                        | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 0.9843 | 0.9842 | 0.9841 | 0.9839 | 0.9838 | 115.5      |
| 116.0      | 0.9848                                                                                        | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 0.9842 | 0.9841 | 0.9840 | 0.9839 | 0.9838 | 0.9837 | 116.0      |
| 116.5      | 0.9847                                                                                        | 0.9846 | 0.9844 | 0.9843 | 0.9842 | 0.9841 | 0.9840 | 0.9839 | 0.9838 | 0.9837 | 0.9835 | 116.5      |
| 117.0      | 0.9845                                                                                        | 0.9844 | 0.9843 | 0.9842 | 0.9841 | 0.9840 | 0.9839 | 0.9837 | 0.9836 | 0.9835 | 0.9834 | 117.0      |
| 117.5      | 0.9844                                                                                        | 0.9843 | 0.9842 | 0.9841 | 0.9839 | 0.9838 | 0.9837 | 0.9836 | 0.9835 | 0.9834 | 0.9832 | 117.5      |
| 118.0      | 0.9843                                                                                        | 0.9842 | 0.9840 | 0.9839 | 0.9838 | 0.9837 | 0.9836 | 0.9834 | 0.9833 | 0.9832 | 0.9831 | 118.0      |
| 118.5      | 0.9841                                                                                        | 0.9840 | 0.9839 | 0.9838 | 0.9837 | 0.9835 | 0.9834 | 0.9833 | 0.9832 | 0.9831 | 0.9830 | 118.5      |
| 119.0      | 0.9840                                                                                        | 0.9839 | 0.9838 | 0.9836 | 0.9835 | 0.9834 | 0.9833 | 0.9832 | 0.9830 | 0.9829 | 0.9828 | 119.0      |
| 119.5      | 0.9839                                                                                        | 0.9837 | 0.9836 | 0.9835 | 0.9834 | 0.9833 | 0.9831 | 0.9830 | 0.9829 | 0.9828 | 0.9827 | 119.5      |
| 120.0      | 0.9837                                                                                        | 0.9836 | 0.9835 | 0.9834 | 0.9832 | 0.9831 | 0.9830 | 0.9829 | 0.9828 | 0.9826 | 0.9825 | 120.0      |

ALPHA = 270.0 TO 290.0

\* DENOTES EXTRAPOLATED VALUE

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |  |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|--|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |  |            |  |
| 120.0      | 0.9835                                                                                        | 0.9834 | 0.9832 | 0.9831 | 0.9830 | 0.9829 | 0.9828 | 0.9826 | 0.9825 |  | 120.0      |  |
| 120.5      | 0.9833                                                                                        | 0.9832 | 0.9831 | 0.9830 | 0.9829 | 0.9827 | 0.9826 | 0.9825 | 0.9824 |  | 120.5      |  |
| 121.0      | 0.9833                                                                                        | 0.9831 | 0.9830 | 0.9828 | 0.9827 | 0.9826 | 0.9825 | 0.9823 | 0.9822 |  | 121.0      |  |
| 121.5      | 0.9833                                                                                        | 0.9829 | 0.9828 | 0.9827 | 0.9826 | 0.9824 | 0.9823 | 0.9822 | 0.9821 |  | 121.5      |  |
| 122.0      | 0.9832                                                                                        | 0.9828 | 0.9827 | 0.9826 | 0.9824 | 0.9823 | 0.9822 | 0.9821 | 0.9819 |  | 122.0      |  |
| 122.5      | 0.9830                                                                                        | 0.9827 | 0.9825 | 0.9824 | 0.9823 | 0.9822 | 0.9820 | 0.9819 | 0.9818 |  | 122.5      |  |
| 123.0      | 0.9829                                                                                        | 0.9825 | 0.9824 | 0.9823 | 0.9821 | 0.9820 | 0.9819 | 0.9818 | 0.9816 |  | 123.0      |  |
| 123.5      | 0.9828                                                                                        | 0.9825 | 0.9824 | 0.9821 | 0.9820 | 0.9819 | 0.9817 | 0.9816 | 0.9815 |  | 123.5      |  |
| 124.0      | 0.9826                                                                                        | 0.9824 | 0.9822 | 0.9821 | 0.9819 | 0.9817 | 0.9816 | 0.9815 | 0.9813 |  | 124.0      |  |
| 124.5      | 0.9825                                                                                        | 0.9822 | 0.9821 | 0.9818 | 0.9817 | 0.9816 | 0.9815 | 0.9813 | 0.9812 |  | 124.5      |  |
| 125.0      | 0.9824                                                                                        | 0.9820 | 0.9818 | 0.9817 | 0.9816 | 0.9814 | 0.9813 | 0.9812 | 0.9810 |  | 125.0      |  |
| 125.5      | 0.9822                                                                                        | 0.9818 | 0.9817 | 0.9816 | 0.9814 | 0.9813 | 0.9812 | 0.9810 | 0.9809 |  | 125.5      |  |
| 126.0      | 0.9821                                                                                        | 0.9817 | 0.9816 | 0.9814 | 0.9813 | 0.9812 | 0.9810 | 0.9809 | 0.9808 |  | 126.0      |  |
| 126.5      | 0.9820                                                                                        | 0.9817 | 0.9815 | 0.9814 | 0.9811 | 0.9810 | 0.9809 | 0.9807 | 0.9806 |  | 126.5      |  |
| 127.0      | 0.9818                                                                                        | 0.9814 | 0.9813 | 0.9811 | 0.9810 | 0.9809 | 0.9807 | 0.9806 | 0.9805 |  | 127.0      |  |
| 127.5      | 0.9817                                                                                        | 0.9814 | 0.9813 | 0.9811 | 0.9809 | 0.9807 | 0.9806 | 0.9805 | 0.9803 |  | 127.5      |  |
| 128.0      | 0.9815                                                                                        | 0.9813 | 0.9811 | 0.9809 | 0.9807 | 0.9806 | 0.9804 | 0.9803 | 0.9802 |  | 128.0      |  |
| 128.5      | 0.9814                                                                                        | 0.9813 | 0.9810 | 0.9809 | 0.9807 | 0.9806 | 0.9803 | 0.9802 | 0.9800 |  | 128.5      |  |
| 129.0      | 0.9813                                                                                        | 0.9809 | 0.9807 | 0.9806 | 0.9804 | 0.9803 | 0.9802 | 0.9800 | 0.9799 |  | 129.0      |  |
| 129.5      | 0.9811                                                                                        | 0.9809 | 0.9807 | 0.9806 | 0.9803 | 0.9801 | 0.9800 | 0.9799 | 0.9797 |  | 129.5      |  |
| 130.0      | 0.9810                                                                                        | 0.9807 | 0.9806 | 0.9804 | 0.9803 | 0.9801 | 0.9799 | 0.9797 | 0.9796 |  | 130.0      |  |
| 130.5      | 0.9809                                                                                        | 0.9806 | 0.9804 | 0.9803 | 0.9801 | 0.9800 | 0.9799 | 0.9796 | 0.9794 |  | 130.5      |  |
| 131.0      | 0.9807                                                                                        | 0.9806 | 0.9803 | 0.9801 | 0.9800 | 0.9799 | 0.9796 | 0.9794 | 0.9793 |  | 131.0      |  |
| 131.5      | 0.9806                                                                                        | 0.9804 | 0.9803 | 0.9800 | 0.9799 | 0.9797 | 0.9796 | 0.9793 | 0.9791 |  | 131.5      |  |
| 132.0      | 0.9805                                                                                        | 0.9803 | 0.9802 | 0.9799 | 0.9796 | 0.9794 | 0.9793 | 0.9791 | 0.9790 |  | 132.0      |  |
| 132.5      | 0.9803                                                                                        | 0.9802 | 0.9799 | 0.9797 | 0.9794 | 0.9793 | 0.9791 | 0.9790 | 0.9788 |  | 132.5      |  |
| 133.0      | 0.9802                                                                                        | 0.9800 | 0.9799 | 0.9796 | 0.9793 | 0.9791 | 0.9790 | 0.9788 | 0.9787 |  | 133.0      |  |
| 133.5      | 0.9800                                                                                        | 0.9799 | 0.9797 | 0.9794 | 0.9791 | 0.9790 | 0.9789 | 0.9787 | 0.9786 |  | 133.5      |  |
| 134.0      | 0.9799                                                                                        | 0.9798 | 0.9796 | 0.9793 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9784 |  | 134.0      |  |
| 134.5      | 0.9798                                                                                        | 0.9796 | 0.9795 | 0.9792 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9783 |  | 134.5      |  |
| 135.0      | 0.9796                                                                                        | 0.9795 | 0.9793 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9781 |  | 135.0      |  |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |        |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|--------|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |  | 288.0      | 290.0  |
| 135.0      | 0.9793                                                                                        | 0.9792 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9781 |  | 0.9783     | 0.9781 |
| 135.5      | 0.9793                                                                                        | 0.9790 | 0.9789 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9781 |  | 0.9781     | 0.9780 |
| 136.0      | 0.9794                                                                                        | 0.9792 | 0.9791 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9781 |  | 0.9780     | 0.9778 |
| 136.5      | 0.9792                                                                                        | 0.9791 | 0.9789 | 0.9788 | 0.9786 | 0.9784 | 0.9783 | 0.9781 | 0.9780 |  | 0.9778     | 0.9777 |
| 137.0      | 0.9791                                                                                        | 0.9789 | 0.9788 | 0.9786 | 0.9785 | 0.9783 | 0.9782 | 0.9780 | 0.9778 |  | 0.9777     | 0.9775 |
| 137.5      | 0.9789                                                                                        | 0.9788 | 0.9785 | 0.9783 | 0.9782 | 0.9780 | 0.9779 | 0.9777 | 0.9774 |  | 0.9775     | 0.9774 |
| 138.0      | 0.9788                                                                                        | 0.9787 | 0.9785 | 0.9782 | 0.9780 | 0.9779 | 0.9777 | 0.9775 | 0.9772 |  | 0.9774     | 0.9772 |
| 138.5      | 0.9787                                                                                        | 0.9785 | 0.9784 | 0.9782 | 0.9780 | 0.9779 | 0.9777 | 0.9776 | 0.9774 |  | 0.9772     | 0.9771 |
| 139.0      | 0.9785                                                                                        | 0.9784 | 0.9782 | 0.9781 | 0.9779 | 0.9777 | 0.9776 | 0.9774 | 0.9773 |  | 0.9771     | 0.9769 |
| 139.5      | 0.9784                                                                                        | 0.9782 | 0.9781 | 0.9779 | 0.9778 | 0.9776 | 0.9774 | 0.9773 | 0.9771 |  | 0.9770     | 0.9768 |
| 140.0      | 0.9783                                                                                        | 0.9781 | 0.9779 | 0.9778 | 0.9776 | 0.9775 | 0.9773 | 0.9771 | 0.9770 |  | 0.9768     | 0.9766 |
| 140.5      | 0.9781                                                                                        | 0.9778 | 0.9776 | 0.9775 | 0.9773 | 0.9772 | 0.9770 | 0.9768 | 0.9767 |  | 0.9767     | 0.9765 |
| 141.0      | 0.9780                                                                                        | 0.9778 | 0.9777 | 0.9775 | 0.9773 | 0.9772 | 0.9770 | 0.9768 | 0.9767 |  | 0.9765     | 0.9764 |
| 141.5      | 0.9779                                                                                        | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 0.9770 | 0.9769 | 0.9767 | 0.9765 |  | 0.9764     | 0.9762 |
| 142.0      | 0.9777                                                                                        | 0.9776 | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 0.9766 | 0.9764 |  | 0.9762     | 0.9761 |
| 142.5      | 0.9776                                                                                        | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 0.9766 | 0.9764 | 0.9762 |  | 0.9761     | 0.9759 |
| 143.0      | 0.9774                                                                                        | 0.9773 | 0.9771 | 0.9769 | 0.9768 | 0.9766 | 0.9764 | 0.9763 | 0.9761 |  | 0.9759     | 0.9758 |
| 143.5      | 0.9773                                                                                        | 0.9771 | 0.9770 | 0.9768 | 0.9766 | 0.9765 | 0.9763 | 0.9761 | 0.9760 |  | 0.9758     | 0.9756 |
| 144.0      | 0.9772                                                                                        | 0.9770 | 0.9768 | 0.9767 | 0.9765 | 0.9763 | 0.9762 | 0.9760 | 0.9758 |  | 0.9756     | 0.9755 |
| 144.5      | 0.9770                                                                                        | 0.9769 | 0.9767 | 0.9765 | 0.9764 | 0.9762 | 0.9760 | 0.9758 | 0.9757 |  | 0.9755     | 0.9753 |
| 145.0      | 0.9769                                                                                        | 0.9767 | 0.9766 | 0.9764 | 0.9762 | 0.9760 | 0.9759 | 0.9757 | 0.9755 |  | 0.9753     | 0.9752 |
| 145.5      | 0.9768                                                                                        | 0.9766 | 0.9764 | 0.9762 | 0.9761 | 0.9759 | 0.9757 | 0.9756 | 0.9754 |  | 0.9752     | 0.9750 |
| 146.0      | 0.9766                                                                                        | 0.9765 | 0.9763 | 0.9761 | 0.9759 | 0.9758 | 0.9756 | 0.9754 | 0.9752 |  | 0.9751     | 0.9749 |
| 146.5      | 0.9765                                                                                        | 0.9763 | 0.9761 | 0.9760 | 0.9758 | 0.9756 | 0.9754 | 0.9753 | 0.9751 |  | 0.9749     | 0.9747 |
| 147.0      | 0.9764                                                                                        | 0.9762 | 0.9760 | 0.9758 | 0.9756 | 0.9755 | 0.9753 | 0.9751 | 0.9749 |  | 0.9748     | 0.9746 |
| 147.5      | 0.9762                                                                                        | 0.9760 | 0.9757 | 0.9755 | 0.9753 | 0.9752 | 0.9750 | 0.9748 | 0.9746 |  | 0.9746     | 0.9744 |
| 148.0      | 0.9761                                                                                        | 0.9759 | 0.9757 | 0.9755 | 0.9754 | 0.9752 | 0.9750 | 0.9748 | 0.9747 |  | 0.9745     | 0.9743 |
| 148.5      | 0.9759                                                                                        | 0.9758 | 0.9756 | 0.9754 | 0.9752 | 0.9750 | 0.9749 | 0.9747 | 0.9745 |  | 0.9743     | 0.9741 |
| 149.0      | 0.9758                                                                                        | 0.9756 | 0.9754 | 0.9753 | 0.9751 | 0.9749 | 0.9747 | 0.9745 | 0.9744 |  | 0.9742     | 0.9740 |
| 149.5      | 0.9757                                                                                        | 0.9755 | 0.9753 | 0.9751 | 0.9749 | 0.9748 | 0.9746 | 0.9744 | 0.9742 |  | 0.9740     | 0.9739 |
| 150.0      | 0.9755                                                                                        | 0.9753 | 0.9752 | 0.9750 | 0.9748 | 0.9746 | 0.9744 | 0.9743 | 0.9741 |  | 0.9739     | 0.9737 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |  |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|--|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |  |            |  |
| 150.0      | 0.9752                                                                                        | 0.9750 | 0.9748 | 0.9746 | 0.9744 | 0.9743 | 0.9741 | 0.9739 | 0.9737 |  | 150.0      |  |
| 150.5      | 0.9750                                                                                        | 0.9748 | 0.9747 | 0.9745 | 0.9743 | 0.9741 | 0.9739 | 0.9737 | 0.9736 |  | 150.5      |  |
| 151.0      | 0.9749                                                                                        | 0.9747 | 0.9745 | 0.9743 | 0.9742 | 0.9740 | 0.9738 | 0.9736 | 0.9734 |  | 151.0      |  |
| 151.5      | 0.9751                                                                                        | 0.9749 | 0.9747 | 0.9745 | 0.9744 | 0.9742 | 0.9738 | 0.9735 | 0.9733 |  | 151.5      |  |
| 152.0      | 0.9748                                                                                        | 0.9746 | 0.9744 | 0.9742 | 0.9741 | 0.9739 | 0.9737 | 0.9735 | 0.9731 |  | 152.0      |  |
| 152.5      | 0.9747                                                                                        | 0.9745 | 0.9743 | 0.9741 | 0.9739 | 0.9737 | 0.9735 | 0.9733 | 0.9730 |  | 152.5      |  |
| 153.0      | 0.9745                                                                                        | 0.9743 | 0.9741 | 0.9740 | 0.9738 | 0.9736 | 0.9734 | 0.9732 | 0.9728 |  | 153.0      |  |
| 153.5      | 0.9744                                                                                        | 0.9742 | 0.9740 | 0.9738 | 0.9736 | 0.9734 | 0.9732 | 0.9729 | 0.9727 |  | 153.5      |  |
| 154.0      | 0.9742                                                                                        | 0.9741 | 0.9739 | 0.9737 | 0.9735 | 0.9733 | 0.9731 | 0.9729 | 0.9725 |  | 154.0      |  |
| 154.5      | 0.9741                                                                                        | 0.9739 | 0.9737 | 0.9735 | 0.9733 | 0.9731 | 0.9730 | 0.9728 | 0.9724 |  | 154.5      |  |
| 155.0      | 0.9738                                                                                        | 0.9736 | 0.9734 | 0.9732 | 0.9730 | 0.9728 | 0.9726 | 0.9724 | 0.9722 |  | 155.0      |  |
| 155.5      | 0.9736                                                                                        | 0.9734 | 0.9733 | 0.9731 | 0.9729 | 0.9727 | 0.9725 | 0.9723 | 0.9721 |  | 155.5      |  |
| 156.0      | 0.9735                                                                                        | 0.9733 | 0.9731 | 0.9729 | 0.9727 | 0.9725 | 0.9723 | 0.9721 | 0.9719 |  | 156.0      |  |
| 156.5      | 0.9734                                                                                        | 0.9732 | 0.9730 | 0.9728 | 0.9726 | 0.9724 | 0.9722 | 0.9720 | 0.9718 |  | 156.5      |  |
| 157.0      | 0.9732                                                                                        | 0.9730 | 0.9728 | 0.9726 | 0.9724 | 0.9722 | 0.9720 | 0.9718 | 0.9716 |  | 157.0      |  |
| 157.5      | 0.9731                                                                                        | 0.9729 | 0.9727 | 0.9725 | 0.9723 | 0.9721 | 0.9719 | 0.9717 | 0.9715 |  | 157.5      |  |
| 158.0      | 0.9729                                                                                        | 0.9727 | 0.9725 | 0.9723 | 0.9721 | 0.9719 | 0.9718 | 0.9716 | 0.9714 |  | 158.0      |  |
| 158.5      | 0.9728                                                                                        | 0.9726 | 0.9724 | 0.9722 | 0.9720 | 0.9718 | 0.9716 | 0.9714 | 0.9712 |  | 158.5      |  |
| 159.0      | 0.9727                                                                                        | 0.9725 | 0.9723 | 0.9721 | 0.9719 | 0.9717 | 0.9715 | 0.9713 | 0.9711 |  | 159.0      |  |
| 159.5      | 0.9725                                                                                        | 0.9723 | 0.9721 | 0.9719 | 0.9717 | 0.9715 | 0.9713 | 0.9711 | 0.9709 |  | 159.5      |  |
| 160.0      | 0.9724                                                                                        | 0.9722 | 0.9720 | 0.9718 | 0.9716 | 0.9714 | 0.9712 | 0.9710 | 0.9708 |  | 160.0      |  |
| 160.5      | 0.9722                                                                                        | 0.9720 | 0.9718 | 0.9716 | 0.9714 | 0.9712 | 0.9710 | 0.9708 | 0.9706 |  | 160.5      |  |
| 161.0      | 0.9721                                                                                        | 0.9719 | 0.9717 | 0.9715 | 0.9713 | 0.9711 | 0.9709 | 0.9707 | 0.9705 |  | 161.0      |  |
| 161.5      | 0.9720                                                                                        | 0.9718 | 0.9716 | 0.9714 | 0.9711 | 0.9709 | 0.9707 | 0.9705 | 0.9703 |  | 161.5      |  |
| 162.0      | 0.9718                                                                                        | 0.9716 | 0.9714 | 0.9712 | 0.9710 | 0.9708 | 0.9706 | 0.9704 | 0.9702 |  | 162.0      |  |
| 162.5      | 0.9717                                                                                        | 0.9715 | 0.9713 | 0.9711 | 0.9709 | 0.9707 | 0.9704 | 0.9702 | 0.9700 |  | 162.5      |  |
| 163.0      | 0.9716                                                                                        | 0.9713 | 0.9711 | 0.9709 | 0.9707 | 0.9705 | 0.9703 | 0.9701 | 0.9699 |  | 163.0      |  |
| 163.5      | 0.9714                                                                                        | 0.9712 | 0.9710 | 0.9708 | 0.9706 | 0.9704 | 0.9702 | 0.9700 | 0.9697 |  | 163.5      |  |
| 164.0      | 0.9713                                                                                        | 0.9711 | 0.9709 | 0.9706 | 0.9704 | 0.9702 | 0.9700 | 0.9698 | 0.9696 |  | 164.0      |  |
| 164.5      | 0.9711                                                                                        | 0.9709 | 0.9707 | 0.9705 | 0.9703 | 0.9701 | 0.9699 | 0.9696 | 0.9694 |  | 164.5      |  |
| 165.0      | 0.9710                                                                                        | 0.9708 | 0.9706 | 0.9704 | 0.9701 | 0.9699 | 0.9697 | 0.9695 | 0.9693 |  | 165.0      |  |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |        |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|--------|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |  | 288.0      | 290.0  |
| 165.0      | 0.9710                                                                                        | 0.9708 | 0.9706 | 0.9704 | 0.9701 | 0.9699 | 0.9697 | 0.9695 | 0.9693 |  | 0.9695     | 0.9693 |
| 165.5      | 0.9709                                                                                        | 0.9706 | 0.9704 | 0.9702 | 0.9700 | 0.9698 | 0.9696 | 0.9694 | 0.9691 |  | 0.9694     | 0.9691 |
| 166.0      | 0.9707                                                                                        | 0.9705 | 0.9703 | 0.9701 | 0.9699 | 0.9696 | 0.9694 | 0.9692 | 0.9690 |  | 0.9692     | 0.9690 |
| 166.5      | 0.9706                                                                                        | 0.9704 | 0.9701 | 0.9699 | 0.9697 | 0.9695 | 0.9693 | 0.9691 | 0.9688 |  | 0.9691     | 0.9688 |
| 167.0      | 0.9704                                                                                        | 0.9702 | 0.9700 | 0.9698 | 0.9696 | 0.9694 | 0.9691 | 0.9689 | 0.9687 |  | 0.9689     | 0.9687 |
| 167.5      | 0.9703                                                                                        | 0.9701 | 0.9699 | 0.9696 | 0.9694 | 0.9692 | 0.9690 | 0.9688 | 0.9686 |  | 0.9688     | 0.9686 |
| 168.0      | 0.9702                                                                                        | 0.9699 | 0.9697 | 0.9695 | 0.9693 | 0.9691 | 0.9688 | 0.9686 | 0.9684 |  | 0.9686     | 0.9684 |
| 168.5      | 0.9700                                                                                        | 0.9698 | 0.9696 | 0.9694 | 0.9691 | 0.9689 | 0.9687 | 0.9685 | 0.9683 |  | 0.9685     | 0.9683 |
| 169.0      | 0.9699                                                                                        | 0.9697 | 0.9694 | 0.9692 | 0.9690 | 0.9688 | 0.9686 | 0.9683 | 0.9681 |  | 0.9683     | 0.9681 |
| 169.5      | 0.9697                                                                                        | 0.9695 | 0.9693 | 0.9691 | 0.9689 | 0.9686 | 0.9684 | 0.9682 | 0.9680 |  | 0.9682     | 0.9680 |
| 170.0      | 0.9696                                                                                        | 0.9694 | 0.9692 | 0.9689 | 0.9687 | 0.9685 | 0.9683 | 0.9680 | 0.9678 |  | 0.9680     | 0.9678 |
| 170.5      | 0.9695                                                                                        | 0.9692 | 0.9690 | 0.9688 | 0.9686 | 0.9683 | 0.9681 | 0.9679 | 0.9677 |  | 0.9679     | 0.9677 |
| 171.0      | 0.9693                                                                                        | 0.9691 | 0.9689 | 0.9686 | 0.9684 | 0.9682 | 0.9680 | 0.9677 | 0.9675 |  | 0.9677     | 0.9675 |
| 171.5      | 0.9692                                                                                        | 0.9690 | 0.9687 | 0.9685 | 0.9683 | 0.9681 | 0.9678 | 0.9676 | 0.9674 |  | 0.9676     | 0.9674 |
| 172.0      | 0.9690                                                                                        | 0.9688 | 0.9686 | 0.9684 | 0.9681 | 0.9679 | 0.9677 | 0.9675 | 0.9672 |  | 0.9675     | 0.9672 |
| 172.5      | 0.9689                                                                                        | 0.9687 | 0.9685 | 0.9682 | 0.9680 | 0.9678 | 0.9675 | 0.9673 | 0.9671 |  | 0.9673     | 0.9671 |
| 173.0      | 0.9688                                                                                        | 0.9685 | 0.9683 | 0.9681 | 0.9678 | 0.9676 | 0.9674 | 0.9672 | 0.9669 |  | 0.9672     | 0.9669 |
| 173.5      | 0.9689                                                                                        | 0.9686 | 0.9684 | 0.9682 | 0.9679 | 0.9677 | 0.9675 | 0.9672 | 0.9670 |  | 0.9670     | 0.9668 |
| 174.0      | 0.9690                                                                                        | 0.9687 | 0.9685 | 0.9683 | 0.9680 | 0.9678 | 0.9676 | 0.9673 | 0.9671 |  | 0.9669     | 0.9666 |
| 174.5      | 0.9688                                                                                        | 0.9686 | 0.9684 | 0.9681 | 0.9679 | 0.9677 | 0.9675 | 0.9672 | 0.9669 |  | 0.9667     | 0.9665 |
| 175.0      | 0.9687                                                                                        | 0.9684 | 0.9682 | 0.9680 | 0.9677 | 0.9675 | 0.9673 | 0.9670 | 0.9668 |  | 0.9666     | 0.9663 |
| 175.5      | 0.9685                                                                                        | 0.9683 | 0.9681 | 0.9678 | 0.9676 | 0.9674 | 0.9671 | 0.9669 | 0.9667 |  | 0.9664     | 0.9662 |
| 176.0      | 0.9684                                                                                        | 0.9682 | 0.9679 | 0.9677 | 0.9675 | 0.9672 | 0.9668 | 0.9665 | 0.9663 |  | 0.9663     | 0.9660 |
| 176.5      | 0.9683                                                                                        | 0.9680 | 0.9678 | 0.9676 | 0.9673 | 0.9671 | 0.9668 | 0.9664 | 0.9661 |  | 0.9661     | 0.9659 |
| 177.0      | 0.9681                                                                                        | 0.9679 | 0.9677 | 0.9674 | 0.9672 | 0.9669 | 0.9667 | 0.9665 | 0.9662 |  | 0.9660     | 0.9657 |
| 177.5      | 0.9680                                                                                        | 0.9678 | 0.9675 | 0.9673 | 0.9670 | 0.9668 | 0.9666 | 0.9663 | 0.9661 |  | 0.9658     | 0.9656 |
| 178.0      | 0.9679                                                                                        | 0.9676 | 0.9674 | 0.9671 | 0.9669 | 0.9667 | 0.9664 | 0.9662 | 0.9659 |  | 0.9657     | 0.9655 |
| 178.5      | 0.9677                                                                                        | 0.9675 | 0.9672 | 0.9670 | 0.9668 | 0.9665 | 0.9663 | 0.9660 | 0.9658 |  | 0.9655     | 0.9653 |
| 179.0      | 0.9676                                                                                        | 0.9673 | 0.9671 | 0.9669 | 0.9666 | 0.9664 | 0.9661 | 0.9659 | 0.9656 |  | 0.9654     | 0.9652 |
| 179.5      | 0.9674                                                                                        | 0.9672 | 0.9670 | 0.9667 | 0.9665 | 0.9662 | 0.9660 | 0.9657 | 0.9655 |  | 0.9653     | 0.9650 |
| 180.0      | 0.9673                                                                                        | 0.9671 | 0.9668 | 0.9666 | 0.9663 | 0.9661 | 0.9658 | 0.9656 | 0.9654 |  | 0.9651     | 0.9649 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |        |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|--------|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |  | 288.0      | 290.0  |
| 180.0      | 0.9668                                                                                        | 0.9666 | 0.9663 | 0.9661 | 0.9658 | 0.9656 | 0.9654 | 0.9651 | 0.9649 |  | 0.9651     | 0.9649 |
| 180.5      | 0.9667                                                                                        | 0.9664 | 0.9662 | 0.9659 | 0.9657 | 0.9655 | 0.9652 | 0.9650 | 0.9647 |  | 0.9650     | 0.9647 |
| 181.0      | 0.9665                                                                                        | 0.9663 | 0.9660 | 0.9658 | 0.9656 | 0.9653 | 0.9651 | 0.9648 | 0.9646 |  | 0.9648     | 0.9646 |
| 181.5      | 0.9664                                                                                        | 0.9662 | 0.9659 | 0.9657 | 0.9654 | 0.9652 | 0.9649 | 0.9647 | 0.9644 |  | 0.9647     | 0.9644 |
| 182.0      | 0.9663                                                                                        | 0.9660 | 0.9658 | 0.9655 | 0.9653 | 0.9650 | 0.9648 | 0.9645 | 0.9643 |  | 0.9645     | 0.9643 |
| 182.5      | 0.9661                                                                                        | 0.9659 | 0.9656 | 0.9654 | 0.9651 | 0.9649 | 0.9646 | 0.9644 | 0.9641 |  | 0.9644     | 0.9641 |
| 183.0      | 0.9660                                                                                        | 0.9657 | 0.9655 | 0.9652 | 0.9650 | 0.9647 | 0.9645 | 0.9642 | 0.9640 |  | 0.9642     | 0.9640 |
| 183.5      | 0.9658                                                                                        | 0.9656 | 0.9653 | 0.9651 | 0.9648 | 0.9646 | 0.9643 | 0.9641 | 0.9638 |  | 0.9641     | 0.9638 |
| 184.0      | 0.9657                                                                                        | 0.9654 | 0.9652 | 0.9649 | 0.9647 | 0.9644 | 0.9642 | 0.9639 | 0.9637 |  | 0.9639     | 0.9637 |
| 184.5      | 0.9656                                                                                        | 0.9653 | 0.9651 | 0.9648 | 0.9645 | 0.9643 | 0.9640 | 0.9638 | 0.9635 |  | 0.9638     | 0.9635 |
| 185.0      | 0.9654                                                                                        | 0.9652 | 0.9649 | 0.9647 | 0.9644 | 0.9642 | 0.9639 | 0.9636 | 0.9634 |  | 0.9636     | 0.9634 |
| 185.5      | 0.9653                                                                                        | 0.9650 | 0.9648 | 0.9645 | 0.9643 | 0.9640 | 0.9637 | 0.9635 | 0.9632 |  | 0.9635     | 0.9632 |
| 186.0      | 0.9651                                                                                        | 0.9649 | 0.9646 | 0.9644 | 0.9641 | 0.9639 | 0.9636 | 0.9633 | 0.9631 |  | 0.9633     | 0.9631 |
| 186.5      | 0.9650                                                                                        | 0.9647 | 0.9645 | 0.9642 | 0.9640 | 0.9637 | 0.9635 | 0.9632 | 0.9629 |  | 0.9632     | 0.9629 |
| 187.0      | 0.9649                                                                                        | 0.9646 | 0.9643 | 0.9641 | 0.9638 | 0.9636 | 0.9633 | 0.9631 | 0.9628 |  | 0.9631     | 0.9628 |
| 187.5      | 0.9647                                                                                        | 0.9644 | 0.9642 | 0.9639 | 0.9637 | 0.9634 | 0.9632 | 0.9629 | 0.9626 |  | 0.9629     | 0.9626 |
| 188.0      | 0.9646                                                                                        | 0.9643 | 0.9641 | 0.9638 | 0.9635 | 0.9633 | 0.9630 | 0.9628 | 0.9625 |  | 0.9628     | 0.9625 |
| 188.5      | 0.9644                                                                                        | 0.9642 | 0.9639 | 0.9637 | 0.9634 | 0.9631 | 0.9629 | 0.9626 | 0.9624 |  | 0.9626     | 0.9624 |
| 189.0      | 0.9643                                                                                        | 0.9640 | 0.9638 | 0.9635 | 0.9633 | 0.9630 | 0.9627 | 0.9625 | 0.9622 |  | 0.9625     | 0.9622 |
| 189.5      | 0.9642                                                                                        | 0.9639 | 0.9636 | 0.9634 | 0.9631 | 0.9628 | 0.9626 | 0.9623 | 0.9621 |  | 0.9623     | 0.9621 |
| 190.0      | 0.9640                                                                                        | 0.9638 | 0.9635 | 0.9632 | 0.9630 | 0.9627 | 0.9624 | 0.9622 | 0.9619 |  | 0.9622     | 0.9619 |
| 190.5      | 0.9639                                                                                        | 0.9636 | 0.9634 | 0.9631 | 0.9628 | 0.9626 | 0.9623 | 0.9620 | 0.9618 |  | 0.9620     | 0.9618 |
| 191.0      | 0.9637                                                                                        | 0.9635 | 0.9632 | 0.9629 | 0.9627 | 0.9624 | 0.9621 | 0.9619 | 0.9616 |  | 0.9619     | 0.9616 |
| 191.5      | 0.9636                                                                                        | 0.9633 | 0.9631 | 0.9628 | 0.9625 | 0.9623 | 0.9620 | 0.9617 | 0.9615 |  | 0.9617     | 0.9615 |
| 192.0      | 0.9635                                                                                        | 0.9632 | 0.9629 | 0.9627 | 0.9624 | 0.9621 | 0.9619 | 0.9616 | 0.9613 |  | 0.9616     | 0.9613 |
| 192.5      | 0.9633                                                                                        | 0.9631 | 0.9628 | 0.9625 | 0.9622 | 0.9620 | 0.9617 | 0.9614 | 0.9612 |  | 0.9614     | 0.9612 |
| 193.0      | 0.9632                                                                                        | 0.9629 | 0.9626 | 0.9624 | 0.9621 | 0.9618 | 0.9616 | 0.9613 | 0.9610 |  | 0.9613     | 0.9610 |
| 193.5      | 0.9631                                                                                        | 0.9628 | 0.9625 | 0.9622 | 0.9620 | 0.9617 | 0.9614 | 0.9611 | 0.9609 |  | 0.9611     | 0.9609 |
| 194.0      | 0.9629                                                                                        | 0.9626 | 0.9624 | 0.9621 | 0.9618 | 0.9615 | 0.9613 | 0.9610 | 0.9607 |  | 0.9610     | 0.9607 |
| 194.5      | 0.9628                                                                                        | 0.9625 | 0.9622 | 0.9619 | 0.9617 | 0.9614 | 0.9611 | 0.9609 | 0.9606 |  | 0.9609     | 0.9606 |
| 195.0      | 0.9626                                                                                        | 0.9624 | 0.9621 | 0.9618 | 0.9615 | 0.9613 | 0.9610 | 0.9607 | 0.9604 |  | 0.9607     | 0.9604 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 270.0                                                                                         | 272.0  | 274.0  | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0      |       |
| 195.0      | 0.9632                                                                                        | 0.9629 | 0.9626 | 0.9624 | 0.9621 | 0.9618 | 0.9615 | 0.9613 | 0.9610 | 0.9607 | 0.9604     | 195.0 |
| 195.5      | 0.9630                                                                                        | 0.9628 | 0.9625 | 0.9622 | 0.9619 | 0.9617 | 0.9614 | 0.9611 | 0.9608 | 0.9606 | 0.9603     | 195.5 |
| 196.0      | 0.9629                                                                                        | 0.9626 | 0.9624 | 0.9621 | 0.9618 | 0.9615 | 0.9612 | 0.9610 | 0.9607 | 0.9604 | 0.9601     | 196.0 |
| 196.5      | 0.9628                                                                                        | 0.9625 | 0.9622 | 0.9619 | 0.9617 | 0.9614 | 0.9611 | 0.9608 | 0.9605 | 0.9603 | 0.9600     | 196.5 |
| 197.0      | 0.9626                                                                                        | 0.9624 | 0.9621 | 0.9618 | 0.9615 | 0.9612 | 0.9610 | 0.9607 | 0.9604 | 0.9601 | 0.9598     | 197.0 |
| 197.5      | 0.9625                                                                                        | 0.9622 | 0.9619 | 0.9617 | 0.9614 | 0.9611 | 0.9608 | 0.9605 | 0.9602 | 0.9600 | 0.9597     | 197.5 |
| 198.0      | 0.9624                                                                                        | 0.9621 | 0.9618 | 0.9615 | 0.9612 | 0.9609 | 0.9607 | 0.9604 | 0.9601 | 0.9598 | 0.9595     | 198.0 |
| 198.5      | 0.9622                                                                                        | 0.9619 | 0.9617 | 0.9614 | 0.9611 | 0.9608 | 0.9605 | 0.9602 | 0.9600 | 0.9597 | 0.9594     | 198.5 |
| 199.0      | 0.9621                                                                                        | 0.9618 | 0.9615 | 0.9612 | 0.9609 | 0.9607 | 0.9604 | 0.9601 | 0.9598 | 0.9595 | 0.9592     | 199.0 |
| 199.5      | 0.9619                                                                                        | 0.9617 | 0.9614 | 0.9611 | 0.9608 | 0.9605 | 0.9602 | 0.9600 | 0.9597 | 0.9594 | 0.9591     | 199.5 |
| 200.0      | 0.9618                                                                                        | 0.9615 | 0.9612 | 0.9609 | 0.9607 | 0.9604 | 0.9601 | 0.9598 | 0.9595 | 0.9592 | 0.9589     | 200.0 |
| 200.5      | 0.9617                                                                                        | 0.9614 | 0.9611 | 0.9608 | 0.9605 | 0.9602 | 0.9599 | 0.9597 | 0.9594 | 0.9591 | 0.9588     | 200.5 |
| 201.0      | 0.9615                                                                                        | 0.9612 | 0.9610 | 0.9607 | 0.9604 | 0.9601 | 0.9598 | 0.9595 | 0.9592 | 0.9589 | 0.9587     | 201.0 |
| 201.5      | 0.9614                                                                                        | 0.9611 | 0.9608 | 0.9605 | 0.9602 | 0.9599 | 0.9597 | 0.9594 | 0.9591 | 0.9588 | 0.9585     | 201.5 |
| 202.0      | 0.9613                                                                                        | 0.9610 | 0.9607 | 0.9604 | 0.9601 | 0.9598 | 0.9595 | 0.9592 | 0.9589 | 0.9586 | 0.9584     | 202.0 |
| 202.5      | 0.9611                                                                                        | 0.9608 | 0.9605 | 0.9602 | 0.9600 | 0.9597 | 0.9594 | 0.9591 | 0.9588 | 0.9585 | 0.9582     | 202.5 |
| 203.0      | 0.9610                                                                                        | 0.9607 | 0.9604 | 0.9601 | 0.9598 | 0.9595 | 0.9592 | 0.9589 | 0.9586 | 0.9584 | 0.9581     | 203.0 |
| 203.5      | 0.9608                                                                                        | 0.9605 | 0.9603 | 0.9600 | 0.9597 | 0.9594 | 0.9591 | 0.9588 | 0.9585 | 0.9582 | 0.9579     | 203.5 |
| 204.0      | 0.9607                                                                                        | 0.9604 | 0.9601 | 0.9598 | 0.9595 | 0.9592 | 0.9589 | 0.9586 | 0.9584 | 0.9581 | 0.9578     | 204.0 |
| 204.5      | 0.9606                                                                                        | 0.9603 | 0.9600 | 0.9597 | 0.9594 | 0.9591 | 0.9588 | 0.9585 | 0.9582 | 0.9579 | 0.9576     | 204.5 |
| 205.0      | 0.9604                                                                                        | 0.9601 | 0.9598 | 0.9595 | 0.9592 | 0.9589 | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575     | 205.0 |
| 205.5      | 0.9603                                                                                        | 0.9600 | 0.9597 | 0.9594 | 0.9591 | 0.9588 | 0.9585 | 0.9582 | 0.9579 | 0.9576 | 0.9573     | 205.5 |
| 206.0      | 0.9602                                                                                        | 0.9599 | 0.9596 | 0.9593 | 0.9590 | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9572     | 206.0 |
| 206.5      | 0.9600                                                                                        | 0.9597 | 0.9594 | 0.9591 | 0.9588 | 0.9585 | 0.9582 | 0.9579 | 0.9576 | 0.9573 | 0.9570     | 206.5 |
| 207.0      | 0.9599                                                                                        | 0.9596 | 0.9593 | 0.9590 | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569     | 207.0 |
| 207.5      | 0.9597                                                                                        | 0.9594 | 0.9591 | 0.9588 | 0.9585 | 0.9582 | 0.9579 | 0.9576 | 0.9573 | 0.9570 | 0.9567     | 207.5 |
| 208.0      | 0.9596                                                                                        | 0.9593 | 0.9590 | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9566     | 208.0 |
| 208.5      | 0.9595                                                                                        | 0.9592 | 0.9589 | 0.9586 | 0.9583 | 0.9579 | 0.9576 | 0.9573 | 0.9570 | 0.9567 | 0.9564     | 208.5 |
| 209.0      | 0.9593                                                                                        | 0.9590 | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9563     | 209.0 |
| 209.5      | 0.9592                                                                                        | 0.9589 | 0.9586 | 0.9583 | 0.9580 | 0.9577 | 0.9574 | 0.9570 | 0.9567 | 0.9564 | 0.9561     | 209.5 |
| 210.0      | 0.9590                                                                                        | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9560     | 210.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |        |            |       |
| 210.0      | 0.9584                                                                                        | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9560 |        | 210.0      | 210.0 |
| 210.5      | 0.9589                                                                                        | 0.9586 | 0.9583 | 0.9579 | 0.9576 | 0.9573 | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 210.5      | 210.5 |
| 211.0      | 0.9588                                                                                        | 0.9585 | 0.9582 | 0.9578 | 0.9575 | 0.9572 | 0.9568 | 0.9565 | 0.9562 | 0.9559 | 211.0      | 211.0 |
| 211.5      | 0.9586                                                                                        | 0.9583 | 0.9580 | 0.9577 | 0.9574 | 0.9571 | 0.9567 | 0.9564 | 0.9561 | 0.9558 | 211.5      | 211.5 |
| 212.0      | 0.9585                                                                                        | 0.9582 | 0.9579 | 0.9576 | 0.9573 | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 212.0      | 212.0 |
| 212.5      | 0.9584                                                                                        | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9568 | 0.9565 | 0.9562 | 0.9559 | 0.9556 | 212.5      | 212.5 |
| 213.0      | 0.9582                                                                                        | 0.9579 | 0.9576 | 0.9573 | 0.9570 | 0.9567 | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 213.0      | 213.0 |
| 213.5      | 0.9581                                                                                        | 0.9578 | 0.9575 | 0.9571 | 0.9568 | 0.9565 | 0.9562 | 0.9559 | 0.9556 | 0.9553 | 213.5      | 213.5 |
| 214.0      | 0.9579                                                                                        | 0.9576 | 0.9573 | 0.9570 | 0.9567 | 0.9564 | 0.9561 | 0.9557 | 0.9554 | 0.9551 | 214.0      | 214.0 |
| 214.5      | 0.9578                                                                                        | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9562 | 0.9559 | 0.9556 | 0.9553 | 0.9550 | 214.5      | 214.5 |
| 215.0      | 0.9577                                                                                        | 0.9574 | 0.9570 | 0.9567 | 0.9564 | 0.9561 | 0.9558 | 0.9555 | 0.9552 | 0.9549 | 215.0      | 215.0 |
| 215.5      | 0.9575                                                                                        | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9559 | 0.9556 | 0.9553 | 0.9550 | 0.9547 | 215.5      | 215.5 |
| 216.0      | 0.9574                                                                                        | 0.9571 | 0.9568 | 0.9564 | 0.9561 | 0.9558 | 0.9555 | 0.9552 | 0.9548 | 0.9545 | 216.0      | 216.0 |
| 216.5      | 0.9573                                                                                        | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 0.9553 | 0.9550 | 0.9547 | 0.9544 | 216.5      | 216.5 |
| 217.0      | 0.9571                                                                                        | 0.9568 | 0.9565 | 0.9562 | 0.9558 | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9542 | 217.0      | 217.0 |
| 217.5      | 0.9570                                                                                        | 0.9567 | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 0.9550 | 0.9547 | 0.9544 | 0.9541 | 217.5      | 217.5 |
| 218.0      | 0.9568                                                                                        | 0.9565 | 0.9562 | 0.9559 | 0.9556 | 0.9552 | 0.9549 | 0.9546 | 0.9543 | 0.9539 | 218.0      | 218.0 |
| 218.5      | 0.9567                                                                                        | 0.9564 | 0.9561 | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9544 | 0.9541 | 0.9538 | 218.5      | 218.5 |
| 219.0      | 0.9566                                                                                        | 0.9562 | 0.9559 | 0.9556 | 0.9553 | 0.9549 | 0.9546 | 0.9543 | 0.9540 | 0.9536 | 219.0      | 219.0 |
| 219.5      | 0.9564                                                                                        | 0.9561 | 0.9558 | 0.9555 | 0.9551 | 0.9548 | 0.9545 | 0.9541 | 0.9538 | 0.9535 | 219.5      | 219.5 |
| 220.0      | 0.9563                                                                                        | 0.9560 | 0.9556 | 0.9553 | 0.9550 | 0.9547 | 0.9543 | 0.9540 | 0.9537 | 0.9533 | 220.0      | 220.0 |
| 220.5      | 0.9562                                                                                        | 0.9558 | 0.9555 | 0.9552 | 0.9548 | 0.9545 | 0.9542 | 0.9539 | 0.9535 | 0.9532 | 220.5      | 220.5 |
| 221.0      | 0.9560                                                                                        | 0.9557 | 0.9554 | 0.9550 | 0.9547 | 0.9544 | 0.9540 | 0.9537 | 0.9534 | 0.9530 | 221.0      | 221.0 |
| 221.5      | 0.9559                                                                                        | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9542 | 0.9539 | 0.9536 | 0.9532 | 0.9529 | 221.5      | 221.5 |
| 222.0      | 0.9557                                                                                        | 0.9554 | 0.9551 | 0.9547 | 0.9544 | 0.9541 | 0.9538 | 0.9534 | 0.9531 | 0.9528 | 222.0      | 222.0 |
| 222.5      | 0.9556                                                                                        | 0.9553 | 0.9549 | 0.9546 | 0.9543 | 0.9539 | 0.9536 | 0.9533 | 0.9529 | 0.9526 | 222.5      | 222.5 |
| 223.0      | 0.9555                                                                                        | 0.9551 | 0.9548 | 0.9545 | 0.9541 | 0.9538 | 0.9535 | 0.9531 | 0.9528 | 0.9525 | 223.0      | 223.0 |
| 223.5      | 0.9553                                                                                        | 0.9550 | 0.9547 | 0.9543 | 0.9540 | 0.9537 | 0.9533 | 0.9530 | 0.9526 | 0.9523 | 223.5      | 223.5 |
| 224.0      | 0.9552                                                                                        | 0.9549 | 0.9545 | 0.9542 | 0.9538 | 0.9535 | 0.9532 | 0.9528 | 0.9525 | 0.9522 | 224.0      | 224.0 |
| 224.5      | 0.9550                                                                                        | 0.9547 | 0.9544 | 0.9540 | 0.9537 | 0.9534 | 0.9530 | 0.9527 | 0.9524 | 0.9520 | 224.5      | 224.5 |
| 225.0      | 0.9549                                                                                        | 0.9546 | 0.9542 | 0.9539 | 0.9536 | 0.9532 | 0.9529 | 0.9525 | 0.9522 | 0.9519 | 225.0      | 225.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F) |        |        |        |        | VOLUME CORRECTION TO 60 F |        |        |        |        | TEMP.<br>F |        |        |        |        |
|------------|-------------------------------------------------------|--------|--------|--------|--------|---------------------------|--------|--------|--------|--------|------------|--------|--------|--------|--------|
|            | 274.0                                                 | 276.0  | 278.0  | 280.0  | 282.0  | 284.0                     | 286.0  | 288.0  | 290.0  | 292.0  | 294.0      | 296.0  | 298.0  | 300.0  | 302.0  |
| 225.0      | 0.9542                                                | 0.9539 | 0.9536 | 0.9532 | 0.9529 | 0.9525                    | 0.9522 | 0.9519 | 0.9515 | 0.9512 | 0.9509     | 0.9506 | 0.9503 | 0.9500 | 0.9497 |
| 225.5      | 0.9541                                                | 0.9538 | 0.9534 | 0.9531 | 0.9527 | 0.9524                    | 0.9521 | 0.9517 | 0.9514 | 0.9511 | 0.9508     | 0.9505 | 0.9502 | 0.9499 | 0.9496 |
| 226.0      | 0.9540                                                | 0.9536 | 0.9533 | 0.9529 | 0.9526 | 0.9523                    | 0.9519 | 0.9516 | 0.9513 | 0.9510 | 0.9507     | 0.9504 | 0.9501 | 0.9498 | 0.9495 |
| 226.5      | 0.9538                                                | 0.9535 | 0.9531 | 0.9528 | 0.9525 | 0.9521                    | 0.9518 | 0.9515 | 0.9512 | 0.9509 | 0.9506     | 0.9503 | 0.9500 | 0.9497 | 0.9494 |
| 227.0      | 0.9537                                                | 0.9533 | 0.9530 | 0.9526 | 0.9523 | 0.9520                    | 0.9516 | 0.9513 | 0.9510 | 0.9507 | 0.9504     | 0.9501 | 0.9498 | 0.9495 | 0.9492 |
| 227.5      | 0.9535                                                | 0.9532 | 0.9528 | 0.9525 | 0.9522 | 0.9518                    | 0.9515 | 0.9511 | 0.9508 | 0.9505 | 0.9502     | 0.9499 | 0.9496 | 0.9493 | 0.9490 |
| 228.0      | 0.9534                                                | 0.9530 | 0.9527 | 0.9524 | 0.9520 | 0.9517                    | 0.9513 | 0.9510 | 0.9507 | 0.9504 | 0.9501     | 0.9498 | 0.9495 | 0.9492 | 0.9489 |
| 228.5      | 0.9533                                                | 0.9529 | 0.9526 | 0.9522 | 0.9519 | 0.9515                    | 0.9512 | 0.9508 | 0.9505 | 0.9502 | 0.9499     | 0.9496 | 0.9493 | 0.9490 | 0.9487 |
| 229.0      | 0.9531                                                | 0.9528 | 0.9524 | 0.9521 | 0.9517 | 0.9514                    | 0.9510 | 0.9507 | 0.9504 | 0.9501 | 0.9498     | 0.9495 | 0.9492 | 0.9489 | 0.9486 |
| 229.5      | 0.9530                                                | 0.9526 | 0.9523 | 0.9519 | 0.9516 | 0.9512                    | 0.9509 | 0.9505 | 0.9502 | 0.9499 | 0.9496     | 0.9493 | 0.9490 | 0.9487 | 0.9484 |
| 230.0      | 0.9528                                                | 0.9525 | 0.9521 | 0.9518 | 0.9514 | 0.9511                    | 0.9507 | 0.9504 | 0.9501 | 0.9498 | 0.9495     | 0.9492 | 0.9489 | 0.9486 | 0.9483 |
| 230.5      | 0.9527                                                | 0.9523 | 0.9520 | 0.9516 | 0.9513 | 0.9509                    | 0.9506 | 0.9502 | 0.9499 | 0.9496 | 0.9493     | 0.9490 | 0.9487 | 0.9484 | 0.9481 |
| 231.0      | 0.9526                                                | 0.9522 | 0.9519 | 0.9515 | 0.9512 | 0.9508                    | 0.9505 | 0.9501 | 0.9498 | 0.9495 | 0.9492     | 0.9489 | 0.9486 | 0.9483 | 0.9480 |
| 231.5      | 0.9524                                                | 0.9521 | 0.9517 | 0.9514 | 0.9510 | 0.9507                    | 0.9503 | 0.9499 | 0.9496 | 0.9493 | 0.9490     | 0.9487 | 0.9484 | 0.9481 | 0.9478 |
| 232.0      | 0.9523                                                | 0.9519 | 0.9516 | 0.9512 | 0.9509 | 0.9505                    | 0.9502 | 0.9499 | 0.9496 | 0.9493 | 0.9490     | 0.9487 | 0.9484 | 0.9481 | 0.9478 |
| 232.5      | 0.9521                                                | 0.9518 | 0.9514 | 0.9511 | 0.9507 | 0.9504                    | 0.9500 | 0.9497 | 0.9494 | 0.9491 | 0.9488     | 0.9485 | 0.9482 | 0.9479 | 0.9476 |
| 233.0      | 0.9520                                                | 0.9516 | 0.9513 | 0.9509 | 0.9506 | 0.9502                    | 0.9499 | 0.9495 | 0.9492 | 0.9489 | 0.9486     | 0.9483 | 0.9480 | 0.9477 | 0.9474 |
| 233.5      | 0.9519                                                | 0.9515 | 0.9511 | 0.9508 | 0.9504 | 0.9501                    | 0.9497 | 0.9494 | 0.9491 | 0.9488 | 0.9485     | 0.9482 | 0.9479 | 0.9476 | 0.9473 |
| 234.0      | 0.9517                                                | 0.9514 | 0.9510 | 0.9506 | 0.9503 | 0.9499                    | 0.9496 | 0.9493 | 0.9490 | 0.9487 | 0.9484     | 0.9481 | 0.9478 | 0.9475 | 0.9472 |
| 234.5      | 0.9516                                                | 0.9512 | 0.9509 | 0.9505 | 0.9501 | 0.9498                    | 0.9494 | 0.9491 | 0.9488 | 0.9485 | 0.9482     | 0.9479 | 0.9476 | 0.9473 | 0.9470 |
| 235.0      | 0.9514                                                | 0.9511 | 0.9507 | 0.9504 | 0.9500 | 0.9496                    | 0.9493 | 0.9489 | 0.9486 | 0.9483 | 0.9480     | 0.9477 | 0.9474 | 0.9471 | 0.9468 |
| 235.5      | 0.9513                                                | 0.9509 | 0.9506 | 0.9502 | 0.9499 | 0.9495                    | 0.9491 | 0.9488 | 0.9484 | 0.9481 | 0.9478     | 0.9475 | 0.9472 | 0.9469 | 0.9466 |
| 236.0      | 0.9511                                                | 0.9508 | 0.9504 | 0.9501 | 0.9497 | 0.9493                    | 0.9490 | 0.9486 | 0.9483 | 0.9480 | 0.9477     | 0.9474 | 0.9471 | 0.9468 | 0.9465 |
| 236.5      | 0.9510                                                | 0.9506 | 0.9503 | 0.9499 | 0.9496 | 0.9492                    | 0.9488 | 0.9485 | 0.9481 | 0.9478 | 0.9475     | 0.9472 | 0.9469 | 0.9466 | 0.9463 |
| 237.0      | 0.9509                                                | 0.9505 | 0.9501 | 0.9498 | 0.9494 | 0.9491                    | 0.9487 | 0.9483 | 0.9480 | 0.9477 | 0.9474     | 0.9471 | 0.9468 | 0.9465 | 0.9462 |
| 237.5      | 0.9507                                                | 0.9504 | 0.9500 | 0.9496 | 0.9493 | 0.9489                    | 0.9485 | 0.9482 | 0.9478 | 0.9475 | 0.9472     | 0.9469 | 0.9466 | 0.9463 | 0.9460 |
| 238.0      | 0.9506                                                | 0.9502 | 0.9499 | 0.9495 | 0.9491 | 0.9488                    | 0.9484 | 0.9480 | 0.9477 | 0.9474 | 0.9471     | 0.9468 | 0.9465 | 0.9462 | 0.9459 |
| 238.5      | 0.9504                                                | 0.9501 | 0.9497 | 0.9493 | 0.9490 | 0.9486                    | 0.9483 | 0.9479 | 0.9475 | 0.9472 | 0.9469     | 0.9466 | 0.9463 | 0.9460 | 0.9457 |
| 239.0      | 0.9503                                                | 0.9499 | 0.9496 | 0.9492 | 0.9488 | 0.9485                    | 0.9481 | 0.9477 | 0.9474 | 0.9471 | 0.9468     | 0.9465 | 0.9462 | 0.9459 | 0.9456 |
| 239.5      | 0.9502                                                | 0.9498 | 0.9494 | 0.9491 | 0.9487 | 0.9483                    | 0.9480 | 0.9476 | 0.9473 | 0.9470 | 0.9467     | 0.9464 | 0.9461 | 0.9458 | 0.9455 |
| 240.0      | 0.9500                                                | 0.9497 | 0.9493 | 0.9489 | 0.9485 | 0.9482                    | 0.9478 | 0.9474 | 0.9471 | 0.9468 | 0.9465     | 0.9462 | 0.9459 | 0.9456 | 0.9453 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|-------|
|            | 274.0                                                                                         | 276.0  | 278.0  | 280.0  | 282.0  | 284.0  | 286.0  | 288.0  | 290.0  |  |            |       |
| 240.0      | 0.9500                                                                                        | 0.9497 | 0.9493 | 0.9489 | 0.9485 | 0.9482 | 0.9478 | 0.9474 | 0.9471 |  |            | 240.0 |
| 240.5      | 0.9499                                                                                        | 0.9495 | 0.9491 | 0.9488 | 0.9484 | 0.9480 | 0.9477 | 0.9473 | 0.9469 |  |            | 240.5 |
| 241.0      | 0.9497                                                                                        | 0.9494 | 0.9490 | 0.9486 | 0.9483 | 0.9479 | 0.9475 | 0.9471 | 0.9468 |  |            | 241.0 |
| 241.5      | 0.9496                                                                                        | 0.9492 | 0.9489 | 0.9485 | 0.9481 | 0.9477 | 0.9474 | 0.9470 | 0.9466 |  |            | 241.5 |
| 242.0      | 0.9495                                                                                        | 0.9491 | 0.9487 | 0.9483 | 0.9480 | 0.9476 | 0.9472 | 0.9469 | 0.9465 |  |            | 242.0 |
| 242.5      | 0.9493                                                                                        | 0.9489 | 0.9486 | 0.9482 | 0.9478 | 0.9475 | 0.9471 | 0.9467 | 0.9463 |  |            | 242.5 |
| 243.0      | 0.9492                                                                                        | 0.9488 | 0.9484 | 0.9481 | 0.9477 | 0.9473 | 0.9469 | 0.9466 | 0.9462 |  |            | 243.0 |
| 243.5      | 0.9490                                                                                        | 0.9487 | 0.9483 | 0.9479 | 0.9475 | 0.9472 | 0.9468 | 0.9464 | 0.9460 |  |            | 243.5 |
| 244.0      | 0.9489                                                                                        | 0.9485 | 0.9481 | 0.9478 | 0.9474 | 0.9470 | 0.9466 | 0.9463 | 0.9459 |  |            | 244.0 |
| 244.5      | 0.9488                                                                                        | 0.9484 | 0.9480 | 0.9476 | 0.9472 | 0.9469 | 0.9465 | 0.9461 | 0.9457 |  |            | 244.5 |
| 245.0      | 0.9486                                                                                        | 0.9482 | 0.9479 | 0.9475 | 0.9471 | 0.9467 | 0.9463 | 0.9460 | 0.9456 |  |            | 245.0 |
| 245.5      | 0.9485                                                                                        | 0.9481 | 0.9477 | 0.9473 | 0.9470 | 0.9466 | 0.9462 | 0.9458 | 0.9454 |  |            | 245.5 |
| 246.0      | 0.9483                                                                                        | 0.9480 | 0.9476 | 0.9472 | 0.9468 | 0.9464 | 0.9461 | 0.9457 | 0.9453 |  |            | 246.0 |
| 246.5      | 0.9482                                                                                        | 0.9478 | 0.9474 | 0.9471 | 0.9467 | 0.9463 | 0.9459 | 0.9455 | 0.9451 |  |            | 246.5 |
| 247.0      | 0.9481                                                                                        | 0.9477 | 0.9473 | 0.9469 | 0.9465 | 0.9461 | 0.9458 | 0.9454 | 0.9450 |  |            | 247.0 |
| 247.5      | 0.9479                                                                                        | 0.9475 | 0.9471 | 0.9468 | 0.9464 | 0.9460 | 0.9456 | 0.9452 | 0.9448 |  |            | 247.5 |
| 248.0      | 0.9478                                                                                        | 0.9474 | 0.9470 | 0.9466 | 0.9462 | 0.9458 | 0.9455 | 0.9451 | 0.9447 |  |            | 248.0 |
| 248.5      | 0.9476                                                                                        | 0.9473 | 0.9469 | 0.9465 | 0.9461 | 0.9457 | 0.9453 | 0.9449 | 0.9445 |  |            | 248.5 |
| 249.0      | 0.9475                                                                                        | 0.9471 | 0.9467 | 0.9463 | 0.9459 | 0.9456 | 0.9452 | 0.9448 | 0.9444 |  |            | 249.0 |
| 249.5      | 0.9474                                                                                        | 0.9470 | 0.9466 | 0.9462 | 0.9458 | 0.9454 | 0.9450 | 0.9446 | 0.9442 |  |            | 249.5 |
| 250.0      | 0.9472                                                                                        | 0.9468 | 0.9464 | 0.9460 | 0.9457 | 0.9453 | 0.9449 | 0.9445 | 0.9441 |  |            | 250.0 |
| 250.5      | 0.9471                                                                                        | 0.9467 | 0.9463 | 0.9459 | 0.9455 | 0.9451 | 0.9447 | 0.9443 | 0.9439 |  |            | 250.5 |
| 251.0      | 0.9469                                                                                        | 0.9465 | 0.9462 | 0.9458 | 0.9454 | 0.9450 | 0.9446 | 0.9442 | 0.9438 |  |            | 251.0 |
| 251.5      | 0.9468                                                                                        | 0.9464 | 0.9460 | 0.9456 | 0.9452 | 0.9448 | 0.9444 | 0.9440 | 0.9436 |  |            | 251.5 |
| 252.0      | 0.9467                                                                                        | 0.9463 | 0.9459 | 0.9455 | 0.9451 | 0.9447 | 0.9443 | 0.9439 | 0.9435 |  |            | 252.0 |
| 252.5      | 0.9465                                                                                        | 0.9461 | 0.9457 | 0.9453 | 0.9449 | 0.9445 | 0.9441 | 0.9437 | 0.9433 |  |            | 252.5 |
| 253.0      | 0.9464                                                                                        | 0.9460 | 0.9456 | 0.9452 | 0.9448 | 0.9444 | 0.9440 | 0.9436 | 0.9432 |  |            | 253.0 |
| 253.5      | 0.9462                                                                                        | 0.9458 | 0.9454 | 0.9450 | 0.9446 | 0.9442 | 0.9438 | 0.9434 | 0.9430 |  |            | 253.5 |
| 254.0      | 0.9461                                                                                        | 0.9457 | 0.9453 | 0.9449 | 0.9445 | 0.9441 | 0.9437 | 0.9433 | 0.9429 |  |            | 254.0 |
| 254.5      | 0.9460                                                                                        | 0.9456 | 0.9452 | 0.9448 | 0.9444 | 0.9440 | 0.9436 | 0.9432 | 0.9428 |  |            | 254.5 |
| 255.0      | 0.9458                                                                                        | 0.9454 | 0.9450 | 0.9446 | 0.9442 | 0.9438 | 0.9434 | 0.9430 | 0.9426 |  |            | 255.0 |

ALPHA = 270.0 TO 290.0

\* DENOTES EXTRAPOLATED VALUE

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |         |         |         |         |         |         |         |         |         |         | TEMP.<br>F |
|------------|-----------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------|
|            | 270.0                                                                                         | 272.0   | 274.0   | 276.0   | 278.0   | 280.0   | 282.0   | 284.0   | 286.0   | 288.0   | 290.0   |            |
| 255.0      | 0.9466*                                                                                       | 0.9462* | 0.9458* | 0.9454* | 0.9450* | 0.9446* | 0.9442* | 0.9438* | 0.9434* | 0.9430* | 0.9426* | 255.0      |
| 255.5      | 0.9465*                                                                                       | 0.9461* | 0.9457* | 0.9453* | 0.9449* | 0.9445* | 0.9441* | 0.9437* | 0.9433* | 0.9429* | 0.9425* | 255.5      |
| 256.0      | 0.9463*                                                                                       | 0.9459* | 0.9455* | 0.9451* | 0.9447* | 0.9443* | 0.9439* | 0.9435* | 0.9431* | 0.9427* | 0.9423* | 256.0      |
| 256.5      | 0.9462*                                                                                       | 0.9458* | 0.9454* | 0.9450* | 0.9446* | 0.9442* | 0.9438* | 0.9434* | 0.9430* | 0.9426* | 0.9422* | 256.5      |
| 257.0      | 0.9461*                                                                                       | 0.9457* | 0.9452* | 0.9448* | 0.9444* | 0.9440* | 0.9436* | 0.9432* | 0.9428* | 0.9424* | 0.9420* | 257.0      |
| 257.5      | 0.9459*                                                                                       | 0.9455* | 0.9451* | 0.9447* | 0.9443* | 0.9439* | 0.9435* | 0.9431* | 0.9427* | 0.9423* | 0.9419* | 257.5      |
| 258.0      | 0.9458*                                                                                       | 0.9454* | 0.9450* | 0.9446* | 0.9442* | 0.9437* | 0.9433* | 0.9429* | 0.9425* | 0.9421* | 0.9417* | 258.0      |
| 258.5      | 0.9456*                                                                                       | 0.9452* | 0.9448* | 0.9444* | 0.9440* | 0.9436* | 0.9432* | 0.9428* | 0.9424* | 0.9420* | 0.9416* | 258.5      |
| 259.0      | 0.9455*                                                                                       | 0.9451* | 0.9447* | 0.9443* | 0.9439* | 0.9435* | 0.9430* | 0.9426* | 0.9422* | 0.9418* | 0.9414* | 259.0      |
| 259.5      | 0.9454*                                                                                       | 0.9450* | 0.9445* | 0.9441* | 0.9437* | 0.9433* | 0.9429* | 0.9425* | 0.9421* | 0.9417* | 0.9413* | 259.5      |
| 260.0      | 0.9452*                                                                                       | 0.9448* | 0.9444* | 0.9440* | 0.9436* | 0.9432* | 0.9428* | 0.9423* | 0.9419* | 0.9415* | 0.9411* | 260.0      |
| 260.5      | 0.9451*                                                                                       | 0.9447* | 0.9443* | 0.9439* | 0.9434* | 0.9430* | 0.9426* | 0.9422* | 0.9418* | 0.9414* | 0.9410* | 260.5      |
| 261.0      | 0.9449*                                                                                       | 0.9445* | 0.9441* | 0.9437* | 0.9433* | 0.9429* | 0.9425* | 0.9421* | 0.9416* | 0.9412* | 0.9408* | 261.0      |
| 261.5      | 0.9448*                                                                                       | 0.9444* | 0.9440* | 0.9436* | 0.9432* | 0.9427* | 0.9423* | 0.9419* | 0.9415* | 0.9411* | 0.9407* | 261.5      |
| 262.0      | 0.9447*                                                                                       | 0.9443* | 0.9438* | 0.9434* | 0.9430* | 0.9426* | 0.9422* | 0.9418* | 0.9413* | 0.9409* | 0.9405* | 262.0      |
| 262.5      | 0.9445*                                                                                       | 0.9441* | 0.9437* | 0.9433* | 0.9429* | 0.9425* | 0.9420* | 0.9416* | 0.9412* | 0.9408* | 0.9404* | 262.5      |
| 263.0      | 0.9444*                                                                                       | 0.9440* | 0.9436* | 0.9431* | 0.9427* | 0.9423* | 0.9419* | 0.9415* | 0.9411* | 0.9406* | 0.9402* | 263.0      |
| 263.5      | 0.9443*                                                                                       | 0.9438* | 0.9434* | 0.9430* | 0.9426* | 0.9422* | 0.9417* | 0.9413* | 0.9409* | 0.9405* | 0.9401* | 263.5      |
| 264.0      | 0.9441*                                                                                       | 0.9437* | 0.9433* | 0.9429* | 0.9424* | 0.9420* | 0.9416* | 0.9412* | 0.9408* | 0.9403* | 0.9399* | 264.0      |
| 264.5      | 0.9440*                                                                                       | 0.9436* | 0.9431* | 0.9427* | 0.9423* | 0.9419* | 0.9415* | 0.9410* | 0.9406* | 0.9402* | 0.9398* | 264.5      |
| 265.0      | 0.9438*                                                                                       | 0.9434* | 0.9430* | 0.9426* | 0.9422* | 0.9417* | 0.9413* | 0.9409* | 0.9405* | 0.9400* | 0.9396* | 265.0      |
| 265.5      | 0.9437*                                                                                       | 0.9433* | 0.9429* | 0.9424* | 0.9420* | 0.9416* | 0.9412* | 0.9407* | 0.9403* | 0.9399* | 0.9395* | 265.5      |
| 266.0      | 0.9436*                                                                                       | 0.9431* | 0.9427* | 0.9423* | 0.9419* | 0.9414* | 0.9410* | 0.9406* | 0.9402* | 0.9397* | 0.9393* | 266.0      |
| 266.5      | 0.9434*                                                                                       | 0.9430* | 0.9426* | 0.9421* | 0.9417* | 0.9413* | 0.9409* | 0.9404* | 0.9400* | 0.9396* | 0.9392* | 266.5      |
| 267.0      | 0.9433*                                                                                       | 0.9429* | 0.9424* | 0.9420* | 0.9416* | 0.9412* | 0.9407* | 0.9403* | 0.9399* | 0.9395* | 0.9390* | 267.0      |
| 267.5      | 0.9431*                                                                                       | 0.9427* | 0.9423* | 0.9419* | 0.9414* | 0.9410* | 0.9406* | 0.9402* | 0.9397* | 0.9393* | 0.9389* | 267.5      |
| 268.0      | 0.9430*                                                                                       | 0.9426* | 0.9422* | 0.9417* | 0.9413* | 0.9409* | 0.9404* | 0.9400* | 0.9396* | 0.9392* | 0.9387* | 268.0      |
| 268.5      | 0.9429*                                                                                       | 0.9424* | 0.9420* | 0.9416* | 0.9412* | 0.9407* | 0.9403* | 0.9399* | 0.9394* | 0.9390* | 0.9386* | 268.5      |
| 269.0      | 0.9427*                                                                                       | 0.9423* | 0.9419* | 0.9414* | 0.9410* | 0.9406* | 0.9401* | 0.9397* | 0.9393* | 0.9389* | 0.9384* | 269.0      |
| 269.5      | 0.9426*                                                                                       | 0.9422* | 0.9417* | 0.9413* | 0.9409* | 0.9404* | 0.9400* | 0.9396* | 0.9391* | 0.9387* | 0.9383* | 269.5      |
| 270.0      | 0.9425*                                                                                       | 0.9420* | 0.9416* | 0.9412* | 0.9407* | 0.9403* | 0.9399* | 0.9394* | 0.9390* | 0.9386* | 0.9381* | 270.0      |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F) |         |         |         |         |         |         |         |         |         | TEMP.<br>F |       |
|------------|-------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------|-------|
|            | 270.0                                                 | 272.0   | 274.0   | 276.0   | 278.0   | 280.0   | 282.0   | 284.0   | 286.0   | 288.0   | 290.0      |       |
|            | FACTOR FOR CORRECTING VOLUME TO 60 F                  |         |         |         |         |         |         |         |         |         |            |       |
| 270.0      | 0.9425*                                               | 0.9420* | 0.9416* | 0.9412* | 0.9407* | 0.9403* | 0.9399* | 0.9394* | 0.9390* | 0.9386* | 0.9381*    | 270.0 |
| 270.5      | 0.9423*                                               | 0.9419* | 0.9414* | 0.9410* | 0.9406* | 0.9401* | 0.9397* | 0.9393* | 0.9388* | 0.9384* | 0.9380*    | 270.5 |
| 271.0      | 0.9422*                                               | 0.9417* | 0.9413* | 0.9409* | 0.9404* | 0.9400* | 0.9396* | 0.9391* | 0.9387* | 0.9383* | 0.9378*    | 271.0 |
| 271.5      | 0.9420*                                               | 0.9416* | 0.9412* | 0.9407* | 0.9403* | 0.9399* | 0.9394* | 0.9390* | 0.9386* | 0.9381* | 0.9377*    | 271.5 |
| 272.0      | 0.9419*                                               | 0.9415* | 0.9410* | 0.9406* | 0.9402* | 0.9397* | 0.9393* | 0.9388* | 0.9384* | 0.9380* | 0.9375*    | 272.0 |
| 272.5      | 0.9418*                                               | 0.9413* | 0.9409* | 0.9404* | 0.9400* | 0.9396* | 0.9391* | 0.9387* | 0.9383* | 0.9378* | 0.9374*    | 272.5 |
| 273.0      | 0.9416*                                               | 0.9412* | 0.9407* | 0.9403* | 0.9399* | 0.9394* | 0.9390* | 0.9385* | 0.9381* | 0.9377* | 0.9372*    | 273.0 |
| 273.5      | 0.9415*                                               | 0.9410* | 0.9406* | 0.9402* | 0.9397* | 0.9393* | 0.9388* | 0.9384* | 0.9380* | 0.9375* | 0.9371*    | 273.5 |
| 274.0      | 0.9413*                                               | 0.9409* | 0.9405* | 0.9400* | 0.9396* | 0.9391* | 0.9387* | 0.9383* | 0.9378* | 0.9374* | 0.9369*    | 274.0 |
| 274.5      | 0.9412*                                               | 0.9408* | 0.9403* | 0.9399* | 0.9394* | 0.9390* | 0.9386* | 0.9381* | 0.9377* | 0.9372* | 0.9368*    | 274.5 |
| 275.0      | 0.9411*                                               | 0.9406* | 0.9402* | 0.9397* | 0.9393* | 0.9389* | 0.9384* | 0.9380* | 0.9375* | 0.9371* | 0.9366*    | 275.0 |
| 275.5      | 0.9409*                                               | 0.9405* | 0.9400* | 0.9396* | 0.9391* | 0.9387* | 0.9383* | 0.9378* | 0.9374* | 0.9369* | 0.9365*    | 275.5 |
| 276.0      | 0.9408*                                               | 0.9403* | 0.9399* | 0.9395* | 0.9390* | 0.9386* | 0.9381* | 0.9377* | 0.9372* | 0.9368* | 0.9363*    | 276.0 |
| 276.5      | 0.9406*                                               | 0.9402* | 0.9398* | 0.9393* | 0.9389* | 0.9384* | 0.9380* | 0.9375* | 0.9371* | 0.9366* | 0.9362*    | 276.5 |
| 277.0      | 0.9405*                                               | 0.9401* | 0.9396* | 0.9392* | 0.9387* | 0.9383* | 0.9378* | 0.9374* | 0.9369* | 0.9365* | 0.9360*    | 277.0 |
| 277.5      | 0.9404*                                               | 0.9399* | 0.9395* | 0.9390* | 0.9386* | 0.9381* | 0.9377* | 0.9372* | 0.9368* | 0.9363* | 0.9359*    | 277.5 |
| 278.0      | 0.9402*                                               | 0.9398* | 0.9393* | 0.9389* | 0.9384* | 0.9380* | 0.9375* | 0.9371* | 0.9366* | 0.9362* | 0.9357*    | 278.0 |
| 278.5      | 0.9401*                                               | 0.9396* | 0.9392* | 0.9387* | 0.9383* | 0.9378* | 0.9374* | 0.9369* | 0.9365* | 0.9360* | 0.9356*    | 278.5 |
| 279.0      | 0.9400*                                               | 0.9395* | 0.9390* | 0.9386* | 0.9381* | 0.9377* | 0.9372* | 0.9368* | 0.9363* | 0.9359* | 0.9354*    | 279.0 |
| 279.5      | 0.9398*                                               | 0.9394* | 0.9389* | 0.9385* | 0.9380* | 0.9376* | 0.9371* | 0.9366* | 0.9362* | 0.9357* | 0.9353*    | 279.5 |
| 280.0      | 0.9397*                                               | 0.9392* | 0.9388* | 0.9383* | 0.9379* | 0.9374* | 0.9370* | 0.9365* | 0.9360* | 0.9356* | 0.9351*    | 280.0 |
| 280.5      | 0.9395*                                               | 0.9391* | 0.9386* | 0.9382* | 0.9377* | 0.9373* | 0.9368* | 0.9364* | 0.9359* | 0.9354* | 0.9350*    | 280.5 |
| 281.0      | 0.9394*                                               | 0.9389* | 0.9385* | 0.9380* | 0.9376* | 0.9371* | 0.9367* | 0.9362* | 0.9358* | 0.9353* | 0.9348*    | 281.0 |
| 281.5      | 0.9393*                                               | 0.9388* | 0.9383* | 0.9379* | 0.9374* | 0.9370* | 0.9365* | 0.9361* | 0.9356* | 0.9352* | 0.9347*    | 281.5 |
| 282.0      | 0.9391*                                               | 0.9387* | 0.9382* | 0.9377* | 0.9373* | 0.9368* | 0.9364* | 0.9359* | 0.9355* | 0.9350* | 0.9345*    | 282.0 |
| 282.5      | 0.9390*                                               | 0.9385* | 0.9381* | 0.9376* | 0.9371* | 0.9367* | 0.9362* | 0.9358* | 0.9353* | 0.9349* | 0.9344*    | 282.5 |
| 283.0      | 0.9388*                                               | 0.9384* | 0.9379* | 0.9375* | 0.9370* | 0.9366* | 0.9361* | 0.9356* | 0.9352* | 0.9347* | 0.9342*    | 283.0 |
| 283.5      | 0.9387*                                               | 0.9382* | 0.9378* | 0.9373* | 0.9369* | 0.9364* | 0.9359* | 0.9355* | 0.9350* | 0.9346* | 0.9341*    | 283.5 |
| 284.0      | 0.9386*                                               | 0.9381* | 0.9376* | 0.9372* | 0.9367* | 0.9363* | 0.9358* | 0.9353* | 0.9349* | 0.9344* | 0.9339*    | 284.0 |
| 284.5      | 0.9384*                                               | 0.9380* | 0.9375* | 0.9370* | 0.9366* | 0.9361* | 0.9356* | 0.9352* | 0.9347* | 0.9343* | 0.9338*    | 284.5 |
| 285.0      | 0.9383*                                               | 0.9378* | 0.9374* | 0.9369* | 0.9364* | 0.9360* | 0.9355* | 0.9350* | 0.9346* | 0.9341* | 0.9336*    | 285.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |         |         |         |         |         |         |         |         |         | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------|-------|
|            | 270.0                                                                                         | 272.0   | 274.0   | 276.0   | 278.0   | 280.0   | 282.0   | 284.0   | 286.0   | 288.0   | 290.0      |       |
| 285.0      | 0.9383*                                                                                       | 0.9378* | 0.9374* | 0.9369* | 0.9364* | 0.9360* | 0.9355* | 0.9350* | 0.9346* | 0.9341* | 0.9336*    | 285.0 |
| 285.5      | 0.9381*                                                                                       | 0.9377* | 0.9372* | 0.9368* | 0.9363* | 0.9358* | 0.9354* | 0.9349* | 0.9344* | 0.9340* | 0.9335*    | 285.5 |
| 286.0      | 0.9380*                                                                                       | 0.9375* | 0.9371* | 0.9366* | 0.9361* | 0.9357* | 0.9352* | 0.9347* | 0.9343* | 0.9338* | 0.9333*    | 286.0 |
| 286.5      | 0.9379*                                                                                       | 0.9374* | 0.9369* | 0.9365* | 0.9360* | 0.9355* | 0.9351* | 0.9346* | 0.9341* | 0.9337* | 0.9332*    | 286.5 |
| 287.0      | 0.9377*                                                                                       | 0.9373* | 0.9368* | 0.9363* | 0.9359* | 0.9354* | 0.9349* | 0.9345* | 0.9340* | 0.9335* | 0.9330*    | 287.0 |
| 287.5      | 0.9376*                                                                                       | 0.9371* | 0.9367* | 0.9362* | 0.9357* | 0.9352* | 0.9348* | 0.9343* | 0.9338* | 0.9334* | 0.9329*    | 287.5 |
| 288.0      | 0.9375*                                                                                       | 0.9370* | 0.9365* | 0.9360* | 0.9356* | 0.9351* | 0.9346* | 0.9342* | 0.9337* | 0.9332* | 0.9328*    | 288.0 |
| 288.5      | 0.9373*                                                                                       | 0.9368* | 0.9364* | 0.9359* | 0.9354* | 0.9350* | 0.9345* | 0.9340* | 0.9335* | 0.9331* | 0.9326*    | 288.5 |
| 289.0      | 0.9372*                                                                                       | 0.9367* | 0.9362* | 0.9358* | 0.9353* | 0.9348* | 0.9343* | 0.9339* | 0.9334* | 0.9329* | 0.9325*    | 289.0 |
| 289.5      | 0.9370*                                                                                       | 0.9366* | 0.9361* | 0.9356* | 0.9351* | 0.9347* | 0.9342* | 0.9337* | 0.9332* | 0.9328* | 0.9323*    | 289.5 |
| 290.0      | 0.9369*                                                                                       | 0.9364* | 0.9359* | 0.9355* | 0.9350* | 0.9345* | 0.9340* | 0.9336* | 0.9331* | 0.9326* | 0.9322*    | 290.0 |
| 290.5      | 0.9368*                                                                                       | 0.9363* | 0.9358* | 0.9353* | 0.9349* | 0.9344* | 0.9339* | 0.9334* | 0.9330* | 0.9325* | 0.9320*    | 290.5 |
| 291.0      | 0.9366*                                                                                       | 0.9361* | 0.9357* | 0.9352* | 0.9347* | 0.9342* | 0.9338* | 0.9333* | 0.9328* | 0.9323* | 0.9319*    | 291.0 |
| 291.5      | 0.9365*                                                                                       | 0.9360* | 0.9355* | 0.9350* | 0.9346* | 0.9341* | 0.9336* | 0.9331* | 0.9327* | 0.9322* | 0.9317*    | 291.5 |
| 292.0      | 0.9363*                                                                                       | 0.9359* | 0.9354* | 0.9349* | 0.9344* | 0.9339* | 0.9335* | 0.9330* | 0.9325* | 0.9320* | 0.9316*    | 292.0 |
| 292.5      | 0.9362*                                                                                       | 0.9357* | 0.9352* | 0.9348* | 0.9343* | 0.9338* | 0.9333* | 0.9328* | 0.9324* | 0.9319* | 0.9314*    | 292.5 |
| 293.0      | 0.9361*                                                                                       | 0.9356* | 0.9351* | 0.9346* | 0.9341* | 0.9337* | 0.9332* | 0.9327* | 0.9322* | 0.9317* | 0.9313*    | 293.0 |
| 293.5      | 0.9359*                                                                                       | 0.9354* | 0.9350* | 0.9345* | 0.9340* | 0.9335* | 0.9330* | 0.9326* | 0.9321* | 0.9316* | 0.9311*    | 293.5 |
| 294.0      | 0.9358*                                                                                       | 0.9353* | 0.9348* | 0.9343* | 0.9339* | 0.9334* | 0.9329* | 0.9324* | 0.9319* | 0.9314* | 0.9310*    | 294.0 |
| 294.5      | 0.9356*                                                                                       | 0.9352* | 0.9347* | 0.9342* | 0.9337* | 0.9332* | 0.9327* | 0.9323* | 0.9318* | 0.9313* | 0.9308*    | 294.5 |
| 295.0      | 0.9355*                                                                                       | 0.9350* | 0.9345* | 0.9340* | 0.9336* | 0.9331* | 0.9326* | 0.9321* | 0.9316* | 0.9311* | 0.9307*    | 295.0 |
| 295.5      | 0.9354*                                                                                       | 0.9349* | 0.9344* | 0.9339* | 0.9334* | 0.9329* | 0.9325* | 0.9320* | 0.9315* | 0.9310* | 0.9305*    | 295.5 |
| 296.0      | 0.9352*                                                                                       | 0.9347* | 0.9343* | 0.9338* | 0.9333* | 0.9328* | 0.9323* | 0.9318* | 0.9313* | 0.9308* | 0.9304*    | 296.0 |
| 296.5      | 0.9351*                                                                                       | 0.9346* | 0.9341* | 0.9336* | 0.9331* | 0.9326* | 0.9322* | 0.9317* | 0.9312* | 0.9307* | 0.9302*    | 296.5 |
| 297.0      | 0.9349*                                                                                       | 0.9345* | 0.9340* | 0.9335* | 0.9330* | 0.9325* | 0.9320* | 0.9315* | 0.9310* | 0.9305* | 0.9301*    | 297.0 |
| 297.5      | 0.9348*                                                                                       | 0.9343* | 0.9338* | 0.9333* | 0.9328* | 0.9324* | 0.9319* | 0.9314* | 0.9309* | 0.9304* | 0.9299*    | 297.5 |
| 298.0      | 0.9347*                                                                                       | 0.9342* | 0.9337* | 0.9332* | 0.9327* | 0.9322* | 0.9317* | 0.9312* | 0.9307* | 0.9302* | 0.9298*    | 298.0 |
| 298.5      | 0.9345*                                                                                       | 0.9340* | 0.9335* | 0.9331* | 0.9326* | 0.9321* | 0.9316* | 0.9311* | 0.9306* | 0.9301* | 0.9296*    | 298.5 |
| 299.0      | 0.9344*                                                                                       | 0.9339* | 0.9334* | 0.9329* | 0.9324* | 0.9319* | 0.9314* | 0.9309* | 0.9304* | 0.9300* | 0.9295*    | 299.0 |
| 299.5      | 0.9343*                                                                                       | 0.9338* | 0.9333* | 0.9328* | 0.9323* | 0.9318* | 0.9313* | 0.9308* | 0.9303* | 0.9298* | 0.9293*    | 299.5 |
| 300.0      | 0.9341*                                                                                       | 0.9336* | 0.9331* | 0.9326* | 0.9321* | 0.9316* | 0.9311* | 0.9306* | 0.9302* | 0.9297* | 0.9292*    | 300.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 270.0 TO 290.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 0.0        | 1.0173                                                                                        | 1.0174 | 1.0175 | 1.0177 | 1.0178 | 1.0179 | 1.0180 | 1.0181 | 1.0183 | 1.0184 | 1.0185     | 0.0   |
| 0.5        | 1.0172                                                                                        | 1.0173 | 1.0174 | 1.0175 | 1.0176 | 1.0178 | 1.0179 | 1.0180 | 1.0181 | 1.0182 | 1.0183     | 0.5   |
| 1.0        | 1.0170                                                                                        | 1.0171 | 1.0173 | 1.0174 | 1.0175 | 1.0176 | 1.0177 | 1.0178 | 1.0180 | 1.0181 | 1.0182     | 1.0   |
| 1.5        | 1.0169                                                                                        | 1.0170 | 1.0171 | 1.0172 | 1.0173 | 1.0175 | 1.0176 | 1.0177 | 1.0178 | 1.0179 | 1.0180     | 1.5   |
| 2.0        | 1.0167                                                                                        | 1.0168 | 1.0170 | 1.0171 | 1.0172 | 1.0173 | 1.0174 | 1.0175 | 1.0176 | 1.0178 | 1.0179     | 2.0   |
| 2.5        | 1.0166                                                                                        | 1.0167 | 1.0168 | 1.0169 | 1.0170 | 1.0172 | 1.0173 | 1.0174 | 1.0175 | 1.0176 | 1.0177     | 2.5   |
| 3.0        | 1.0164                                                                                        | 1.0166 | 1.0167 | 1.0168 | 1.0169 | 1.0170 | 1.0171 | 1.0172 | 1.0173 | 1.0175 | 1.0176     | 3.0   |
| 3.5        | 1.0163                                                                                        | 1.0164 | 1.0165 | 1.0166 | 1.0167 | 1.0169 | 1.0170 | 1.0171 | 1.0172 | 1.0173 | 1.0174     | 3.5   |
| 4.0        | 1.0162                                                                                        | 1.0163 | 1.0164 | 1.0165 | 1.0166 | 1.0167 | 1.0168 | 1.0169 | 1.0170 | 1.0172 | 1.0173     | 4.0   |
| 4.5        | 1.0160                                                                                        | 1.0161 | 1.0162 | 1.0163 | 1.0165 | 1.0166 | 1.0167 | 1.0168 | 1.0169 | 1.0170 | 1.0171     | 4.5   |
| 5.0        | 1.0159                                                                                        | 1.0160 | 1.0161 | 1.0162 | 1.0163 | 1.0164 | 1.0165 | 1.0166 | 1.0167 | 1.0169 | 1.0170     | 5.0   |
| 5.5        | 1.0157                                                                                        | 1.0158 | 1.0159 | 1.0161 | 1.0162 | 1.0163 | 1.0164 | 1.0165 | 1.0166 | 1.0167 | 1.0168     | 5.5   |
| 6.0        | 1.0156                                                                                        | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0161 | 1.0162 | 1.0163 | 1.0164 | 1.0165 | 1.0167     | 6.0   |
| 6.5        | 1.0154                                                                                        | 1.0155 | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0161 | 1.0162 | 1.0163 | 1.0164 | 1.0165     | 6.5   |
| 7.0        | 1.0153                                                                                        | 1.0154 | 1.0155 | 1.0156 | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0161 | 1.0162 | 1.0163     | 7.0   |
| 7.5        | 1.0152                                                                                        | 1.0153 | 1.0154 | 1.0155 | 1.0156 | 1.0157 | 1.0158 | 1.0159 | 1.0160 | 1.0161 | 1.0162     | 7.5   |
| 8.0        | 1.0150                                                                                        | 1.0151 | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0156 | 1.0157 | 1.0158 | 1.0159 | 1.0160     | 8.0   |
| 8.5        | 1.0149                                                                                        | 1.0150 | 1.0151 | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0156 | 1.0157 | 1.0158 | 1.0159     | 8.5   |
| 9.0        | 1.0147                                                                                        | 1.0148 | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0156 | 1.0157     | 9.0   |
| 9.5        | 1.0146                                                                                        | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153 | 1.0154 | 1.0155 | 1.0156     | 9.5   |
| 10.0       | 1.0144                                                                                        | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153 | 1.0154     | 10.0  |
| 10.5       | 1.0143                                                                                        | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0151 | 1.0152 | 1.0153     | 10.5  |
| 11.0       | 1.0141                                                                                        | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150 | 1.0151     | 11.0  |
| 11.5       | 1.0140                                                                                        | 1.0141 | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148 | 1.0149 | 1.0150     | 11.5  |
| 12.0       | 1.0139                                                                                        | 1.0140 | 1.0141 | 1.0141 | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147 | 1.0148     | 12.0  |
| 12.5       | 1.0137                                                                                        | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0142 | 1.0143 | 1.0144 | 1.0145 | 1.0146 | 1.0147     | 12.5  |
| 13.0       | 1.0136                                                                                        | 1.0137 | 1.0138 | 1.0139 | 1.0139 | 1.0140 | 1.0141 | 1.0142 | 1.0143 | 1.0144 | 1.0145     | 13.0  |
| 13.5       | 1.0134                                                                                        | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0142 | 1.0143 | 1.0144     | 13.5  |
| 14.0       | 1.0133                                                                                        | 1.0134 | 1.0135 | 1.0136 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 1.0140 | 1.0141 | 1.0142     | 14.0  |
| 14.5       | 1.0131                                                                                        | 1.0132 | 1.0133 | 1.0134 | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 1.0140 | 1.0140     | 14.5  |
| 15.0       | 1.0130                                                                                        | 1.0131 | 1.0132 | 1.0133 | 1.0134 | 1.0134 | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139     | 15.0  |

ALPHA = 290.0 TO 310.0

\* DENOTES EXTRAPOLATED VALUE

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        |        | TEMP.<br>F |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  | 310.0  |            |
| 15.0       | 1.0130                                                                                        | 1.0131 | 1.0132 | 1.0133 | 1.0134 | 1.0134 | 1.0135 | 1.0136 | 1.0137 | 1.0138 | 1.0139 | 15.0       |
| 15.5       | 1.0129                                                                                        | 1.0129 | 1.0130 | 1.0131 | 1.0132 | 1.0133 | 1.0134 | 1.0135 | 1.0136 | 1.0136 | 1.0137 | 15.5       |
| 16.0       | 1.0127                                                                                        | 1.0128 | 1.0129 | 1.0130 | 1.0131 | 1.0131 | 1.0132 | 1.0133 | 1.0134 | 1.0135 | 1.0136 | 16.0       |
| 16.5       | 1.0126                                                                                        | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 1.0130 | 1.0131 | 1.0132 | 1.0133 | 1.0133 | 1.0134 | 16.5       |
| 17.0       | 1.0124                                                                                        | 1.0125 | 1.0126 | 1.0127 | 1.0128 | 1.0128 | 1.0129 | 1.0130 | 1.0131 | 1.0132 | 1.0133 | 17.0       |
| 17.5       | 1.0123                                                                                        | 1.0124 | 1.0124 | 1.0125 | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 1.0130 | 1.0131 | 17.5       |
| 18.0       | 1.0121                                                                                        | 1.0122 | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 1.0126 | 1.0127 | 1.0128 | 1.0129 | 1.0130 | 18.0       |
| 18.5       | 1.0120                                                                                        | 1.0121 | 1.0122 | 1.0122 | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 1.0126 | 1.0127 | 1.0128 | 18.5       |
| 19.0       | 1.0118                                                                                        | 1.0119 | 1.0120 | 1.0121 | 1.0122 | 1.0123 | 1.0123 | 1.0124 | 1.0125 | 1.0126 | 1.0127 | 19.0       |
| 19.5       | 1.0117                                                                                        | 1.0118 | 1.0119 | 1.0120 | 1.0120 | 1.0121 | 1.0122 | 1.0123 | 1.0123 | 1.0124 | 1.0125 | 19.5       |
| 20.0       | 1.0116                                                                                        | 1.0116 | 1.0117 | 1.0118 | 1.0119 | 1.0120 | 1.0120 | 1.0121 | 1.0122 | 1.0123 | 1.0124 | 20.0       |
| 20.5       | 1.0114                                                                                        | 1.0115 | 1.0116 | 1.0116 | 1.0117 | 1.0118 | 1.0119 | 1.0120 | 1.0120 | 1.0121 | 1.0122 | 20.5       |
| 21.0       | 1.0113                                                                                        | 1.0113 | 1.0114 | 1.0115 | 1.0116 | 1.0117 | 1.0117 | 1.0118 | 1.0119 | 1.0120 | 1.0120 | 21.0       |
| 21.5       | 1.0111                                                                                        | 1.0112 | 1.0113 | 1.0114 | 1.0114 | 1.0115 | 1.0116 | 1.0117 | 1.0117 | 1.0118 | 1.0119 | 21.5       |
| 22.0       | 1.0110                                                                                        | 1.0111 | 1.0111 | 1.0112 | 1.0113 | 1.0114 | 1.0114 | 1.0115 | 1.0116 | 1.0117 | 1.0117 | 22.0       |
| 22.5       | 1.0108                                                                                        | 1.0109 | 1.0110 | 1.0111 | 1.0111 | 1.0112 | 1.0113 | 1.0114 | 1.0114 | 1.0115 | 1.0116 | 22.5       |
| 23.0       | 1.0107                                                                                        | 1.0108 | 1.0108 | 1.0109 | 1.0110 | 1.0111 | 1.0111 | 1.0112 | 1.0113 | 1.0114 | 1.0114 | 23.0       |
| 23.5       | 1.0106                                                                                        | 1.0106 | 1.0107 | 1.0108 | 1.0108 | 1.0109 | 1.0110 | 1.0111 | 1.0111 | 1.0112 | 1.0113 | 23.5       |
| 24.0       | 1.0104                                                                                        | 1.0105 | 1.0105 | 1.0106 | 1.0107 | 1.0108 | 1.0108 | 1.0109 | 1.0110 | 1.0111 | 1.0111 | 24.0       |
| 24.5       | 1.0103                                                                                        | 1.0103 | 1.0104 | 1.0105 | 1.0105 | 1.0106 | 1.0107 | 1.0108 | 1.0108 | 1.0109 | 1.0110 | 24.5       |
| 25.0       | 1.0101                                                                                        | 1.0102 | 1.0103 | 1.0103 | 1.0104 | 1.0105 | 1.0105 | 1.0106 | 1.0107 | 1.0107 | 1.0108 | 25.0       |
| 25.5       | 1.0100                                                                                        | 1.0100 | 1.0101 | 1.0102 | 1.0102 | 1.0103 | 1.0104 | 1.0105 | 1.0105 | 1.0106 | 1.0107 | 25.5       |
| 26.0       | 1.0098                                                                                        | 1.0099 | 1.0100 | 1.0100 | 1.0101 | 1.0102 | 1.0102 | 1.0103 | 1.0104 | 1.0104 | 1.0105 | 26.0       |
| 26.5       | 1.0097                                                                                        | 1.0098 | 1.0098 | 1.0099 | 1.0100 | 1.0100 | 1.0101 | 1.0102 | 1.0102 | 1.0103 | 1.0104 | 26.5       |
| 27.0       | 1.0095                                                                                        | 1.0096 | 1.0097 | 1.0097 | 1.0098 | 1.0099 | 1.0099 | 1.0100 | 1.0101 | 1.0101 | 1.0102 | 27.0       |
| 27.5       | 1.0094                                                                                        | 1.0095 | 1.0095 | 1.0096 | 1.0097 | 1.0097 | 1.0098 | 1.0099 | 1.0099 | 1.0100 | 1.0100 | 27.5       |
| 28.0       | 1.0093                                                                                        | 1.0093 | 1.0094 | 1.0094 | 1.0095 | 1.0096 | 1.0096 | 1.0097 | 1.0098 | 1.0098 | 1.0099 | 28.0       |
| 28.5       | 1.0091                                                                                        | 1.0092 | 1.0092 | 1.0093 | 1.0094 | 1.0094 | 1.0095 | 1.0095 | 1.0096 | 1.0097 | 1.0097 | 28.5       |
| 29.0       | 1.0090                                                                                        | 1.0090 | 1.0091 | 1.0092 | 1.0092 | 1.0093 | 1.0093 | 1.0094 | 1.0095 | 1.0095 | 1.0096 | 29.0       |
| 29.5       | 1.0088                                                                                        | 1.0089 | 1.0089 | 1.0090 | 1.0091 | 1.0091 | 1.0092 | 1.0092 | 1.0093 | 1.0094 | 1.0094 | 29.5       |
| 30.0       | 1.0087                                                                                        | 1.0087 | 1.0088 | 1.0089 | 1.0089 | 1.0090 | 1.0090 | 1.0091 | 1.0092 | 1.0092 | 1.0093 | 30.0       |

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\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 30.0       | 1.0087                                                                                        | 1.0087 | 1.0088 | 1.0089 | 1.0089 | 1.0090 | 1.0090 | 1.0091 | 1.0092 | 1.0092 | 1.0093     | 30.0  |
| 30.5       | 1.0085                                                                                        | 1.0086 | 1.0087 | 1.0087 | 1.0088 | 1.0088 | 1.0089 | 1.0089 | 1.0090 | 1.0091 | 1.0091     | 30.5  |
| 31.0       | 1.0084                                                                                        | 1.0084 | 1.0085 | 1.0086 | 1.0086 | 1.0087 | 1.0087 | 1.0088 | 1.0088 | 1.0089 | 1.0090     | 31.0  |
| 31.5       | 1.0082                                                                                        | 1.0083 | 1.0084 | 1.0084 | 1.0085 | 1.0085 | 1.0086 | 1.0086 | 1.0087 | 1.0088 | 1.0088     | 31.5  |
| 32.0       | 1.0081                                                                                        | 1.0082 | 1.0082 | 1.0083 | 1.0083 | 1.0084 | 1.0084 | 1.0085 | 1.0085 | 1.0086 | 1.0087     | 32.0  |
| 32.5       | 1.0080                                                                                        | 1.0080 | 1.0081 | 1.0081 | 1.0082 | 1.0082 | 1.0083 | 1.0083 | 1.0084 | 1.0084 | 1.0085     | 32.5  |
| 33.0       | 1.0078                                                                                        | 1.0079 | 1.0079 | 1.0080 | 1.0080 | 1.0081 | 1.0081 | 1.0082 | 1.0082 | 1.0083 | 1.0083     | 33.0  |
| 33.5       | 1.0077                                                                                        | 1.0077 | 1.0078 | 1.0078 | 1.0079 | 1.0079 | 1.0080 | 1.0080 | 1.0081 | 1.0081 | 1.0082     | 33.5  |
| 34.0       | 1.0075                                                                                        | 1.0076 | 1.0076 | 1.0077 | 1.0077 | 1.0078 | 1.0078 | 1.0079 | 1.0079 | 1.0080 | 1.0080     | 34.0  |
| 34.5       | 1.0074                                                                                        | 1.0074 | 1.0075 | 1.0075 | 1.0076 | 1.0076 | 1.0077 | 1.0077 | 1.0078 | 1.0078 | 1.0079     | 34.5  |
| 35.0       | 1.0072                                                                                        | 1.0073 | 1.0073 | 1.0074 | 1.0074 | 1.0075 | 1.0075 | 1.0076 | 1.0076 | 1.0077 | 1.0077     | 35.0  |
| 35.5       | 1.0071                                                                                        | 1.0071 | 1.0072 | 1.0072 | 1.0073 | 1.0073 | 1.0074 | 1.0074 | 1.0075 | 1.0075 | 1.0076     | 35.5  |
| 36.0       | 1.0069                                                                                        | 1.0070 | 1.0070 | 1.0071 | 1.0071 | 1.0072 | 1.0072 | 1.0073 | 1.0073 | 1.0074 | 1.0074     | 36.0  |
| 36.5       | 1.0068                                                                                        | 1.0068 | 1.0069 | 1.0069 | 1.0070 | 1.0070 | 1.0071 | 1.0071 | 1.0072 | 1.0072 | 1.0073     | 36.5  |
| 37.0       | 1.0067                                                                                        | 1.0067 | 1.0067 | 1.0068 | 1.0068 | 1.0069 | 1.0069 | 1.0070 | 1.0070 | 1.0071 | 1.0071     | 37.0  |
| 37.5       | 1.0065                                                                                        | 1.0066 | 1.0066 | 1.0066 | 1.0067 | 1.0067 | 1.0068 | 1.0068 | 1.0069 | 1.0069 | 1.0070     | 37.5  |
| 38.0       | 1.0064                                                                                        | 1.0064 | 1.0065 | 1.0065 | 1.0065 | 1.0066 | 1.0066 | 1.0067 | 1.0067 | 1.0068 | 1.0068     | 38.0  |
| 38.5       | 1.0062                                                                                        | 1.0063 | 1.0063 | 1.0064 | 1.0064 | 1.0064 | 1.0065 | 1.0065 | 1.0066 | 1.0066 | 1.0067     | 38.5  |
| 39.0       | 1.0061                                                                                        | 1.0061 | 1.0062 | 1.0062 | 1.0062 | 1.0063 | 1.0063 | 1.0064 | 1.0064 | 1.0065 | 1.0065     | 39.0  |
| 39.5       | 1.0059                                                                                        | 1.0060 | 1.0060 | 1.0061 | 1.0061 | 1.0061 | 1.0062 | 1.0062 | 1.0063 | 1.0063 | 1.0063     | 39.5  |
| 40.0       | 1.0058                                                                                        | 1.0058 | 1.0059 | 1.0059 | 1.0059 | 1.0060 | 1.0060 | 1.0061 | 1.0061 | 1.0061 | 1.0062     | 40.0  |
| 40.5       | 1.0056                                                                                        | 1.0057 | 1.0057 | 1.0058 | 1.0058 | 1.0058 | 1.0059 | 1.0059 | 1.0060 | 1.0060 | 1.0060     | 40.5  |
| 41.0       | 1.0055                                                                                        | 1.0055 | 1.0056 | 1.0056 | 1.0057 | 1.0057 | 1.0057 | 1.0058 | 1.0058 | 1.0058 | 1.0059     | 41.0  |
| 41.5       | 1.0054                                                                                        | 1.0054 | 1.0054 | 1.0055 | 1.0055 | 1.0055 | 1.0056 | 1.0056 | 1.0057 | 1.0057 | 1.0057     | 41.5  |
| 42.0       | 1.0052                                                                                        | 1.0052 | 1.0053 | 1.0053 | 1.0054 | 1.0054 | 1.0054 | 1.0055 | 1.0055 | 1.0055 | 1.0056     | 42.0  |
| 42.5       | 1.0051                                                                                        | 1.0051 | 1.0051 | 1.0052 | 1.0052 | 1.0052 | 1.0053 | 1.0053 | 1.0053 | 1.0054 | 1.0054     | 42.5  |
| 43.0       | 1.0049                                                                                        | 1.0050 | 1.0050 | 1.0050 | 1.0051 | 1.0051 | 1.0051 | 1.0052 | 1.0052 | 1.0052 | 1.0053     | 43.0  |
| 43.5       | 1.0048                                                                                        | 1.0048 | 1.0048 | 1.0049 | 1.0049 | 1.0049 | 1.0050 | 1.0050 | 1.0050 | 1.0051 | 1.0051     | 43.5  |
| 44.0       | 1.0046                                                                                        | 1.0047 | 1.0047 | 1.0047 | 1.0048 | 1.0048 | 1.0048 | 1.0049 | 1.0049 | 1.0049 | 1.0050     | 44.0  |
| 44.5       | 1.0045                                                                                        | 1.0045 | 1.0046 | 1.0046 | 1.0046 | 1.0046 | 1.0047 | 1.0047 | 1.0047 | 1.0048 | 1.0048     | 44.5  |
| 45.0       | 1.0043                                                                                        | 1.0044 | 1.0044 | 1.0044 | 1.0045 | 1.0045 | 1.0045 | 1.0046 | 1.0046 | 1.0046 | 1.0046     | 45.0  |

ALPHA= 290.0 TO 310.0

ALPHA = 290.0 TO 310.0

\* DENOTES EXTRAPOLATED VALUE

API TABLE 24C. VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 45.0       | 1.0043                                                                                        | 1.0044 | 1.0044 | 1.0044 | 1.0045 | 1.0045 | 1.0045 | 1.0046 | 1.0046 | 1.0046 | 1.0046     | 45.0  |
| 45.5       | 1.0042                                                                                        | 1.0042 | 1.0043 | 1.0043 | 1.0043 | 1.0043 | 1.0044 | 1.0044 | 1.0044 | 1.0045 | 1.0045     | 45.5  |
| 46.0       | 1.0041                                                                                        | 1.0041 | 1.0041 | 1.0041 | 1.0042 | 1.0042 | 1.0042 | 1.0043 | 1.0043 | 1.0043 | 1.0043     | 46.0  |
| 46.5       | 1.0039                                                                                        | 1.0039 | 1.0040 | 1.0040 | 1.0040 | 1.0040 | 1.0041 | 1.0041 | 1.0041 | 1.0042 | 1.0042     | 46.5  |
| 47.0       | 1.0038                                                                                        | 1.0038 | 1.0038 | 1.0038 | 1.0039 | 1.0039 | 1.0039 | 1.0039 | 1.0040 | 1.0040 | 1.0040     | 47.0  |
| 47.5       | 1.0036                                                                                        | 1.0036 | 1.0037 | 1.0037 | 1.0037 | 1.0037 | 1.0038 | 1.0038 | 1.0038 | 1.0038 | 1.0039     | 47.5  |
| 48.0       | 1.0035                                                                                        | 1.0035 | 1.0035 | 1.0035 | 1.0036 | 1.0036 | 1.0036 | 1.0036 | 1.0037 | 1.0037 | 1.0037     | 48.0  |
| 48.5       | 1.0033                                                                                        | 1.0034 | 1.0034 | 1.0034 | 1.0034 | 1.0034 | 1.0035 | 1.0035 | 1.0035 | 1.0035 | 1.0036     | 48.5  |
| 49.0       | 1.0032                                                                                        | 1.0032 | 1.0032 | 1.0033 | 1.0033 | 1.0033 | 1.0033 | 1.0033 | 1.0034 | 1.0034 | 1.0034     | 49.0  |
| 49.5       | 1.0030                                                                                        | 1.0031 | 1.0031 | 1.0031 | 1.0031 | 1.0031 | 1.0032 | 1.0032 | 1.0032 | 1.0032 | 1.0033     | 49.5  |
| 50.0       | 1.0029                                                                                        | 1.0029 | 1.0029 | 1.0030 | 1.0030 | 1.0030 | 1.0030 | 1.0030 | 1.0031 | 1.0031 | 1.0031     | 50.0  |
| 50.5       | 1.0028                                                                                        | 1.0028 | 1.0028 | 1.0028 | 1.0028 | 1.0028 | 1.0029 | 1.0029 | 1.0029 | 1.0029 | 1.0029     | 50.5  |
| 51.0       | 1.0026                                                                                        | 1.0026 | 1.0026 | 1.0027 | 1.0027 | 1.0027 | 1.0027 | 1.0027 | 1.0028 | 1.0028 | 1.0028     | 51.0  |
| 51.5       | 1.0025                                                                                        | 1.0025 | 1.0025 | 1.0025 | 1.0025 | 1.0025 | 1.0026 | 1.0026 | 1.0026 | 1.0026 | 1.0026     | 51.5  |
| 52.0       | 1.0023                                                                                        | 1.0023 | 1.0024 | 1.0024 | 1.0024 | 1.0024 | 1.0024 | 1.0024 | 1.0024 | 1.0025 | 1.0025     | 52.0  |
| 52.5       | 1.0022                                                                                        | 1.0022 | 1.0022 | 1.0022 | 1.0022 | 1.0022 | 1.0023 | 1.0023 | 1.0023 | 1.0023 | 1.0023     | 52.5  |
| 53.0       | 1.0020                                                                                        | 1.0020 | 1.0021 | 1.0021 | 1.0021 | 1.0021 | 1.0021 | 1.0021 | 1.0021 | 1.0022 | 1.0022     | 53.0  |
| 53.5       | 1.0019                                                                                        | 1.0019 | 1.0019 | 1.0019 | 1.0019 | 1.0019 | 1.0020 | 1.0020 | 1.0020 | 1.0020 | 1.0020     | 53.5  |
| 54.0       | 1.0017                                                                                        | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0018 | 1.0019     | 54.0  |
| 54.5       | 1.0016                                                                                        | 1.0016 | 1.0016 | 1.0016 | 1.0016 | 1.0016 | 1.0017 | 1.0017 | 1.0017 | 1.0017 | 1.0017     | 54.5  |
| 55.0       | 1.0014                                                                                        | 1.0015 | 1.0015 | 1.0015 | 1.0015 | 1.0015 | 1.0015 | 1.0015 | 1.0015 | 1.0015 | 1.0015     | 55.0  |
| 55.5       | 1.0013                                                                                        | 1.0013 | 1.0013 | 1.0013 | 1.0013 | 1.0013 | 1.0014 | 1.0014 | 1.0014 | 1.0014 | 1.0014     | 55.5  |
| 56.0       | 1.0012                                                                                        | 1.0012 | 1.0012 | 1.0012 | 1.0012 | 1.0012 | 1.0012 | 1.0012 | 1.0012 | 1.0012 | 1.0012     | 56.0  |
| 56.5       | 1.0010                                                                                        | 1.0010 | 1.0010 | 1.0010 | 1.0010 | 1.0010 | 1.0011 | 1.0011 | 1.0011 | 1.0011 | 1.0011     | 56.5  |
| 57.0       | 1.0009                                                                                        | 1.0009 | 1.0009 | 1.0009 | 1.0009 | 1.0009 | 1.0009 | 1.0009 | 1.0009 | 1.0009 | 1.0009     | 57.0  |
| 57.5       | 1.0007                                                                                        | 1.0007 | 1.0007 | 1.0007 | 1.0007 | 1.0007 | 1.0008 | 1.0008 | 1.0008 | 1.0008 | 1.0008     | 57.5  |
| 58.0       | 1.0006                                                                                        | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006 | 1.0006     | 58.0  |
| 58.5       | 1.0004                                                                                        | 1.0004 | 1.0004 | 1.0004 | 1.0004 | 1.0004 | 1.0005 | 1.0005 | 1.0005 | 1.0005 | 1.0005     | 58.5  |
| 59.0       | 1.0003                                                                                        | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003 | 1.0003     | 59.0  |
| 59.5       | 1.0001                                                                                        | 1.0001 | 1.0001 | 1.0001 | 1.0001 | 1.0001 | 1.0002 | 1.0002 | 1.0002 | 1.0002 | 1.0002     | 59.5  |
| 60.0       | 1.0000                                                                                        | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000     | 60.0  |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 60.0       | 1.0000                                                                                        | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000     | 60.0  |
| 60.5       | 0.9999                                                                                        | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998     | 60.5  |
| 61.0       | 0.9997                                                                                        | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997     | 61.0  |
| 61.5       | 0.9996                                                                                        | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9995 | 0.9995 | 0.9995 | 0.9995 | 0.9995 | 0.9995     | 61.5  |
| 62.0       | 0.9994                                                                                        | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994     | 62.0  |
| 62.5       | 0.9993                                                                                        | 0.9993 | 0.9993 | 0.9993 | 0.9993 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9992     | 62.5  |
| 63.0       | 0.9991                                                                                        | 0.9991 | 0.9991 | 0.9991 | 0.9991 | 0.9991 | 0.9991 | 0.9991 | 0.9991 | 0.9991 | 0.9991     | 63.0  |
| 63.5       | 0.9990                                                                                        | 0.9990 | 0.9990 | 0.9990 | 0.9990 | 0.9989 | 0.9989 | 0.9989 | 0.9989 | 0.9989 | 0.9989     | 63.5  |
| 64.0       | 0.9988                                                                                        | 0.9988 | 0.9988 | 0.9988 | 0.9988 | 0.9988 | 0.9988 | 0.9988 | 0.9988 | 0.9988 | 0.9988     | 64.0  |
| 64.5       | 0.9987                                                                                        | 0.9987 | 0.9987 | 0.9987 | 0.9987 | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9986 | 0.9986     | 64.5  |
| 65.0       | 0.9985                                                                                        | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9985 | 0.9984     | 65.0  |
| 65.5       | 0.9984                                                                                        | 0.9984 | 0.9984 | 0.9984 | 0.9984 | 0.9983 | 0.9983 | 0.9983 | 0.9983 | 0.9983 | 0.9983     | 65.5  |
| 66.0       | 0.9983                                                                                        | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9982 | 0.9981     | 66.0  |
| 66.5       | 0.9981                                                                                        | 0.9981 | 0.9981 | 0.9981 | 0.9981 | 0.9980 | 0.9980 | 0.9980 | 0.9980 | 0.9980 | 0.9980     | 66.5  |
| 67.0       | 0.9980                                                                                        | 0.9980 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9979 | 0.9978 | 0.9978     | 67.0  |
| 67.5       | 0.9978                                                                                        | 0.9978 | 0.9978 | 0.9978 | 0.9978 | 0.9977 | 0.9977 | 0.9977 | 0.9977 | 0.9977 | 0.9977     | 67.5  |
| 68.0       | 0.9977                                                                                        | 0.9977 | 0.9976 | 0.9976 | 0.9976 | 0.9976 | 0.9976 | 0.9976 | 0.9976 | 0.9975 | 0.9975     | 68.0  |
| 68.5       | 0.9975                                                                                        | 0.9975 | 0.9975 | 0.9975 | 0.9975 | 0.9974 | 0.9974 | 0.9974 | 0.9974 | 0.9974 | 0.9974     | 68.5  |
| 69.0       | 0.9974                                                                                        | 0.9974 | 0.9974 | 0.9973 | 0.9973 | 0.9973 | 0.9973 | 0.9973 | 0.9972 | 0.9972 | 0.9972     | 69.0  |
| 69.5       | 0.9972                                                                                        | 0.9972 | 0.9972 | 0.9972 | 0.9972 | 0.9971 | 0.9971 | 0.9971 | 0.9971 | 0.9971 | 0.9971     | 69.5  |
| 70.0       | 0.9971                                                                                        | 0.9971 | 0.9971 | 0.9970 | 0.9970 | 0.9970 | 0.9970 | 0.9970 | 0.9969 | 0.9969 | 0.9969     | 70.0  |
| 70.5       | 0.9970                                                                                        | 0.9969 | 0.9969 | 0.9969 | 0.9969 | 0.9968 | 0.9968 | 0.9968 | 0.9968 | 0.9968 | 0.9967     | 70.5  |
| 71.0       | 0.9968                                                                                        | 0.9968 | 0.9968 | 0.9967 | 0.9967 | 0.9967 | 0.9967 | 0.9967 | 0.9966 | 0.9966 | 0.9966     | 71.0  |
| 71.5       | 0.9967                                                                                        | 0.9966 | 0.9966 | 0.9966 | 0.9966 | 0.9965 | 0.9965 | 0.9965 | 0.9965 | 0.9965 | 0.9964     | 71.5  |
| 72.0       | 0.9965                                                                                        | 0.9965 | 0.9965 | 0.9964 | 0.9964 | 0.9964 | 0.9964 | 0.9963 | 0.9963 | 0.9963 | 0.9963     | 72.0  |
| 72.5       | 0.9964                                                                                        | 0.9963 | 0.9963 | 0.9963 | 0.9963 | 0.9962 | 0.9962 | 0.9962 | 0.9962 | 0.9961 | 0.9961     | 72.5  |
| 73.0       | 0.9962                                                                                        | 0.9962 | 0.9962 | 0.9961 | 0.9961 | 0.9961 | 0.9961 | 0.9960 | 0.9960 | 0.9960 | 0.9960     | 73.0  |
| 73.5       | 0.9961                                                                                        | 0.9961 | 0.9960 | 0.9960 | 0.9960 | 0.9959 | 0.9959 | 0.9959 | 0.9959 | 0.9958 | 0.9958     | 73.5  |
| 74.0       | 0.9959                                                                                        | 0.9959 | 0.9959 | 0.9959 | 0.9958 | 0.9958 | 0.9958 | 0.9957 | 0.9957 | 0.9957 | 0.9957     | 74.0  |
| 74.5       | 0.9958                                                                                        | 0.9958 | 0.9957 | 0.9957 | 0.9957 | 0.9956 | 0.9956 | 0.9956 | 0.9956 | 0.9955 | 0.9955     | 74.5  |
| 75.0       | 0.9956                                                                                        | 0.9956 | 0.9956 | 0.9956 | 0.9955 | 0.9955 | 0.9955 | 0.9954 | 0.9954 | 0.9954 | 0.9953     | 75.0  |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 75.0       | 0.9956                                                                                        | 0.9956 | 0.9956 | 0.9956 | 0.9955 | 0.9955 | 0.9955 | 0.9954 | 0.9954 | 0.9954 | 0.9953     | 75.0  |
| 75.5       | 0.9955                                                                                        | 0.9955 | 0.9954 | 0.9954 | 0.9954 | 0.9953 | 0.9953 | 0.9953 | 0.9953 | 0.9952 | 0.9952     | 75.5  |
| 76.0       | 0.9954                                                                                        | 0.9953 | 0.9953 | 0.9953 | 0.9952 | 0.9952 | 0.9952 | 0.9951 | 0.9951 | 0.9951 | 0.9950     | 76.0  |
| 76.5       | 0.9952                                                                                        | 0.9952 | 0.9951 | 0.9951 | 0.9951 | 0.9950 | 0.9950 | 0.9950 | 0.9949 | 0.9949 | 0.9949     | 76.5  |
| 77.0       | 0.9951                                                                                        | 0.9950 | 0.9950 | 0.9950 | 0.9949 | 0.9949 | 0.9949 | 0.9948 | 0.9948 | 0.9948 | 0.9947     | 77.0  |
| 77.5       | 0.9949                                                                                        | 0.9949 | 0.9948 | 0.9948 | 0.9948 | 0.9947 | 0.9947 | 0.9947 | 0.9946 | 0.9946 | 0.9946     | 77.5  |
| 78.0       | 0.9948                                                                                        | 0.9947 | 0.9947 | 0.9947 | 0.9946 | 0.9946 | 0.9946 | 0.9945 | 0.9945 | 0.9944 | 0.9944     | 78.0  |
| 78.5       | 0.9946                                                                                        | 0.9946 | 0.9946 | 0.9945 | 0.9945 | 0.9944 | 0.9944 | 0.9944 | 0.9943 | 0.9943 | 0.9943     | 78.5  |
| 79.0       | 0.9945                                                                                        | 0.9944 | 0.9944 | 0.9944 | 0.9943 | 0.9943 | 0.9943 | 0.9942 | 0.9942 | 0.9941 | 0.9941     | 79.0  |
| 79.5       | 0.9943                                                                                        | 0.9943 | 0.9943 | 0.9942 | 0.9942 | 0.9941 | 0.9941 | 0.9941 | 0.9940 | 0.9940 | 0.9939     | 79.5  |
| 80.0       | 0.9942                                                                                        | 0.9941 | 0.9941 | 0.9941 | 0.9940 | 0.9940 | 0.9939 | 0.9939 | 0.9939 | 0.9938 | 0.9938     | 80.0  |
| 80.5       | 0.9940                                                                                        | 0.9940 | 0.9940 | 0.9939 | 0.9939 | 0.9938 | 0.9938 | 0.9938 | 0.9937 | 0.9937 | 0.9936     | 80.5  |
| 81.0       | 0.9939                                                                                        | 0.9939 | 0.9938 | 0.9938 | 0.9937 | 0.9937 | 0.9936 | 0.9936 | 0.9936 | 0.9935 | 0.9935     | 81.0  |
| 81.5       | 0.9938                                                                                        | 0.9937 | 0.9937 | 0.9936 | 0.9936 | 0.9935 | 0.9935 | 0.9935 | 0.9934 | 0.9934 | 0.9933     | 81.5  |
| 82.0       | 0.9936                                                                                        | 0.9936 | 0.9935 | 0.9935 | 0.9934 | 0.9934 | 0.9933 | 0.9933 | 0.9933 | 0.9932 | 0.9932     | 82.0  |
| 82.5       | 0.9935                                                                                        | 0.9934 | 0.9934 | 0.9933 | 0.9933 | 0.9932 | 0.9932 | 0.9931 | 0.9931 | 0.9931 | 0.9930     | 82.5  |
| 83.0       | 0.9933                                                                                        | 0.9933 | 0.9932 | 0.9932 | 0.9931 | 0.9931 | 0.9930 | 0.9930 | 0.9929 | 0.9929 | 0.9929     | 83.0  |
| 83.5       | 0.9932                                                                                        | 0.9931 | 0.9931 | 0.9930 | 0.9930 | 0.9929 | 0.9929 | 0.9928 | 0.9928 | 0.9927 | 0.9927     | 83.5  |
| 84.0       | 0.9930                                                                                        | 0.9930 | 0.9929 | 0.9929 | 0.9928 | 0.9928 | 0.9927 | 0.9927 | 0.9926 | 0.9926 | 0.9925     | 84.0  |
| 84.5       | 0.9929                                                                                        | 0.9928 | 0.9928 | 0.9927 | 0.9927 | 0.9926 | 0.9926 | 0.9925 | 0.9925 | 0.9924 | 0.9924     | 84.5  |
| 85.0       | 0.9927                                                                                        | 0.9927 | 0.9926 | 0.9926 | 0.9925 | 0.9925 | 0.9924 | 0.9924 | 0.9923 | 0.9923 | 0.9922     | 85.0  |
| 85.5       | 0.9926                                                                                        | 0.9925 | 0.9925 | 0.9924 | 0.9924 | 0.9923 | 0.9923 | 0.9922 | 0.9922 | 0.9921 | 0.9921     | 85.5  |
| 86.0       | 0.9924                                                                                        | 0.9924 | 0.9923 | 0.9923 | 0.9922 | 0.9922 | 0.9921 | 0.9921 | 0.9920 | 0.9920 | 0.9919     | 86.0  |
| 86.5       | 0.9923                                                                                        | 0.9922 | 0.9922 | 0.9921 | 0.9921 | 0.9920 | 0.9920 | 0.9919 | 0.9919 | 0.9918 | 0.9918     | 86.5  |
| 87.0       | 0.9922                                                                                        | 0.9921 | 0.9920 | 0.9920 | 0.9919 | 0.9919 | 0.9918 | 0.9918 | 0.9917 | 0.9917 | 0.9916     | 87.0  |
| 87.5       | 0.9920                                                                                        | 0.9920 | 0.9919 | 0.9918 | 0.9918 | 0.9917 | 0.9917 | 0.9916 | 0.9916 | 0.9915 | 0.9915     | 87.5  |
| 88.0       | 0.9919                                                                                        | 0.9918 | 0.9917 | 0.9917 | 0.9916 | 0.9916 | 0.9915 | 0.9915 | 0.9914 | 0.9914 | 0.9913     | 88.0  |
| 88.5       | 0.9917                                                                                        | 0.9917 | 0.9916 | 0.9915 | 0.9915 | 0.9914 | 0.9914 | 0.9913 | 0.9913 | 0.9912 | 0.9911     | 88.5  |
| 89.0       | 0.9916                                                                                        | 0.9915 | 0.9915 | 0.9914 | 0.9913 | 0.9913 | 0.9912 | 0.9912 | 0.9911 | 0.9910 | 0.9910     | 89.0  |
| 89.5       | 0.9914                                                                                        | 0.9914 | 0.9913 | 0.9912 | 0.9912 | 0.9911 | 0.9911 | 0.9910 | 0.9909 | 0.9909 | 0.9908     | 89.5  |
| 90.0       | 0.9913                                                                                        | 0.9912 | 0.9912 | 0.9911 | 0.9910 | 0.9910 | 0.9909 | 0.9909 | 0.9908 | 0.9907 | 0.9907     | 90.0  |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  | 310.0      |       |       |
| 90.0       | 0.9913                                                                                        | 0.9912 | 0.9912 | 0.9911 | 0.9910 | 0.9910 | 0.9909 | 0.9909 | 0.9908 | 0.9907 | 0.9907     | 90.0  | 90.0  |
| 90.5       | 0.9911                                                                                        | 0.9911 | 0.9910 | 0.9909 | 0.9909 | 0.9908 | 0.9908 | 0.9907 | 0.9906 | 0.9906 | 0.9905     | 90.5  | 90.5  |
| 91.0       | 0.9910                                                                                        | 0.9909 | 0.9909 | 0.9908 | 0.9907 | 0.9907 | 0.9906 | 0.9905 | 0.9905 | 0.9904 | 0.9904     | 91.0  | 91.0  |
| 91.5       | 0.9908                                                                                        | 0.9908 | 0.9907 | 0.9907 | 0.9906 | 0.9905 | 0.9905 | 0.9904 | 0.9903 | 0.9903 | 0.9902     | 91.5  | 91.5  |
| 92.0       | 0.9907                                                                                        | 0.9906 | 0.9906 | 0.9905 | 0.9904 | 0.9904 | 0.9903 | 0.9902 | 0.9902 | 0.9901 | 0.9901     | 92.0  | 92.0  |
| 92.5       | 0.9905                                                                                        | 0.9905 | 0.9904 | 0.9904 | 0.9903 | 0.9902 | 0.9902 | 0.9901 | 0.9900 | 0.9900 | 0.9899     | 92.5  | 92.5  |
| 93.0       | 0.9904                                                                                        | 0.9903 | 0.9903 | 0.9902 | 0.9901 | 0.9901 | 0.9900 | 0.9899 | 0.9899 | 0.9898 | 0.9897     | 93.0  | 93.0  |
| 93.5       | 0.9903                                                                                        | 0.9902 | 0.9901 | 0.9901 | 0.9900 | 0.9899 | 0.9899 | 0.9898 | 0.9897 | 0.9897 | 0.9896     | 93.5  | 93.5  |
| 94.0       | 0.9901                                                                                        | 0.9900 | 0.9900 | 0.9899 | 0.9898 | 0.9898 | 0.9897 | 0.9896 | 0.9896 | 0.9895 | 0.9894     | 94.0  | 94.0  |
| 94.5       | 0.9900                                                                                        | 0.9899 | 0.9898 | 0.9898 | 0.9897 | 0.9896 | 0.9895 | 0.9895 | 0.9894 | 0.9893 | 0.9893     | 94.5  | 94.5  |
| 95.0       | 0.9898                                                                                        | 0.9897 | 0.9897 | 0.9896 | 0.9895 | 0.9895 | 0.9894 | 0.9893 | 0.9893 | 0.9892 | 0.9891     | 95.0  | 95.0  |
| 95.5       | 0.9897                                                                                        | 0.9896 | 0.9895 | 0.9895 | 0.9894 | 0.9893 | 0.9892 | 0.9892 | 0.9891 | 0.9890 | 0.9890     | 95.5  | 95.5  |
| 96.0       | 0.9895                                                                                        | 0.9895 | 0.9894 | 0.9893 | 0.9892 | 0.9892 | 0.9891 | 0.9890 | 0.9889 | 0.9889 | 0.9888     | 96.0  | 96.0  |
| 96.5       | 0.9894                                                                                        | 0.9893 | 0.9892 | 0.9892 | 0.9891 | 0.9890 | 0.9889 | 0.9889 | 0.9888 | 0.9887 | 0.9886     | 96.5  | 96.5  |
| 97.0       | 0.9892                                                                                        | 0.9892 | 0.9891 | 0.9890 | 0.9889 | 0.9889 | 0.9888 | 0.9887 | 0.9886 | 0.9886 | 0.9885     | 97.0  | 97.0  |
| 97.5       | 0.9891                                                                                        | 0.9890 | 0.9889 | 0.9889 | 0.9888 | 0.9887 | 0.9886 | 0.9886 | 0.9885 | 0.9884 | 0.9883     | 97.5  | 97.5  |
| 98.0       | 0.9889                                                                                        | 0.9889 | 0.9888 | 0.9887 | 0.9886 | 0.9886 | 0.9885 | 0.9884 | 0.9883 | 0.9883 | 0.9882     | 98.0  | 98.0  |
| 98.5       | 0.9888                                                                                        | 0.9887 | 0.9886 | 0.9886 | 0.9885 | 0.9884 | 0.9883 | 0.9883 | 0.9882 | 0.9881 | 0.9880     | 98.5  | 98.5  |
| 99.0       | 0.9887                                                                                        | 0.9886 | 0.9885 | 0.9884 | 0.9883 | 0.9883 | 0.9882 | 0.9881 | 0.9880 | 0.9879 | 0.9879     | 99.0  | 99.0  |
| 99.5       | 0.9885                                                                                        | 0.9884 | 0.9883 | 0.9883 | 0.9882 | 0.9881 | 0.9880 | 0.9879 | 0.9879 | 0.9878 | 0.9877     | 99.5  | 99.5  |
| 100.0      | 0.9884                                                                                        | 0.9883 | 0.9882 | 0.9881 | 0.9880 | 0.9880 | 0.9879 | 0.9878 | 0.9877 | 0.9876 | 0.9876     | 100.0 | 100.0 |
| 100.5      | 0.9882                                                                                        | 0.9881 | 0.9881 | 0.9880 | 0.9879 | 0.9878 | 0.9877 | 0.9876 | 0.9876 | 0.9875 | 0.9874     | 100.5 | 100.5 |
| 101.0      | 0.9881                                                                                        | 0.9880 | 0.9879 | 0.9878 | 0.9877 | 0.9877 | 0.9876 | 0.9875 | 0.9874 | 0.9873 | 0.9872     | 101.0 | 101.0 |
| 101.5      | 0.9879                                                                                        | 0.9878 | 0.9878 | 0.9877 | 0.9876 | 0.9875 | 0.9874 | 0.9873 | 0.9873 | 0.9872 | 0.9871     | 101.5 | 101.5 |
| 102.0      | 0.9878                                                                                        | 0.9877 | 0.9876 | 0.9875 | 0.9874 | 0.9874 | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869     | 102.0 | 102.0 |
| 102.5      | 0.9876                                                                                        | 0.9875 | 0.9875 | 0.9874 | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869 | 0.9869 | 0.9868     | 102.5 | 102.5 |
| 103.0      | 0.9875                                                                                        | 0.9874 | 0.9873 | 0.9872 | 0.9871 | 0.9871 | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9866     | 103.0 | 103.0 |
| 103.5      | 0.9873                                                                                        | 0.9873 | 0.9872 | 0.9871 | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9866 | 0.9865 | 0.9865     | 103.5 | 103.5 |
| 104.0      | 0.9872                                                                                        | 0.9871 | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9863     | 104.0 | 104.0 |
| 104.5      | 0.9870                                                                                        | 0.9870 | 0.9869 | 0.9868 | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 0.9861     | 104.5 | 104.5 |
| 105.0      | 0.9869                                                                                        | 0.9868 | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860     | 105.0 | 105.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 105.0      | 0.9869                                                                                        | 0.9868 | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860     | 105.0 |
| 105.5      | 0.9868                                                                                        | 0.9867 | 0.9866 | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 0.9858     | 105.5 |
| 106.0      | 0.9866                                                                                        | 0.9865 | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857     | 106.0 |
| 106.5      | 0.9865                                                                                        | 0.9864 | 0.9863 | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 0.9855     | 106.5 |
| 107.0      | 0.9863                                                                                        | 0.9862 | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 0.9857 | 0.9856 | 0.9855 | 0.9854     | 107.0 |
| 107.5      | 0.9862                                                                                        | 0.9861 | 0.9860 | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 0.9853 | 0.9852     | 107.5 |
| 108.0      | 0.9860                                                                                        | 0.9859 | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850     | 108.0 |
| 108.5      | 0.9859                                                                                        | 0.9858 | 0.9857 | 0.9856 | 0.9855 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9849     | 108.5 |
| 109.0      | 0.9857                                                                                        | 0.9856 | 0.9855 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847     | 109.0 |
| 109.5      | 0.9856                                                                                        | 0.9855 | 0.9854 | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 0.9846     | 109.5 |
| 110.0      | 0.9854                                                                                        | 0.9853 | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9844     | 110.0 |
| 110.5      | 0.9853                                                                                        | 0.9852 | 0.9851 | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 0.9843     | 110.5 |
| 111.0      | 0.9851                                                                                        | 0.9850 | 0.9849 | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 0.9843 | 0.9842 | 0.9841     | 111.0 |
| 111.5      | 0.9850                                                                                        | 0.9849 | 0.9848 | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 0.9843 | 0.9842 | 0.9841 | 0.9840     | 111.5 |
| 112.0      | 0.9849                                                                                        | 0.9847 | 0.9846 | 0.9845 | 0.9844 | 0.9843 | 0.9842 | 0.9841 | 0.9840 | 0.9839 | 0.9838     | 112.0 |
| 112.5      | 0.9847                                                                                        | 0.9846 | 0.9845 | 0.9844 | 0.9843 | 0.9842 | 0.9841 | 0.9840 | 0.9839 | 0.9838 | 0.9836     | 112.5 |
| 113.0      | 0.9846                                                                                        | 0.9845 | 0.9843 | 0.9842 | 0.9841 | 0.9840 | 0.9839 | 0.9838 | 0.9837 | 0.9836 | 0.9835     | 113.0 |
| 113.5      | 0.9844                                                                                        | 0.9843 | 0.9842 | 0.9841 | 0.9840 | 0.9839 | 0.9838 | 0.9837 | 0.9836 | 0.9834 | 0.9833     | 113.5 |
| 114.0      | 0.9843                                                                                        | 0.9842 | 0.9841 | 0.9839 | 0.9838 | 0.9837 | 0.9836 | 0.9835 | 0.9834 | 0.9833 | 0.9832     | 114.0 |
| 114.5      | 0.9841                                                                                        | 0.9840 | 0.9839 | 0.9838 | 0.9837 | 0.9836 | 0.9835 | 0.9834 | 0.9832 | 0.9831 | 0.9830     | 114.5 |
| 115.0      | 0.9840                                                                                        | 0.9839 | 0.9838 | 0.9836 | 0.9835 | 0.9834 | 0.9833 | 0.9832 | 0.9831 | 0.9830 | 0.9829     | 115.0 |
| 115.5      | 0.9838                                                                                        | 0.9837 | 0.9836 | 0.9835 | 0.9834 | 0.9833 | 0.9832 | 0.9830 | 0.9829 | 0.9828 | 0.9827     | 115.5 |
| 116.0      | 0.9837                                                                                        | 0.9836 | 0.9835 | 0.9833 | 0.9832 | 0.9831 | 0.9830 | 0.9829 | 0.9828 | 0.9827 | 0.9826     | 116.0 |
| 116.5      | 0.9835                                                                                        | 0.9834 | 0.9833 | 0.9832 | 0.9831 | 0.9830 | 0.9829 | 0.9827 | 0.9826 | 0.9825 | 0.9824     | 116.5 |
| 117.0      | 0.9834                                                                                        | 0.9833 | 0.9832 | 0.9830 | 0.9829 | 0.9828 | 0.9827 | 0.9826 | 0.9825 | 0.9824 | 0.9822     | 117.0 |
| 117.5      | 0.9832                                                                                        | 0.9831 | 0.9830 | 0.9829 | 0.9828 | 0.9827 | 0.9825 | 0.9824 | 0.9823 | 0.9822 | 0.9821     | 117.5 |
| 118.0      | 0.9831                                                                                        | 0.9830 | 0.9829 | 0.9827 | 0.9826 | 0.9825 | 0.9824 | 0.9823 | 0.9822 | 0.9820 | 0.9819     | 118.0 |
| 118.5      | 0.9830                                                                                        | 0.9828 | 0.9827 | 0.9826 | 0.9825 | 0.9824 | 0.9822 | 0.9821 | 0.9820 | 0.9819 | 0.9818     | 118.5 |
| 119.0      | 0.9828                                                                                        | 0.9827 | 0.9826 | 0.9824 | 0.9823 | 0.9822 | 0.9821 | 0.9820 | 0.9819 | 0.9817 | 0.9816     | 119.0 |
| 119.5      | 0.9827                                                                                        | 0.9825 | 0.9824 | 0.9823 | 0.9822 | 0.9821 | 0.9819 | 0.9818 | 0.9817 | 0.9816 | 0.9815     | 119.5 |
| 120.0      | 0.9825                                                                                        | 0.9824 | 0.9823 | 0.9821 | 0.9820 | 0.9819 | 0.9818 | 0.9817 | 0.9815 | 0.9814 | 0.9813     | 120.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            |
| 120.0      | 0.9825                                                                                        | 0.9824 | 0.9823 | 0.9821 | 0.9820 | 0.9819 | 0.9818 | 0.9817 | 0.9815 | 0.9814 | 120.0      |
| 120.5      | 0.9824                                                                                        | 0.9822 | 0.9821 | 0.9820 | 0.9819 | 0.9818 | 0.9816 | 0.9815 | 0.9814 | 0.9813 | 120.5      |
| 121.0      | 0.9822                                                                                        | 0.9821 | 0.9820 | 0.9818 | 0.9817 | 0.9816 | 0.9815 | 0.9814 | 0.9812 | 0.9811 | 121.0      |
| 121.5      | 0.9821                                                                                        | 0.9819 | 0.9818 | 0.9817 | 0.9816 | 0.9815 | 0.9813 | 0.9812 | 0.9811 | 0.9810 | 121.5      |
| 122.0      | 0.9819                                                                                        | 0.9818 | 0.9817 | 0.9816 | 0.9814 | 0.9813 | 0.9812 | 0.9810 | 0.9809 | 0.9808 | 122.0      |
| 122.5      | 0.9818                                                                                        | 0.9817 | 0.9815 | 0.9814 | 0.9813 | 0.9811 | 0.9810 | 0.9809 | 0.9808 | 0.9806 | 122.5      |
| 123.0      | 0.9816                                                                                        | 0.9815 | 0.9814 | 0.9813 | 0.9811 | 0.9810 | 0.9809 | 0.9807 | 0.9806 | 0.9805 | 123.0      |
| 123.5      | 0.9815                                                                                        | 0.9814 | 0.9812 | 0.9811 | 0.9810 | 0.9808 | 0.9807 | 0.9806 | 0.9805 | 0.9803 | 123.5      |
| 124.0      | 0.9813                                                                                        | 0.9812 | 0.9811 | 0.9810 | 0.9808 | 0.9807 | 0.9806 | 0.9804 | 0.9803 | 0.9802 | 124.0      |
| 124.5      | 0.9812                                                                                        | 0.9811 | 0.9809 | 0.9808 | 0.9807 | 0.9805 | 0.9804 | 0.9803 | 0.9802 | 0.9800 | 124.5      |
| 125.0      | 0.9810                                                                                        | 0.9809 | 0.9808 | 0.9807 | 0.9805 | 0.9804 | 0.9803 | 0.9801 | 0.9800 | 0.9799 | 125.0      |
| 125.5      | 0.9809                                                                                        | 0.9808 | 0.9806 | 0.9805 | 0.9804 | 0.9802 | 0.9801 | 0.9800 | 0.9798 | 0.9797 | 125.5      |
| 126.0      | 0.9808                                                                                        | 0.9806 | 0.9805 | 0.9804 | 0.9802 | 0.9801 | 0.9800 | 0.9798 | 0.9797 | 0.9796 | 126.0      |
| 126.5      | 0.9806                                                                                        | 0.9805 | 0.9803 | 0.9802 | 0.9801 | 0.9799 | 0.9798 | 0.9797 | 0.9795 | 0.9794 | 126.5      |
| 127.0      | 0.9805                                                                                        | 0.9803 | 0.9802 | 0.9801 | 0.9799 | 0.9798 | 0.9796 | 0.9795 | 0.9794 | 0.9792 | 127.0      |
| 127.5      | 0.9803                                                                                        | 0.9802 | 0.9800 | 0.9799 | 0.9798 | 0.9796 | 0.9795 | 0.9794 | 0.9792 | 0.9791 | 127.5      |
| 128.0      | 0.9802                                                                                        | 0.9800 | 0.9799 | 0.9798 | 0.9796 | 0.9795 | 0.9793 | 0.9792 | 0.9791 | 0.9789 | 128.0      |
| 128.5      | 0.9800                                                                                        | 0.9799 | 0.9797 | 0.9796 | 0.9795 | 0.9793 | 0.9792 | 0.9791 | 0.9789 | 0.9788 | 128.5      |
| 129.0      | 0.9799                                                                                        | 0.9797 | 0.9796 | 0.9795 | 0.9793 | 0.9792 | 0.9790 | 0.9789 | 0.9788 | 0.9786 | 129.0      |
| 129.5      | 0.9797                                                                                        | 0.9796 | 0.9794 | 0.9793 | 0.9792 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9785 | 129.5      |
| 130.0      | 0.9796                                                                                        | 0.9794 | 0.9793 | 0.9792 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 130.0      |
| 130.5      | 0.9794                                                                                        | 0.9793 | 0.9791 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9782 | 130.5      |
| 131.0      | 0.9793                                                                                        | 0.9791 | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9781 | 0.9780 | 131.0      |
| 131.5      | 0.9791                                                                                        | 0.9790 | 0.9789 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9781 | 0.9780 | 0.9777 | 131.5      |
| 132.0      | 0.9790                                                                                        | 0.9788 | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9781 | 0.9780 | 0.9778 | 0.9775 | 132.0      |
| 132.5      | 0.9788                                                                                        | 0.9787 | 0.9786 | 0.9784 | 0.9783 | 0.9781 | 0.9780 | 0.9778 | 0.9777 | 0.9775 | 132.5      |
| 133.0      | 0.9787                                                                                        | 0.9786 | 0.9784 | 0.9783 | 0.9781 | 0.9780 | 0.9778 | 0.9777 | 0.9775 | 0.9774 | 133.0      |
| 133.5      | 0.9786                                                                                        | 0.9784 | 0.9783 | 0.9781 | 0.9780 | 0.9778 | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 133.5      |
| 134.0      | 0.9784                                                                                        | 0.9783 | 0.9781 | 0.9780 | 0.9778 | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 0.9771 | 134.0      |
| 134.5      | 0.9783                                                                                        | 0.9781 | 0.9780 | 0.9778 | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 134.5      |
| 135.0      | 0.9781                                                                                        | 0.9780 | 0.9778 | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 135.0      |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 135.0      | 0.9781                                                                                        | 0.9780 | 0.9778 | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 0.9766     | 135.0 |
| 135.5      | 0.9780                                                                                        | 0.9778 | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 0.9766 | 0.9764     | 135.5 |
| 136.0      | 0.9778                                                                                        | 0.9777 | 0.9775 | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 0.9766 | 0.9764 | 0.9763     | 136.0 |
| 136.5      | 0.9777                                                                                        | 0.9775 | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 0.9766 | 0.9764 | 0.9763 | 0.9761     | 136.5 |
| 137.0      | 0.9775                                                                                        | 0.9774 | 0.9772 | 0.9771 | 0.9769 | 0.9767 | 0.9766 | 0.9764 | 0.9763 | 0.9761 | 0.9760     | 137.0 |
| 137.5      | 0.9774                                                                                        | 0.9772 | 0.9771 | 0.9769 | 0.9768 | 0.9766 | 0.9764 | 0.9763 | 0.9761 | 0.9760 | 0.9758     | 137.5 |
| 138.0      | 0.9772                                                                                        | 0.9771 | 0.9769 | 0.9768 | 0.9766 | 0.9764 | 0.9763 | 0.9761 | 0.9760 | 0.9758 | 0.9757     | 138.0 |
| 138.5      | 0.9771                                                                                        | 0.9769 | 0.9768 | 0.9766 | 0.9765 | 0.9763 | 0.9761 | 0.9760 | 0.9758 | 0.9757 | 0.9755     | 138.5 |
| 139.0      | 0.9769                                                                                        | 0.9768 | 0.9766 | 0.9765 | 0.9763 | 0.9761 | 0.9760 | 0.9758 | 0.9757 | 0.9755 | 0.9753     | 139.0 |
| 139.5      | 0.9768                                                                                        | 0.9766 | 0.9765 | 0.9763 | 0.9761 | 0.9760 | 0.9758 | 0.9757 | 0.9755 | 0.9753 | 0.9752     | 139.5 |
| 140.0      | 0.9766                                                                                        | 0.9765 | 0.9763 | 0.9762 | 0.9760 | 0.9758 | 0.9757 | 0.9755 | 0.9753 | 0.9752 | 0.9750     | 140.0 |
| 140.5      | 0.9765                                                                                        | 0.9763 | 0.9762 | 0.9760 | 0.9758 | 0.9757 | 0.9755 | 0.9754 | 0.9752 | 0.9750 | 0.9749     | 140.5 |
| 141.0      | 0.9764                                                                                        | 0.9762 | 0.9760 | 0.9759 | 0.9757 | 0.9755 | 0.9754 | 0.9752 | 0.9750 | 0.9749 | 0.9747     | 141.0 |
| 141.5      | 0.9762                                                                                        | 0.9760 | 0.9759 | 0.9757 | 0.9755 | 0.9754 | 0.9752 | 0.9750 | 0.9749 | 0.9747 | 0.9746     | 141.5 |
| 142.0      | 0.9761                                                                                        | 0.9759 | 0.9757 | 0.9756 | 0.9754 | 0.9752 | 0.9751 | 0.9749 | 0.9747 | 0.9746 | 0.9744     | 142.0 |
| 142.5      | 0.9759                                                                                        | 0.9757 | 0.9756 | 0.9754 | 0.9752 | 0.9751 | 0.9749 | 0.9747 | 0.9746 | 0.9744 | 0.9742     | 142.5 |
| 143.0      | 0.9758                                                                                        | 0.9756 | 0.9754 | 0.9753 | 0.9751 | 0.9749 | 0.9748 | 0.9746 | 0.9744 | 0.9743 | 0.9741     | 143.0 |
| 143.5      | 0.9756                                                                                        | 0.9754 | 0.9753 | 0.9751 | 0.9749 | 0.9748 | 0.9746 | 0.9744 | 0.9743 | 0.9741 | 0.9739     | 143.5 |
| 144.0      | 0.9755                                                                                        | 0.9753 | 0.9751 | 0.9750 | 0.9748 | 0.9746 | 0.9744 | 0.9743 | 0.9741 | 0.9739 | 0.9738     | 144.0 |
| 144.5      | 0.9753                                                                                        | 0.9752 | 0.9750 | 0.9748 | 0.9746 | 0.9745 | 0.9743 | 0.9741 | 0.9740 | 0.9738 | 0.9736     | 144.5 |
| 145.0      | 0.9752                                                                                        | 0.9750 | 0.9748 | 0.9747 | 0.9745 | 0.9743 | 0.9741 | 0.9740 | 0.9738 | 0.9736 | 0.9735     | 145.0 |
| 145.5      | 0.9750                                                                                        | 0.9749 | 0.9747 | 0.9745 | 0.9743 | 0.9742 | 0.9740 | 0.9738 | 0.9736 | 0.9735 | 0.9733     | 145.5 |
| 146.0      | 0.9749                                                                                        | 0.9747 | 0.9745 | 0.9744 | 0.9742 | 0.9740 | 0.9738 | 0.9737 | 0.9735 | 0.9733 | 0.9731     | 146.0 |
| 146.5      | 0.9747                                                                                        | 0.9746 | 0.9744 | 0.9742 | 0.9740 | 0.9739 | 0.9737 | 0.9735 | 0.9733 | 0.9732 | 0.9730     | 146.5 |
| 147.0      | 0.9746                                                                                        | 0.9744 | 0.9742 | 0.9741 | 0.9739 | 0.9737 | 0.9735 | 0.9734 | 0.9732 | 0.9730 | 0.9728     | 147.0 |
| 147.5      | 0.9744                                                                                        | 0.9743 | 0.9741 | 0.9739 | 0.9737 | 0.9736 | 0.9734 | 0.9732 | 0.9730 | 0.9728 | 0.9727     | 147.5 |
| 148.0      | 0.9743                                                                                        | 0.9741 | 0.9739 | 0.9738 | 0.9736 | 0.9734 | 0.9732 | 0.9730 | 0.9729 | 0.9727 | 0.9725     | 148.0 |
| 148.5      | 0.9741                                                                                        | 0.9740 | 0.9738 | 0.9736 | 0.9734 | 0.9733 | 0.9731 | 0.9729 | 0.9727 | 0.9725 | 0.9724     | 148.5 |
| 149.0      | 0.9740                                                                                        | 0.9738 | 0.9736 | 0.9735 | 0.9733 | 0.9731 | 0.9729 | 0.9727 | 0.9726 | 0.9724 | 0.9722     | 149.0 |
| 149.5      | 0.9739                                                                                        | 0.9737 | 0.9735 | 0.9733 | 0.9731 | 0.9729 | 0.9728 | 0.9726 | 0.9724 | 0.9722 | 0.9720     | 149.5 |
| 150.0      | 0.9737                                                                                        | 0.9735 | 0.9733 | 0.9732 | 0.9730 | 0.9728 | 0.9726 | 0.9724 | 0.9722 | 0.9721 | 0.9719     | 150.0 |

\* DENOTES EXTRAPOLATED VALUE

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ALPHA = 290.0 TO 310.0



API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |  | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--|------------|-------|
|            | 294.0                                                                                         | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  | 310.0  |  |            |       |
| 150.0      | 0.9733                                                                                        | 0.9732 | 0.9730 | 0.9728 | 0.9726 | 0.9724 | 0.9722 | 0.9721 | 0.9719 |  |            | 150.0 |
| 150.5      | 0.9732                                                                                        | 0.9730 | 0.9728 | 0.9726 | 0.9725 | 0.9723 | 0.9721 | 0.9719 | 0.9717 |  |            | 150.5 |
| 151.0      | 0.9730                                                                                        | 0.9729 | 0.9727 | 0.9725 | 0.9723 | 0.9721 | 0.9719 | 0.9718 | 0.9716 |  |            | 151.0 |
| 151.5      | 0.9729                                                                                        | 0.9727 | 0.9725 | 0.9723 | 0.9722 | 0.9720 | 0.9718 | 0.9716 | 0.9714 |  |            | 151.5 |
| 152.0      | 0.9727                                                                                        | 0.9726 | 0.9724 | 0.9722 | 0.9720 | 0.9718 | 0.9716 | 0.9714 | 0.9713 |  |            | 152.0 |
| 152.5      | 0.9726                                                                                        | 0.9724 | 0.9722 | 0.9720 | 0.9718 | 0.9717 | 0.9715 | 0.9713 | 0.9711 |  |            | 152.5 |
| 153.0      | 0.9724                                                                                        | 0.9723 | 0.9721 | 0.9719 | 0.9717 | 0.9715 | 0.9713 | 0.9711 | 0.9709 |  |            | 153.0 |
| 153.5      | 0.9723                                                                                        | 0.9721 | 0.9719 | 0.9717 | 0.9715 | 0.9713 | 0.9712 | 0.9710 | 0.9708 |  |            | 153.5 |
| 154.0      | 0.9721                                                                                        | 0.9720 | 0.9718 | 0.9716 | 0.9714 | 0.9712 | 0.9710 | 0.9708 | 0.9706 |  |            | 154.0 |
| 154.5      | 0.9720                                                                                        | 0.9718 | 0.9716 | 0.9714 | 0.9712 | 0.9710 | 0.9708 | 0.9707 | 0.9705 |  |            | 154.5 |
| 155.0      | 0.9718                                                                                        | 0.9717 | 0.9715 | 0.9713 | 0.9711 | 0.9709 | 0.9707 | 0.9705 | 0.9703 |  |            | 155.0 |
| 155.5      | 0.9717                                                                                        | 0.9715 | 0.9713 | 0.9711 | 0.9709 | 0.9707 | 0.9705 | 0.9703 | 0.9701 |  |            | 155.5 |
| 156.0      | 0.9716                                                                                        | 0.9714 | 0.9712 | 0.9710 | 0.9708 | 0.9706 | 0.9704 | 0.9702 | 0.9700 |  |            | 156.0 |
| 156.5      | 0.9714                                                                                        | 0.9712 | 0.9710 | 0.9708 | 0.9706 | 0.9704 | 0.9702 | 0.9700 | 0.9698 |  |            | 156.5 |
| 157.0      | 0.9713                                                                                        | 0.9711 | 0.9709 | 0.9707 | 0.9705 | 0.9703 | 0.9701 | 0.9699 | 0.9697 |  |            | 157.0 |
| 157.5      | 0.9711                                                                                        | 0.9709 | 0.9707 | 0.9705 | 0.9703 | 0.9701 | 0.9699 | 0.9697 | 0.9695 |  |            | 157.5 |
| 158.0      | 0.9710                                                                                        | 0.9708 | 0.9706 | 0.9704 | 0.9702 | 0.9700 | 0.9698 | 0.9696 | 0.9694 |  |            | 158.0 |
| 158.5      | 0.9708                                                                                        | 0.9706 | 0.9704 | 0.9702 | 0.9700 | 0.9698 | 0.9696 | 0.9694 | 0.9692 |  |            | 158.5 |
| 159.0      | 0.9707                                                                                        | 0.9705 | 0.9703 | 0.9701 | 0.9699 | 0.9696 | 0.9694 | 0.9692 | 0.9690 |  |            | 159.0 |
| 159.5      | 0.9705                                                                                        | 0.9703 | 0.9701 | 0.9699 | 0.9697 | 0.9695 | 0.9693 | 0.9691 | 0.9689 |  |            | 159.5 |
| 160.0      | 0.9704                                                                                        | 0.9702 | 0.9700 | 0.9697 | 0.9695 | 0.9693 | 0.9691 | 0.9689 | 0.9687 |  |            | 160.0 |
| 160.5      | 0.9702                                                                                        | 0.9700 | 0.9698 | 0.9696 | 0.9694 | 0.9692 | 0.9690 | 0.9688 | 0.9686 |  |            | 160.5 |
| 161.0      | 0.9701                                                                                        | 0.9699 | 0.9696 | 0.9694 | 0.9692 | 0.9690 | 0.9688 | 0.9686 | 0.9684 |  |            | 161.0 |
| 161.5      | 0.9699                                                                                        | 0.9697 | 0.9695 | 0.9693 | 0.9691 | 0.9689 | 0.9687 | 0.9685 | 0.9683 |  |            | 161.5 |
| 162.0      | 0.9698                                                                                        | 0.9696 | 0.9693 | 0.9691 | 0.9689 | 0.9687 | 0.9685 | 0.9683 | 0.9681 |  |            | 162.0 |
| 162.5      | 0.9696                                                                                        | 0.9694 | 0.9692 | 0.9690 | 0.9688 | 0.9686 | 0.9684 | 0.9682 | 0.9679 |  |            | 162.5 |
| 163.0      | 0.9695                                                                                        | 0.9693 | 0.9690 | 0.9688 | 0.9686 | 0.9684 | 0.9682 | 0.9680 | 0.9678 |  |            | 163.0 |
| 163.5      | 0.9693                                                                                        | 0.9691 | 0.9689 | 0.9687 | 0.9685 | 0.9683 | 0.9681 | 0.9679 | 0.9676 |  |            | 163.5 |
| 164.0      | 0.9692                                                                                        | 0.9690 | 0.9687 | 0.9685 | 0.9683 | 0.9681 | 0.9679 | 0.9677 | 0.9675 |  |            | 164.0 |
| 164.5      | 0.9690                                                                                        | 0.9688 | 0.9686 | 0.9684 | 0.9682 | 0.9679 | 0.9677 | 0.9675 | 0.9673 |  |            | 164.5 |
| 165.0      | 0.9689                                                                                        | 0.9686 | 0.9684 | 0.9682 | 0.9680 | 0.9678 | 0.9676 | 0.9674 | 0.9672 |  |            | 165.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 165.0      | 0.9693                                                                                        | 0.9691 | 0.9689 | 0.9686 | 0.9684 | 0.9682 | 0.9680 | 0.9678 | 0.9676 | 0.9674 | 0.9672     | 165.0 |
| 165.5      | 0.9691                                                                                        | 0.9689 | 0.9687 | 0.9685 | 0.9683 | 0.9681 | 0.9679 | 0.9676 | 0.9674 | 0.9672 | 0.9670     | 165.5 |
| 166.0      | 0.9690                                                                                        | 0.9688 | 0.9686 | 0.9683 | 0.9681 | 0.9679 | 0.9677 | 0.9675 | 0.9673 | 0.9671 | 0.9668     | 166.0 |
| 166.5      | 0.9688                                                                                        | 0.9686 | 0.9684 | 0.9682 | 0.9680 | 0.9678 | 0.9675 | 0.9673 | 0.9671 | 0.9669 | 0.9667     | 166.5 |
| 167.0      | 0.9687                                                                                        | 0.9685 | 0.9683 | 0.9680 | 0.9678 | 0.9676 | 0.9674 | 0.9672 | 0.9670 | 0.9667 | 0.9665     | 167.0 |
| 167.5      | 0.9686                                                                                        | 0.9683 | 0.9681 | 0.9679 | 0.9677 | 0.9675 | 0.9672 | 0.9670 | 0.9668 | 0.9666 | 0.9664     | 167.5 |
| 168.0      | 0.9684                                                                                        | 0.9682 | 0.9680 | 0.9677 | 0.9675 | 0.9673 | 0.9671 | 0.9669 | 0.9666 | 0.9664 | 0.9662     | 168.0 |
| 168.5      | 0.9683                                                                                        | 0.9680 | 0.9678 | 0.9676 | 0.9674 | 0.9672 | 0.9669 | 0.9667 | 0.9665 | 0.9663 | 0.9660     | 168.5 |
| 169.0      | 0.9681                                                                                        | 0.9679 | 0.9677 | 0.9674 | 0.9672 | 0.9670 | 0.9668 | 0.9666 | 0.9663 | 0.9661 | 0.9659     | 169.0 |
| 169.5      | 0.9680                                                                                        | 0.9677 | 0.9675 | 0.9673 | 0.9671 | 0.9668 | 0.9666 | 0.9664 | 0.9662 | 0.9660 | 0.9657     | 169.5 |
| 170.0      | 0.9678                                                                                        | 0.9676 | 0.9674 | 0.9671 | 0.9669 | 0.9667 | 0.9665 | 0.9662 | 0.9660 | 0.9658 | 0.9656     | 170.0 |
| 170.5      | 0.9677                                                                                        | 0.9674 | 0.9672 | 0.9670 | 0.9668 | 0.9665 | 0.9663 | 0.9661 | 0.9659 | 0.9656 | 0.9654     | 170.5 |
| 171.0      | 0.9675                                                                                        | 0.9673 | 0.9671 | 0.9668 | 0.9666 | 0.9664 | 0.9662 | 0.9659 | 0.9657 | 0.9655 | 0.9653     | 171.0 |
| 171.5      | 0.9674                                                                                        | 0.9671 | 0.9669 | 0.9667 | 0.9665 | 0.9662 | 0.9660 | 0.9658 | 0.9656 | 0.9653 | 0.9651     | 171.5 |
| 172.0      | 0.9672                                                                                        | 0.9670 | 0.9668 | 0.9665 | 0.9663 | 0.9661 | 0.9659 | 0.9656 | 0.9654 | 0.9652 | 0.9649     | 172.0 |
| 172.5      | 0.9671                                                                                        | 0.9668 | 0.9666 | 0.9664 | 0.9662 | 0.9659 | 0.9657 | 0.9655 | 0.9652 | 0.9650 | 0.9648     | 172.5 |
| 173.0      | 0.9669                                                                                        | 0.9667 | 0.9665 | 0.9662 | 0.9660 | 0.9658 | 0.9655 | 0.9653 | 0.9651 | 0.9649 | 0.9646     | 173.0 |
| 173.5      | 0.9668                                                                                        | 0.9666 | 0.9663 | 0.9661 | 0.9659 | 0.9656 | 0.9654 | 0.9652 | 0.9649 | 0.9647 | 0.9645     | 173.5 |
| 174.0      | 0.9666                                                                                        | 0.9664 | 0.9662 | 0.9659 | 0.9657 | 0.9655 | 0.9652 | 0.9650 | 0.9648 | 0.9645 | 0.9643     | 174.0 |
| 174.5      | 0.9665                                                                                        | 0.9663 | 0.9660 | 0.9658 | 0.9656 | 0.9653 | 0.9651 | 0.9649 | 0.9646 | 0.9644 | 0.9642     | 174.5 |
| 175.0      | 0.9663                                                                                        | 0.9661 | 0.9659 | 0.9656 | 0.9654 | 0.9652 | 0.9649 | 0.9647 | 0.9645 | 0.9642 | 0.9640     | 175.0 |
| 175.5      | 0.9662                                                                                        | 0.9660 | 0.9657 | 0.9655 | 0.9653 | 0.9650 | 0.9648 | 0.9645 | 0.9643 | 0.9641 | 0.9638     | 175.5 |
| 176.0      | 0.9660                                                                                        | 0.9658 | 0.9656 | 0.9653 | 0.9651 | 0.9649 | 0.9646 | 0.9644 | 0.9642 | 0.9639 | 0.9637     | 176.0 |
| 176.5      | 0.9659                                                                                        | 0.9657 | 0.9654 | 0.9652 | 0.9649 | 0.9647 | 0.9645 | 0.9642 | 0.9640 | 0.9638 | 0.9635     | 176.5 |
| 177.0      | 0.9657                                                                                        | 0.9655 | 0.9653 | 0.9650 | 0.9648 | 0.9646 | 0.9643 | 0.9641 | 0.9638 | 0.9636 | 0.9634     | 177.0 |
| 177.5      | 0.9656                                                                                        | 0.9654 | 0.9651 | 0.9649 | 0.9646 | 0.9644 | 0.9642 | 0.9639 | 0.9637 | 0.9634 | 0.9632     | 177.5 |
| 178.0      | 0.9655                                                                                        | 0.9652 | 0.9650 | 0.9647 | 0.9645 | 0.9643 | 0.9640 | 0.9638 | 0.9635 | 0.9633 | 0.9630     | 178.0 |
| 178.5      | 0.9653                                                                                        | 0.9651 | 0.9648 | 0.9646 | 0.9643 | 0.9641 | 0.9639 | 0.9636 | 0.9634 | 0.9631 | 0.9629     | 178.5 |
| 179.0      | 0.9652                                                                                        | 0.9649 | 0.9647 | 0.9644 | 0.9642 | 0.9639 | 0.9637 | 0.9635 | 0.9632 | 0.9630 | 0.9627     | 179.0 |
| 179.5      | 0.9650                                                                                        | 0.9648 | 0.9645 | 0.9643 | 0.9640 | 0.9638 | 0.9635 | 0.9633 | 0.9631 | 0.9628 | 0.9626     | 179.5 |
| 180.0      | 0.9649                                                                                        | 0.9646 | 0.9644 | 0.9641 | 0.9639 | 0.9636 | 0.9634 | 0.9632 | 0.9629 | 0.9627 | 0.9624     | 180.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 180.0      | 0.9649                                                                                        | 0.9646 | 0.9644 | 0.9641 | 0.9639 | 0.9636 | 0.9634 | 0.9632 | 0.9629 | 0.9627 | 0.9624     | 180.0 |
| 180.5      | 0.9647                                                                                        | 0.9645 | 0.9642 | 0.9640 | 0.9637 | 0.9635 | 0.9632 | 0.9630 | 0.9628 | 0.9625 | 0.9623     | 180.5 |
| 181.0      | 0.9646                                                                                        | 0.9643 | 0.9641 | 0.9638 | 0.9636 | 0.9633 | 0.9631 | 0.9628 | 0.9626 | 0.9623 | 0.9621     | 181.0 |
| 181.5      | 0.9644                                                                                        | 0.9642 | 0.9639 | 0.9637 | 0.9634 | 0.9632 | 0.9629 | 0.9627 | 0.9624 | 0.9622 | 0.9619     | 181.5 |
| 182.0      | 0.9643                                                                                        | 0.9640 | 0.9638 | 0.9635 | 0.9633 | 0.9630 | 0.9628 | 0.9625 | 0.9623 | 0.9620 | 0.9618     | 182.0 |
| 182.5      | 0.9641                                                                                        | 0.9639 | 0.9636 | 0.9634 | 0.9631 | 0.9629 | 0.9626 | 0.9624 | 0.9621 | 0.9619 | 0.9616     | 182.5 |
| 183.0      | 0.9640                                                                                        | 0.9637 | 0.9635 | 0.9632 | 0.9630 | 0.9627 | 0.9625 | 0.9622 | 0.9620 | 0.9617 | 0.9615     | 183.0 |
| 183.5      | 0.9638                                                                                        | 0.9636 | 0.9633 | 0.9631 | 0.9628 | 0.9626 | 0.9623 | 0.9621 | 0.9618 | 0.9616 | 0.9613     | 183.5 |
| 184.0      | 0.9637                                                                                        | 0.9634 | 0.9632 | 0.9629 | 0.9627 | 0.9624 | 0.9622 | 0.9619 | 0.9617 | 0.9614 | 0.9612     | 184.0 |
| 184.5      | 0.9635                                                                                        | 0.9633 | 0.9630 | 0.9628 | 0.9625 | 0.9623 | 0.9620 | 0.9618 | 0.9615 | 0.9612 | 0.9610     | 184.5 |
| 185.0      | 0.9634                                                                                        | 0.9631 | 0.9629 | 0.9626 | 0.9624 | 0.9621 | 0.9619 | 0.9616 | 0.9613 | 0.9611 | 0.9608     | 185.0 |
| 185.5      | 0.9632                                                                                        | 0.9630 | 0.9627 | 0.9625 | 0.9622 | 0.9620 | 0.9617 | 0.9614 | 0.9612 | 0.9609 | 0.9607     | 185.5 |
| 186.0      | 0.9631                                                                                        | 0.9628 | 0.9626 | 0.9623 | 0.9621 | 0.9618 | 0.9615 | 0.9613 | 0.9610 | 0.9608 | 0.9605     | 186.0 |
| 186.5      | 0.9629                                                                                        | 0.9627 | 0.9624 | 0.9622 | 0.9619 | 0.9617 | 0.9614 | 0.9611 | 0.9609 | 0.9606 | 0.9604     | 186.5 |
| 187.0      | 0.9628                                                                                        | 0.9625 | 0.9623 | 0.9620 | 0.9618 | 0.9615 | 0.9612 | 0.9610 | 0.9607 | 0.9605 | 0.9602     | 187.0 |
| 187.5      | 0.9626                                                                                        | 0.9624 | 0.9621 | 0.9619 | 0.9616 | 0.9613 | 0.9611 | 0.9608 | 0.9606 | 0.9603 | 0.9600     | 187.5 |
| 188.0      | 0.9625                                                                                        | 0.9622 | 0.9620 | 0.9617 | 0.9615 | 0.9612 | 0.9609 | 0.9607 | 0.9604 | 0.9601 | 0.9599     | 188.0 |
| 188.5      | 0.9624                                                                                        | 0.9621 | 0.9618 | 0.9616 | 0.9613 | 0.9610 | 0.9608 | 0.9605 | 0.9603 | 0.9600 | 0.9597     | 188.5 |
| 189.0      | 0.9622                                                                                        | 0.9619 | 0.9617 | 0.9614 | 0.9612 | 0.9609 | 0.9606 | 0.9604 | 0.9601 | 0.9598 | 0.9596     | 189.0 |
| 189.5      | 0.9621                                                                                        | 0.9618 | 0.9615 | 0.9613 | 0.9610 | 0.9607 | 0.9605 | 0.9602 | 0.9599 | 0.9597 | 0.9594     | 189.5 |
| 190.0      | 0.9619                                                                                        | 0.9616 | 0.9614 | 0.9611 | 0.9608 | 0.9606 | 0.9603 | 0.9601 | 0.9598 | 0.9595 | 0.9593     | 190.0 |
| 190.5      | 0.9618                                                                                        | 0.9615 | 0.9612 | 0.9610 | 0.9607 | 0.9604 | 0.9602 | 0.9599 | 0.9596 | 0.9594 | 0.9591     | 190.5 |
| 191.0      | 0.9616                                                                                        | 0.9613 | 0.9611 | 0.9608 | 0.9605 | 0.9603 | 0.9600 | 0.9597 | 0.9595 | 0.9592 | 0.9589     | 191.0 |
| 191.5      | 0.9615                                                                                        | 0.9612 | 0.9609 | 0.9607 | 0.9604 | 0.9601 | 0.9599 | 0.9596 | 0.9593 | 0.9590 | 0.9588     | 191.5 |
| 192.0      | 0.9613                                                                                        | 0.9610 | 0.9608 | 0.9605 | 0.9602 | 0.9600 | 0.9597 | 0.9594 | 0.9592 | 0.9589 | 0.9586     | 192.0 |
| 192.5      | 0.9612                                                                                        | 0.9609 | 0.9606 | 0.9604 | 0.9601 | 0.9598 | 0.9595 | 0.9593 | 0.9590 | 0.9587 | 0.9585     | 192.5 |
| 193.0      | 0.9610                                                                                        | 0.9607 | 0.9605 | 0.9602 | 0.9599 | 0.9597 | 0.9594 | 0.9591 | 0.9588 | 0.9586 | 0.9583     | 193.0 |
| 193.5      | 0.9609                                                                                        | 0.9606 | 0.9603 | 0.9601 | 0.9598 | 0.9595 | 0.9592 | 0.9590 | 0.9587 | 0.9584 | 0.9581     | 193.5 |
| 194.0      | 0.9607                                                                                        | 0.9605 | 0.9602 | 0.9599 | 0.9596 | 0.9594 | 0.9591 | 0.9588 | 0.9585 | 0.9583 | 0.9580     | 194.0 |
| 194.5      | 0.9606                                                                                        | 0.9603 | 0.9600 | 0.9598 | 0.9595 | 0.9592 | 0.9589 | 0.9587 | 0.9584 | 0.9581 | 0.9578     | 194.5 |
| 195.0      | 0.9604                                                                                        | 0.9602 | 0.9599 | 0.9596 | 0.9593 | 0.9590 | 0.9588 | 0.9585 | 0.9582 | 0.9579 | 0.9577     | 195.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 195.0      | 0.9604                                                                                        | 0.9602 | 0.9599 | 0.9596 | 0.9593 | 0.9590 | 0.9588 | 0.9585 | 0.9582 | 0.9579 | 0.9577     | 195.0 |
| 195.5      | 0.9603                                                                                        | 0.9600 | 0.9597 | 0.9595 | 0.9592 | 0.9589 | 0.9586 | 0.9583 | 0.9581 | 0.9578 | 0.9575     | 195.5 |
| 196.0      | 0.9601                                                                                        | 0.9599 | 0.9596 | 0.9593 | 0.9590 | 0.9587 | 0.9585 | 0.9582 | 0.9579 | 0.9576 | 0.9574     | 196.0 |
| 196.5      | 0.9600                                                                                        | 0.9597 | 0.9594 | 0.9591 | 0.9589 | 0.9586 | 0.9583 | 0.9580 | 0.9578 | 0.9575 | 0.9572     | 196.5 |
| 197.0      | 0.9598                                                                                        | 0.9596 | 0.9593 | 0.9590 | 0.9587 | 0.9584 | 0.9582 | 0.9579 | 0.9576 | 0.9573 | 0.9570     | 197.0 |
| 197.5      | 0.9597                                                                                        | 0.9594 | 0.9591 | 0.9588 | 0.9586 | 0.9583 | 0.9580 | 0.9577 | 0.9574 | 0.9572 | 0.9569     | 197.5 |
| 198.0      | 0.9595                                                                                        | 0.9593 | 0.9590 | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9576 | 0.9573 | 0.9570 | 0.9567     | 198.0 |
| 198.5      | 0.9594                                                                                        | 0.9591 | 0.9588 | 0.9585 | 0.9583 | 0.9580 | 0.9577 | 0.9574 | 0.9571 | 0.9568 | 0.9566     | 198.5 |
| 199.0      | 0.9592                                                                                        | 0.9590 | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9573 | 0.9570 | 0.9567 | 0.9564     | 199.0 |
| 199.5      | 0.9591                                                                                        | 0.9588 | 0.9585 | 0.9582 | 0.9580 | 0.9577 | 0.9574 | 0.9571 | 0.9568 | 0.9565 | 0.9562     | 199.5 |
| 200.0      | 0.9589                                                                                        | 0.9587 | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9567 | 0.9564 | 0.9561     | 200.0 |
| 200.5      | 0.9588                                                                                        | 0.9585 | 0.9582 | 0.9579 | 0.9577 | 0.9574 | 0.9571 | 0.9568 | 0.9565 | 0.9562 | 0.9559     | 200.5 |
| 201.0      | 0.9587                                                                                        | 0.9584 | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9561 | 0.9558     | 201.0 |
| 201.5      | 0.9585                                                                                        | 0.9582 | 0.9579 | 0.9576 | 0.9573 | 0.9571 | 0.9568 | 0.9565 | 0.9562 | 0.9559 | 0.9556     | 201.5 |
| 202.0      | 0.9584                                                                                        | 0.9581 | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 0.9555     | 202.0 |
| 202.5      | 0.9582                                                                                        | 0.9579 | 0.9576 | 0.9573 | 0.9570 | 0.9568 | 0.9565 | 0.9562 | 0.9559 | 0.9556 | 0.9553     | 202.5 |
| 203.0      | 0.9581                                                                                        | 0.9578 | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 0.9551     | 203.0 |
| 203.5      | 0.9579                                                                                        | 0.9576 | 0.9573 | 0.9570 | 0.9567 | 0.9564 | 0.9562 | 0.9559 | 0.9556 | 0.9553 | 0.9550     | 203.5 |
| 204.0      | 0.9578                                                                                        | 0.9575 | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 0.9551 | 0.9548     | 204.0 |
| 204.5      | 0.9576                                                                                        | 0.9573 | 0.9570 | 0.9567 | 0.9564 | 0.9561 | 0.9558 | 0.9555 | 0.9553 | 0.9550 | 0.9547     | 204.5 |
| 205.0      | 0.9575                                                                                        | 0.9572 | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9545     | 205.0 |
| 205.5      | 0.9573                                                                                        | 0.9570 | 0.9567 | 0.9564 | 0.9561 | 0.9558 | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9543     | 205.5 |
| 206.0      | 0.9572                                                                                        | 0.9569 | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9545 | 0.9542     | 206.0 |
| 206.5      | 0.9570                                                                                        | 0.9567 | 0.9564 | 0.9561 | 0.9558 | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9543 | 0.9540     | 206.5 |
| 207.0      | 0.9569                                                                                        | 0.9566 | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9545 | 0.9542 | 0.9539     | 207.0 |
| 207.5      | 0.9567                                                                                        | 0.9564 | 0.9561 | 0.9558 | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9543 | 0.9540 | 0.9537     | 207.5 |
| 208.0      | 0.9566                                                                                        | 0.9563 | 0.9560 | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9545 | 0.9542 | 0.9539 | 0.9535     | 208.0 |
| 208.5      | 0.9564                                                                                        | 0.9561 | 0.9558 | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9543 | 0.9540 | 0.9537 | 0.9534     | 208.5 |
| 209.0      | 0.9563                                                                                        | 0.9560 | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9545 | 0.9541 | 0.9538 | 0.9535 | 0.9532     | 209.0 |
| 209.5      | 0.9561                                                                                        | 0.9558 | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9543 | 0.9540 | 0.9537 | 0.9534 | 0.9531     | 209.5 |
| 310.0      | 0.9560                                                                                        | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9545 | 0.9541 | 0.9538 | 0.9535 | 0.9532 | 0.9529     | 310.0 |

ALPHA 290.0 TO 310.0

\* DENOTES EXTRAPOLATED VALUE

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0

API TABLE 24C, VCF FOR INDIVIDUAL AND SPECIAL APPLICATIONS  
VOLUME CORRECTION TO 60 F

| TEMP.<br>F | COEFFICIENT OF THERMAL EXPANSION * 1000000. (1/DEG F)<br>FACTOR FOR CORRECTING VOLUME TO 60 F |        |        |        |        |        |        |        |        |        | TEMP.<br>F |       |
|------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------|-------|
|            | 290.0                                                                                         | 292.0  | 294.0  | 296.0  | 298.0  | 300.0  | 302.0  | 304.0  | 306.0  | 308.0  |            | 310.0 |
| 210.0      | 0.9560                                                                                        | 0.9557 | 0.9554 | 0.9551 | 0.9548 | 0.9545 | 0.9541 | 0.9538 | 0.9535 | 0.9532 | 0.9529     | 210.0 |
| 210.5      | 0.9558                                                                                        | 0.9555 | 0.9552 | 0.9549 | 0.9546 | 0.9543 | 0.9540 | 0.9537 | 0.9534 | 0.9531 | 0.9528     | 210.5 |
| 211.0      | 0.9557                                                                                        | 0.9554 | 0.9551 | 0.9548 | 0.9545 | 0.9541 | 0.9538 | 0.9535 | 0.9532 | 0.9529 | 0.9526     | 211.0 |
| 211.5      | 0.9555                                                                                        | 0.9552 | 0.9549 | 0.9546 | 0.9543 | 0.9540 | 0.9537 | 0.9534 | 0.9531 | 0.9527 | 0.9524     | 211.5 |
| 212.0      | 0.9554                                                                                        | 0.9551 | 0.9548 | 0.9545 | 0.9541 | 0.9538 | 0.9535 | 0.9532 | 0.9529 | 0.9526 | 0.9523     | 212.0 |
| 212.5      | 0.9552                                                                                        | 0.9549 | 0.9546 | 0.9543 | 0.9540 | 0.9537 | 0.9534 | 0.9531 | 0.9527 | 0.9524 | 0.9521     | 212.5 |
| 213.0      | 0.9551                                                                                        | 0.9548 | 0.9545 | 0.9542 | 0.9538 | 0.9535 | 0.9532 | 0.9529 | 0.9526 | 0.9523 | 0.9520     | 213.0 |
| 213.5      | 0.9549                                                                                        | 0.9546 | 0.9543 | 0.9540 | 0.9537 | 0.9534 | 0.9531 | 0.9527 | 0.9524 | 0.9521 | 0.9518     | 213.5 |
| 214.0      | 0.9548                                                                                        | 0.9545 | 0.9542 | 0.9539 | 0.9535 | 0.9532 | 0.9529 | 0.9526 | 0.9523 | 0.9520 | 0.9516     | 214.0 |
| 214.5      | 0.9546                                                                                        | 0.9543 | 0.9540 | 0.9537 | 0.9534 | 0.9531 | 0.9528 | 0.9524 | 0.9521 | 0.9518 | 0.9515     | 214.5 |
| 215.0      | 0.9545                                                                                        | 0.9542 | 0.9539 | 0.9535 | 0.9532 | 0.9529 | 0.9526 | 0.9523 | 0.9520 | 0.9516 | 0.9513     | 215.0 |
| 215.5      | 0.9544                                                                                        | 0.9540 | 0.9537 | 0.9534 | 0.9531 | 0.9528 | 0.9524 | 0.9521 | 0.9518 | 0.9515 | 0.9512     | 215.5 |
| 216.0      | 0.9542                                                                                        | 0.9539 | 0.9536 | 0.9532 | 0.9529 | 0.9526 | 0.9523 | 0.9520 | 0.9516 | 0.9513 | 0.9510     | 216.0 |
| 216.5      | 0.9541                                                                                        | 0.9537 | 0.9534 | 0.9531 | 0.9528 | 0.9525 | 0.9521 | 0.9518 | 0.9515 | 0.9512 | 0.9509     | 216.5 |
| 217.0      | 0.9539                                                                                        | 0.9536 | 0.9533 | 0.9529 | 0.9526 | 0.9523 | 0.9520 | 0.9517 | 0.9513 | 0.9510 | 0.9507     | 217.0 |
| 217.5      | 0.9538                                                                                        | 0.9534 | 0.9531 | 0.9528 | 0.9525 | 0.9521 | 0.9518 | 0.9515 | 0.9512 | 0.9509 | 0.9505     | 217.5 |
| 218.0      | 0.9536                                                                                        | 0.9533 | 0.9530 | 0.9526 | 0.9523 | 0.9520 | 0.9517 | 0.9513 | 0.9510 | 0.9507 | 0.9504     | 218.0 |
| 218.5      | 0.9535                                                                                        | 0.9531 | 0.9528 | 0.9525 | 0.9522 | 0.9518 | 0.9515 | 0.9512 | 0.9509 | 0.9505 | 0.9502     | 218.5 |
| 219.0      | 0.9533                                                                                        | 0.9530 | 0.9527 | 0.9523 | 0.9520 | 0.9517 | 0.9514 | 0.9510 | 0.9507 | 0.9504 | 0.9501     | 219.0 |
| 219.5      | 0.9532                                                                                        | 0.9528 | 0.9525 | 0.9522 | 0.9519 | 0.9515 | 0.9512 | 0.9509 | 0.9506 | 0.9502 | 0.9499     | 219.5 |
| 220.0      | 0.9530                                                                                        | 0.9527 | 0.9524 | 0.9520 | 0.9517 | 0.9514 | 0.9511 | 0.9507 | 0.9504 | 0.9501 | 0.9497     | 220.0 |
| 220.5      | 0.9529                                                                                        | 0.9525 | 0.9522 | 0.9519 | 0.9516 | 0.9512 | 0.9509 | 0.9506 | 0.9502 | 0.9499 | 0.9496     | 220.5 |
| 221.0      | 0.9527                                                                                        | 0.9524 | 0.9521 | 0.9517 | 0.9514 | 0.9511 | 0.9507 | 0.9504 | 0.9501 | 0.9498 | 0.9494     | 221.0 |
| 221.5      | 0.9526                                                                                        | 0.9522 | 0.9519 | 0.9516 | 0.9512 | 0.9509 | 0.9506 | 0.9503 | 0.9499 | 0.9496 | 0.9493     | 221.5 |
| 222.0      | 0.9524                                                                                        | 0.9521 | 0.9518 | 0.9514 | 0.9511 | 0.9508 | 0.9504 | 0.9501 | 0.9498 | 0.9494 | 0.9491     | 222.0 |
| 222.5      | 0.9523                                                                                        | 0.9519 | 0.9516 | 0.9513 | 0.9509 | 0.9506 | 0.9503 | 0.9499 | 0.9496 | 0.9493 | 0.9489     | 222.5 |
| 223.0      | 0.9521                                                                                        | 0.9518 | 0.9515 | 0.9511 | 0.9508 | 0.9505 | 0.9501 | 0.9498 | 0.9495 | 0.9491 | 0.9488     | 223.0 |
| 223.5      | 0.9520                                                                                        | 0.9516 | 0.9513 | 0.9510 | 0.9506 | 0.9503 | 0.9500 | 0.9496 | 0.9493 | 0.9490 | 0.9486     | 223.5 |
| 224.0      | 0.9518                                                                                        | 0.9515 | 0.9512 | 0.9508 | 0.9505 | 0.9501 | 0.9498 | 0.9495 | 0.9491 | 0.9488 | 0.9485     | 224.0 |
| 224.5      | 0.9517                                                                                        | 0.9513 | 0.9510 | 0.9507 | 0.9503 | 0.9500 | 0.9497 | 0.9493 | 0.9490 | 0.9486 | 0.9483     | 224.5 |
| 225.0      | 0.9515                                                                                        | 0.9512 | 0.9509 | 0.9505 | 0.9502 | 0.9498 | 0.9495 | 0.9492 | 0.9488 | 0.9485 | 0.9481     | 225.0 |

\* DENOTES EXTRAPOLATED VALUE

ALPHA = 290.0 TO 310.0