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# RESEARCH MEMORANDUM

## IDEAL TEMPERATURE RISE DUE TO CONSTANT-PRESSURE COMBUSTION OF A JP-4 FUEL

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NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS
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# IDEAL TEMPERATURE RISE DUE TO CONSTANT-PRESSURE COMBUSTION OF A JP-4 FUEL

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## SUMMARY

The ideal temperature rise due to the constant-pressure combustion of a methylene ($CH_2$) fuel was calculated. $CH_2$ fuel closely approximates MIL-F-5624 grade JP-4 fuel presently used in most turbojet and ram-jet engines. Charts are presented from which the ideal temperature rise or the ideal quantity of fuel required to obtain a specified combustion temperature may be obtained for any flight condition likely to be encountered with turbojet or ram-jet engines using this fuel.

The charts are applicable only to a fuel having a hydrogen-carbon mass ratio of 0.168. They include a range of fuel-air ratios from 0 to 1.2 fraction of stoichiometric fuel-air ratio with dissociation taken into account, inlet-air temperatures from 400° to 1600° R, and combustion pressures from 1/16 to 64 atmospheres. The use of the charts is illustrated by several examples.

## INTRODUCTION

A knowledge of the combustion temperature or of the quantity of fuel required to obtain a specified combustion temperature is necessary in the performance analyses of aircraft turbojet and ram-jet engines. Ideal combustion temperature is generally calculated assuming complete oxidation of the fuel where final fuel-air ratios are leaner than stoichiometric and where dissociation is unimportant. In the stoichiometric range of fuel-air ratios, ideal combustion temperatures are generally calculated assuming that chemical equilibrium exists among the combustion products and dissociation is thereby taken into account. With dissociation, the ideal combustion temperature is dependent on combustion-pressure level.

Accurate calculation of the ideal combustion-temperature rise of hydrocarbon fuels has been simplified by the presentation of charts for cases where the final fuel-air ratios are leaner than stoichiometric and at combustion temperatures where dissociation is unimportant.

Examples of these charts are found in references 1 and 2. Similar charts are presented in reference 3, which also includes the stoichiometric range of fuel-air ratios. In the latter case, with dissociation taken into account, the charts are applicable to combustion processes occurring at pressure levels from 1 to 5 atmospheres.

The operational range of turbojet and ram-jet engines has been extended in recent years to high altitudes and high flight speeds. This increase in operational range has extended the range of combustion-pressure levels which must be covered in the performance analyses of these engines. A laborious solution is required to calculate ideal combustion-temperature rise in the stoichiometric range of fuel-air ratios where combustion-pressure level has an effect. In addition, a different solution is required for each combination of combustion pressure, inlet-air temperature, and fraction of stoichiometric fuel-air ratio. Therefore, it is evident that a need exists for an accurate and simple method of determining the ideal combustion-temperature rise in the stoichiometric range of fuel-air ratios and for an extensive range of combustion pressures. The purpose of this report is to provide charts from which the ideal temperature rise or the ideal quantity of fuel required to obtain a specified combustion temperature may be obtained for a comprehensive range of turbojet- and ram-jet-engine operating conditions. 3774

A general method and thermodynamic tables for the solution of thermodynamic properties of a combustion gas in chemical equilibrium are provided in reference 4. This method has been used at the NACA Lewis laboratory to establish thermodynamic properties of a combustion gas for a $CH_2$ fuel and air reaction. These unpublished data were used to compute the ideal combustion-temperature rise. The temperature-rise results are presented herein.

Charts are presented from which the ideal combustion-temperature rise or the ideal quantity of fuel required to obtain a specified combustion temperature may be easily and accurately obtained. The charts are applicable only to a fuel having a hydrogen-carbon mass ratio of 0.168, which closely approximates MIL-F-5624 grade JP-4 fuel presently used in most turbojet and ram-jet engines. The charts are based on a constant-pressure adiabatic combustion process covering a range of fuel-air ratios from 0 to 1.2 fraction of stoichiometric, a range of combustion pressures from 1/16 to 64 atmospheres, and a range of inlet-air temperatures from $400^{\circ}$ to $1600^{\circ}$ R. Use of the charts for a nonadiabatic combustion process or for variations in heat content of the fuel is considered, and their use is illustrated by numerical examples.

## SYMBOLS

The following symbols are used in this report:

| | |
|---|---|
| a,b,c,d | constants used in interpolation process |
| $c_p^o$ | specific heat at constant pressure and standard conditions, Btu/lb-$^oR$ |
| f' | stoichiometric fuel-air mass ratio (0.067626) |
| $h_c$ | lower heating value of fuel at constant pressure |
| $h_T^o$ | sum of sensible enthalpy and chemical energy at temperature T and standard conditions, Btu/lb |
| $\Delta h_T^o$ | difference in enthalpy at T and at 400$^o$ R (table II), Btu/lb |
| i | air mass-flow ratio at station i |
| M | molecular weight, lb/lb-mole |
| m | mass-flow rate, lb/sec |
| P | absolute combustion pressure, atm or lb/sq ft |
| S | fraction of stoichiometric fuel-air ratio |
| T | absolute temperature, $^oR$ |
| $\Delta T$ | temperature rise, $^oR$ |
| $\delta\Delta T$ | difference in temperature rise or correction factor, $^oR$ |

Subscripts:

| | |
|---|---|
| a | air |
| f | fuel |
| g | combustion gas |
| i | station |
| r | reference or assigned value |

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x adjusted values

1,2,3 stations

## THEORETICAL BASIS OF CHARTS

The charts presented herein apply to an ideal constant-pressure adiabatic combustion process with an assigned value of fuel enthalpy. A method is discussed in the section USE OF CHARTS which accounts for a nonadiabatic combustion process or for a change in the assigned value of fuel enthalpy. Chemical equilibrium was assumed to exist among the products of combustion in the stoichiometric range of fuel-air ratio. At leaner-than-stoichiometric fuel-air ratios and at low combustion temperatures completely oxidized products of combustion were assumed. 3774

For convenience, the enthalpy used is defined as the sum of sensible enthalpy and chemical energy. When the chemical energy is included in the enthalpy of each substance, enthalpy of the combustion gas for an adiabatic combustion must equal the enthalpy of the fuel and air entering the combustion process, or

$$(h_T^o)_a + Sf'(h_T^o)_f = (1 + Sf')(h_T^o)_g \tag{1}$$

where the state temperature for each term in equation (1) is taken as the appropriate entering or leaving temperature. Combustion-gas enthalpy was calculated from equation (1) for an assigned value of fuel enthalpy, for selected values of inlet-air temperature, and for several fractions of stoichiometric fuel-air ratio.

The composition of air was assumed to consist of the following mole fractions: $N_2$, 0.780881; $O_2$, 0.209495; A, 0.009324; $CO_2$, 0.000300. The air enthalpy at selected values of inlet-air temperature was calculated using this composition and the molar enthalpy of each constituent from the thermodynamic tables of reference 4.

The assigned value of fuel enthalpy was determined at a fuel temperature of 540° R. At this temperature, the liquid $CH_2$ fuel was assumed to have a lower heating value at constant pressure $(h_c)_{CH_2}$ of -18,700 Btu per pound. The lower heating value at constant pressure is defined as the amount of heat removed during the constant-pressure combustion of a fuel and gaseous oxygen mixture when the initial and final temperatures are equal and the completely oxidized combustion products are all in the gaseous state. The reaction equation for the determination of the lower heating value of $CH_2$ fuel is then

$$CH_2 + \frac{3}{2} O_2 \rightarrow CO_2 + H_2O \tag{2}$$

and the enthalpy equation is

$$(Mh_T^o)_{CH_2} + \frac{3}{2}(Mh_T^o)_{O_2} = (Mh_T^o)_{CO_2} + (Mh_T^o)_{H_2O} - (Mh_c)_{CH_2} \tag{3}$$

from which

$$(Mh_T^o)_{CH_2} = (Mh_T^o)_{CO_2} + (Mh_T^o)_{H_2O} - \frac{3}{2}(Mh_T^o)_{O_2} - (Mh_c)_{CH_2} \tag{4}$$

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The assigned value of fuel enthalpy at a temperature of 540° R was determined from equation (4) using the assigned lower heating value at constant pressure and the molar enthalpy of each constituent from the thermodynamic tables of reference 4. Stoichiometric fuel-air ratio f' is evaluated by consideration of equation (2) and the mole fraction of $O_2$ in the air available for combustion as

$$\left.\begin{aligned} f' \frac{M_a}{M_{CH_2}} &= \frac{2(0.209495)}{3} \\ \text{or} \qquad f' &= 0.067626 \end{aligned}\right\} \tag{5}$$

The combustion temperature associated with a specific value of combustion-gas enthalpy was determined by interpolation from established relations between temperature, enthalpy, and specific heat at constant pressure. These thermodynamic properties were obtained at a sequence of temperatures in either 200° or 100° K increments. In the stoichiometric range of fuel-air ratios, chemical equilibrium was assumed to exist among products of combustion consisting of CO, $CO_2$, H, $H_2$, $H_2O$, O, $O_2$, OH, N, $N_2$, NO, and A. Applying the general method of reference 4 to these assumed products of combustion leads to eight dissociative equilibrium equations for gaseous molecules in terms of atomic species, namely, for CO, $CO_2$, $H_2$, $H_2O$, $O_2$, OH, $N_2$, and NO. However, as no free carbon was assumed among the combustion products, the equilibrium equation for $CO_2$ was expressed in terms of CO and O. Conservation of mass leads to five additional equations, one for each atomic type, namely, for C, H, O, N, and A. The total pressure being the sum of the partial pressure of each constituent provides an additional equation. The simultaneous solution of these equations subsequently leads to the composition of the combustion gas for a constant-pressure combustion process at a specified temperature, pressure, and fraction of stoichiometric fuel-air ratio. The composition of the combustion gas and selected thermodynamic properties were established for a sequence of temperatures in 200° K increments, at several pressures, and at several fractions of stoichiometric fuel-air ratio.

At leaner-than-stoichiometric fuel-air ratios and at low combustion temperatures, the combustion gas was assumed to be completely oxidized. The products of combustion, in this case, were assumed to consist of $CO_2$, $H_2O$, and the original air entering the combustion less the oxygen that went into the formation of $CO_2$ and $H_2O$, which leads to

$$(1 + Sf')(h_T^o)_g = (h_T^o)_a + \frac{2}{3}\left(\frac{0.209495}{M_a}\right)S\left[(Mh_T^o)_{CO_2} + (Mh_T^o)_{H_2O} - \frac{3}{2}(Mh_T^o)_{O_2}\right] \tag{6}$$

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and

$$(1 + Sf')(c_p^o)_g = (c_p^o)_a + \frac{2}{3}\left(\frac{0.209495}{M_a}\right)S\left[(Mc_p^o)_{CO_2} + (Mc_p^o)_{H_2O} - \frac{3}{2}(Mc_p^o)_{O_2}\right] \tag{7}$$

where the state temperature for each term in equations (6) and (7) is the combustion temperature. Equations (6) and (7) were used in conjunction with the thermodynamic tables of reference 4 to calculate the enthalpy and specific heat at constant pressure of the completely oxidized combustion gas at a sequence of temperatures in $100^\circ$ K increments and at several fractions of stoichiometric fuel-air ratio.

A relation between temperature, enthalpy, and specific heat at constant pressure was established by assuming that

$$T_g = a(h_T^o)_g^3 + b(h_T^o)_g^2 + c(h_T^o)_g + d \tag{8}$$

and

$$\left[\frac{d(T_g)}{d(h_T^o)_g}\right]_p = \frac{1}{(c_p^o)_g} = 3a(h_T^o)_g^2 + 2b(h_T^o)_g + c \tag{9}$$

where a, b, c, and d were evaluated for each temperature increment from the thermodynamic properties of each temperature sequence. This relation was then assumed to be true for any temperature between the values at which a, b, c, and d were determined. This method gives an interpolation process based on a 2-point - 2-slope technique. From this established relation the combustion temperature associated with a specific value of combustion-gas enthalpy was determined for selected values of inlet-air temperature and for several fractions of stoichiometric fuel-air ratio.

## PRESENTATION OF CHARTS

The ideal combustion-temperature rise associated with a constant-pressure adiabatic combustion process is shown in figure 1 for a combustion pressure of 1 atmosphere and for inlet-air temperatures of 400° and 1600° R as a function of the fraction of stoichiometric fuel-air ratio. The effect of dissociation on temperature rise is illustrated by the separation between the curves with dissociation and without dissociation. The effect of dissociation is to decrease the ideal temperature rise attainable with a completely oxidized combustion gas, especially at high values of combustion temperature. The typical trend of temperature rise as the inlet-air temperature is increased is to reduce the temperature rise. The temperature rise is reduced more at near-stoichiometric mixtures, and the peak temperature rise occurs at richer mixtures with higher inlet temperatures. These trends in temperature rise for a pressure level of 1 atmosphere are also typical of other combustion-pressure levels.

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The values of temperature rise in the stoichiometric range of fuel-air ratios were computed with the assumption of dissociation; whereas, at the leaner fuel-air ratios no dissociation was assumed. The resulting two sets of values were faired together as shown by the dashed curves in figure 1. The resulting continuous curves were used in subsequent charts for the relation of ideal combustion-temperature rise as a function of the fraction of stoichiometric fuel-air ratio.

Ideal combustion-temperature rise at a combustion pressure of 1 atmosphere is presented in table I as a function of the fraction of stoichiometric fuel-air ratio for a range of inlet-air temperatures from 400° to 1600° R. Temperature rise or the ideal quantity of fuel required to obtain a specified temperature rise may be easily obtained at any 0.001 incremental fraction of stoichiometric fuel-air ratio or at any 100° R increment in inlet-air temperature. These increments in fuel-air ratio and inlet-air temperature are sufficiently small to give accurate values by a simple straight-line interpolation at any interval between increments.

Ideal combustion-temperature rise for any combustion pressure other than 1 atmosphere is obtained by additive correction factors applied to the value of temperature rise obtained from table I at the appropriate fraction of stoichiometric fuel-air ratio and inlet-air temperature. Exact differences in temperature rise for equal increments of the logarithm of combustion pressure are presented in figure 2. The number of temperature-rise differences to be added depends on the difference of the pressure level from 1 atmosphere, as will be shown later in examples illustrating the use of the charts. Temperature rise is very nearly linear with the logarithm of combustion pressure. Consequently, a straight-line interpolation using the logarithm of the particular

pressure gives a close approximation to the difference in temperature rise for a pressure within each increment. This relation was used to establish lines of intermediate pressure levels on each chart of figure 2, from which the appropriate temperature-rise correction factor may be easily obtained. More exact interpolations may be achieved, of course, by direct plots of the temperature-rise difference as a function of the logarithm of combustion pressure.

Correction-factor charts have also been prepared to assist in obtaining the ideal quantity of fuel required for a specified temperature rise at any combustion pressure. These charts are presented in figure 3. Additive correction factors are obtained from figure 3 as a function of the specified temperature rise, the inlet-air temperature, and the combustion pressure. These additive correction factors are derived in a manner similar to that for the correction factors of figure 2. The quantity of fuel required for a specified temperature rise at any combustion pressure is obtained from table I after applying the correction factors of figure 3 to the specified temperature rise. The number of correction factors to be applied to the specified temperature rise is again dependent on the difference between the pressure level and 1 atmosphere.

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## USE OF CHARTS

The combustion charts presented herein may be used directly for an adiabatic combustion process and for the assigned value of fuel enthalpy. The charts may also be used for a nonadiabatic combustion process, such as a loss of air or power extraction, and for variations in the heat content of the fuel. A general system is presented in figure 4, which shows enthalpies for a nonadiabatic combustion process with a loss of air in the system and with a variation in heat content of the fuel from the assigned fuel enthalpy. The heat balance is

$$(mh_T^o)_{a,1} - (mh_T^o)_{a,i} + (mh_T^o)_{f,2} = (mh_T^o)_{g,3} \tag{10}$$

and the mass balance of the system is

$$m_{a,1} - m_{a,i} + m_{f,2} = m_{g,3} \tag{11}$$

Since, by definition,

$$\left.\begin{aligned} Sf' &= \frac{m_{f,2}}{m_{a,1} - m_{a,i}} \\ \text{and} \qquad & \\ i &= \frac{m_{a,i}}{m_{a,1} - m_{a,i}} \end{aligned}\right\} \tag{12}$$

then, combining equations (10), (11), and (12) and using the assigned fuel enthalpy yield

$$(h_T^o)_{a,1} - i\left[(h_T^o)_{a,i} - (h_T^o)_{a,1}\right] + Sf'(h_T^o)_{f,r} +$$

$$Sf'\left[(h_T^o)_{f,2} - (h_T^o)_{f,r}\right] = (1 + Sf')(h_T^o)_{g,3} \tag{13}$$

Now, by using an adjusted inlet-air temperature $T_x$ to accomodate the change in energy from an adiabatic process with assigned conditions, the adjusted inlet-air enthalpy is

$$(h_T^o)_{a,x} = (h_T^o)_{a,1} - i\left[(h_T^o)_{a,i} - (h_T^o)_{a,1}\right] + Sf'\left[(h_T^o)_{f,2} - (h_T^o)_{f,r}\right] \tag{14}$$

Substituting equation (14) into equation (13) yields the generalized (or adiabatic) heat-balance equation

$$(h_T^o)_{a,x} + Sf'(h_T^o)_{f,r} = (1 + Sf')(h_T^o)_{g,3} \tag{15}$$

The generalized heat-balance equation which is similar to equation (1) is directly applicable to the combustion charts.

An adjustment of inlet-air temperature is necessary to satisfy the difference between the generalized inlet-air enthalpy $(h_T^o)_{a,x}$ and the actual inlet-air enthalpy $(h_T^o)_{a,1}$. This difference in air enthalpy involves only a change in sensible enthalpy; consequently, any available sensible-enthalpy table for air may be used to obtain the corresponding adjustment of inlet-air temperature. For convenience, a chart of sensible air enthalpy as a function of temperature is presented in table II, which was calculated using the same air composition and molar enthalpy of each constituent as was used for the combustion charts. The change in enthalpy resulting from the loss of air in a general system (such as fig. 4) may be used directly in equation (14). An appropriate term may also be included to account for any other change in energy which may result in a nonadiabatic process, such as energy extracted from the system for auxiliary equipment.

A variation in fuel enthalpy from the assigned value may be the result of a change in either the lower heating value of the fuel at constant pressure or in the fuel-inlet temperature. The change in enthalpy

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resulting from a change in the lower heating value of the fuel at constant pressure is simply $Sf'(-18,700 - h_c)$. A change in enthalpy reresulting from a variation in fuel-inlet temperature from the assigned value of 540° R may be obtained from a consideration of the specific heat at constant pressure of the liquid fuel. A typical variation of specific heat with fuel temperature was obtained from reference 5 for a JP-4 hydrocarbon fuel. The change in fuel enthalpy from the assigned value at 540° R was calculated by using

$$(c_p^o)_{f,liquid} = 0.502 + 0.000525(T_f - 540)$$

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For convenience, a chart of the change in fuel enthalpy of a stoichiometric mixture on a unit-mass-of-air basis is presented in table III as a function of the fuel-inlet temperature. The product of a chart value and the fraction of stoichiometric fuel-air ratio yields the appropriate change in air enthalpy for a variation in fuel-inlet temperature (eq. (14)).

The use of the combustion charts is illustrated by calculations for a turbojet engine with an afterburner for which the following conditions are employed: engine-inlet temperature, 520° R; 4-percent loss in air flow by compressor interstage air bleed occurring at a temperature of 624° R; combustor-inlet temperature, 1000° R, engine fuel-air ratio, 25 percent of stoichiometric; fuel-inlet temperature, 540° R; lower heating value of fuel at constant pressure of -19,135 Btu per pound at 540° R; turbine-outlet temperature, 1675° R; afterburner fuel-air ratio, 55 percent of stoichiometric; afterburner combustion pressure, 400 pounds per square foot; and afterburner combustion temperature, 3500° R.

Example 1 - Determination of Ideal Turbine-Outlet Temperature

Generalizing the heat balance from the engine inlet to the turbine outlet indicates that an adjustment in the inlet-air temperature is necessary before using table I. From equation (14) the adjusted inlet-air enthalpy is

$$(\Delta h_T^o)_{a,x} = (\Delta h_T^o)_{a,1} - i\left[(\Delta h_T^o)_{a,i} - (\Delta h_T^o)_{a,1}\right] + Sf'\left[-h_c - 18,700\right]$$

From table II

$$(\Delta h_T^o)_{a,i} - (\Delta h_T^o)_{a,1} = 53.7 - 28.8 = 24.9 \text{ Btu/lb}$$

and

$$(\Delta h_T^o)_{a,x} = 28.8 - 0.04(24.9) + 0.25 \times 0.067626(19,135 - 18,700)$$

$$= 35.2 \text{ Btu/lb}$$

or, from $(\Delta h_T^o)_{a,x}$ and table II,

$$T_x = 547^o \text{ R}$$

Then, from $T_x$, S, and table I,

$$\Delta T = 1195^o \text{ R}$$

The ideal turbine-outlet temperature is $1195^o + 547^o = 1742^o$ R. No correction is necessary for combustion pressure at this low combustion temperature (lean fuel-air ratio).

Example 2 - Determination of Ideal Engine Fuel-Air Ratio

This example is the inverse of example 1, and an iteration process is necessary because of the change in fuel enthalpy from the assigned value.

An approximate adjusted inlet-air temperature may be obtained by using an estimated ideal engine fuel-air ratio. The estimated fuel-air ratio is obtained from a temperature rise based on the adjusted inlet temperature and the ideal $\Delta T$ of example 1. The approximate $\Delta T$ is $1675^o - 547^o = 1128^o$ R; the ideal $\Delta T$ is $1195^o$ R. An ideal fuel-air ratio estimated from a ratio of these temperature rises and the actual fuel-air ratio is $0.25 \times \frac{1128}{1195} = 0.236$ fraction of stoichiometric fuel-air ratio. An approximate adjusted inlet-air enthalpy is

$$(\Delta h_T^o)_{a,x} = 28.8 - 0.04(24.9) + 0.236 \times 0.067626(19.135 - 18,700)$$

$$= 34.7 \text{ Btu/lb}$$

or, from $(\Delta h_T^o)_{a,x}$ and table II,

$$T_x = 545^o \text{ R}$$

A new approximation of specified $\Delta T$ is $1675^o - 545^o = 1130^o$ R. By using $T_x = 545^o$ R, $\Delta T = 1130^o$ R, and table I, the ideal fuel-air ratio

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is found to be 0.2348 fraction of stoichiometric fuel-air ratio. A reiteration process using this fuel-air ratio gives the same adjusted inlet-air temperature; therefore, no further iterations are necessary.

Example 3 - Determination of Engine Combustion Temperature

If it is assumed that the combustion of ideal engine fuel occurs only in the engine combustor, then the ideal fuel-air ratio may be specified by either the combustor temperature rise or the engine temperature rise. Consequently, the combustor temperature rise may be calculated from the ideal fuel flow determined in example 2 and the combustor-inlet temperature by applying a heat balance to the engine combustor. Generalizing the heat balance from the combustor inlet to exit indicates an adjustment of combustor-inlet temperature is necessary before using table I. This heat balance indicates an adiabatic process with an adjustment for variation of fuel enthalpy of the ideal fuel-air ratio. Furthermore, the combustor air flow is equal to the air flow used to specify the ideal fuel-air ratio of example 2; so no adjustment of fuel-air ratio is necessary. From the combustor-inlet temperature, table II, and the ideal fuel-air ratio, 3774

$$\left(\Delta h_T^o\right)_{a,x} = 145.5 + 0.2348 \times 0.067626(19,135 - 18,700) = 152.4 \text{ Btu/lb}$$

or

$$T_x = 1027^\circ \text{ R}$$

Then, from $T_x$, ideal S, and table I,

$$\Delta T = 1058^\circ \text{ R}$$

The engine combustion temperature is $1058^\circ + 1027^\circ = 2085^\circ$ R.

Example 4 - Determination of Ideal Afterburner Combustion Temperature

Generalizing the heat balance from the engine inlet to the afterburner outlet indicates that an adjustment in the engine-inlet temperature is to be made which differs from example 1 because of the additional fuel supplied to the afterburner; therefore,

$$\left(\Delta h_T^o\right)_{a,x} = 35.2 + 0.55 \times 0.067626(19,135 - 18,700) = 51.4 \text{ Btu/lb}$$

or

$$T_x = 614^\circ \text{ R}$$

The total fuel-air ratio supplied to the system is 0.25 + 0.55 = 0.80 fraction of the stoichiometric fuel-air ratio. Then, from $T_x$, total S, and table I,

$$\Delta T = 3119^{\circ}\ R$$

As afterburner combustion occurs at a pressure of 400 pounds per square foot, correction factors must be applied to the temperature rise obtained from table I. From figure 2(a), total S, $T_x$, and P,

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$$\delta\Delta T = -7^{\circ}\ R$$

From figure 2(b), total S, $T_x$, and P = 1/4 atmosphere,

$$\delta\Delta T = -24^{\circ}\ R$$

The ideal afterburner combustion temperature is $3119^{\circ} - 7^{\circ} - 24^{\circ} + 614^{\circ} = 3702^{\circ}$ R.

Example 5 - Determination of Ideal Afterburner Fuel-Air Ratio

This example is the inverse of example 4; and, as in example 2, an iteration process is necessary. The specified afterburner temperature rise is $3500^{\circ} - 1675^{\circ} = 1825^{\circ}$ R. From example 4, the ideal afterburner temperature rise is $3702^{\circ} - 1675^{\circ} = 2027^{\circ}$ R. An ideal afterburner fuel-air ratio estimated from a ratio of these temperature rises and the actual afterburner fuel-air ratio is $0.55 \times \frac{1825}{2027} = 0.495$ fraction of stoichiometric fuel-air ratio. An approximate adjusted inlet-air enthalpy from an estimate of the total ideal fuel-air ratio is

$$(\Delta h_T^{\circ})_{a,x} = 28.8 - 0.04(24.9) + (0.2348 + 0.495)0.067626(19,135 - 18,700)$$

$$= 49.3\ \text{Btu/lb}$$

or, from $(\Delta h_T^{\circ})_{a,x}$ and table II,

$$T_x = 605^{\circ}\ R$$

An approximation of total-temperature rise is $3500^{\circ} - 605^{\circ} = 2895^{\circ}$ R. By using $T_x = 605^{\circ}$ R, $\Delta T = 2895^{\circ}$ R, P = 400 pounds per square foot, and figure 3, the following correction factors are obtained:

$$\delta\Delta T = 3^{\circ}\ R\ \text{(from fig. 3(a))}$$

$$\delta\Delta T = 9^{\circ}\ R\ \text{(from fig. 3(b))}$$

The adjusted temperature rise becomes $2895^{\circ} + 3^{\circ} + 9^{\circ} = 2907^{\circ}$ R. From table I, $T_x = 605^{\circ}$ R, and $\Delta T = 2907^{\circ}$ R, the ideal fuel-air ratio is found to be 0.7247 fraction of stoichiometric fuel-air ratio. A reiteration process using this fuel-air ratio gives the same adjusted inlet-air temperature; therefore, no further iterations are necessary. The ideal afterburner fuel-air ratio is then 0.7247 - 0.2348 = 0.4899 fraction of stoichiometric fuel-air ratio.

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Lewis Flight Propulsion Laboratory
National Advisory Committee for Aeronautics
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TABLE I. - IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| .001 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 |
| .002 | 11 | 11 | 11 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 9 | 9 | 9 |
| .003 | 16 | 16 | 16 | 16 | 15 | 15 | 15 | 15 | 14 | 14 | 14 | 14 | 13 |
| .004 | 21 | 21 | 21 | 21 | 21 | 20 | 20 | 20 | 19 | 19 | 19 | 18 | 18 |
| .005 | 27 | 27 | 26 | 26 | 26 | 25 | 25 | 24 | 24 | 24 | 23 | 23 | 22 |
| .006 | 32 | 32 | 32 | 31 | 31 | 30 | 30 | 29 | 29 | 28 | 28 | 28 | 27 |
| .007 | 37 | 37 | 37 | 36 | 36 | 35 | 35 | 34 | 34 | 33 | 33 | 32 | 31 |
| .008 | 43 | 42 | 42 | 42 | 41 | 40 | 40 | 39 | 39 | 38 | 37 | 37 | 36 |
| .009 | 48 | 48 | 47 | 47 | 46 | 45 | 45 | 44 | 43 | 43 | 42 | 41 | 40 |
| .010 | 53 | 53 | 53 | 52 | 51 | 50 | 50 | 49 | 48 | 47 | 47 | 46 | 44 |
| .011 | 59 | 58 | 58 | 57 | 56 | 55 | 55 | 54 | 53 | 52 | 51 | 51 | 49 |
| .012 | 64 | 64 | 63 | 62 | 61 | 60 | 60 | 59 | 58 | 57 | 56 | 55 | 53 |
| .013 | 69 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 62 | 61 | 60 | 58 |
| .014 | 75 | 74 | 73 | 73 | 72 | 71 | 69 | 68 | 67 | 66 | 65 | 64 | 62 |
| .015 | 80 | 79 | 79 | 78 | 77 | 76 | 74 | 73 | 72 | 71 | 70 | 69 | 67 |
| .016 | 85 | 85 | 84 | 83 | 82 | 81 | 79 | 78 | 77 | 76 | 74 | 73 | 71 |
| .017 | 91 | 90 | 89 | 88 | 87 | 86 | 84 | 83 | 82 | 80 | 79 | 78 | 75 |
| .018 | 96 | 95 | 94 | 93 | 92 | 90 | 89 | 88 | 86 | 85 | 84 | 82 | 80 |
| .019 | 101 | 100 | 100 | 98 | 97 | 95 | 94 | 93 | 91 | 90 | 88 | 87 | 84 |
| .020 | 106 | 106 | 105 | 103 | 102 | 100 | 99 | 97 | 96 | 94 | 93 | 92 | 89 |
| .021 | 112 | 111 | 110 | 109 | 107 | 105 | 104 | 102 | 101 | 99 | 98 | 96 | 93 |
| .022 | 117 | 116 | 115 | 114 | 112 | 110 | 109 | 107 | 105 | 104 | 102 | 101 | 98 |
| .023 | 122 | 121 | 120 | 119 | 117 | 115 | 114 | 112 | 110 | 108 | 107 | 105 | 102 |
| .024 | 128 | 127 | 125 | 124 | 122 | 120 | 119 | 117 | 115 | 113 | 111 | 110 | 106 |
| .025 | 133 | 132 | 131 | 129 | 127 | 125 | 123 | 121 | 120 | 118 | 116 | 114 | 111 |
| .026 | 138 | 137 | 136 | 134 | 132 | 130 | 128 | 126 | 124 | 122 | 121 | 119 | 115 |
| .027 | 143 | 142 | 141 | 139 | 137 | 135 | 133 | 131 | 129 | 127 | 125 | 123 | 120 |
| .028 | 149 | 148 | 146 | 144 | 142 | 140 | 138 | 136 | 134 | 132 | 130 | 128 | 124 |
| .029 | 154 | 153 | 151 | 149 | 147 | 145 | 143 | 141 | 138 | 136 | 134 | 132 | 128 |
| .030 | 159 | 158 | 156 | 154 | 152 | 150 | 148 | 145 | 143 | 141 | 139 | 137 | 133 |
| .031 | 164 | 163 | 162 | 160 | 157 | 155 | 153 | 150 | 148 | 146 | 144 | 141 | 137 |
| .032 | 170 | 168 | 167 | 165 | 162 | 160 | 158 | 155 | 153 | 150 | 148 | 146 | 142 |
| .033 | 175 | 173 | 172 | 170 | 167 | 165 | 162 | 160 | 157 | 155 | 153 | 150 | 146 |
| .034 | 180 | 179 | 177 | 175 | 172 | 170 | 167 | 165 | 162 | 160 | 157 | 155 | 151 |
| .035 | 185 | 184 | 182 | 180 | 177 | 175 | 172 | 169 | 167 | 164 | 162 | 159 | 155 |
| .036 | 190 | 189 | 187 | 185 | 182 | 180 | 177 | 174 | 171 | 169 | 166 | 164 | 159 |
| .037 | 196 | 194 | 192 | 190 | 187 | 185 | 182 | 179 | 176 | 173 | 171 | 168 | 164 |
| .038 | 201 | 199 | 197 | 195 | 192 | 189 | 187 | 184 | 181 | 178 | 175 | 173 | 168 |
| .039 | 206 | 205 | 203 | 200 | 197 | 194 | 191 | 188 | 186 | 183 | 180 | 177 | 173 |
| .040 | 211 | 210 | 208 | 205 | 202 | 199 | 196 | 193 | 190 | 187 | 185 | 182 | 177 |
| .041 | 216 | 215 | 213 | 210 | 207 | 204 | 201 | 198 | 195 | 192 | 189 | 186 | 181 |
| .042 | 222 | 220 | 218 | 215 | 212 | 209 | 206 | 203 | 200 | 197 | 194 | 191 | 186 |
| .043 | 227 | 225 | 223 | 220 | 217 | 214 | 211 | 207 | 204 | 201 | 198 | 195 | 190 |
| .044 | 232 | 230 | 228 | 225 | 222 | 219 | 216 | 212 | 209 | 206 | 203 | 200 | 195 |
| .045 | 237 | 235 | 233 | 230 | 227 | 224 | 220 | 217 | 214 | 210 | 207 | 204 | 199 |
| .046 | 242 | 241 | 238 | 235 | 232 | 229 | 225 | 222 | 218 | 215 | 212 | 209 | 203 |
| .047 | 248 | 246 | 243 | 240 | 237 | 233 | 230 | 226 | 223 | 220 | 216 | 213 | 208 |
| .048 | 253 | 251 | 248 | 245 | 242 | 238 | 235 | 231 | 228 | 224 | 221 | 218 | 212 |
| .049 | 258 | 256 | 253 | 250 | 247 | 243 | 240 | 236 | 232 | 229 | 225 | 222 | 217 |
| .050 | 263 | 261 | 259 | 255 | 252 | 248 | 244 | 241 | 237 | 233 | 230 | 227 | 221 |

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TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.051 | 268 | 266 | 264 | 260 | 257 | 253 | 249 | 245 | 242 | 238 | 234 | 231 | 225 |
| .052 | 273 | 271 | 269 | 265 | 262 | 258 | 254 | 250 | 246 | 242 | 239 | 235 | 230 |
| .053 | 279 | 276 | 274 | 270 | 267 | 263 | 259 | 255 | 251 | 247 | 243 | 240 | 234 |
| .054 | 284 | 282 | 279 | 275 | 272 | 267 | 263 | 259 | 255 | 252 | 248 | 244 | 238 |
| .055 | 289 | 287 | 284 | 280 | 276 | 272 | 268 | 264 | 260 | 256 | 252 | 249 | 243 |
| .056 | 294 | 292 | 289 | 285 | 281 | 277 | 273 | 269 | 265 | 261 | 257 | 253 | 247 |
| .057 | 299 | 297 | 294 | 290 | 286 | 282 | 278 | 273 | 269 | 265 | 261 | 258 | 252 |
| .058 | 304 | 302 | 299 | 295 | 291 | 287 | 283 | 278 | 274 | 270 | 266 | 262 | 256 |
| .059 | 309 | 307 | 304 | 300 | 296 | 292 | 287 | 283 | 279 | 274 | 270 | 267 | 260 |
| .060 | 315 | 312 | 309 | 305 | 301 | 296 | 292 | 288 | 283 | 279 | 275 | 271 | 265 |
| .061 | 320 | 317 | 314 | 310 | 306 | 301 | 297 | 292 | 288 | 283 | 279 | 275 | 269 |
| .062 | 325 | 322 | 319 | 315 | 311 | 306 | 302 | 297 | 292 | 288 | 284 | 280 | 274 |
| .063 | 330 | 327 | 324 | 320 | 316 | 311 | 306 | 302 | 297 | 293 | 288 | 284 | 278 |
| .064 | 335 | 332 | 329 | 325 | 320 | 316 | 311 | 306 | 302 | 297 | 293 | 289 | 282 |
| .065 | 340 | 337 | 334 | 330 | 325 | 321 | 316 | 311 | 306 | 302 | 297 | 293 | 287 |
| .066 | 345 | 342 | 339 | 335 | 330 | 325 | 320 | 316 | 311 | 306 | 302 | 297 | 291 |
| .067 | 350 | 348 | 344 | 340 | 335 | 330 | 325 | 320 | 315 | 311 | 306 | 302 | 295 |
| .068 | 355 | 353 | 349 | 345 | 340 | 335 | 330 | 325 | 320 | 315 | 311 | 306 | 300 |
| .069 | 361 | 358 | 354 | 349 | 345 | 340 | 335 | 329 | 325 | 320 | 315 | 311 | 304 |
| .070 | 366 | 363 | 359 | 354 | 350 | 344 | 339 | 334 | 329 | 324 | 320 | 315 | 309 |
| .071 | 371 | 368 | 364 | 359 | 354 | 349 | 344 | 339 | 334 | 329 | 324 | 319 | 313 |
| .072 | 376 | 373 | 369 | 364 | 359 | 354 | 349 | 343 | 338 | 333 | 328 | 324 | 317 |
| .073 | 381 | 378 | 374 | 369 | 364 | 359 | 353 | 348 | 343 | 338 | 333 | 328 | 322 |
| .074 | 386 | 383 | 379 | 374 | 369 | 364 | 358 | 353 | 347 | 342 | 337 | 333 | 326 |
| .075 | 391 | 388 | 384 | 379 | 374 | 368 | 363 | 357 | 352 | 347 | 342 | 337 | 330 |
| .076 | 396 | 393 | 389 | 384 | 379 | 373 | 368 | 362 | 356 | 351 | 346 | 341 | 335 |
| .077 | 401 | 398 | 394 | 389 | 383 | 378 | 372 | 367 | 361 | 356 | 351 | 346 | 339 |
| .078 | 406 | 403 | 399 | 394 | 388 | 383 | 377 | 371 | 366 | 360 | 355 | 350 | 344 |
| .079 | 411 | 408 | 404 | 398 | 393 | 387 325 | 382 | 376 | 370 | 365 | 359 | 354 | 348 |
| .080 | 416 | 413 | 409 | 403 | 398 | 392 387 | 386 | 380 | 375 | 369 | 364 | 359 | 352 |
| .081 | 421 | 418 | 413 | 408 | 403 | 397 | 391 | 385 | 379 | 374 | 368 | 363 | 357 |
| .082 | 426 | 423 | 418 | 413 | 407 | 401 | 396 | 390 | 384 | 378 | 373 | 367 | 361 |
| .083 | 431 | 428 | 423 | 418 | 412 | 406 | 400 | 394 | 388 | 383 | 377 | 372 | 365 |
| .084 | 436 | 433 | 428 | 423 | 417 | 411 | 405 | 399 | 393 | 387 | 381 | 376 | 370 |
| .085 | 442 | 438 | 433 | 428 | 422 | 416 | 410 | 403 | 397 | 391 | 386 | 381 | 374 |
| .086 | 447 | 443 | 438 | 432 | 427 | 420 | 414 | 408 | 402 | 396 | 390 | 385 | 378 |
| .087 | 452 | 448 | 443 | 437 | 431 | 425 | 419 | 412 | 406 | 400 | 395 | 389 | 383 |
| .088 | 457 | 453 | 448 | 442 | 436 | 430 | 423 | 417 | 411 | 405 | 399 | 394 | 387 |
| .089 | 462 | 458 | 453 | 447 | 441 | 434 | 428 | 422 | 415 | 409 | 403 | 398 | 392 |
| .090 | 467 | 463 | 458 | 452 | 446 | 439 | 433 | 426 | 420 | 414 | 408 | 402 | 396 |
| .091 | 472 | 467 | 463 | 457 | 450 | 444 | 437 | 431 | 424 | 418 | 412 | 407 | 400 |
| .092 | 477 | 472 | 467 | 461 | 455 | 449 | 442 | 435 | 429 | 423 | 417 | 411 | 405 |
| .093 | 482 | 477 | 472 | 466 | 460 | 453 | 447 | 440 | 433 | 427 | 421 | 415 | 409 |
| .094 | 487 | 482 | 477 | 471 | 465 | 458 | 451 | 444 | 438 | 431 | 425 | 419 | 413 |
| .095 | 492 | 487 | 482 | 476 | 469 | 463 | 456 | 449 | 442 | 436 | 430 | 424 | 418 |
| .096 | 497 | 492 | 487 | 481 | 474 | 467 | 460 | 453 | 447 | 440 | 434 | 428 | 422 |
| .097 | 502 | 497 | 492 | 486 | 479 | 472 | 465 | 458 | 451 | 445 | 438 | 432 | 426 |
| .098 | 507 | 502 | 497 | 490 | 484 | 477 | 470 | 463 | 456 | 449 | 443 | 437 | 431 |
| .099 | 512 | 507 | 502 | 495 | 488 | 481 | 474 | 467 | 460 | 454 | 447 | 441 | 435 |
| .100 | 517 | 512 | 506 | 500 | 493 | 486 | 479 | 472 | 465 | 458 | 451 | 445 | 439 |

S = 0 to 0.100

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.101 | 521 | 517 | 511 | 505 | 498 | 491 | 483 | 476 | 469 | 462 | 456 | 450 | 444 |
| .102 | 526 | 522 | 516 | 509 | 502 | 495 | 488 | 481 | 473 | 467 | 460 | 454 | 448 |
| .103 | 531 | 527 | 521 | 514 | 507 | 500 | 492 | 485 | 478 | 471 | 464 | 458 | 452 |
| .104 | 536 | 531 | 526 | 519 | 512 | 504 | 497 | 490 | 482 | 475 | 469 | 462 | 456 |
| .105 | 541 | 536 | 530 | 524 | 516 | 509 | 501 | 494 | 487 | 480 | 473 | 467 | 460 |
| .106 | 546 | 541 | 535 | 528 | 521 | 514 | 506 | 498 | 491 | 484 | 477 | 471 | 465 |
| .107 | 551 | 546 | 540 | 533 | 526 | 518 | 511 | 503 | 496 | 488 | 482 | 475 | 469 |
| .108 | 556 | 551 | 545 | 538 | 530 | 523 | 515 | 507 | 500 | 493 | 486 | 479 | 473 |
| .109 | 561 | 556 | 550 | 542 | 535 | 527 | 520 | 512 | 504 | 497 | 490 | 484 | 477 |
| .110 | 566 | 561 | 554 | 547 | 540 | 532 | 524 | 516 | 509 | 501 | 494 | 488 | 481 |
| .111 | 571 | 566 | 559 | 552 | 544 | 536 | 529 | 521 | 513 | 506 | 499 | 492 | 486 |
| .112 | 576 | 570 | 564 | 557 | 549 | 541 | 533 | 525 | 518 | 510 | 503 | 496 | 490 |
| .113 | 581 | 575 | 569 | 561 | 554 | 546 | 538 | 530 | 522 | 514 | 507 | 500 | 494 |
| .114 | 586 | 580 | 574 | 566 | 558 | 550 | 542 | 534 | 526 | 519 | 512 | 505 | 498 |
| .115 | 591 | 585 | 578 | 571 | 563 | 555 | 547 | 539 | 531 | 523 | 516 | 509 | 502 |
| .116 | 596 | 590 | 583 | 575 | 568 | 559 | 551 | 543 | 535 | 527 | 520 | 513 | 506 |
| .117 | 601 | 595 | 588 | 580 | 572 | 564 | 556 | 547 | 539 | 532 | 524 | 517 | 511 |
| .118 | 605 | 599 | 593 | 585 | 577 | 568 | 560 | 552 | 544 | 536 | 529 | 522 | 515 |
| .119 | 610 | 604 | 597 | 590 | 581 | 573 | 565 | 556 | 548 | 540 | 533 | 526 | 519 |
| .120 | 615 | 609 | 602 | 594 | 586 | 578 | 569 | 561 | 553 | 545 | 537 | 530 | 523 |
| .121 | 620 | 614 | 607 | 599 | 591 | 582 | 574 | 565 | 557 | 549 | 541 | 534 | 527 |
| .122 | 625 | 619 | 612 | 604 | 595 | 587 | 578 | 570 | 561 | 553 | 546 | 538 | 531 |
| .123 | 630 | 624 | 616 | 608 | 600 | 591 | 583 | 574 | 566 | 558 | 550 | 543 | 536 |
| .124 | 635 | 628 | 621 | 613 | 604 | 596 | 587 | 578 | 570 | 562 | 554 | 547 | 540 |
| .125 | 640 | 633 | 626 | 618 | 609 | 600 | 591 | 583 | 574 | 566 | 558 | 551 | 544 |
| .126 | 645 | 638 | 631 | 622 | 614 | 605 | 596 | 587 | 579 | 571 | 563 | 555 | 548 |
| .127 | 649 | 643 | 635 | 627 | 618 | 609 | 600 | 592 | 583 | 575 | 567 | 559 | 552 |
| .128 | 654 | 648 | 640 | 632 | 623 | 614 | 605 | 596 | 587 | 579 | 571 | 564 | 556 |
| .129 | 659 | 652 | 645 | 636 | 627 | 618 | 609 | 600 | 592 | 583 | 575 | 568 | 560 |
| .130 | 664 | 657 | 649 | 641 | 632 | 623 | 614 | 605 | 596 | 588 | 580 | 572 | 565 |
| .131 | 669 | 662 | 654 | 645 | 637 | 627 | 618 | 609 | 600 | 592 | 584 | 576 | 569 |
| .132 | 674 | 667 | 659 | 650 | 641 | 632 | 623 | 614 | 605 | 596 | 588 | 580 | 573 |
| .133 | 679 | 671 | 664 | 655 | 646 | 636 | 627 | 618 | 609 | 601 | 592 | 585 | 577 |
| .134 | 683 | 676 | 668 | 659 | 650 | 641 | 632 | 622 | 613 | 605 | 597 | 589 | 581 |
| .135 | 688 | 681 | 673 | 664 | 655 | 645 | 636 | 627 | 618 | 609 | 601 | 593 | 585 |
| .136 | 693 | 686 | 678 | 669 | 659 | 650 | 640 | 631 | 622 | 613 | 605 | 597 | 589 |
| .137 | 698 | 690 | 682 | 673 | 664 | 654 | 645 | 635 | 626 | 618 | 609 | 601 | 594 |
| .138 | 703 | 695 | 687 | 678 | 668 | 659 | 649 | 640 | 631 | 622 | 613 | 605 | 598 |
| .139 | 708 | 700 | 692 | 682 | 673 | 663 | 654 | 644 | 635 | 626 | 618 | 610 | 602 |
| .140 | 712 | 705 | 696 | 687 | 678 | 668 | 658 | 649 | 639 | 630 | 622 | 614 | 606 |
| .141 | 717 | 709 | 701 | 692 | 682 | 672 | 663 | 653 | 644 | 635 | 626 | 618 | 610 |
| .142 | 722 | 714 | 706 | 696 | 687 | 677 | 667 | 657 | 648 | 639 | 630 | 622 | 614 |
| .143 | 727 | 719 | 710 | 701 | 691 | 681 | 671 | 662 | 652 | 643 | 634 | 626 | 618 |
| .144 | 732 | 724 | 715 | 705 | 696 | 686 | 676 | 666 | 657 | 647 | 639 | 630 | 622 |
| .145 | 736 | 728 | 720 | 710 | 700 | 690 | 680 | 670 | 661 | 652 | 643 | 634 | 626 |
| .146 | 741 | 733 | 724 | 715 | 705 | 695 | 685 | 675 | 665 | 656 | 647 | 639 | 631 |
| .147 | 746 | 738 | 729 | 719 | 709 | 699 | 689 | 679 | 669 | 660 | 651 | 643 | 635 |
| .148 | 751 | 743 | 734 | 724 | 714 | 704 | 693 | 683 | 674 | 664 | 655 | 647 | 639 |
| .149 | 756 | 747 | 738 | 728 | 718 | 708 | 698 | 688 | 678 | 669 | 660 | 651 | 643 |
| .150 | 760 | 752 | 743 | 733 | 723 | 712 | 702 | 692 | 682 | 673 | 664 | 655 | 647 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.151 | 765 | 757 | 748 | 738 | 727 | 717 | 707 | 696 | 687 | 677 | 668 | 659 | 651 |
| .152 | 770 | 761 | 752 | 742 | 732 | 721 | 711 | 701 | 691 | 681 | 672 | 663 | 655 |
| .153 | 775 | 766 | 757 | 747 | 736 | 726 | 715 | 705 | 695 | 686 | 676 | 668 | 659 |
| .154 | 779 | 771 | 761 | 751 | 741 | 730 | 720 | 709 | 699 | 690 | 681 | 672 | 663 |
| .155 | 784 | 775 | 766 | 756 | 745 | 735 | 724 | 714 | 704 | 694 | 685 | 676 | 667 |
| .156 | 789 | 780 | 771 | 760 | 750 | 739 | 728 | 718 | 708 | 698 | 689 | 680 | 671 |
| .157 | 794 | 785 | 775 | 765 | 754 | 743 | 733 | 722 | 712 | 702 | 693 | 684 | 676 |
| .158 | 798 | 789 | 780 | 769 | 759 | 748 | 737 | 727 | 716 | 707 | 697 | 688 | 680 |
| .159 | 803 | 794 | 785 | 774 | 763 | 752 | 742 | 731 | 721 | 711 | 701 | 692 | 684 |
| .160 | 808 | 799 | 789 | 778 | 768 | 757 | 746 | 735 | 725 | 715 | 706 | 696 | 688 |
| .161 | 813 | 803 | 794 | 783 | 772 | 761 | 750 | 740 | 729 | 719 | 710 | 701 | 692 |
| .162 | 817 | 808 | 798 | 788 | 777 | 766 | 755 | 744 | 733 | 723 | 714 | 705 | 696 |
| .163 | 822 | 813 | 803 | 792 | 781 | 770 | 759 | 748 | 738 | 728 | 718 | 709 | 700 |
| .164 | 827 | 817 | 807 | 797 | 786 | 774 | 763 | 752 | 742 | 732 | 722 | 713 | 704 |
| .165 | 832 | 822 | 812 | 801 | 790 | 779 | 768 | 757 | 746 | 736 | 726 | 717 | 708 |
| .166 | 836 | 827 | 817 | 806 | 795 | 783 | 772 | 761 | 750 | 740 | 730 | 721 | 712 |
| .167 | 841 | 831 | 821 | 810 | 799 | 788 | 776 | 765 | 755 | 744 | 735 | 725 | 716 |
| .168 | 846 | 836 | 826 | 815 | 803 | 792 | 781 | 770 | 759 | 749 | 739 | 729 | 720 |
| .169 | 850 | 841 | 830 | 819 | 808 | 796 | 785 | 774 | 763 | 753 | 743 | 733 | 724 |
| .170 | 855 | 845 | 835 | 824 | 812 | 801 | 789 | 778 | 767 | 757 | 747 | 737 | 728 |
| .171 | 860 | 850 | 839 | 828 | 817 | 805 | 794 | 782 | 772 | 761 | 751 | 742 | 732 |
| .172 | 864 | 855 | 844 | 833 | 821 | 809 | 798 | 787 | 776 | 765 | 755 | 746 | 736 |
| .173 | 869 | 859 | 849 | 837 | 826 | 814 | 802 | 791 | 780 | 769 | 759 | 750 | 740 |
| .174 | 874 | 864 | 853 | 842 | 830 | 818 | 807 | 795 | 784 | 774 | 763 | 754 | 745 |
| .175 | 878 | 868 | 858 | 846 | 834 | 823 | 811 | 799 | 788 | 778 | 768 | 758 | 749 |
| .176 | 883 | 873 | 862 | 851 | 839 | 827 | 815 | 804 | 793 | 782 | 772 | 762 | 753 |
| .177 | 888 | 878 | 867 | 855 | 843 | 831 | 820 | 808 | 797 | 786 | 776 | 766 | 757 |
| .178 | 892 | 882 | 871 | 860 | 848 | 836 | 824 | 812 | 801 | 790 | 780 | 770 | 761 |
| .179 | 897 | 887 | 876 | 864 | 852 | 840 | 828 | 816 | 805 | 794 | 784 | 774 | 765 |
| .180 | 902 | 891 | 880 | 868 | 857 | 844 | 832 | 821 | 809 | 799 | 788 | 778 | 769 |
| .181 | 906 | 896 | 885 | 873 | 861 | 849 | 837 | 825 | 814 | 803 | 792 | 782 | 773 |
| .182 | 911 | 901 | 889 | 877 | 865 | 853 | 841 | 829 | 818 | 807 | 796 | 786 | 777 |
| .183 | 916 | 905 | 894 | 882 | 870 | 857 | 845 | 833 | 822 | 811 | 800 | 790 | 781 |
| .184 | 920 | 910 | 898 | 886 | 874 | 862 | 850 | 838 | 826 | 815 | 805 | 794 | 785 |
| .185 | 925 | 914 | 903 | 891 | 879 | 866 | 854 | 842 | 830 | 819 | 809 | 798 | 789 |
| .186 | 930 | 919 | 907 | 895 | 883 | 870 | 858 | 846 | 835 | 823 | 813 | 803 | 793 |
| .187 | 934 | 923 | 912 | 900 | 887 | 875 | 862 | 850 | 839 | 828 | 817 | 807 | 797 |
| .188 | 939 | 928 | 916 | 904 | 892 | 879 | 867 | 855 | 843 | 832 | 821 | 811 | 801 |
| .189 | 944 | 932 | 921 | 909 | 896 | 883 | 871 | 859 | 847 | 836 | 825 | 815 | 805 |
| .190 | 948 | 937 | 925 | 913 | 900 | 888 | 875 | 863 | 851 | 840 | 829 | 819 | 809 |
| .191 | 953 | 942 | 930 | 917 | 905 | 892 | 880 | 867 | 855 | 844 | 833 | 823 | 813 |
| .192 | 957 | 946 | 934 | 922 | 909 | 896 | 884 | 871 | 860 | 848 | 837 | 827 | 817 |
| .193 | 962 | 951 | 939 | 926 | 914 | 901 | 888 | 876 | 864 | 852 | 841 | 831 | 821 |
| .194 | 967 | 955 | 943 | 931 | 918 | 905 | 892 | 880 | 868 | 856 | 845 | 835 | 825 |
| .195 | 971 | 960 | 948 | 935 | 922 | 909 | 897 | 884 | 872 | 860 | 849 | 839 | 829 |
| .196 | 976 | 964 | 952 | 939 | 927 | 914 | 901 | 888 | 876 | 865 | 853 | 843 | 833 |
| .197 | 980 | 969 | 957 | 944 | 931 | 918 | 905 | 892 | 880 | 869 | 858 | 847 | 837 |
| .198 | 985 | 973 | 961 | 948 | 935 | 922 | 909 | 897 | 884 | 873 | 862 | 851 | 841 |
| .199 | 989 | 978 | 966 | 953 | 940 | 926 | 914 | 901 | 889 | 877 | 866 | 855 | 845 |
| .200 | 994 | 982 | 970 | 957 | 944 | 931 | 918 | 905 | 893 | 881 | 870 | 859 | 849 |

S = 0.101 to 0.200

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.201 | 999 | 987 | 974 | 961 | 948 | 935 | 922 | 909 | 897 | 885 | 874 | 863 | 853 |
| .202 | 1003 | 991 | 979 | 966 | 953 | 939 | 926 | 913 | 901 | 889 | 878 | 867 | 857 |
| .203 | 1008 | 996 | 983 | 970 | 957 | 943 | 930 | 917 | 905 | 893 | 882 | 871 | 861 |
| .204 | 1012 | 1000 | 988 | 974 | 961 | 948 | 935 | 922 | 909 | 897 | 886 | 875 | 865 |
| .205 | 1017 | 1005 | 992 | 979 | 965 | 952 | 939 | 926 | 913 | 901 | 890 | 879 | 869 |
| .206 | 1021 | 1009 | 996 | 983 | 970 | 956 | 943 | 930 | 917 | 905 | 894 | 883 | 873 |
| .207 | 1026 | 1014 | 1001 | 987 | 974 | 960 | 947 | 934 | 922 | 910 | 898 | 887 | 877 |
| .208 | 1030 | 1018 | 1005 | 992 | 978 | 965 | 951 | 938 | 926 | 914 | 902 | 891 | 881 |
| .209 | 1035 | 1022 | 1010 | 996 | 983 | 969 | 955 | 942 | 930 | 918 | 906 | 895 | 885 |
| .210 | 1039 | 1027 | 1014 | 1000 | 987 | 973 | 960 | 946 | 934 | 922 | 910 | 899 | 889 |
| .211 | 1044 | 1031 | 1018 | 1005 | 991 | 977 | 964 | 951 | 938 | 926 | 914 | 903 | 893 |
| .212 | 1048 | 1036 | 1023 | 1009 | 995 | 981 | 968 | 955 | 942 | 930 | 918 | 907 | 897 |
| .213 | 1053 | 1040 | 1027 | 1013 | 1000 | 986 | 972 | 959 | 946 | 934 | 922 | 911 | 901 |
| .214 | 1057 | 1045 | 1031 | 1018 | 1004 | 990 | 976 | 963 | 950 | 938 | 926 | 915 | 905 |
| .215 | 1062 | 1049 | 1036 | 1022 | 1008 | 994 | 980 | 967 | 954 | 942 | 930 | 919 | 909 |
| .216 | 1066 | 1053 | 1040 | 1026 | 1012 | 998 | 985 | 971 | 958 | 946 | 934 | 923 | 913 |
| .217 | 1071 | 1058 | 1045 | 1031 | 1017 | 1003 | 989 | 975 | 962 | 950 | 938 | 927 | 917 |
| .218 | 1075 | 1062 | 1049 | 1035 | 1021 | 1007 | 993 | 979 | 967 | 954 | 942 | 931 | 921 |
| .219 | 1080 | 1067 | 1053 | 1039 | 1025 | 1011 | 997 | 984 | 971 | 958 | 947 | 935 | 925 |
| .220 | 1084 | 1071 | 1058 | 1043 | 1029 | 1015 | 1001 | 988 | 975 | 962 | 951 | 939 | 929 |
| .221 | 1088 | 1075 | 1062 | 1048 | 1034 | 1019 | 1005 | 992 | 979 | 966 | 955 | 943 | 933 |
| .222 | 1093 | 1080 | 1066 | 1052 | 1038 | 1023 | 1010 | 996 | 983 | 970 | 959 | 947 | 937 |
| .223 | 1097 | 1084 | 1071 | 1056 | 1042 | 1028 | 1014 | 1000 | 987 | 974 | 963 | 951 | 940 |
| .224 | 1102 | 1089 | 1075 | 1061 | 1046 | 1032 | 1018 | 1004 | 991 | 978 | 967 | 955 | 944 |
| .225 | 1106 | 1093 | 1079 | 1065 | 1051 | 1036 | 1022 | 1008 | 995 | 982 | 971 | 959 | 948 |
| .226 | 1111 | 1097 | 1084 | 1069 | 1055 | 1040 | 1026 | 1012 | 999 | 987 | 975 | 963 | 952 |
| .227 | 1115 | 1102 | 1088 | 1073 | 1059 | 1044 | 1030 | 1016 | 1003 | 991 | 979 | 967 | 956 |
| .228 | 1120 | 1106 | 1092 | 1078 | 1063 | 1049 | 1034 | 1020 | 1007 | 995 | 983 | 971 | 960 |
| .229 | 1124 | 1111 | 1097 | 1082 | 1067 | 1053 | 1038 | 1025 | 1011 | 999 | 987 | 975 | 964 |
| .230 | 1128 | 1115 | 1101 | 1086 | 1072 | 1057 | 1043 | 1029 | 1015 | 1003 | 990 | 979 | 968 |
| .231 | 1133 | 1119 | 1105 | 1091 | 1076 | 1061 | 1047 | 1033 | 1019 | 1007 | 994 | 983 | 972 |
| .232 | 1137 | 1124 | 1110 | 1095 | 1080 | 1065 | 1051 | 1037 | 1023 | 1011 | 998 | 987 | 976 |
| .233 | 1142 | 1128 | 1114 | 1099 | 1084 | 1069 | 1055 | 1041 | 1027 | 1015 | 1002 | 991 | 980 |
| .234 | 1146 | 1132 | 1118 | 1103 | 1088 | 1074 | 1059 | 1045 | 1031 | 1019 | 1006 | 995 | 984 |
| .235 | 1151 | 1137 | 1123 | 1108 | 1093 | 1078 | 1063 | 1049 | 1035 | 1023 | 1010 | 999 | 988 |
| .236 | 1155 | 1141 | 1127 | 1112 | 1097 | 1082 | 1067 | 1053 | 1040 | 1027 | 1014 | 1003 | 992 |
| .237 | 1159 | 1145 | 1131 | 1116 | 1101 | 1086 | 1071 | 1057 | 1044 | 1031 | 1018 | 1007 | 995 |
| .238 | 1164 | 1150 | 1135 | 1120 | 1105 | 1090 | 1076 | 1061 | 1048 | 1035 | 1022 | 1010 | 999 |
| .239 | 1168 | 1154 | 1140 | 1125 | 1109 | 1094 | 1080 | 1065 | 1052 | 1039 | 1026 | 1014 | 1003 |
| .240 | 1173 | 1159 | 1144 | 1129 | 1114 | 1098 | 1084 | 1069 | 1056 | 1043 | 1030 | 1018 | 1007 |
| .241 | 1177 | 1163 | 1148 | 1133 | 1118 | 1103 | 1088 | 1073 | 1060 | 1047 | 1034 | 1022 | 1011 |
| .242 | 1181 | 1167 | 1153 | 1137 | 1122 | 1107 | 1092 | 1077 | 1064 | 1051 | 1038 | 1026 | 1015 |
| .243 | 1186 | 1172 | 1157 | 1142 | 1126 | 1111 | 1096 | 1082 | 1068 | 1055 | 1042 | 1030 | 1019 |
| .244 | 1190 | 1176 | 1161 | 1146 | 1130 | 1115 | 1100 | 1086 | 1072 | 1058 | 1046 | 1034 | 1023 |
| .245 | 1195 | 1180 | 1165 | 1150 | 1135 | 1119 | 1104 | 1090 | 1076 | 1062 | 1050 | 1038 | 1027 |
| .246 | 1199 | 1185 | 1170 | 1154 | 1139 | 1123 | 1108 | 1094 | 1080 | 1066 | 1054 | 1042 | 1030 |
| .247 | 1203 | 1189 | 1174 | 1158 | 1143 | 1127 | 1112 | 1098 | 1084 | 1070 | 1058 | 1046 | 1034 |
| .248 | 1208 | 1193 | 1178 | 1163 | 1147 | 1132 | 1116 | 1102 | 1088 | 1074 | 1062 | 1050 | 1038 |
| .249 | 1212 | 1197 | 1182 | 1167 | 1151 | 1136 | 1121 | 1106 | 1092 | 1078 | 1066 | 1054 | 1042 |
| .250 | 1216 | 1202 | 1187 | 1171 | 1155 | 1140 | 1125 | 1110 | 1096 | 1082 | 1070 | 1057 | 1046 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.251 | 1221 | 1206 | 1191 | 1175 | 1160 | 1144 | 1129 | 1114 | 1100 | 1086 | 1073 | 1061 | 1050 |
| .252 | 1225 | 1210 | 1195 | 1179 | 1164 | 1148 | 1133 | 1118 | 1104 | 1090 | 1077 | 1065 | 1054 |
| .253 | 1230 | 1215 | 1200 | 1184 | 1168 | 1152 | 1137 | 1122 | 1108 | 1094 | 1081 | 1069 | 1057 |
| .254 | 1234 | 1219 | 1204 | 1188 | 1172 | 1156 | 1141 | 1126 | 1112 | 1098 | 1085 | 1073 | 1061 |
| .255 | 1238 | 1223 | 1208 | 1192 | 1176 | 1160 | 1145 | 1130 | 1116 | 1102 | 1089 | 1077 | 1065 |
| .256 | 1243 | 1228 | 1212 | 1196 | 1180 | 1164 | 1149 | 1134 | 1120 | 1106 | 1093 | 1081 | 1069 |
| .257 | 1247 | 1232 | 1216 | 1200 | 1185 | 1169 | 1153 | 1138 | 1124 | 1110 | 1097 | 1085 | 1073 |
| .258 | 1251 | 1236 | 1221 | 1205 | 1189 | 1173 | 1157 | 1142 | 1128 | 1114 | 1101 | 1088 | 1077 |
| .259 | 1256 | 1240 | 1225 | 1209 | 1193 | 1177 | 1161 | 1146 | 1132 | 1118 | 1105 | 1092 | 1081 |
| .260 | 1260 | 1245 | 1229 | 1213 | 1197 | 1181 | 1165 | 1150 | 1136 | 1122 | 1109 | 1096 | 1084 |
| .261 | 1264 | 1249 | 1233 | 1217 | 1201 | 1185 | 1169 | 1154 | 1139 | 1126 | 1113 | 1100 | 1088 |
| .262 | 1269 | 1253 | 1238 | 1221 | 1205 | 1189 | 1173 | 1158 | 1143 | 1130 | 1116 | 1104 | 1092 |
| .263 | 1273 | 1258 | 1242 | 1226 | 1209 | 1193 | 1177 | 1162 | 1147 | 1133 | 1120 | 1108 | 1096 |
| .264 | 1277 | 1262 | 1246 | 1230 | 1213 | 1197 | 1181 | 1166 | 1151 | 1137 | 1124 | 1112 | 1100 |
| .265 | 1282 | 1266 | 1250 | 1234 | 1218 | 1201 | 1185 | 1170 | 1155 | 1141 | 1128 | 1115 | 1103 |
| .266 | 1286 | 1270 | 1255 | 1238 | 1222 | 1205 | 1189 | 1174 | 1159 | 1145 | 1132 | 1119 | 1107 |
| .267 | 1290 | 1275 | 1259 | 1242 | 1226 | 1209 | 1194 | 1178 | 1163 | 1149 | 1136 | 1123 | 1111 |
| .268 | 1295 | 1279 | 1263 | 1246 | 1230 | 1214 | 1198 | 1182 | 1167 | 1153 | 1140 | 1127 | 1115 |
| .269 | 1299 | 1283 | 1267 | 1251 | 1234 | 1218 | 1202 | 1186 | 1171 | 1157 | 1144 | 1131 | 1119 |
| .270 | 1303 | 1287 | 1271 | 1255 | 1238 | 1222 | 1206 | 1190 | 1175 | 1161 | 1147 | 1135 | 1122 |
| .271 | 1307 | 1292 | 1276 | 1259 | 1242 | 1226 | 1210 | 1194 | 1179 | 1165 | 1151 | 1138 | 1126 |
| .272 | 1312 | 1296 | 1280 | 1263 | 1246 | 1230 | 1214 | 1198 | 1183 | 1169 | 1155 | 1142 | 1130 |
| .273 | 1316 | 1300 | 1284 | 1267 | 1250 | 1234 | 1218 | 1202 | 1187 | 1173 | 1159 | 1146 | 1134 |
| .274 | 1320 | 1304 | 1288 | 1271 | 1255 | 1238 | 1222 | 1206 | 1191 | 1176 | 1163 | 1150 | 1138 |
| .275 | 1325 | 1309 | 1292 | 1275 | 1259 | 1242 | 1226 | 1210 | 1195 | 1180 | 1167 | 1154 | 1141 |
| .276 | 1329 | 1313 | 1297 | 1280 | 1263 | 1246 | 1230 | 1214 | 1199 | 1184 | 1171 | 1157 | 1145 |
| .277 | 1333 | 1317 | 1301 | 1284 | 1267 | 1250 | 1234 | 1218 | 1203 | 1188 | 1174 | 1161 | 1149 |
| .278 | 1338 | 1321 | 1305 | 1288 | 1271 | 1254 | 1238 | 1222 | 1207 | 1192 | 1178 | 1165 | 1153 |
| .279 | 1342 | 1326 | 1309 | 1292 | 1275 | 1258 | 1242 | 1226 | 1210 | 1196 | 1182 | 1169 | 1156 |
| .280 | 1346 | 1330 | 1313 | 1296 | 1279 | 1262 | 1246 | 1230 | 1214 | 1200 | 1186 | 1173 | 1160 |
| .281 | 1350 | 1334 | 1317 | 1300 | 1283 | 1266 | 1250 | 1234 | 1218 | 1204 | 1190 | 1176 | 1164 |
| .282 | 1355 | 1338 | 1322 | 1304 | 1287 | 1270 | 1254 | 1238 | 1222 | 1208 | 1194 | 1180 | 1168 |
| .283 | 1359 | 1342 | 1326 | 1308 | 1291 | 1274 | 1258 | 1242 | 1226 | 1211 | 1197 | 1184 | 1171 |
| .284 | 1363 | 1347 | 1330 | 1313 | 1295 | 1278 | 1262 | 1246 | 1230 | 1215 | 1201 | 1188 | 1175 |
| .285 | 1367 | 1351 | 1334 | 1317 | 1300 | 1282 | 1266 | 1249 | 1234 | 1219 | 1205 | 1192 | 1179 |
| .286 | 1372 | 1355 | 1338 | 1321 | 1304 | 1286 | 1270 | 1253 | 1238 | 1223 | 1209 | 1195 | 1183 |
| .287 | 1376 | 1359 | 1342 | 1325 | 1308 | 1290 | 1274 | 1257 | 1242 | 1227 | 1213 | 1199 | 1186 |
| .288 | 1380 | 1363 | 1347 | 1329 | 1312 | 1294 | 1278 | 1261 | 1246 | 1231 | 1216 | 1203 | 1190 |
| .289 | 1384 | 1368 | 1351 | 1333 | 1316 | 1298 | 1282 | 1265 | 1250 | 1235 | 1220 | 1207 | 1194 |
| .290 | 1389 | 1372 | 1355 | 1337 | 1320 | 1302 | 1286 | 1269 | 1253 | 1238 | 1224 | 1210 | 1198 |
| .291 | 1393 | 1376 | 1359 | 1341 | 1324 | 1306 | 1290 | 1273 | 1257 | 1242 | 1228 | 1214 | 1201 |
| .292 | 1397 | 1380 | 1363 | 1345 | 1328 | 1311 | 1294 | 1277 | 1261 | 1246 | 1232 | 1218 | 1205 |
| .293 | 1401 | 1384 | 1367 | 1350 | 1332 | 1315 | 1298 | 1281 | 1265 | 1250 | 1235 | 1222 | 1209 |
| .294 | 1406 | 1389 | 1371 | 1354 | 1336 | 1319 | 1302 | 1285 | 1269 | 1254 | 1239 | 1225 | 1212 |
| .295 | 1410 | 1393 | 1376 | 1358 | 1340 | 1323 | 1305 | 1289 | 1273 | 1258 | 1243 | 1229 | 1216 |
| .296 | 1414 | 1397 | 1380 | 1362 | 1344 | 1327 | 1309 | 1293 | 1277 | 1261 | 1247 | 1233 | 1220 |
| .297 | 1418 | 1401 | 1384 | 1366 | 1348 | 1331 | 1313 | 1297 | 1281 | 1265 | 1251 | 1237 | 1223 |
| .298 | 1422 | 1405 | 1388 | 1370 | 1352 | 1335 | 1317 | 1301 | 1284 | 1269 | 1254 | 1240 | 1227 |
| .299 | 1427 | 1409 | 1392 | 1374 | 1356 | 1339 | 1321 | 1304 | 1288 | 1273 | 1258 | 1244 | 1231 |
| .300 | 1431 | 1414 | 1396 | 1378 | 1360 | 1343 | 1325 | 1308 | 1292 | 1277 | 1262 | 1248 | 1235 |

S = 0.201 to 0.300

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.301 | 1435 | 1418 | 1400 | 1382 | 1364 | 1346 | 1329 | 1312 | 1296 | 1281 | 1266 | 1252 | 1238 |
| .302 | 1439 | 1422 | 1404 | 1386 | 1368 | 1350 | 1333 | 1316 | 1300 | 1284 | 1269 | 1255 | 1242 |
| .303 | 1443 | 1426 | 1408 | 1390 | 1372 | 1354 | 1337 | 1320 | 1304 | 1288 | 1273 | 1259 | 1245 |
| .304 | 1448 | 1430 | 1412 | 1394 | 1376 | 1358 | 1341 | 1324 | 1308 | 1292 | 1277 | 1263 | 1249 |
| .305 | 1452 | 1434 | 1417 | 1398 | 1380 | 1362 | 1345 | 1328 | 1312 | 1296 | 1281 | 1266 | 1253 |
| .306 | 1456 | 1438 | 1421 | 1402 | 1384 | 1366 | 1349 | 1332 | 1315 | 1300 | 1284 | 1270 | 1256 |
| .307 | 1460 | 1442 | 1425 | 1406 | 1388 | 1370 | 1353 | 1336 | 1319 | 1303 | 1288 | 1274 | 1260 |
| .308 | 1464 | 1447 | 1429 | 1410 | 1392 | 1374 | 1357 | 1340 | 1323 | 1307 | 1292 | 1277 | 1264 |
| .309 | 1468 | 1451 | 1433 | 1414 | 1396 | 1378 | 1361 | 1344 | 1327 | 1311 | 1296 | 1281 | 1267 |
| .310 | 1472 | 1455 | 1437 | 1418 | 1400 | 1382 | 1365 | 1347 | 1331 | 1315 | 1299 | 1285 | 1271 |
| .311 | 1477 | 1459 | 1441 | 1422 | 1404 | 1386 | 1369 | 1351 | 1335 | 1319 | 1303 | 1288 | 1274 |
| .312 | 1481 | 1463 | 1445 | 1427 | 1408 | 1390 | 1373 | 1355 | 1339 | 1322 | 1307 | 1292 | 1278 |
| .313 | 1485 | 1467 | 1449 | 1431 | 1412 | 1394 | 1376 | 1359 | 1342 | 1326 | 1311 | 1296 | 1282 |
| .314 | 1489 | 1471 | 1453 | 1435 | 1416 | 1398 | 1380 | 1363 | 1346 | 1330 | 1314 | 1299 | 1285 |
| .315 | 1493 | 1475 | 1457 | 1439 | 1420 | 1402 | 1384 | 1367 | 1350 | 1334 | 1318 | 1303 | 1289 |
| .316 | 1497 | 1479 | 1461 | 1443 | 1424 | 1406 | 1388 | 1371 | 1354 | 1337 | 1322 | 1307 | 1293 |
| .317 | 1501 | 1483 | 1465 | 1447 | 1428 | 1410 | 1392 | 1375 | 1358 | 1341 | 1326 | 1310 | 1296 |
| .318 | 1506 | 1488 | 1469 | 1451 | 1432 | 1414 | 1396 | 1379 | 1362 | 1345 | 1329 | 1314 | 1300 |
| .319 | 1510 | 1492 | 1473 | 1455 | 1436 | 1418 | 1400 | 1382 | 1365 | 1349 | 1333 | 1318 | 1303 |
| .320 | 1514 | 1496 | 1477 | 1459 | 1440 | 1422 | 1404 | 1386 | 1369 | 1353 | 1337 | 1321 | 1307 |
| .321 | 1518 | 1500 | 1481 | 1463 | 1444 | 1426 | 1408 | 1390 | 1373 | 1356 | 1340 | 1325 | 1310 |
| .322 | 1522 | 1504 | 1485 | 1467 | 1448 | 1430 | 1412 | 1394 | 1377 | 1360 | 1344 | 1329 | 1314 |
| .323 | 1526 | 1508 | 1489 | 1471 | 1452 | 1434 | 1416 | 1398 | 1381 | 1364 | 1348 | 1332 | 1318 |
| .324 | 1530 | 1512 | 1493 | 1475 | 1456 | 1437 | 1419 | 1402 | 1384 | 1368 | 1351 | 1336 | 1321 |
| .325 | 1534 | 1516 | 1498 | 1479 | 1460 | 1441 | 1423 | 1406 | 1388 | 1371 | 1355 | 1340 | 1325 |
| .326 | 1539 | 1520 | 1502 | 1483 | 1464 | 1445 | 1427 | 1409 | 1392 | 1375 | 1359 | 1343 | 1328 |
| .327 | 1543 | 1524 | 1506 | 1487 | 1468 | 1449 | 1431 | 1413 | 1396 | 1379 | 1363 | 1347 | 1332 |
| .328 | 1547 | 1528 | 1510 | 1491 | 1472 | 1453 | 1435 | 1417 | 1400 | 1383 | 1366 | 1351 | 1336 |
| .329 | 1551 | 1532 | 1514 | 1495 | 1476 | 1457 | 1439 | 1421 | 1404 | 1386 | 1370 | 1354 | 1339 |
| .330 | 1555 | 1536 | 1518 | 1498 | 1480 | 1461 | 1443 | 1425 | 1407 | 1390 | 1374 | 1358 | 1343 |
| .331 | 1559 | 1540 | 1522 | 1502 | 1484 | 1465 | 1447 | 1429 | 1411 | 1394 | 1377 | 1361 | 1346 |
| .332 | 1563 | 1544 | 1526 | 1506 | 1487 | 1469 | 1451 | 1433 | 1415 | 1398 | 1381 | 1365 | 1350 |
| .333 | 1567 | 1549 | 1530 | 1510 | 1491 | 1473 | 1454 | 1436 | 1419 | 1401 | 1385 | 1369 | 1353 |
| .334 | 1571 | 1553 | 1534 | 1514 | 1495 | 1477 | 1458 | 1440 | 1422 | 1405 | 1388 | 1372 | 1357 |
| .335 | 1575 | 1557 | 1538 | 1518 | 1499 | 1481 | 1462 | 1444 | 1426 | 1409 | 1392 | 1376 | 1360 |
| .336 | 1579 | 1561 | 1542 | 1522 | 1503 | 1484 | 1466 | 1448 | 1430 | 1412 | 1396 | 1379 | 1364 |
| .337 | 1584 | 1565 | 1546 | 1526 | 1507 | 1488 | 1470 | 1452 | 1434 | 1416 | 1399 | 1383 | 1368 |
| .338 | 1588 | 1569 | 1550 | 1530 | 1511 | 1492 | 1474 | 1455 | 1438 | 1420 | 1403 | 1387 | 1371 |
| .339 | 1592 | 1573 | 1554 | 1534 | 1515 | 1496 | 1478 | 1459 | 1441 | 1424 | 1407 | 1390 | 1375 |
| .340 | 1596 | 1577 | 1558 | 1538 | 1519 | 1500 | 1481 | 1463 | 1445 | 1427 | 1410 | 1394 | 1378 |
| .341 | 1600 | 1581 | 1562 | 1542 | 1523 | 1504 | 1485 | 1467 | 1449 | 1431 | 1414 | 1397 | 1382 |
| .342 | 1604 | 1585 | 1566 | 1546 | 1527 | 1508 | 1489 | 1471 | 1453 | 1435 | 1418 | 1401 | 1385 |
| .343 | 1608 | 1589 | 1570 | 1550 | 1531 | 1512 | 1493 | 1475 | 1456 | 1438 | 1421 | 1405 | 1389 |
| .344 | 1612 | 1593 | 1574 | 1554 | 1535 | 1516 | 1497 | 1478 | 1460 | 1442 | 1425 | 1408 | 1392 |
| .345 | 1616 | 1597 | 1578 | 1558 | 1538 | 1519 | 1501 | 1482 | 1464 | 1446 | 1428 | 1412 | 1396 |
| .346 | 1620 | 1601 | 1582 | 1562 | 1542 | 1523 | 1504 | 1486 | 1468 | 1450 | 1432 | 1415 | 1399 |
| .347 | 1624 | 1605 | 1586 | 1566 | 1546 | 1527 | 1508 | 1490 | 1471 | 1453 | 1436 | 1419 | 1403 |
| .348 | 1628 | 1609 | 1590 | 1570 | 1550 | 1531 | 1512 | 1493 | 1475 | 1457 | 1439 | 1423 | 1406 |
| .349 | 1632 | 1613 | 1593 | 1574 | 1554 | 1535 | 1516 | 1497 | 1479 | 1461 | 1443 | 1426 | 1410 |
| .350 | 1636 | 1617 | 1597 | 1578 | 1558 | 1539 | 1520 | 1501 | 1483 | 1464 | 1447 | 1430 | 1413 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.351 | 1640 | 1621 | 1601 | 1582 | 1562 | 1543 | 1524 | 1505 | 1486 | 1468 | 1450 | 1433 | 1417 |
| .352 | 1644 | 1625 | 1605 | 1585 | 1566 | 1546 | 1527 | 1509 | 1490 | 1472 | 1454 | 1437 | 1421 |
| .353 | 1648 | 1629 | 1609 | 1589 | 1570 | 1550 | 1531 | 1512 | 1494 | 1475 | 1458 | 1440 | 1424 |
| .354 | 1653 | 1633 | 1613 | 1593 | 1574 | 1554 | 1535 | 1516 | 1498 | 1479 | 1461 | 1444 | 1428 |
| .355 | 1657 | 1637 | 1617 | 1597 | 1577 | 1558 | 1539 | 1520 | 1501 | 1483 | 1465 | 1448 | 1431 |
| .356 | 1661 | 1641 | 1621 | 1601 | 1581 | 1562 | 1543 | 1524 | 1505 | 1486 | 1468 | 1451 | 1435 |
| .357 | 1665 | 1645 | 1625 | 1605 | 1585 | 1566 | 1547 | 1527 | 1509 | 1490 | 1472 | 1455 | 1438 |
| .358 | 1669 | 1649 | 1629 | 1609 | 1589 | 1570 | 1550 | 1531 | 1512 | 1494 | 1476 | 1458 | 1442 |
| .359 | 1673 | 1653 | 1633 | 1613 | 1593 | 1573 | 1554 | 1535 | 1516 | 1497 | 1479 | 1462 | 1445 |
| .360 | 1677 | 1657 | 1637 | 1617 | 1597 | 1577 | 1558 | 1539 | 1520 | 1501 | 1483 | 1465 | 1448 |
| .361 | 1681 | 1661 | 1641 | 1621 | 1601 | 1581 | 1562 | 1543 | 1524 | 1505 | 1486 | 1469 | 1452 |
| .362 | 1685 | 1665 | 1645 | 1625 | 1605 | 1585 | 1566 | 1546 | 1527 | 1508 | 1490 | 1472 | 1455 |
| .363 | 1689 | 1669 | 1649 | 1628 | 1608 | 1589 | 1569 | 1550 | 1531 | 1512 | 1494 | 1476 | 1459 |
| .364 | 1693 | 1673 | 1653 | 1632 | 1612 | 1593 | 1573 | 1554 | 1535 | 1516 | 1497 | 1479 | 1462 |
| .365 | 1697 | 1677 | 1657 | 1636 | 1616 | 1596 | 1577 | 1558 | 1538 | 1519 | 1501 | 1483 | 1466 |
| .366 | 1701 | 1681 | 1661 | 1640 | 1620 | 1600 | 1581 | 1561 | 1542 | 1523 | 1504 | 1486 | 1469 |
| .367 | 1705 | 1685 | 1665 | 1644 | 1624 | 1604 | 1584 | 1565 | 1546 | 1526 | 1508 | 1490 | 1473 |
| .368 | 1709 | 1689 | 1668 | 1648 | 1628 | 1608 | 1588 | 1569 | 1549 | 1530 | 1511 | 1494 | 1476 |
| .369 | 1713 | 1693 | 1672 | 1652 | 1632 | 1612 | 1592 | 1572 | 1553 | 1534 | 1515 | 1497 | 1480 |
| .370 | 1717 | 1697 | 1676 | 1656 | 1635 | 1616 | 1596 | 1576 | 1557 | 1537 | 1519 | 1501 | 1483 |
| .371 | 1721 | 1701 | 1680 | 1660 | 1639 | 1619 | 1600 | 1580 | 1560 | 1541 | 1522 | 1504 | 1487 |
| .372 | 1725 | 1705 | 1684 | 1664 | 1643 | 1623 | 1603 | 1584 | 1564 | 1545 | 1526 | 1508 | 1490 |
| .373 | 1729 | 1708 | 1688 | 1667 | 1647 | 1627 | 1607 | 1587 | 1568 | 1548 | 1529 | 1511 | 1494 |
| .374 | 1733 | 1712 | 1692 | 1671 | 1651 | 1631 | 1611 | 1591 | 1572 | 1552 | 1533 | 1515 | 1497 |
| .375 | 1737 | 1716 | 1696 | 1675 | 1655 | 1635 | 1615 | 1595 | 1575 | 1555 | 1536 | 1518 | 1501 |
| .376 | 1741 | 1720 | 1700 | 1679 | 1658 | 1638 | 1618 | 1599 | 1579 | 1559 | 1540 | 1522 | 1504 |
| .377 | 1745 | 1724 | 1704 | 1683 | 1662 | 1642 | 1622 | 1602 | 1583 | 1563 | 1544 | 1525 | 1507 |
| .378 | 1749 | 1728 | 1708 | 1687 | 1666 | 1646 | 1626 | 1606 | 1586 | 1566 | 1547 | 1529 | 1511 |
| .379 | 1753 | 1732 | 1712 | 1691 | 1670 | 1650 | 1630 | 1610 | 1590 | 1570 | 1551 | 1532 | 1514 |
| .380 | 1757 | 1736 | 1715 | 1694 | 1674 | 1654 | 1633 | 1613 | 1593 | 1573 | 1554 | 1536 | 1518 |
| .381 | 1761 | 1740 | 1719 | 1698 | 1678 | 1657 | 1637 | 1617 | 1597 | 1577 | 1558 | 1539 | 1521 |
| .382 | 1765 | 1744 | 1723 | 1702 | 1681 | 1661 | 1641 | 1621 | 1601 | 1581 | 1561 | 1543 | 1525 |
| .383 | 1769 | 1748 | 1727 | 1706 | 1685 | 1665 | 1645 | 1624 | 1604 | 1584 | 1565 | 1546 | 1528 |
| .384 | 1773 | 1752 | 1731 | 1710 | 1689 | 1669 | 1648 | 1628 | 1608 | 1588 | 1568 | 1550 | 1531 |
| .385 | 1776 | 1756 | 1735 | 1714 | 1693 | 1672 | 1652 | 1632 | 1612 | 1591 | 1572 | 1553 | 1535 |
| .386 | 1780 | 1760 | 1739 | 1718 | 1697 | 1676 | 1656 | 1636 | 1615 | 1595 | 1575 | 1557 | 1538 |
| .387 | 1784 | 1764 | 1743 | 1721 | 1701 | 1680 | 1660 | 1639 | 1619 | 1599 | 1579 | 1560 | 1542 |
| .388 | 1788 | 1767 | 1747 | 1725 | 1704 | 1684 | 1663 | 1643 | 1623 | 1602 | 1582 | 1563 | 1545 |
| .389 | 1792 | 1771 | 1750 | 1729 | 1708 | 1688 | 1667 | 1647 | 1626 | 1606 | 1586 | 1567 | 1549 |
| .390 | 1796 | 1775 | 1754 | 1733 | 1712 | 1691 | 1671 | 1650 | 1630 | 1609 | 1590 | 1570 | 1552 |
| .391 | 1800 | 1779 | 1758 | 1737 | 1716 | 1695 | 1674 | 1654 | 1633 | 1613 | 1593 | 1574 | 1555 |
| .392 | 1804 | 1783 | 1762 | 1741 | 1720 | 1699 | 1678 | 1658 | 1637 | 1616 | 1597 | 1577 | 1559 |
| .393 | 1808 | 1787 | 1766 | 1744 | 1723 | 1703 | 1682 | 1661 | 1641 | 1620 | 1600 | 1581 | 1562 |
| .394 | 1812 | 1791 | 1770 | 1748 | 1727 | 1706 | 1686 | 1665 | 1644 | 1624 | 1604 | 1584 | 1566 |
| .395 | 1816 | 1795 | 1774 | 1752 | 1731 | 1710 | 1689 | 1669 | 1648 | 1627 | 1607 | 1588 | 1569 |
| .396 | 1820 | 1799 | 1777 | 1756 | 1735 | 1714 | 1693 | 1672 | 1652 | 1631 | 1611 | 1591 | 1572 |
| .397 | 1824 | 1803 | 1781 | 1760 | 1738 | 1718 | 1697 | 1676 | 1655 | 1634 | 1614 | 1595 | 1576 |
| .398 | 1828 | 1807 | 1785 | 1764 | 1742 | 1721 | 1700 | 1680 | 1659 | 1638 | 1618 | 1598 | 1579 |
| .399 | 1832 | 1810 | 1789 | 1767 | 1746 | 1725 | 1704 | 1683 | 1662 | 1641 | 1621 | 1601 | 1583 |
| .400 | 1836 | 1814 | 1793 | 1771 | 1750 | 1729 | 1708 | 1687 | 1666 | 1645 | 1625 | 1605 | 1586 |

S = 0.301 to 0.400

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.401 | 1840 | 1818 | 1797 | 1775 | 1754 | 1733 | 1711 | 1690 | 1670 | 1648 | 1628 | 1608 | 1589 |
| .402 | 1843 | 1822 | 1801 | 1779 | 1757 | 1736 | 1715 | 1694 | 1673 | 1652 | 1632 | 1612 | 1593 |
| .403 | 1847 | 1826 | 1805 | 1783 | 1761 | 1740 | 1719 | 1698 | 1677 | 1656 | 1635 | 1615 | 1596 |
| .404 | 1851 | 1830 | 1808 | 1787 | 1765 | 1744 | 1723 | 1701 | 1680 | 1659 | 1638 | 1619 | 1600 |
| .405 | 1855 | 1834 | 1812 | 1790 | 1769 | 1748 | 1726 | 1705 | 1684 | 1663 | 1642 | 1622 | 1603 |
| .406 | 1859 | 1838 | 1816 | 1794 | 1773 | 1751 | 1730 | 1709 | 1687 | 1666 | 1645 | 1626 | 1606 |
| .407 | 1863 | 1842 | 1820 | 1798 | 1776 | 1755 | 1734 | 1712 | 1691 | 1670 | 1649 | 1629 | 1610 |
| .408 | 1867 | 1845 | 1824 | 1802 | 1780 | 1759 | 1737 | 1716 | 1695 | 1673 | 1652 | 1632 | 1613 |
| .409 | 1871 | 1849 | 1828 | 1806 | 1784 | 1763 | 1741 | 1720 | 1698 | 1677 | 1656 | 1636 | 1616 |
| .410 | 1875 | 1853 | 1832 | 1810 | 1788 | 1766 | 1745 | 1723 | 1702 | 1680 | 1659 | 1639 | 1620 |
| .411 | 1879 | 1857 | 1835 | 1813 | 1792 | 1770 | 1748 | 1727 | 1705 | 1684 | 1663 | 1643 | 1623 |
| .412 | 1883 | 1861 | 1839 | 1817 | 1795 | 1774 | 1752 | 1730 | 1709 | 1687 | 1666 | 1646 | 1627 |
| .413 | 1887 | 1865 | 1843 | 1821 | 1799 | 1777 | 1756 | 1734 | 1712 | 1691 | 1670 | 1649 | 1630 |
| .414 | 1890 | 1869 | 1847 | 1825 | 1803 | 1781 | 1759 | 1738 | 1716 | 1694 | 1673 | 1653 | 1633 |
| .415 | 1894 | 1873 | 1851 | 1829 | 1807 | 1785 | 1763 | 1741 | 1719 | 1698 | 1677 | 1656 | 1637 |
| .416 | 1898 | 1876 | 1855 | 1832 | 1810 | 1789 | 1767 | 1745 | 1723 | 1701 | 1680 | 1660 | 1640 |
| .417 | 1902 | 1880 | 1858 | 1836 | 1814 | 1792 | 1770 | 1748 | 1727 | 1705 | 1683 | 1663 | 1643 |
| .418 | 1906 | 1884 | 1862 | 1840 | 1818 | 1796 | 1774 | 1752 | 1730 | 1708 | 1687 | 1666 | 1647 |
| .419 | 1910 | 1888 | 1866 | 1844 | 1822 | 1800 | 1778 | 1756 | 1734 | 1712 | 1690 | 1670 | 1650 |
| .420 | 1914 | 1892 | 1870 | 1848 | 1825 | 1803 | 1781 | 1759 | 1737 | 1715 | 1694 | 1673 | 1653 |
| .421 | 1918 | 1896 | 1874 | 1851 | 1829 | 1807 | 1785 | 1763 | 1741 | 1719 | 1697 | 1677 | 1657 |
| .422 | 1922 | 1900 | 1878 | 1855 | 1833 | 1811 | 1789 | 1766 | 1744 | 1722 | 1701 | 1680 | 1660 |
| .423 | 1925 | 1903 | 1881 | 1859 | 1837 | 1814 | 1792 | 1770 | 1748 | 1725 | 1704 | 1683 | 1663 |
| .424 | 1929 | 1907 | 1885 | 1863 | 1840 | 1818 | 1796 | 1773 | 1751 | 1729 | 1707 | 1687 | 1667 |
| .425 | 1933 | 1911 | 1889 | 1867 | 1844 | 1822 | 1800 | 1777 | 1755 | 1732 | 1711 | 1690 | 1670 |
| .426 | 1937 | 1915 | 1893 | 1870 | 1848 | 1826 | 1803 | 1781 | 1758 | 1736 | 1714 | 1693 | 1673 |
| .427 | 1941 | 1919 | 1897 | 1874 | 1852 | 1829 | 1807 | 1784 | 1762 | 1739 | 1718 | 1697 | 1677 |
| .428 | 1945 | 1923 | 1900 | 1878 | 1855 | 1833 | 1810 | 1788 | 1765 | 1743 | 1721 | 1700 | 1680 |
| .429 | 1949 | 1926 | 1904 | 1882 | 1859 | 1837 | 1814 | 1791 | 1769 | 1746 | 1724 | 1703 | 1683 |
| .430 | 1952 | 1930 | 1908 | 1885 | 1863 | 1840 | 1818 | 1795 | 1772 | 1750 | 1728 | 1707 | 1687 |
| .431 | 1956 | 1934 | 1912 | 1889 | 1866 | 1844 | 1821 | 1798 | 1776 | 1753 | 1731 | 1710 | 1690 |
| .432 | 1960 | 1938 | 1916 | 1893 | 1870 | 1848 | 1825 | 1802 | 1779 | 1757 | 1735 | 1714 | 1693 |
| .433 | 1964 | 1942 | 1919 | 1897 | 1874 | 1851 | 1829 | 1806 | 1783 | 1760 | 1738 | 1717 | 1696 |
| .434 | 1968 | 1946 | 1923 | 1900 | 1878 | 1855 | 1832 | 1809 | 1786 | 1764 | 1742 | 1720 | 1700 |
| .435 | 1972 | 1949 | 1927 | 1904 | 1881 | 1859 | 1836 | 1813 | 1790 | 1767 | 1745 | 1724 | 1703 |
| .436 | 1975 | 1953 | 1931 | 1908 | 1885 | 1862 | 1839 | 1816 | 1793 | 1770 | 1748 | 1727 | 1706 |
| .437 | 1979 | 1957 | 1934 | 1912 | 1889 | 1866 | 1843 | 1820 | 1797 | 1774 | 1752 | 1730 | 1710 |
| .438 | 1983 | 1961 | 1938 | 1915 | 1892 | 1870 | 1847 | 1823 | 1800 | 1777 | 1755 | 1734 | 1713 |
| .439 | 1987 | 1965 | 1942 | 1919 | 1896 | 1873 | 1850 | 1827 | 1804 | 1781 | 1758 | 1737 | 1716 |
| .440 | 1991 | 1968 | 1946 | 1923 | 1900 | 1877 | 1854 | 1830 | 1807 | 1784 | 1762 | 1740 | 1720 |
| .441 | 1995 | 1972 | 1949 | 1926 | 1903 | 1880 | 1857 | 1834 | 1811 | 1788 | 1765 | 1744 | 1723 |
| .442 | 1998 | 1976 | 1953 | 1930 | 1907 | 1884 | 1861 | 1837 | 1814 | 1791 | 1769 | 1747 | 1726 |
| .443 | 2002 | 1980 | 1957 | 1934 | 1911 | 1888 | 1865 | 1841 | 1818 | 1794 | 1772 | 1750 | 1729 |
| .444 | 2006 | 1984 | 1961 | 1938 | 1915 | 1891 | 1868 | 1844 | 1821 | 1798 | 1775 | 1754 | 1733 |
| .445 | 2010 | 1987 | 1964 | 1941 | 1918 | 1895 | 1872 | 1848 | 1825 | 1801 | 1779 | 1757 | 1736 |
| .446 | 2014 | 1991 | 1968 | 1945 | 1922 | 1899 | 1875 | 1852 | 1828 | 1805 | 1782 | 1760 | 1739 |
| .447 | 2017 | 1995 | 1972 | 1949 | 1926 | 1902 | 1879 | 1855 | 1832 | 1808 | 1785 | 1764 | 1742 |
| .448 | 2021 | 1999 | 1976 | 1953 | 1929 | 1906 | 1882 | 1859 | 1835 | 1812 | 1789 | 1767 | 1746 |
| .449 | 2025 | 2002 | 1979 | 1956 | 1933 | 1909 | 1886 | 1862 | 1838 | 1815 | 1792 | 1770 | 1749 |
| .450 | 2029 | 2006 | 1983 | 1960 | 1937 | 1913 | 1890 | 1866 | 1842 | 1818 | 1796 | 1774 | 1752 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.451 | 2033 | 2010 | 1987 | 1964 | 1940 | 1917 | 1893 | 1869 | 1845 | 1822 | 1799 | 1777 | 1756 |
| .452 | 2036 | 2014 | 1991 | 1967 | 1944 | 1920 | 1897 | 1873 | 1849 | 1825 | 1802 | 1780 | 1759 |
| .453 | 2040 | 2017 | 1994 | 1971 | 1947 | 1924 | 1900 | 1876 | 1852 | 1829 | 1806 | 1783 | 1762 |
| .454 | 2044 | 2021 | 1998 | 1975 | 1951 | 1928 | 1904 | 1880 | 1856 | 1832 | 1809 | 1787 | 1765 |
| .455 | 2048 | 2025 | 2002 | 1978 | 1955 | 1931 | 1907 | 1883 | 1859 | 1835 | 1812 | 1790 | 1769 |
| .456 | 2052 | 2029 | 2006 | 1982 | 1958 | 1935 | 1911 | 1887 | 1863 | 1839 | 1816 | 1793 | 1772 |
| .457 | 2055 | 2032 | 2009 | 1986 | 1962 | 1938 | 1914 | 1890 | 1866 | 1842 | 1819 | 1797 | 1775 |
| .458 | 2059 | 2036 | 2013 | 1989 | 1966 | 1942 | 1918 | 1894 | 1870 | 1846 | 1822 | 1800 | 1778 |
| .459 | 2063 | 2040 | 2017 | 1993 | 1969 | 1945 | 1921 | 1897 | 1873 | 1849 | 1826 | 1803 | 1781 |
| .460 | 2067 | 2044 | 2020 | 1997 | 1973 | 1949 | 1925 | 1901 | 1876 | 1852 | 1829 | 1806 | 1785 |
| .461 | 2070 | 2047 | 2024 | 2000 | 1977 | 1953 | 1929 | 1904 | 1880 | 1856 | 1832 | 1810 | 1788 |
| .462 | 2074 | 2051 | 2028 | 2004 | 1980 | 1956 | 1932 | 1907 | 1883 | 1859 | 1836 | 1813 | 1791 |
| .463 | 2078 | 2055 | 2031 | 2008 | 1984 | 1960 | 1936 | 1911 | 1887 | 1862 | 1839 | 1816 | 1794 |
| .464 | 2082 | 2059 | 2035 | 2011 | 1987 | 1963 | 1939 | 1914 | 1890 | 1866 | 1842 | 1820 | 1798 |
| .465 | 2086 | 2062 | 2039 | 2015 | 1991 | 1967 | 1943 | 1918 | 1893 | 1869 | 1846 | 1823 | 1801 |
| .466 | 2089 | 2066 | 2043 | 2019 | 1995 | 1971 | 1946 | 1921 | 1897 | 1873 | 1849 | 1826 | 1804 |
| .467 | 2093 | 2070 | 2046 | 2022 | 1998 | 1974 | 1950 | 1925 | 1900 | 1876 | 1852 | 1829 | 1807 |
| .468 | 2097 | 2073 | 2050 | 2026 | 2002 | 1978 | 1953 | 1928 | 1904 | 1879 | 1856 | 1833 | 1810 |
| .469 | 2101 | 2077 | 2054 | 2030 | 2006 | 1981 | 1957 | 1932 | 1907 | 1883 | 1859 | 1836 | 1814 |
| .470 | 2104 | 2081 | 2057 | 2033 | 2009 | 1985 | 1960 | 1935 | 1911 | 1886 | 1862 | 1839 | 1817 |
| .471 | 2108 | 2085 | 2061 | 2037 | 2013 | 1988 | 1964 | 1939 | 1914 | 1889 | 1865 | 1842 | 1820 |
| .472 | 2112 | 2088 | 2065 | 2041 | 2016 | 1992 | 1967 | 1942 | 1917 | 1893 | 1869 | 1846 | 1823 |
| .473 | 2115 | 2092 | 2068 | 2044 | 2020 | 1995 | 1971 | 1946 | 1921 | 1896 | 1872 | 1849 | 1826 |
| .474 | 2119 | 2096 | 2072 | 2048 | 2023 | 1999 | 1974 | 1949 | 1924 | 1899 | 1875 | 1852 | 1830 |
| .475 | 2123 | 2099 | 2076 | 2051 | 2027 | 2002 | 1978 | 1952 | 1928 | 1903 | 1879 | 1855 | 1833 |
| .476 | 2127 | 2103 | 2079 | 2055 | 2031 | 2006 | 1981 | 1956 | 1931 | 1906 | 1882 | 1859 | 1836 |
| .477 | 2130 | 2107 | 2083 | 2059 | 2034 | 2010 | 1985 | 1959 | 1934 | 1909 | 1885 | 1862 | 1839 |
| .478 | 2134 | 2110 | 2087 | 2062 | 2038 | 2013 | 1988 | 1963 | 1938 | 1913 | 1889 | 1865 | 1842 |
| .479 | 2138 | 2114 | 2090 | 2066 | 2041 | 2017 | 1992 | 1966 | 1941 | 1916 | 1892 | 1868 | 1846 |
| .480 | 2142 | 2118 | 2094 | 2070 | 2045 | 2020 | 1995 | 1970 | 1944 | 1919 | 1895 | 1872 | 1849 |
| .481 | 2145 | 2122 | 2098 | 2073 | 2049 | 2024 | 1999 | 1973 | 1948 | 1923 | 1898 | 1875 | 1852 |
| .482 | 2149 | 2125 | 2101 | 2077 | 2052 | 2027 | 2002 | 1976 | 1951 | 1926 | 1902 | 1878 | 1855 |
| .483 | 2153 | 2129 | 2105 | 2080 | 2056 | 2031 | 2005 | 1980 | 1955 | 1929 | 1905 | 1881 | 1858 |
| .484 | 2156 | 2133 | 2108 | 2084 | 2059 | 2034 | 2009 | 1983 | 1958 | 1933 | 1908 | 1884 | 1861 |
| .485 | 2160 | 2136 | 2112 | 2088 | 2063 | 2038 | 2012 | 1987 | 1961 | 1936 | 1912 | 1888 | 1865 |
| .486 | 2164 | 2140 | 2116 | 2091 | 2066 | 2041 | 2016 | 1990 | 1965 | 1939 | 1915 | 1891 | 1868 |
| .487 | 2167 | 2144 | 2119 | 2095 | 2070 | 2045 | 2019 | 1994 | 1968 | 1943 | 1918 | 1894 | 1871 |
| .488 | 2171 | 2147 | 2123 | 2098 | 2073 | 2048 | 2023 | 1997 | 1971 | 1946 | 1921 | 1897 | 1874 |
| .489 | 2175 | 2151 | 2127 | 2102 | 2077 | 2052 | 2026 | 2000 | 1975 | 1949 | 1925 | 1901 | 1877 |
| .490 | 2178 | 2155 | 2130 | 2106 | 2081 | 2055 | 2030 | 2004 | 1978 | 1953 | 1928 | 1904 | 1880 |
| .491 | 2182 | 2158 | 2134 | 2109 | 2084 | 2059 | 2033 | 2007 | 1982 | 1956 | 1931 | 1907 | 1883 |
| .492 | 2186 | 2162 | 2137 | 2113 | 2088 | 2062 | 2037 | 2011 | 1985 | 1959 | 1934 | 1910 | 1887 |
| .493 | 2190 | 2165 | 2141 | 2116 | 2091 | 2066 | 2040 | 2014 | 1988 | 1963 | 1938 | 1913 | 1890 |
| .494 | 2193 | 2169 | 2145 | 2120 | 2095 | 2069 | 2043 | 2017 | 1992 | 1966 | 1941 | 1917 | 1893 |
| .495 | 2197 | 2173 | 2148 | 2123 | 2098 | 2073 | 2047 | 2021 | 1995 | 1969 | 1944 | 1920 | 1896 |
| .496 | 2201 | 2176 | 2152 | 2127 | 2102 | 2076 | 2050 | 2024 | 1998 | 1972 | 1947 | 1923 | 1899 |
| .497 | 2204 | 2180 | 2155 | 2131 | 2105 | 2080 | 2054 | 2028 | 2002 | 1976 | 1951 | 1926 | 1902 |
| .498 | 2208 | 2184 | 2159 | 2134 | 2109 | 2083 | 2057 | 2031 | 2005 | 1979 | 1954 | 1929 | 1905 |
| .499 | 2212 | 2187 | 2163 | 2138 | 2112 | 2086 | 2061 | 2034 | 2008 | 1982 | 1957 | 1932 | 1909 |
| .500 | 2215 | 2191 | 2166 | 2141 | 2116 | 2090 | 2064 | 2038 | 2012 | 1986 | 1960 | 1936 | 1912 |

S = 0.401 to 0.500

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.501 | 2219 | 2194 | 2170 | 2145 | 2119 | 2093 | 2067 | 2041 | 2015 | 1989 | 1964 | 1939 | 1915 |
| .502 | 2222 | 2198 | 2173 | 2148 | 2123 | 2097 | 2071 | 2044 | 2018 | 1992 | 1967 | 1942 | 1918 |
| .503 | 2226 | 2202 | 2177 | 2152 | 2126 | 2100 | 2074 | 2048 | 2022 | 1996 | 1970 | 1945 | 1921 |
| .504 | 2230 | 2205 | 2180 | 2155 | 2130 | 2104 | 2078 | 2051 | 2025 | 1999 | 1973 | 1949 | 1924 |
| .505 | 2233 | 2209 | 2184 | 2159 | 2133 | 2107 | 2081 | 2054 | 2028 | 2002 | 1977 | 1952 | 1928 |
| .506 | 2237 | 2212 | 2188 | 2162 | 2137 | 2110 | 2084 | 2058 | 2032 | 2006 | 1980 | 1955 | 1931 |
| .507 | 2240 | 2216 | 2191 | 2166 | 2140 | 2114 | 2088 | 2061 | 2035 | 2009 | 1983 | 1958 | 1934 |
| .508 | 2244 | 2220 | 2195 | 2169 | 2144 | 2117 | 2091 | 2065 | 2038 | 2012 | 1987 | 1962 | 1937 |
| .509 | 2248 | 2223 | 2198 | 2173 | 2147 | 2121 | 2094 | 2068 | 2042 | 2015 | 1990 | 1965 | 1940 |
| .510 | 2251 | 2227 | 2202 | 2176 | 2150 | 2124 | 2098 | 2071 | 2045 | 2019 | 1993 | 1968 | 1943 |
| .511 | 2255 | 2230 | 2205 | 2180 | 2154 | 2128 | 2101 | 2075 | 2048 | 2022 | 1996 | 1971 | 1947 |
| .512 | 2258 | 2234 | 2209 | 2183 | 2157 | 2131 | 2104 | 2078 | 2052 | 2025 | 2000 | 1974 | 1950 |
| .513 | 2262 | 2237 | 2212 | 2187 | 2161 | 2134 | 2108 | 2081 | 2055 | 2029 | 2003 | 1978 | 1953 |
| .514 | 2266 | 2241 | 2216 | 2190 | 2164 | 2138 | 2111 | 2085 | 2058 | 2032 | 2006 | 1981 | 1956 |
| .515 | 2269 | 2244 | 2219 | 2194 | 2168 | 2141 | 2115 | 2088 | 2062 | 2035 | 2009 | 1984 | 1959 |
| .516 | 2273 | 2248 | 2223 | 2197 | 2171 | 2145 | 2118 | 2091 | 2065 | 2038 | 2013 | 1987 | 1962 |
| .517 | 2276 | 2252 | 2226 | 2201 | 2175 | 2148 | 2121 | 2095 | 2068 | 2042 | 2016 | 1990 | 1965 |
| .518 | 2280 | 2255 | 2230 | 2204 | 2178 | 2151 | 2125 | 2098 | 2071 | 2045 | 2019 | 1994 | 1969 |
| .519 | 2284 | 2259 | 2233 | 2208 | 2181 | 2155 | 2128 | 2101 | 2075 | 2048 | 2022 | 1997 | 1972 |
| .520 | 2287 | 2262 | 2237 | 2211 | 2185 | 2158 | 2131 | 2105 | 2078 | 2052 | 2026 | 2000 | 1975 |
| .521 | 2291 | 2266 | 2240 | 2215 | 2188 | 2161 | 2135 | 2108 | 2081 | 2055 | 2029 | 2003 | 1978 |
| .522 | 2294 | 2269 | 2244 | 2218 | 2192 | 2165 | 2138 | 2111 | 2085 | 2058 | 2032 | 2006 | 1981 |
| .523 | 2298 | 2273 | 2247 | 2222 | 2195 | 2168 | 2141 | 2115 | 2088 | 2061 | 2035 | 2009 | 1984 |
| .524 | 2301 | 2276 | 2251 | 2225 | 2199 | 2172 | 2145 | 2118 | 2091 | 2065 | 2038 | 2013 | 1987 |
| .525 | 2305 | 2280 | 2254 | 2228 | 2202 | 2175 | 2148 | 2121 | 2094 | 2068 | 2042 | 2016 | 1990 |
| .526 | 2309 | 2283 | 2258 | 2232 | 2205 | 2178 | 2151 | 2124 | 2098 | 2071 | 2045 | 2019 | 1993 |
| .527 | 2312 | 2287 | 2261 | 2235 | 2209 | 2182 | 2155 | 2128 | 2101 | 2074 | 2048 | 2022 | 1996 |
| .528 | 2316 | 2291 | 2265 | 2239 | 2212 | 2185 | 2158 | 2131 | 2104 | 2078 | 2051 | 2025 | 1999 |
| .529 | 2319 | 2294 | 2268 | 2242 | 2216 | 2188 | 2161 | 2134 | 2108 | 2081 | 2054 | 2028 | 2003 |
| .530 | 2323 | 2298 | 2272 | 2246 | 2219 | 2192 | 2165 | 2138 | 2111 | 2084 | 2058 | 2031 | 2006 |
| .531 | 2326 | 2301 | 2275 | 2249 | 2222 | 2195 | 2168 | 2141 | 2114 | 2087 | 2061 | 2035 | 2009 |
| .532 | 2330 | 2305 | 2279 | 2253 | 2226 | 2198 | 2171 | 2144 | 2117 | 2090 | 2064 | 2038 | 2012 |
| .533 | 2333 | 2308 | 2282 | 2256 | 2229 | 2202 | 2175 | 2148 | 2121 | 2094 | 2067 | 2041 | 2015 |
| .534 | 2337 | 2312 | 2286 | 2259 | 2233 | 2205 | 2178 | 2151 | 2124 | 2097 | 2070 | 2044 | 2018 |
| .535 | 2341 | 2315 | 2289 | 2263 | 2236 | 2209 | 2181 | 2154 | 2127 | 2100 | 2073 | 2047 | 2021 |
| .536 | 2344 | 2319 | 2293 | 2266 | 2239 | 2212 | 2184 | 2157 | 2130 | 2103 | 2077 | 2050 | 2024 |
| .537 | 2348 | 2322 | 2296 | 2270 | 2243 | 2215 | 2188 | 2161 | 2134 | 2107 | 2080 | 2053 | 2027 |
| .538 | 2351 | 2326 | 2300 | 2273 | 2246 | 2219 | 2191 | 2164 | 2137 | 2110 | 2083 | 2056 | 2030 |
| .539 | 2355 | 2329 | 2303 | 2277 | 2250 | 2222 | 2194 | 2167 | 2140 | 2113 | 2086 | 2059 | 2033 |
| .540 | 2358 | 2333 | 2307 | 2280 | 2253 | 2225 | 2198 | 2170 | 2143 | 2116 | 2089 | 2063 | 2036 |
| .541 | 2362 | 2336 | 2310 | 2284 | 2256 | 2229 | 2201 | 2174 | 2147 | 2119 | 2092 | 2066 | 2039 |
| .542 | 2365 | 2340 | 2314 | 2287 | 2260 | 2232 | 2204 | 2177 | 2150 | 2123 | 2096 | 2069 | 2042 |
| .543 | 2369 | 2343 | 2317 | 2290 | 2263 | 2235 | 2208 | 2180 | 2153 | 2126 | 2099 | 2072 | 2045 |
| .544 | 2372 | 2347 | 2321 | 2294 | 2267 | 2239 | 2211 | 2184 | 2156 | 2129 | 2102 | 2075 | 2048 |
| .545 | 2376 | 2350 | 2324 | 2297 | 2270 | 2242 | 2214 | 2187 | 2159 | 2132 | 2105 | 2078 | 2051 |
| .546 | 2379 | 2354 | 2327 | 2301 | 2273 | 2245 | 2217 | 2190 | 2163 | 2135 | 2108 | 2081 | 2054 |
| .547 | 2383 | 2357 | 2331 | 2304 | 2277 | 2249 | 2221 | 2193 | 2166 | 2138 | 2111 | 2084 | 2057 |
| .548 | 2386 | 2361 | 2334 | 2307 | 2280 | 2252 | 2224 | 2197 | 2169 | 2142 | 2114 | 2087 | 2060 |
| .549 | 2390 | 2364 | 2338 | 2311 | 2283 | 2255 | 2227 | 2200 | 2172 | 2145 | 2117 | 2090 | 2063 |
| .550 | 2394 | 2368 | 2341 | 2314 | 2287 | 2258 | 2230 | 2203 | 2176 | 2148 | 2121 | 2093 | 2066 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.551 | 2397 | 2371 | 2345 | 2318 | 2290 | 2262 | 2234 | 2206 | 2179 | 2151 | 2124 | 2096 | 2069 |
| .552 | 2401 | 2375 | 2348 | 2321 | 2293 | 2265 | 2237 | 2209 | 2182 | 2154 | 2127 | 2099 | 2072 |
| .553 | 2404 | 2378 | 2352 | 2324 | 2297 | 2268 | 2240 | 2213 | 2185 | 2157 | 2130 | 2102 | 2075 |
| .554 | 2408 | 2382 | 2355 | 2328 | 2300 | 2272 | 2244 | 2216 | 2188 | 2161 | 2133 | 2105 | 2078 |
| .555 | 2411 | 2385 | 2358 | 2331 | 2304 | 2275 | 2247 | 2219 | 2191 | 2164 | 2136 | 2108 | 2081 |
| .556 | 2415 | 2388 | 2362 | 2335 | 2307 | 2278 | 2250 | 2222 | 2195 | 2167 | 2139 | 2111 | 2084 |
| .557 | 2418 | 2392 | 2365 | 2338 | 2310 | 2282 | 2253 | 2226 | 2198 | 2170 | 2142 | 2115 | 2087 |
| .558 | 2422 | 2395 | 2369 | 2341 | 2314 | 2285 | 2257 | 2229 | 2201 | 2173 | 2145 | 2118 | 2090 |
| .559 | 2425 | 2399 | 2372 | 2345 | 2317 | 2288 | 2260 | 2232 | 2204 | 2176 | 2148 | 2121 | 2093 |
| .560 | 2429 | 2402 | 2376 | 2348 | 2320 | 2291 | 2263 | 2235 | 2207 | 2179 | 2151 | 2124 | 2096 |
| .561 | 2432 | 2406 | 2379 | 2352 | 2324 | 2295 | 2266 | 2238 | 2211 | 2183 | 2155 | 2127 | 2099 |
| .562 | 2436 | 2409 | 2382 | 2355 | 2327 | 2298 | 2270 | 2242 | 2214 | 2186 | 2158 | 2130 | 2102 |
| .563 | 2439 | 2413 | 2386 | 2358 | 2330 | 2301 | 2273 | 2245 | 2217 | 2189 | 2161 | 2133 | 2104 |
| .564 | 2443 | 2416 | 2389 | 2362 | 2334 | 2305 | 2276 | 2248 | 2220 | 2192 | 2164 | 2136 | 2107 |
| .565 | 2446 | 2420 | 2393 | 2365 | 2337 | 2308 | 2279 | 2251 | 2223 | 2195 | 2167 | 2139 | 2110 |
| .566 | 2449 | 2423 | 2396 | 2368 | 2340 | 2311 | 2283 | 2254 | 2226 | 2198 | 2170 | 2142 | 2113 |
| .567 | 2453 | 2427 | 2399 | 2372 | 2344 | 2314 | 2286 | 2258 | 2230 | 2201 | 2173 | 2145 | 2116 |
| .568 | 2456 | 2430 | 2403 | 2375 | 2347 | 2318 | 2289 | 2261 | 2233 | 2204 | 2176 | 2148 | 2119 |
| .569 | 2460 | 2433 | 2406 | 2378 | 2350 | 2321 | 2292 | 2264 | 2236 | 2207 | 2179 | 2150 | 2122 |
| .570 | 2463 | 2437 | 2410 | 2382 | 2354 | 2324 | 2295 | 2267 | 2239 | 2211 | 2182 | 2153 | 2125 |
| .571 | 2467 | 2440 | 2413 | 2385 | 2357 | 2328 | 2299 | 2270 | 2242 | 2214 | 2185 | 2156 | 2128 |
| .572 | 2470 | 2444 | 2416 | 2389 | 2360 | 2331 | 2302 | 2274 | 2245 | 2217 | 2188 | 2159 | 2131 |
| .573 | 2474 | 2447 | 2420 | 2392 | 2363 | 2334 | 2305 | 2277 | 2248 | 2220 | 2191 | 2162 | 2134 |
| .574 | 2477 | 2451 | 2423 | 2395 | 2367 | 2337 | 2308 | 2280 | 2251 | 2223 | 2194 | 2165 | 2136 |
| .575 | 2481 | 2454 | 2427 | 2399 | 2370 | 2341 | 2312 | 2283 | 2255 | 2226 | 2197 | 2168 | 2139 |
| .576 | 2484 | 2457 | 2430 | 2402 | 2373 | 2344 | 2315 | 2286 | 2258 | 2229 | 2200 | 2171 | 2142 |
| .577 | 2488 | 2461 | 2433 | 2405 | 2377 | 2347 | 2318 | 2289 | 2261 | 2232 | 2203 | 2174 | 2145 |
| .578 | 2491 | 2464 | 2437 | 2409 | 2380 | 2350 | 2321 | 2293 | 2264 | 2235 | 2206 | 2177 | 2148 |
| .579 | 2495 | 2468 | 2440 | 2412 | 2383 | 2354 | 2324 | 2296 | 2267 | 2238 | 2209 | 2180 | 2151 |
| .580 | 2498 | 2471 | 2444 | 2415 | 2387 | 2357 | 2328 | 2299 | 2270 | 2241 | 2212 | 2183 | 2154 |
| .581 | 2501 | 2475 | 2447 | 2419 | 2390 | 2360 | 2331 | 2302 | 2273 | 2244 | 2215 | 2186 | 2156 |
| .582 | 2505 | 2478 | 2450 | 2422 | 2393 | 2363 | 2334 | 2305 | 2276 | 2247 | 2218 | 2189 | 2159 |
| .583 | 2508 | 2481 | 2454 | 2425 | 2396 | 2367 | 2337 | 2308 | 2280 | 2250 | 2221 | 2192 | 2162 |
| .584 | 2512 | 2485 | 2457 | 2429 | 2400 | 2370 | 2340 | 2312 | 2283 | 2253 | 2224 | 2195 | 2165 |
| .585 | 2515 | 2488 | 2460 | 2432 | 2403 | 2373 | 2344 | 2315 | 2286 | 2257 | 2227 | 2198 | 2168 |
| .586 | 2519 | 2492 | 2464 | 2435 | 2406 | 2376 | 2347 | 2318 | 2289 | 2260 | 2230 | 2200 | 2171 |
| .587 | 2522 | 2495 | 2467 | 2439 | 2410 | 2379 | 2350 | 2321 | 2292 | 2263 | 2233 | 2203 | 2173 |
| .588 | 2526 | 2498 | 2470 | 2442 | 2413 | 2383 | 2353 | 2324 | 2295 | 2266 | 2236 | 2206 | 2176 |
| .589 | 2529 | 2502 | 2474 | 2445 | 2416 | 2386 | 2356 | 2327 | 2298 | 2269 | 2239 | 2209 | 2179 |
| .590 | 2532 | 2505 | 2477 | 2449 | 2419 | 2389 | 2359 | 2330 | 2301 | 2272 | 2242 | 2212 | 2182 |
| .591 | 2536 | 2509 | 2481 | 2452 | 2423 | 2392 | 2363 | 2334 | 2304 | 2275 | 2245 | 2215 | 2185 |
| .592 | 2539 | 2512 | 2484 | 2455 | 2426 | 2396 | 2366 | 2337 | 2307 | 2278 | 2248 | 2218 | 2187 |
| .593 | 2543 | 2515 | 2487 | 2458 | 2429 | 2399 | 2369 | 2340 | 2310 | 2281 | 2251 | 2221 | 2190 |
| .594 | 2546 | 2519 | 2491 | 2462 | 2432 | 2402 | 2372 | 2343 | 2313 | 2284 | 2254 | 2224 | 2193 |
| .595 | 2550 | 2522 | 2494 | 2465 | 2436 | 2405 | 2375 | 2346 | 2317 | 2287 | 2257 | 2226 | 2196 |
| .596 | 2553 | 2525 | 2497 | 2468 | 2439 | 2408 | 2378 | 2349 | 2320 | 2290 | 2260 | 2229 | 2199 |
| .597 | 2556 | 2529 | 2501 | 2472 | 2442 | 2412 | 2382 | 2352 | 2323 | 2293 | 2263 | 2232 | 2201 |
| .598 | 2560 | 2532 | 2504 | 2475 | 2445 | 2415 | 2385 | 2355 | 2326 | 2296 | 2266 | 2235 | 2204 |
| .599 | 2563 | 2536 | 2507 | 2478 | 2449 | 2418 | 2388 | 2359 | 2329 | 2299 | 2268 | 2238 | 2207 |
| .600 | 2567 | 2539 | 2511 | 2481 | 2452 | 2421 | 2391 | 2362 | 2332 | 2302 | 2271 | 2241 | 2210 |

S = 0.501 to 0.600

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.601 | 2570 | 2542 | 2514 | 2485 | 2455 | 2425 | 2394 | 2365 | 2335 | 2305 | 2274 | 2244 | 2213 |
| .602 | 2574 | 2546 | 2517 | 2488 | 2458 | 2428 | 2398 | 2368 | 2338 | 2308 | 2277 | 2247 | 2215 |
| .603 | 2577 | 2549 | 2521 | 2491 | 2462 | 2431 | 2401 | 2371 | 2341 | 2311 | 2280 | 2249 | 2218 |
| .604 | 2580 | 2553 | 2524 | 2495 | 2465 | 2434 | 2404 | 2374 | 2344 | 2314 | 2283 | 2252 | 2221 |
| .605 | 2584 | 2556 | 2527 | 2498 | 2468 | 2438 | 2407 | 2378 | 2347 | 2317 | 2286 | 2255 | 2224 |
| .606 | 2587 | 2559 | 2531 | 2501 | 2472 | 2441 | 2410 | 2381 | 2351 | 2320 | 2289 | 2258 | 2227 |
| .607 | 2591 | 2563 | 2534 | 2505 | 2475 | 2444 | 2414 | 2384 | 2354 | 2323 | 2292 | 2261 | 2229 |
| .608 | 2594 | 2566 | 2537 | 2508 | 2478 | 2447 | 2417 | 2387 | 2357 | 2326 | 2295 | 2264 | 2232 |
| .609 | 2598 | 2569 | 2541 | 2511 | 2481 | 2451 | 2420 | 2390 | 2360 | 2329 | 2298 | 2267 | 2235 |
| .610 | 2601 | 2573 | 2544 | 2515 | 2485 | 2454 | 2423 | 2393 | 2363 | 2332 | 2301 | 2270 | 2238 |
| .611 | 2604 | 2576 | 2547 | 2518 | 2488 | 2457 | 2427 | 2396 | 2366 | 2335 | 2304 | 2272 | 2240 |
| .612 | 2608 | 2580 | 2551 | 2521 | 2491 | 2460 | 2430 | 2400 | 2369 | 2338 | 2307 | 2275 | 2243 |
| .613 | 2611 | 2583 | 2554 | 2524 | 2494 | 2464 | 2433 | 2403 | 2372 | 2341 | 2310 | 2278 | 2246 |
| .614 | 2615 | 2586 | 2557 | 2528 | 2498 | 2467 | 2436 | 2406 | 2375 | 2344 | 2313 | 2281 | 2249 |
| .615 | 2618 | 2590 | 2561 | 2531 | 2501 | 2470 | 2439 | 2409 | 2378 | 2347 | 2316 | 2284 | 2251 |
| .616 | 2621 | 2593 | 2564 | 2534 | 2504 | 2473 | 2442 | 2412 | 2381 | 2350 | 2319 | 2287 | 2254 |
| .617 | 2625 | 2596 | 2567 | 2538 | 2507 | 2476 | 2446 | 2415 | 2384 | 2353 | 2322 | 2289 | 2257 |
| .618 | 2628 | 2600 | 2571 | 2541 | 2511 | 2480 | 2449 | 2418 | 2388 | 2356 | 2324 | 2292 | 2260 |
| .619 | 2632 | 2603 | 2574 | 2544 | 2514 | 2483 | 2452 | 2422 | 2391 | 2359 | 2327 | 2295 | 2262 |
| .620 | 2635 | 2606 | 2577 | 2547 | 2517 | 2486 | 2455 | 2425 | 2394 | 2362 | 2330 | 2298 | 2265 |
| .621 | 2638 | 2610 | 2580 | 2551 | 2520 | 2489 | 2458 | 2428 | 2397 | 2365 | 2333 | 2301 | 2268 |
| .622 | 2642 | 2613 | 2584 | 2554 | 2523 | 2492 | 2461 | 2431 | 2400 | 2368 | 2336 | 2304 | 2270 |
| .623 | 2645 | 2616 | 2587 | 2557 | 2527 | 2496 | 2465 | 2434 | 2403 | 2371 | 2339 | 2306 | 2273 |
| .624 | 2648 | 2620 | 2590 | 2560 | 2530 | 2499 | 2468 | 2437 | 2406 | 2374 | 2342 | 2309 | 2276 |
| .625 | 2652 | 2623 | 2594 | 2564 | 2533 | 2502 | 2471 | 2440 | 2409 | 2377 | 2345 | 2312 | 2279 |
| .626 | 2655 | 2626 | 2597 | 2567 | 2536 | 2505 | 2474 | 2443 | 2412 | 2380 | 2348 | 2315 | 2281 |
| .627 | 2659 | 2630 | 2600 | 2570 | 2540 | 2508 | 2477 | 2446 | 2415 | 2383 | 2350 | 2317 | 2284 |
| .628 | 2662 | 2633 | 2604 | 2573 | 2543 | 2511 | 2480 | 2449 | 2418 | 2386 | 2353 | 2320 | 2287 |
| .629 | 2665 | 2636 | 2607 | 2577 | 2546 | 2515 | 2483 | 2452 | 2421 | 2389 | 2356 | 2323 | 2289 |
| .630 | 2669 | 2640 | 2610 | 2580 | 2549 | 2518 | 2486 | 2455 | 2424 | 2392 | 2359 | 2326 | 2292 |
| .631 | 2672 | 2643 | 2613 | 2583 | 2552 | 2521 | 2490 | 2458 | 2427 | 2395 | 2362 | 2328 | 2295 |
| .632 | 2675 | 2646 | 2617 | 2586 | 2556 | 2524 | 2493 | 2462 | 2430 | 2397 | 2365 | 2331 | 2297 |
| .633 | 2679 | 2650 | 2620 | 2589 | 2559 | 2527 | 2496 | 2465 | 2433 | 2400 | 2367 | 2334 | 2300 |
| .634 | 2682 | 2653 | 2623 | 2593 | 2562 | 2530 | 2499 | 2468 | 2436 | 2403 | 2370 | 2337 | 2302 |
| .635 | 2685 | 2656 | 2626 | 2596 | 2565 | 2534 | 2502 | 2471 | 2439 | 2406 | 2373 | 2339 | 2305 |
| .636 | 2689 | 2659 | 2630 | 2599 | 2568 | 2537 | 2505 | 2474 | 2442 | 2409 | 2376 | 2342 | 2308 |
| .637 | 2692 | 2663 | 2633 | 2602 | 2571 | 2540 | 2508 | 2477 | 2445 | 2412 | 2379 | 2345 | 2310 |
| .638 | 2695 | 2666 | 2636 | 2606 | 2575 | 2543 | 2511 | 2480 | 2448 | 2415 | 2382 | 2348 | 2313 |
| .639 | 2699 | 2669 | 2639 | 2609 | 2578 | 2546 | 2514 | 2483 | 2451 | 2418 | 2384 | 2350 | 2316 |
| .640 | 2702 | 2673 | 2643 | 2612 | 2581 | 2549 | 2517 | 2486 | 2454 | 2421 | 2387 | 2353 | 2318 |
| .641 | 2705 | 2676 | 2646 | 2615 | 2584 | 2552 | 2521 | 2489 | 2456 | 2423 | 2390 | 2356 | 2321 |
| .642 | 2709 | 2679 | 2649 | 2618 | 2587 | 2555 | 2524 | 2492 | 2459 | 2426 | 2393 | 2358 | 2323 |
| .643 | 2712 | 2683 | 2652 | 2622 | 2590 | 2559 | 2527 | 2495 | 2462 | 2429 | 2395 | 2361 | 2326 |
| .644 | 2715 | 2686 | 2656 | 2625 | 2593 | 2562 | 2530 | 2498 | 2465 | 2432 | 2398 | 2364 | 2329 |
| .645 | 2719 | 2689 | 2659 | 2628 | 2597 | 2565 | 2533 | 2501 | 2468 | 2435 | 2401 | 2366 | 2331 |
| .646 | 2722 | 2692 | 2662 | 2631 | 2600 | 2568 | 2536 | 2504 | 2471 | 2438 | 2404 | 2369 | 2334 |
| .647 | 2725 | 2696 | 2665 | 2634 | 2603 | 2571 | 2539 | 2507 | 2474 | 2441 | 2406 | 2372 | 2336 |
| .648 | 2729 | 2699 | 2669 | 2637 | 2606 | 2574 | 2542 | 2510 | 2477 | 2443 | 2409 | 2374 | 2339 |
| .649 | 2732 | 2702 | 2672 | 2641 | 2609 | 2577 | 2545 | 2513 | 2480 | 2446 | 2412 | 2377 | 2341 |
| .650 | 2735 | 2705 | 2675 | 2644 | 2612 | 2580 | 2548 | 2516 | 2483 | 2449 | 2415 | 2380 | 2344 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.651 | 2739 | 2709 | 2678 | 2647 | 2615 | 2583 | 2551 | 2519 | 2486 | 2452 | 2417 | 2382 | 2346 |
| .652 | 2742 | 2712 | 2681 | 2650 | 2619 | 2586 | 2554 | 2522 | 2489 | 2455 | 2420 | 2385 | 2349 |
| .653 | 2745 | 2715 | 2685 | 2653 | 2622 | 2590 | 2557 | 2525 | 2491 | 2457 | 2423 | 2388 | 2352 |
| .654 | 2749 | 2718 | 2688 | 2656 | 2625 | 2593 | 2560 | 2528 | 2494 | 2460 | 2426 | 2390 | 2354 |
| .655 | 2752 | 2722 | 2691 | 2660 | 2628 | 2596 | 2563 | 2531 | 2497 | 2463 | 2428 | 2393 | 2357 |
| .656 | 2755 | 2725 | 2694 | 2663 | 2631 | 2599 | 2566 | 2533 | 2500 | 2466 | 2431 | 2395 | 2359 |
| .657 | 2758 | 2728 | 2697 | 2666 | 2634 | 2602 | 2569 | 2536 | 2503 | 2469 | 2434 | 2398 | 2362 |
| .658 | 2762 | 2731 | 2701 | 2669 | 2637 | 2605 | 2572 | 2539 | 2506 | 2471 | 2436 | 2401 | 2364 |
| .659 | 2765 | 2735 | 2704 | 2672 | 2640 | 2608 | 2575 | 2542 | 2509 | 2474 | 2439 | 2403 | 2367 |
| .660 | 2768 | 2738 | 2707 | 2675 | 2643 | 2611 | 2578 | 2545 | 2511 | 2477 | 2442 | 2406 | 2369 |
| .661 | 2772 | 2741 | 2710 | 2678 | 2646 | 2614 | 2581 | 2548 | 2514 | 2480 | 2444 | 2408 | 2372 |
| .662 | 2775 | 2744 | 2713 | 2682 | 2650 | 2617 | 2584 | 2551 | 2517 | 2483 | 2447 | 2411 | 2374 |
| .663 | 2778 | 2748 | 2717 | 2685 | 2653 | 2620 | 2587 | 2554 | 2520 | 2485 | 2450 | 2414 | 2377 |
| .664 | 2781 | 2751 | 2720 | 2688 | 2656 | 2623 | 2590 | 2557 | 2523 | 2488 | 2452 | 2416 | 2379 |
| .665 | 2785 | 2754 | 2723 | 2691 | 2659 | 2626 | 2593 | 2560 | 2526 | 2491 | 2455 | 2419 | 2382 |
| .666 | 2788 | 2757 | 2726 | 2694 | 2662 | 2629 | 2596 | 2563 | 2528 | 2494 | 2458 | 2421 | 2384 |
| .667 | 2791 | 2761 | 2729 | 2697 | 2665 | 2632 | 2599 | 2566 | 2531 | 2496 | 2460 | 2424 | 2386 |
| .668 | 2794 | 2764 | 2732 | 2700 | 2668 | 2635 | 2602 | 2568 | 2534 | 2499 | 2463 | 2426 | 2389 |
| .669 | 2798 | 2767 | 2736 | 2703 | 2671 | 2638 | 2605 | 2571 | 2537 | 2502 | 2466 | 2429 | 2391 |
| .670 | 2801 | 2770 | 2739 | 2707 | 2674 | 2641 | 2608 | 2574 | 2540 | 2504 | 2468 | 2431 | 2394 |
| .671 | 2804 | 2773 | 2742 | 2710 | 2677 | 2644 | 2611 | 2577 | 2543 | 2507 | 2471 | 2434 | 2396 |
| .672 | 2807 | 2777 | 2745 | 2713 | 2680 | 2647 | 2614 | 2580 | 2545 | 2510 | 2474 | 2437 | 2399 |
| .673 | 2811 | 2780 | 2748 | 2716 | 2683 | 2650 | 2617 | 2583 | 2548 | 2513 | 2476 | 2439 | 2401 |
| .674 | 2814 | 2783 | 2751 | 2719 | 2686 | 2653 | 2620 | 2586 | 2551 | 2515 | 2479 | 2442 | 2404 |
| .675 | 2817 | 2786 | 2754 | 2722 | 2689 | 2656 | 2623 | 2589 | 2554 | 2518 | 2481 | 2444 | 2406 |
| .676 | 2820 | 2789 | 2758 | 2725 | 2692 | 2659 | 2625 | 2591 | 2556 | 2521 | 2484 | 2447 | 2408 |
| .677 | 2824 | 2793 | 2761 | 2728 | 2695 | 2662 | 2628 | 2594 | 2559 | 2523 | 2487 | 2449 | 2411 |
| .678 | 2827 | 2796 | 2764 | 2731 | 2698 | 2665 | 2631 | 2597 | 2562 | 2526 | 2489 | 2452 | 2413 |
| .679 | 2830 | 2799 | 2767 | 2734 | 2701 | 2668 | 2634 | 2600 | 2565 | 2529 | 2492 | 2454 | 2416 |
| .680 | 2833 | 2802 | 2770 | 2738 | 2704 | 2671 | 2637 | 2603 | 2567 | 2531 | 2494 | 2457 | 2418 |
| .681 | 2837 | 2805 | 2773 | 2741 | 2707 | 2674 | 2640 | 2606 | 2570 | 2534 | 2497 | 2459 | 2420 |
| .682 | 2840 | 2808 | 2776 | 2744 | 2710 | 2677 | 2643 | 2608 | 2573 | 2537 | 2500 | 2462 | 2423 |
| .683 | 2843 | 2812 | 2780 | 2747 | 2713 | 2680 | 2646 | 2611 | 2576 | 2539 | 2502 | 2464 | 2425 |
| .684 | 2846 | 2815 | 2783 | 2750 | 2717 | 2683 | 2649 | 2614 | 2578 | 2542 | 2505 | 2466 | 2427 |
| .685 | 2850 | 2818 | 2786 | 2753 | 2720 | 2686 | 2652 | 2617 | 2581 | 2545 | 2507 | 2469 | 2430 |
| .686 | 2853 | 2821 | 2789 | 2756 | 2723 | 2689 | 2654 | 2620 | 2584 | 2547 | 2510 | 2471 | 2432 |
| .687 | 2856 | 2824 | 2792 | 2759 | 2726 | 2692 | 2657 | 2622 | 2587 | 2550 | 2512 | 2474 | 2434 |
| .688 | 2859 | 2827 | 2795 | 2762 | 2729 | 2695 | 2660 | 2625 | 2589 | 2553 | 2515 | 2476 | 2437 |
| .689 | 2862 | 2831 | 2798 | 2765 | 2732 | 2698 | 2663 | 2628 | 2592 | 2555 | 2517 | 2479 | 2439 |
| .690 | 2866 | 2834 | 2801 | 2768 | 2734 | 2701 | 2666 | 2631 | 2595 | 2558 | 2520 | 2481 | 2441 |
| .691 | 2869 | 2837 | 2804 | 2771 | 2737 | 2703 | 2669 | 2634 | 2597 | 2560 | 2522 | 2484 | 2444 |
| .692 | 2872 | 2840 | 2808 | 2774 | 2740 | 2706 | 2672 | 2636 | 2600 | 2563 | 2525 | 2486 | 2446 |
| .693 | 2875 | 2843 | 2811 | 2777 | 2743 | 2709 | 2675 | 2639 | 2603 | 2566 | 2528 | 2488 | 2448 |
| .694 | 2878 | 2846 | 2814 | 2780 | 2746 | 2712 | 2677 | 2642 | 2606 | 2568 | 2530 | 2491 | 2451 |
| .695 | 2882 | 2850 | 2817 | 2783 | 2749 | 2715 | 2680 | 2645 | 2608 | 2571 | 2533 | 2493 | 2453 |
| .696 | 2885 | 2853 | 2820 | 2786 | 2752 | 2718 | 2683 | 2647 | 2611 | 2573 | 2535 | 2496 | 2455 |
| .697 | 2888 | 2856 | 2823 | 2789 | 2755 | 2721 | 2686 | 2650 | 2614 | 2576 | 2538 | 2498 | 2458 |
| .698 | 2891 | 2859 | 2826 | 2792 | 2758 | 2724 | 2689 | 2653 | 2616 | 2579 | 2540 | 2500 | 2460 |
| .699 | 2894 | 2862 | 2829 | 2795 | 2761 | 2727 | 2692 | 2656 | 2619 | 2581 | 2542 | 2503 | 2462 |
| .700 | 2898 | 2865 | 2832 | 2798 | 2764 | 2730 | 2694 | 2658 | 2622 | 2584 | 2545 | 2505 | 2464 |

S = 0.601 to 0.700

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.701 | 2901 | 2868 | 2835 | 2802 | 2767 | 2733 | 2697 | 2661 | 2624 | 2586 | 2547 | 2508 | 2467 |
| .702 | 2904 | 2872 | 2839 | 2805 | 2770 | 2736 | 2700 | 2664 | 2627 | 2589 | 2550 | 2510 | 2469 |
| .703 | 2907 | 2875 | 2842 | 2808 | 2773 | 2739 | 2703 | 2667 | 2630 | 2592 | 2552 | 2512 | 2471 |
| .704 | 2911 | 2878 | 2845 | 2811 | 2776 | 2742 | 2706 | 2670 | 2632 | 2594 | 2555 | 2515 | 2473 |
| .705 | 2914 | 2881 | 2848 | 2814 | 2780 | 2745 | 2709 | 2673 | 2635 | 2597 | 2557 | 2517 | 2475 |
| .706 | 2917 | 2885 | 2851 | 2817 | 2783 | 2748 | 2712 | 2675 | 2638 | 2599 | 2560 | 2520 | 2478 |
| .707 | 2920 | 2888 | 2854 | 2820 | 2786 | 2751 | 2715 | 2678 | 2641 | 2602 | 2562 | 2522 | 2480 |
| .708 | 2924 | 2891 | 2858 | 2823 | 2789 | 2753 | 2718 | 2681 | 2643 | 2605 | 2565 | 2524 | 2482 |
| .709 | 2927 | 2894 | 2861 | 2826 | 2792 | 2756 | 2720 | 2684 | 2646 | 2607 | 2567 | 2527 | 2484 |
| .710 | 2930 | 2897 | 2864 | 2830 | 2795 | 2759 | 2723 | 2686 | 2649 | 2610 | 2570 | 2529 | 2486 |
| .711 | 2933 | 2901 | 2867 | 2833 | 2798 | 2762 | 2726 | 2689 | 2651 | 2612 | 2572 | 2531 | 2488 |
| .712 | 2936 | 2904 | 2870 | 2836 | 2801 | 2765 | 2729 | 2692 | 2654 | 2615 | 2575 | 2534 | 2490 |
| .713 | 2940 | 2907 | 2873 | 2839 | 2804 | 2768 | 2732 | 2695 | 2657 | 2617 | 2577 | 2536 | 2493 |
| .714 | 2943 | 2910 | 2876 | 2842 | 2807 | 2771 | 2735 | 2697 | 2659 | 2620 | 2580 | 2538 | 2495 |
| .715 | 2946 | 2913 | 2879 | 2845 | 2810 | 2774 | 2737 | 2700 | 2662 | 2622 | 2582 | 2541 | 2497 |
| .716 | 2949 | 2916 | 2883 | 2848 | 2813 | 2777 | 2740 | 2703 | 2665 | 2625 | 2585 | 2543 | 2499 |
| .717 | 2953 | 2920 | 2886 | 2851 | 2816 | 2780 | 2743 | 2706 | 2667 | 2628 | 2587 | 2545 | 2501 |
| .718 | 2956 | 2923 | 2889 | 2854 | 2819 | 2783 | 2746 | 2708 | 2670 | 2630 | 2589 | 2548 | 2503 |
| .719 | 2959 | 2926 | 2892 | 2857 | 2822 | 2786 | 2749 | 2711 | 2672 | 2633 | 2592 | 2550 | 2505 |
| .720 | 2962 | 2929 | 2895 | 2860 | 2825 | 2788 | 2752 | 2714 | 2675 | 2635 | 2594 | 2552 | 2507 |
| .721 | 2965 | 2932 | 2898 | 2863 | 2827 | 2791 | 2754 | 2716 | 2678 | 2638 | 2597 | 2554 | 2510 |
| .722 | 2968 | 2935 | 2901 | 2866 | 2830 | 2794 | 2757 | 2719 | 2680 | 2640 | 2599 | 2557 | 2512 |
| .723 | 2972 | 2938 | 2904 | 2869 | 2833 | 2797 | 2760 | 2722 | 2683 | 2643 | 2601 | 2559 | 2514 |
| .724 | 2975 | 2941 | 2907 | 2872 | 2836 | 2800 | 2763 | 2725 | 2685 | 2645 | 2604 | 2561 | 2516 |
| .725 | 2978 | 2945 | 2910 | 2875 | 2839 | 2803 | 2765 | 2727 | 2688 | 2648 | 2606 | 2564 | 2518 |
| .726 | 2981 | 2948 | 2913 | 2878 | 2842 | 2806 | 2768 | 2730 | 2691 | 2650 | 2608 | 2566 | 2520 |
| .727 | 2984 | 2951 | 2916 | 2881 | 2845 | 2808 | 2771 | 2733 | 2693 | 2652 | 2611 | 2568 | 2522 |
| .728 | 2987 | 2954 | 2919 | 2884 | 2848 | 2811 | 2774 | 2735 | 2696 | 2655 | 2613 | 2570 | 2524 |
| .729 | 2991 | 2957 | 2923 | 2887 | 2851 | 2814 | 2776 | 2738 | 2698 | 2657 | 2615 | 2572 | 2526 |
| .730 | 2994 | 2960 | 2926 | 2890 | 2854 | 2817 | 2779 | 2740 | 2701 | 2660 | 2618 | 2575 | 2528 |
| .731 | 2997 | 2963 | 2929 | 2893 | 2857 | 2820 | 2782 | 2743 | 2703 | 2662 | 2620 | 2577 | 2530 |
| .732 | 3000 | 2966 | 2932 | 2896 | 2860 | 2823 | 2785 | 2746 | 2706 | 2665 | 2622 | 2579 | 2533 |
| .733 | 3003 | 2969 | 2935 | 2899 | 2862 | 2825 | 2787 | 2748 | 2708 | 2667 | 2625 | 2581 | 2535 |
| .734 | 3006 | 2972 | 2938 | 2902 | 2865 | 2828 | 2790 | 2751 | 2711 | 2670 | 2627 | 2584 | 2537 |
| .735 | 3009 | 2975 | 2941 | 2905 | 2868 | 2831 | 2793 | 2754 | 2713 | 2672 | 2629 | 2586 | 2539 |
| .736 | 3012 | 2979 | 2944 | 2908 | 2871 | 2834 | 2795 | 2756 | 2716 | 2674 | 2632 | 2588 | 2541 |
| .737 | 3016 | 2982 | 2947 | 2911 | 2874 | 2837 | 2798 | 2759 | 2718 | 2677 | 2634 | 2590 | 2543 |
| .738 | 3019 | 2985 | 2950 | 2914 | 2877 | 2839 | 2801 | 2761 | 2721 | 2679 | 2636 | 2592 | 2545 |
| .739 | 3022 | 2988 | 2953 | 2917 | 2880 | 2842 | 2804 | 2764 | 2723 | 2682 | 2639 | 2595 | 2547 |
| .740 | 3025 | 2991 | 2956 | 2919 | 2883 | 2845 | 2806 | 2767 | 2726 | 2684 | 2641 | 2597 | 2549 |
| .741 | 3028 | 2994 | 2959 | 2922 | 2885 | 2848 | 2809 | 2769 | 2728 | 2686 | 2643 | 2599 | 2551 |
| .742 | 3031 | 2997 | 2962 | 2925 | 2888 | 2850 | 2812 | 2772 | 2731 | 2689 | 2645 | 2601 | 2553 |
| .743 | 3034 | 3000 | 2965 | 2928 | 2891 | 2853 | 2814 | 2774 | 2733 | 2691 | 2648 | 2603 | 2555 |
| .744 | 3037 | 3003 | 2968 | 2931 | 2894 | 2856 | 2817 | 2777 | 2736 | 2693 | 2650 | 2605 | 2557 |
| .745 | 3040 | 3006 | 2970 | 2934 | 2897 | 2859 | 2819 | 2779 | 2738 | 2696 | 2652 | 2607 | 2559 |
| .746 | 3043 | 3009 | 2973 | 2937 | 2899 | 2861 | 2822 | 2782 | 2741 | 2698 | 2654 | 2610 | 2561 |
| .747 | 3046 | 3012 | 2976 | 2940 | 2902 | 2864 | 2825 | 2784 | 2743 | 2700 | 2657 | 2612 | 2563 |
| .748 | 3050 | 3015 | 2979 | 2943 | 2905 | 2867 | 2827 | 2787 | 2745 | 2703 | 2659 | 2614 | 2565 |
| .749 | 3053 | 3018 | 2982 | 2946 | 2908 | 2869 | 2830 | 2790 | 2748 | 2705 | 2661 | 2616 | 2567 |
| .750 | 3056 | 3021 | 2985 | 2948 | 2911 | 2872 | 2833 | 2792 | 2750 | 2707 | 2663 | 2618 | 2569 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.751 | 3059 | 3024 | 2988 | 2951 | 2913 | 2875 | 2835 | 2795 | 2753 | 2710 | 2666 | 2620 | 2571 |
| .752 | 3062 | 3027 | 2991 | 2954 | 2916 | 2878 | 2838 | 2797 | 2755 | 2712 | 2668 | 2622 | 2573 |
| .753 | 3065 | 3030 | 2994 | 2957 | 2919 | 2880 | 2840 | 2800 | 2758 | 2714 | 2670 | 2624 | 2575 |
| .754 | 3068 | 3033 | 2997 | 2960 | 2922 | 2883 | 2843 | 2802 | 2760 | 2717 | 2672 | 2626 | 2577 |
| .755 | 3071 | 3036 | 3000 | 2963 | 2925 | 2886 | 2846 | 2805 | 2762 | 2719 | 2674 | 2629 | 2579 |
| .756 | 3074 | 3039 | 3003 | 2965 | 2927 | 2888 | 2848 | 2807 | 2765 | 2721 | 2676 | 2631 | 2581 |
| .757 | 3077 | 3042 | 3006 | 2968 | 2930 | 2891 | 2851 | 2809 | 2767 | 2723 | 2679 | 2633 | 2583 |
| .758 | 3080 | 3045 | 3008 | 2971 | 2933 | 2894 | 2853 | 2812 | 2769 | 2726 | 2681 | 2635 | 2585 |
| .759 | 3083 | 3048 | 3011 | 2974 | 2935 | 2896 | 2856 | 2814 | 2772 | 2728 | 2683 | 2637 | 2587 |
| .760 | 3086 | 3051 | 3014 | 2977 | 2938 | 2899 | 2858 | 2817 | 2774 | 2730 | 2685 | 2639 | 2589 |
| .761 | 3089 | 3054 | 3017 | 2980 | 2941 | 2901 | 2861 | 2819 | 2777 | 2733 | 2687 | 2641 | 2591 |
| .762 | 3092 | 3057 | 3020 | 2982 | 2944 | 2904 | 2863 | 2822 | 2779 | 2735 | 2689 | 2643 | 2593 |
| .763 | 3095 | 3059 | 3023 | 2985 | 2946 | 2907 | 2866 | 2824 | 2781 | 2737 | 2692 | 2645 | 2595 |
| .764 | 3098 | 3062 | 3026 | 2988 | 2949 | 2909 | 2869 | 2827 | 2784 | 2739 | 2694 | 2647 | 2597 |
| .765 | 3101 | 3065 | 3029 | 2991 | 2952 | 2912 | 2871 | 2829 | 2786 | 2741 | 2696 | 2649 | 2599 |
| .766 | 3104 | 3068 | 3031 | 2993 | 2954 | 2915 | 2874 | 2831 | 2788 | 2744 | 2698 | 2651 | 2601 |
| .767 | 3107 | 3071 | 3034 | 2996 | 2957 | 2917 | 2876 | 2834 | 2790 | 2746 | 2700 | 2653 | 2603 |
| .768 | 3110 | 3074 | 3037 | 2999 | 2960 | 2920 | 2879 | 2836 | 2793 | 2748 | 2702 | 2655 | 2604 |
| .769 | 3113 | 3077 | 3040 | 3002 | 2962 | 2922 | 2881 | 2839 | 2795 | 2750 | 2704 | 2657 | 2606 |
| .770 | 3116 | 3080 | 3043 | 3004 | 2965 | 2925 | 2884 | 2841 | 2797 | 2752 | 2706 | 2659 | 2608 |
| .771 | 3119 | 3083 | 3046 | 3007 | 2968 | 2927 | 2886 | 2843 | 2800 | 2755 | 2708 | 2661 | 2610 |
| .772 | 3122 | 3086 | 3048 | 3010 | 2970 | 2930 | 2888 | 2846 | 2802 | 2757 | 2711 | 2663 | 2612 |
| .773 | 3125 | 3089 | 3051 | 3013 | 2973 | 2933 | 2891 | 2848 | 2804 | 2759 | 2713 | 2665 | 2614 |
| .774 | 3128 | 3091 | 3054 | 3015 | 2976 | 2935 | 2893 | 2851 | 2806 | 2761 | 2715 | 2667 | 2616 |
| .775 | 3131 | 3094 | 3057 | 3018 | 2978 | 2938 | 2896 | 2853 | 2809 | 2763 | 2717 | 2669 | 2618 |
| .776 | 3133 | 3097 | 3060 | 3021 | 2981 | 2940 | 2898 | 2855 | 2811 | 2765 | 2719 | 2671 | 2620 |
| .777 | 3136 | 3100 | 3062 | 3024 | 2984 | 2943 | 2901 | 2858 | 2813 | 2768 | 2721 | 2673 | 2622 |
| .778 | 3139 | 3103 | 3065 | 3026 | 2986 | 2945 | 2903 | 2860 | 2815 | 2770 | 2723 | 2675 | 2624 |
| .779 | 3142 | 3106 | 3068 | 3029 | 2989 | 2948 | 2906 | 2862 | 2818 | 2772 | 2725 | 2677 | 2625 |
| .780 | 3145 | 3109 | 3071 | 3032 | 2992 | 2950 | 2908 | 2865 | 2820 | 2774 | 2727 | 2679 | 2627 |
| .781 | 3148 | 3111 | 3074 | 3034 | 2994 | 2953 | 2910 | 2867 | 2822 | 2776 | 2729 | 2680 | 2629 |
| .782 | 3151 | 3114 | 3076 | 3037 | 2997 | 2955 | 2913 | 2869 | 2824 | 2778 | 2731 | 2682 | 2631 |
| .783 | 3154 | 3117 | 3079 | 3040 | 2999 | 2958 | 2915 | 2872 | 2827 | 2780 | 2733 | 2684 | 2633 |
| .784 | 3157 | 3120 | 3082 | 3042 | 3002 | 2960 | 2918 | 2874 | 2829 | 2783 | 2735 | 2686 | 2635 |
| .785 | 3160 | 3123 | 3085 | 3045 | 3005 | 2963 | 2920 | 2876 | 2831 | 2785 | 2737 | 2688 | 2637 |
| .786 | 3163 | 3126 | 3087 | 3048 | 3007 | 2965 | 2923 | 2878 | 2833 | 2787 | 2739 | 2690 | 2639 |
| .787 | 3166 | 3128 | 3090 | 3050 | 3010 | 2968 | 2925 | 2881 | 2835 | 2789 | 2741 | 2692 | 2640 |
| .788 | 3168 | 3131 | 3093 | 3053 | 3012 | 2970 | 2927 | 2883 | 2838 | 2791 | 2743 | 2694 | 2642 |
| .789 | 3171 | 3134 | 3096 | 3056 | 3015 | 2973 | 2930 | 2885 | 2840 | 2793 | 2745 | 2696 | 2644 |
| .790 | 3174 | 3137 | 3098 | 3058 | 3017 | 2975 | 2932 | 2888 | 2842 | 2795 | 2747 | 2698 | 2646 |
| .791 | 3177 | 3140 | 3101 | 3061 | 3020 | 2978 | 2934 | 2890 | 2844 | 2797 | 2749 | 2699 | 2648 |
| .792 | 3180 | 3142 | 3104 | 3064 | 3022 | 2980 | 2937 | 2892 | 2846 | 2799 | 2751 | 2701 | 2650 |
| .793 | 3183 | 3145 | 3106 | 3066 | 3025 | 2983 | 2939 | 2894 | 2848 | 2801 | 2753 | 2703 | 2652 |
| .794 | 3186 | 3148 | 3109 | 3069 | 3028 | 2985 | 2941 | 2897 | 2851 | 2803 | 2755 | 2705 | 2653 |
| .795 | 3189 | 3151 | 3112 | 3071 | 3030 | 2987 | 2944 | 2899 | 2853 | 2805 | 2757 | 2707 | 2655 |
| .796 | 3191 | 3154 | 3114 | 3074 | 3033 | 2990 | 2946 | 2901 | 2855 | 2807 | 2759 | 2709 | 2657 |
| .797 | 3194 | 3156 | 3117 | 3077 | 3035 | 2992 | 2948 | 2903 | 2857 | 2809 | 2760 | 2710 | 2659 |
| .798 | 3197 | 3159 | 3120 | 3079 | 3038 | 2995 | 2951 | 2905 | 2859 | 2811 | 2762 | 2712 | 2661 |
| .799 | 3200 | 3162 | 3123 | 3082 | 3040 | 2997 | 2953 | 2908 | 2861 | 2813 | 2764 | 2714 | 2662 |
| .800 | 3203 | 3165 | 3125 | 3084 | 3043 | 3000 | 2955 | 2910 | 2863 | 2815 | 2766 | 2716 | 2664 |

S = 0.701 to 0.800

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.801 | 3206 | 3168 | 3128 | 3087 | 3045 | 3002 | 2958 | 2912 | 2865 | 2817 | 2768 | 2718 | 2666 |
| .802 | 3209 | 3171 | 3131 | 3090 | 3048 | 3005 | 2960 | 2914 | 2867 | 2819 | 2770 | 2719 | 2668 |
| .803 | 3212 | 3173 | 3134 | 3093 | 3050 | 3007 | 2962 | 2917 | 2870 | 2821 | 2772 | 2721 | 2669 |
| .804 | 3215 | 3176 | 3137 | 3095 | 3053 | 3010 | 2965 | 2919 | 2872 | 2823 | 2774 | 2723 | 2671 |
| .805 | 3218 | 3179 | 3139 | 3098 | 3056 | 3012 | 2967 | 2921 | 2874 | 2825 | 2776 | 2725 | 2673 |
| .806 | 3221 | 3182 | 3142 | 3101 | 3058 | 3014 | 2969 | 2923 | 2876 | 2827 | 2778 | 2727 | 2674 |
| .807 | 3224 | 3185 | 3145 | 3103 | 3061 | 3017 | 2972 | 2926 | 2878 | 2829 | 2779 | 2728 | 2676 |
| .808 | 3227 | 3188 | 3148 | 3106 | 3063 | 3019 | 2974 | 2928 | 2880 | 2831 | 2781 | 2730 | 2678 |
| .809 | 3230 | 3191 | 3151 | 3109 | 3066 | 3022 | 2976 | 2930 | 2882 | 2833 | 2783 | 2732 | 2679 |
| .810 | 3233 | 3194 | 3153 | 3112 | 3068 | 3024 | 2979 | 2932 | 2884 | 2835 | 2785 | 2734 | 2681 |
| .811 | 3236 | 3197 | 3156 | 3114 | 3071 | 3027 | 2981 | 2934 | 2886 | 2837 | 2787 | 2735 | 2683 |
| .812 | 3239 | 3200 | 3159 | 3117 | 3074 | 3029 | 2983 | 2936 | 2888 | 2839 | 2789 | 2737 | 2684 |
| .813 | 3242 | 3202 | 3162 | 3119 | 3076 | 3031 | 2986 | 2939 | 2890 | 2841 | 2791 | 2739 | 2686 |
| .814 | 3245 | 3205 | 3164 | 3122 | 3079 | 3034 | 2988 | 2941 | 2893 | 2843 | 2792 | 2740 | 2687 |
| .815 | 3248 | 3208 | 3167 | 3125 | 3081 | 3036 | 2990 | 2943 | 2895 | 2845 | 2794 | 2742 | 2689 |
| .816 | 3251 | 3211 | 3170 | 3127 | 3084 | 3039 | 2992 | 2945 | 2897 | 2847 | 2796 | 2744 | 2691 |
| .817 | 3254 | 3214 | 3173 | 3130 | 3086 | 3041 | 2995 | 2947 | 2899 | 2849 | 2798 | 2746 | 2692 |
| .818 | 3257 | 3217 | 3175 | 3133 | 3089 | 3043 | 2997 | 2949 | 2901 | 2851 | 2800 | 2747 | 2694 |
| .819 | 3259 | 3219 | 3178 | 3135 | 3091 | 3046 | 2999 | 2952 | 2903 | 2853 | 2801 | 2749 | 2695 |
| .820 | 3262 | 3222 | 3181 | 3138 | 3093 | 3048 | 3001 | 2954 | 2905 | 2854 | 2803 | 2751 | 2697 |
| .821 | 3265 | 3225 | 3183 | 3140 | 3096 | 3050 | 3004 | 2956 | 2907 | 2856 | 2805 | 2752 | 2699 |
| .822 | 3268 | 3228 | 3186 | 3143 | 3098 | 3053 | 3006 | 2958 | 2909 | 2858 | 2807 | 2754 | 2700 |
| .823 | 3271 | 3231 | 3189 | 3145 | 3101 | 3055 | 3008 | 2960 | 2911 | 2860 | 2808 | 2756 | 2702 |
| .824 | 3274 | 3233 | 3191 | 3148 | 3103 | 3057 | 3010 | 2962 | 2913 | 2862 | 2810 | 2757 | 2703 |
| .825 | 3277 | 3236 | 3194 | 3150 | 3106 | 3060 | 3012 | 2964 | 2915 | 2864 | 2812 | 2759 | 2705 |
| .826 | 3279 | 3239 | 3197 | 3153 | 3108 | 3062 | 3015 | 2966 | 2916 | 2866 | 2814 | 2761 | 2706 |
| .827 | 3282 | 3242 | 3199 | 3156 | 3110 | 3064 | 3017 | 2968 | 2918 | 2868 | 2816 | 2762 | 2708 |
| .828 | 3285 | 3244 | 3202 | 3158 | 3113 | 3067 | 3019 | 2970 | 2920 | 2869 | 2817 | 2764 | 2710 |
| .829 | 3288 | 3247 | 3204 | 3161 | 3115 | 3069 | 3021 | 2972 | 2922 | 2871 | 2819 | 2766 | 2711 |
| .830 | 3291 | 3250 | 3207 | 3163 | 3118 | 3071 | 3023 | 2974 | 2924 | 2873 | 2821 | 2767 | 2713 |
| .831 | 3294 | 3252 | 3210 | 3165 | 3120 | 3073 | 3025 | 2976 | 2926 | 2875 | 2822 | 2769 | 2714 |
| .832 | 3296 | 3255 | 3212 | 3168 | 3122 | 3076 | 3028 | 2978 | 2928 | 2877 | 2824 | 2770 | 2716 |
| .833 | 3299 | 3258 | 3215 | 3170 | 3125 | 3078 | 3030 | 2980 | 2930 | 2878 | 2826 | 2772 | 2717 |
| .834 | 3302 | 3260 | 3217 | 3173 | 3127 | 3080 | 3032 | 2982 | 2932 | 2880 | 2828 | 2774 | 2719 |
| .835 | 3305 | 3263 | 3220 | 3175 | 3129 | 3082 | 3034 | 2984 | 2934 | 2882 | 2829 | 2775 | 2720 |
| .836 | 3307 | 3266 | 3222 | 3178 | 3132 | 3084 | 3036 | 2986 | 2936 | 2884 | 2831 | 2777 | 2722 |
| .837 | 3310 | 3268 | 3225 | 3180 | 3134 | 3087 | 3038 | 2988 | 2938 | 2886 | 2833 | 2778 | 2723 |
| .838 | 3313 | 3271 | 3228 | 3183 | 3136 | 3089 | 3040 | 2990 | 2939 | 2887 | 2834 | 2780 | 2725 |
| .839 | 3316 | 3274 | 3230 | 3185 | 3139 | 3091 | 3042 | 2992 | 2941 | 2889 | 2836 | 2782 | 2726 |
| .840 | 3318 | 3276 | 3233 | 3187 | 3141 | 3093 | 3044 | 2994 | 2943 | 2891 | 2838 | 2783 | 2728 |
| .841 | 3321 | 3279 | 3235 | 3190 | 3143 | 3095 | 3046 | 2996 | 2945 | 2893 | 2839 | 2785 | 2729 |
| .842 | 3324 | 3281 | 3238 | 3192 | 3146 | 3098 | 3049 | 2998 | 2947 | 2894 | 2841 | 2786 | 2731 |
| .843 | 3326 | 3284 | 3240 | 3195 | 3148 | 3100 | 3051 | 3000 | 2949 | 2896 | 2843 | 2788 | 2732 |
| .844 | 3329 | 3286 | 3242 | 3197 | 3150 | 3102 | 3053 | 3002 | 2951 | 2898 | 2844 | 2789 | 2733 |
| .845 | 3332 | 3289 | 3245 | 3199 | 3152 | 3104 | 3055 | 3004 | 2952 | 2900 | 2846 | 2791 | 2735 |
| .846 | 3334 | 3292 | 3247 | 3202 | 3155 | 3106 | 3057 | 3006 | 2954 | 2901 | 2847 | 2792 | 2736 |
| .847 | 3337 | 3294 | 3250 | 3204 | 3157 | 3108 | 3059 | 3008 | 2956 | 2903 | 2849 | 2794 | 2738 |
| .848 | 3340 | 3297 | 3252 | 3206 | 3159 | 3110 | 3061 | 3010 | 2958 | 2905 | 2851 | 2795 | 2739 |
| .849 | 3342 | 3299 | 3255 | 3209 | 3161 | 3112 | 3063 | 3012 | 2960 | 2906 | 2852 | 2797 | 2741 |
| .850 | 3345 | 3302 | 3257 | 3211 | 3163 | 3115 | 3065 | 3014 | 2961 | 2908 | 2854 | 2798 | 2742 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.851 | 3347 | 3304 | 3260 | 3213 | 3166 | 3117 | 3067 | 3015 | 2963 | 2910 | 2855 | 2800 | 2743 |
| .852 | 3350 | 3307 | 3262 | 3215 | 3168 | 3119 | 3069 | 3017 | 2965 | 2911 | 2857 | 2801 | 2745 |
| .853 | 3353 | 3309 | 3264 | 3218 | 3170 | 3121 | 3071 | 3019 | 2967 | 2913 | 2859 | 2803 | 2746 |
| .854 | 3355 | 3312 | 3267 | 3220 | 3172 | 3123 | 3073 | 3021 | 2968 | 2915 | 2860 | 2804 | 2748 |
| .855 | 3358 | 3314 | 3269 | 3222 | 3174 | 3125 | 3075 | 3023 | 2970 | 2916 | 2862 | 2806 | 2749 |
| .856 | 3360 | 3317 | 3271 | 3225 | 3176 | 3127 | 3076 | 3025 | 2972 | 2918 | 2863 | 2807 | 2750 |
| .857 | 3363 | 3319 | 3274 | 3227 | 3179 | 3129 | 3078 | 3027 | 2974 | 2920 | 2865 | 2809 | 2752 |
| .858 | 3365 | 3321 | 3276 | 3229 | 3181 | 3131 | 3080 | 3028 | 2975 | 2921 | 2866 | 2810 | 2753 |
| .859 | 3368 | 3324 | 3278 | 3231 | 3183 | 3133 | 3082 | 3030 | 2977 | 2923 | 2868 | 2812 | 2755 |
| .860 | 3370 | 3326 | 3281 | 3233 | 3185 | 3135 | 3084 | 3032 | 2979 | 2925 | 2869 | 2813 | 2756 |
| .861 | 3373 | 3329 | 3283 | 3236 | 3187 | 3137 | 3086 | 3034 | 2981 | 2926 | 2871 | 2815 | 2757 |
| .862 | 3375 | 3331 | 3285 | 3238 | 3189 | 3139 | 3088 | 3036 | 2982 | 2928 | 2873 | 2816 | 2759 |
| .863 | 3378 | 3334 | 3288 | 3240 | 3191 | 3141 | 3090 | 3037 | 2984 | 2929 | 2874 | 2818 | 2760 |
| .864 | 3380 | 3336 | 3290 | 3242 | 3193 | 3143 | 3092 | 3039 | 2986 | 2931 | 2876 | 2819 | 2761 |
| .865 | 3383 | 3338 | 3292 | 3244 | 3195 | 3145 | 3094 | 3041 | 2987 | 2933 | 2877 | 2820 | 2763 |
| .866 | 3385 | 3341 | 3294 | 3247 | 3197 | 3147 | 3095 | 3043 | 2989 | 2934 | 2879 | 2822 | 2764 |
| .867 | 3388 | 3343 | 3297 | 3249 | 3200 | 3149 | 3097 | 3044 | 2991 | 2936 | 2880 | 2823 | 2765 |
| .868 | 3390 | 3345 | 3299 | 3251 | 3202 | 3151 | 3099 | 3046 | 2992 | 2937 | 2881 | 2825 | 2767 |
| .869 | 3393 | 3348 | 3301 | 3253 | 3204 | 3153 | 3101 | 3048 | 2994 | 2939 | 2883 | 2826 | 2768 |
| .870 | 3395 | 3350 | 3303 | 3255 | 3206 | 3155 | 3103 | 3050 | 2996 | 2941 | 2884 | 2827 | 2769 |
| .871 | 3397 | 3352 | 3306 | 3257 | 3208 | 3157 | 3105 | 3051 | 2997 | 2942 | 2886 | 2829 | 2771 |
| .872 | 3400 | 3355 | 3308 | 3259 | 3210 | 3159 | 3106 | 3053 | 2999 | 2944 | 2887 | 2830 | 2772 |
| .873 | 3402 | 3357 | 3310 | 3262 | 3212 | 3161 | 3108 | 3055 | 3000 | 2945 | 2889 | 2832 | 2773 |
| .874 | 3405 | 3359 | 3312 | 3264 | 3214 | 3162 | 3110 | 3057 | 3002 | 2947 | 2890 | 2833 | 2775 |
| .875 | 3407 | 3362 | 3314 | 3266 | 3216 | 3164 | 3112 | 3058 | 3004 | 2948 | 2892 | 2834 | 2776 |
| .876 | 3409 | 3364 | 3317 | 3268 | 3218 | 3166 | 3114 | 3060 | 3005 | 2950 | 2893 | 2836 | 2777 |
| .877 | 3412 | 3366 | 3319 | 3270 | 3220 | 3168 | 3115 | 3062 | 3007 | 2951 | 2895 | 2837 | 2778 |
| .878 | 3414 | 3368 | 3321 | 3272 | 3222 | 3170 | 3117 | 3063 | 3009 | 2953 | 2896 | 2838 | 2780 |
| .879 | 3416 | 3371 | 3323 | 3274 | 3224 | 3172 | 3119 | 3065 | 3010 | 2954 | 2897 | 2840 | 2781 |
| .880 | 3419 | 3373 | 3325 | 3276 | 3225 | 3174 | 3121 | 3067 | 3012 | 2956 | 2899 | 2841 | 2782 |
| .881 | 3421 | 3375 | 3327 | 3278 | 3227 | 3175 | 3122 | 3068 | 3013 | 2957 | 2900 | 2842 | 2783 |
| .882 | 3423 | 3377 | 3330 | 3280 | 3229 | 3177 | 3124 | 3070 | 3015 | 2959 | 2902 | 2844 | 2785 |
| .883 | 3426 | 3379 | 3332 | 3282 | 3231 | 3179 | 3126 | 3072 | 3016 | 2960 | 2903 | 2845 | 2786 |
| .884 | 3428 | 3382 | 3334 | 3284 | 3233 | 3181 | 3128 | 3073 | 3018 | 2962 | 2904 | 2846 | 2787 |
| .885 | 3430 | 3384 | 3336 | 3286 | 3235 | 3183 | 3129 | 3075 | 3019 | 2963 | 2906 | 2848 | 2788 |
| .886 | 3433 | 3386 | 3338 | 3288 | 3237 | 3185 | 3131 | 3076 | 3021 | 2965 | 2907 | 2849 | 2790 |
| .887 | 3435 | 3388 | 3340 | 3290 | 3239 | 3186 | 3133 | 3078 | 3022 | 2966 | 2908 | 2850 | 2791 |
| .888 | 3437 | 3390 | 3342 | 3292 | 3241 | 3188 | 3134 | 3080 | 3024 | 2967 | 2910 | 2851 | 2792 |
| .889 | 3439 | 3393 | 3344 | 3294 | 3243 | 3190 | 3136 | 3081 | 3025 | 2969 | 2911 | 2853 | 2793 |
| .890 | 3442 | 3395 | 3346 | 3296 | 3244 | 3192 | 3138 | 3083 | 3027 | 2970 | 2913 | 2854 | 2794 |
| .891 | 3444 | 3397 | 3348 | 3298 | 3246 | 3193 | 3139 | 3084 | 3028 | 2972 | 2914 | 2855 | 2796 |
| .892 | 3446 | 3399 | 3350 | 3300 | 3248 | 3195 | 3141 | 3086 | 3030 | 2973 | 2915 | 2856 | 2797 |
| .893 | 3448 | 3401 | 3352 | 3302 | 3250 | 3197 | 3143 | 3088 | 3031 | 2974 | 2917 | 2858 | 2798 |
| .894 | 3451 | 3403 | 3354 | 3304 | 3252 | 3199 | 3144 | 3089 | 3033 | 2976 | 2918 | 2859 | 2799 |
| .895 | 3453 | 3405 | 3356 | 3306 | 3254 | 3200 | 3146 | 3091 | 3034 | 2977 | 2919 | 2860 | 2800 |
| .896 | 3455 | 3407 | 3358 | 3307 | 3255 | 3202 | 3148 | 3092 | 3036 | 2979 | 2920 | 2861 | 2801 |
| .897 | 3457 | 3409 | 3360 | 3309 | 3257 | 3204 | 3149 | 3094 | 3037 | 2980 | 2922 | 2863 | 2803 |
| .898 | 3459 | 3411 | 3362 | 3311 | 3259 | 3205 | 3151 | 3095 | 3039 | 2981 | 2923 | 2864 | 2804 |
| .899 | 3461 | 3414 | 3364 | 3313 | 3261 | 3207 | 3153 | 3097 | 3040 | 2983 | 2924 | 2865 | 2805 |
| .900 | 3464 | 3416 | 3366 | 3315 | 3263 | 3209 | 3154 | 3098 | 3042 | 2984 | 2926 | 2866 | 2806 |

S = 0.801 to 0.900

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.901 | 3466 | 3418 | 3368 | 3317 | 3264 | 3211 | 3156 | 3100 | 3043 | 2985 | 2927 | 2867 | 2807 |
| .902 | 3468 | 3420 | 3370 | 3319 | 3266 | 3212 | 3157 | 3101 | 3044 | 2987 | 2928 | 2869 | 2808 |
| .903 | 3470 | 3422 | 3372 | 3321 | 3268 | 3214 | 3159 | 3103 | 3046 | 2988 | 2929 | 2870 | 2809 |
| .904 | 3473 | 3424 | 3374 | 3323 | 3270 | 3216 | 3161 | 3104 | 3047 | 2989 | 2931 | 2871 | 2811 |
| .905 | 3475 | 3426 | 3376 | 3325 | 3272 | 3217 | 3162 | 3106 | 3049 | 2991 | 2932 | 2872 | 2812 |
| .906 | 3477 | 3429 | 3378 | 3326 | 3273 | 3219 | 3164 | 3107 | 3050 | 2992 | 2933 | 2873 | 2813 |
| .907 | 3480 | 3431 | 3380 | 3328 | 3275 | 3221 | 3165 | 3109 | 3051 | 2993 | 2934 | 2875 | 2814 |
| .908 | 3482 | 3433 | 3382 | 3330 | 3277 | 3222 | 3167 | 3110 | 3053 | 2995 | 2936 | 2876 | 2815 |
| .909 | 3484 | 3435 | 3384 | 3332 | 3279 | 3224 | 3168 | 3112 | 3054 | 2996 | 2937 | 2877 | 2816 |
| .910 | 3486 | 3437 | 3386 | 3334 | 3280 | 3226 | 3170 | 3113 | 3056 | 2997 | 2938 | 2878 | 2817 |
| .911 | 3488 | 3439 | 3388 | 3336 | 3282 | 3227 | 3171 | 3115 | 3057 | 2999 | 2939 | 2879 | 2818 |
| .912 | 3491 | 3441 | 3390 | 3338 | 3284 | 3229 | 3173 | 3116 | 3058 | 3000 | 2940 | 2880 | 2819 |
| .913 | 3493 | 3443 | 3392 | 3339 | 3286 | 3231 | 3175 | 3118 | 3060 | 3001 | 2942 | 2881 | 2820 |
| .914 | 3495 | 3445 | 3394 | 3341 | 3287 | 3232 | 3176 | 3119 | 3061 | 3002 | 2943 | 2883 | 2821 |
| .915 | 3497 | 3447 | 3396 | 3343 | 3289 | 3234 | 3178 | 3120 | 3062 | 3004 | 2944 | 2884 | 2823 |
| .916 | 3499 | 3449 | 3398 | 3345 | 3291 | 3235 | 3179 | 3122 | 3064 | 3005 | 2945 | 2885 | 2824 |
| .917 | 3501 | 3451 | 3400 | 3347 | 3292 | 3237 | 3181 | 3123 | 3065 | 3006 | 2946 | 2886 | 2825 |
| .918 | 3504 | 3453 | 3402 | 3348 | 3294 | 3238 | 3182 | 3125 | 3066 | 3007 | 2948 | 2887 | 2826 |
| .919 | 3506 | 3455 | 3404 | 3350 | 3296 | 3240 | 3183 | 3126 | 3068 | 3009 | 2949 | 2888 | 2827 |
| .920 | 3508 | 3457 | 3405 | 3352 | 3297 | 3242 | 3185 | 3127 | 3069 | 3010 | 2950 | 2889 | 2828 |
| .921 | 3510 | 3459 | 3407 | 3354 | 3299 | 3243 | 3186 | 3129 | 3070 | 3011 | 2951 | 2890 | 2829 |
| .922 | 3512 | 3461 | 3409 | 3355 | 3301 | 3245 | 3188 | 3130 | 3071 | 3012 | 2952 | 2891 | 2830 |
| .923 | 3514 | 3463 | 3411 | 3357 | 3302 | 3246 | 3189 | 3131 | 3073 | 3013 | 2953 | 2892 | 2831 |
| .924 | 3516 | 3465 | 3413 | 3359 | 3304 | 3248 | 3191 | 3133 | 3074 | 3015 | 2954 | 2893 | 2832 |
| .925 | 3518 | 3467 | 3414 | 3360 | 3305 | 3249 | 3192 | 3134 | 3075 | 3016 | 2955 | 2894 | 2833 |
| .926 | 3520 | 3469 | 3416 | 3362 | 3307 | 3251 | 3193 | 3135 | 3076 | 3017 | 2957 | 2896 | 2834 |
| .927 | 3522 | 3471 | 3418 | 3364 | 3309 | 3252 | 3195 | 3137 | 3078 | 3018 | 2958 | 2897 | 2835 |
| .928 | 3524 | 3473 | 3420 | 3365 | 3310 | 3254 | 3196 | 3138 | 3079 | 3019 | 2959 | 2898 | 2836 |
| .929 | 3526 | 3474 | 3421 | 3367 | 3312 | 3255 | 3198 | 3139 | 3080 | 3020 | 2960 | 2899 | 2837 |
| .930 | 3528 | 3476 | 3423 | 3369 | 3313 | 3257 | 3199 | 3141 | 3081 | 3022 | 2961 | 2900 | 2838 |
| .931 | 3530 | 3478 | 3425 | 3370 | 3315 | 3258 | 3200 | 3142 | 3083 | 3023 | 2962 | 2901 | 2839 |
| .932 | 3532 | 3480 | 3427 | 3372 | 3316 | 3259 | 3202 | 3143 | 3084 | 3024 | 2963 | 2902 | 2840 |
| .933 | 3534 | 3482 | 3428 | 3374 | 3318 | 3261 | 3203 | 3144 | 3085 | 3025 | 2964 | 2903 | 2841 |
| .934 | 3535 | 3483 | 3430 | 3375 | 3319 | 3262 | 3204 | 3146 | 3086 | 3026 | 2965 | 2904 | 2842 |
| .935 | 3537 | 3485 | 3432 | 3377 | 3321 | 3264 | 3206 | 3147 | 3087 | 3027 | 2966 | 2905 | 2843 |
| .936 | 3539 | 3487 | 3433 | 3378 | 3322 | 3265 | 3207 | 3148 | 3089 | 3028 | 2967 | 2906 | 2843 |
| .937 | 3541 | 3489 | 3435 | 3380 | 3324 | 3266 | 3208 | 3149 | 3090 | 3029 | 2968 | 2907 | 2844 |
| .938 | 3543 | 3490 | 3437 | 3381 | 3325 | 3268 | 3210 | 3151 | 3091 | 3031 | 2969 | 2908 | 2845 |
| .939 | 3545 | 3492 | 3438 | 3383 | 3327 | 3269 | 3211 | 3152 | 3092 | 3032 | 2971 | 2909 | 2846 |
| .940 | 3547 | 3494 | 3440 | 3385 | 3328 | 3271 | 3212 | 3153 | 3093 | 3033 | 2972 | 2910 | 2847 |
| .941 | 3548 | 3496 | 3442 | 3386 | 3329 | 3272 | 3214 | 3154 | 3094 | 3034 | 2973 | 2911 | 2848 |
| .942 | 3550 | 3497 | 3443 | 3388 | 3331 | 3273 | 3215 | 3155 | 3095 | 3035 | 2974 | 2912 | 2849 |
| .943 | 3552 | 3499 | 3445 | 3389 | 3332 | 3275 | 3216 | 3157 | 3097 | 3036 | 2975 | 2913 | 2850 |
| .944 | 3554 | 3501 | 3446 | 3390 | 3334 | 3276 | 3217 | 3158 | 3098 | 3037 | 2976 | 2914 | 2851 |
| .945 | 3555 | 3502 | 3448 | 3392 | 3335 | 3277 | 3219 | 3159 | 3099 | 3038 | 2977 | 2914 | 2852 |
| .946 | 3557 | 3504 | 3449 | 3393 | 3336 | 3278 | 3220 | 3160 | 3100 | 3039 | 2978 | 2915 | 2853 |
| .947 | 3559 | 3506 | 3451 | 3395 | 3338 | 3280 | 3221 | 3161 | 3101 | 3040 | 2979 | 2916 | 2854 |
| .948 | 3561 | 3507 | 3452 | 3396 | 3339 | 3281 | 3222 | 3162 | 3102 | 3041 | 2980 | 2917 | 2854 |
| .949 | 3562 | 3509 | 3454 | 3398 | 3341 | 3282 | 3223 | 3164 | 3103 | 3042 | 2980 | 2918 | 2855 |
| .950 | 3564 | 3510 | 3455 | 3399 | 3342 | 3284 | 3225 | 3165 | 3104 | 3043 | 2981 | 2919 | 2856 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 0.951 | 3566 | 3512 | 3457 | 3401 | 3343 | 3285 | 3226 | 3166 | 3105 | 3044 | 2982 | 2920 | 2857 |
| .952 | 3568 | 3514 | 3459 | 3402 | 3345 | 3286 | 3227 | 3167 | 3106 | 3045 | 2983 | 2921 | 2858 |
| .953 | 3569 | 3515 | 3460 | 3403 | 3346 | 3287 | 3228 | 3168 | 3107 | 3046 | 2984 | 2922 | 2859 |
| .954 | 3571 | 3517 | 3462 | 3405 | 3347 | 3289 | 3229 | 3169 | 3109 | 3047 | 2985 | 2923 | 2860 |
| .955 | 3573 | 3519 | 3463 | 3406 | 3349 | 3290 | 3231 | 3170 | 3110 | 3048 | 2986 | 2924 | 2860 |
| .956 | 3575 | 3520 | 3465 | 3408 | 3350 | 3291 | 3232 | 3171 | 3111 | 3049 | 2987 | 2924 | 2861 |
| .957 | 3576 | 3522 | 3466 | 3409 | 3351 | 3292 | 3233 | 3172 | 3112 | 3050 | 2988 | 2925 | 2862 |
| .958 | 3578 | 3523 | 3468 | 3410 | 3352 | 3294 | 3234 | 3174 | 3113 | 3051 | 2989 | 2926 | 2863 |
| .959 | 3580 | 3525 | 3469 | 3412 | 3354 | 3295 | 3235 | 3175 | 3114 | 3052 | 2990 | 2927 | 2864 |
| .960 | 3581 | 3526 | 3470 | 3413 | 3355 | 3296 | 3236 | 3176 | 3115 | 3053 | 2991 | 2928 | 2865 |
| .961 | 3583 | 3528 | 3472 | 3414 | 3356 | 3297 | 3237 | 3177 | 3116 | 3054 | 2992 | 2929 | 2865 |
| .962 | 3584 | 3529 | 3473 | 3416 | 3357 | 3298 | 3238 | 3178 | 3117 | 3055 | 2993 | 2930 | 2866 |
| .963 | 3586 | 3531 | 3475 | 3417 | 3359 | 3299 | 3240 | 3179 | 3118 | 3056 | 2993 | 2930 | 2867 |
| .964 | 3588 | 3532 | 3476 | 3418 | 3360 | 3301 | 3241 | 3180 | 3119 | 3057 | 2994 | 2931 | 2868 |
| .965 | 3589 | 3534 | 3477 | 3420 | 3361 | 3302 | 3242 | 3181 | 3120 | 3058 | 2995 | 2932 | 2869 |
| .966 | 3591 | 3535 | 3479 | 3421 | 3362 | 3303 | 3243 | 3182 | 3120 | 3059 | 2996 | 2933 | 2869 |
| .967 | 3592 | 3537 | 3480 | 3422 | 3363 | 3304 | 3244 | 3183 | 3121 | 3059 | 2997 | 2934 | 2870 |
| .968 | 3594 | 3538 | 3481 | 3423 | 3365 | 3305 | 3245 | 3184 | 3122 | 3060 | 2998 | 2935 | 2871 |
| .969 | 3595 | 3539 | 3483 | 3425 | 3366 | 3306 | 3246 | 3185 | 3123 | 3061 | 2999 | 2935 | 2872 |
| .970 | 3597 | 3541 | 3484 | 3426 | 3367 | 3307 | 3247 | 3186 | 3124 | 3062 | 2999 | 2936 | 2872 |
| .971 | 3598 | 3542 | 3485 | 3427 | 3368 | 3308 | 3248 | 3187 | 3125 | 3063 | 3000 | 2937 | 2873 |
| .972 | 3599 | 3543 | 3486 | 3428 | 3369 | 3309 | 3249 | 3188 | 3126 | 3064 | 3001 | 2938 | 2874 |
| .973 | 3601 | 3545 | 3488 | 3429 | 3370 | 3310 | 3250 | 3189 | 3127 | 3065 | 3002 | 2939 | 2875 |
| .974 | 3602 | 3546 | 3489 | 3430 | 3371 | 3311 | 3251 | 3190 | 3128 | 3066 | 3003 | 2939 | 2875 |
| .975 | 3604 | 3547 | 3490 | 3432 | 3372 | 3312 | 3252 | 3191 | 3129 | 3066 | 3004 | 2940 | 2876 |
| .976 | 3605 | 3549 | 3491 | 3433 | 3374 | 3314 | 3253 | 3191 | 3130 | 3067 | 3004 | 2941 | 2877 |
| .977 | 3606 | 3550 | 3492 | 3434 | 3375 | 3315 | 3254 | 3192 | 3131 | 3068 | 3005 | 2942 | 2878 |
| .978 | 3607 | 3551 | 3494 | 3435 | 3376 | 3316 | 3255 | 3193 | 3131 | 3069 | 3006 | 2942 | 2878 |
| .979 | 3609 | 3552 | 3495 | 3436 | 3377 | 3317 | 3256 | 3194 | 3132 | 3070 | 3007 | 2943 | 2879 |
| .980 | 3610 | 3553 | 3496 | 3437 | 3378 | 3317 | 3257 | 3195 | 3133 | 3071 | 3007 | 2944 | 2880 |
| .981 | 3611 | 3555 | 3497 | 3438 | 3379 | 3318 | 3258 | 3196 | 3134 | 3071 | 3008 | 2945 | 2881 |
| .982 | 3612 | 3556 | 3498 | 3439 | 3380 | 3319 | 3258 | 3197 | 3135 | 3072 | 3009 | 2945 | 2881 |
| .983 | 3614 | 3557 | 3499 | 3440 | 3381 | 3320 | 3259 | 3198 | 3136 | 3073 | 3010 | 2946 | 2882 |
| .984 | 3615 | 3558 | 3500 | 3441 | 3382 | 3321 | 3260 | 3199 | 3136 | 3074 | 3011 | 2947 | 2883 |
| .985 | 3616 | 3559 | 3501 | 3442 | 3383 | 3322 | 3261 | 3199 | 3137 | 3074 | 3011 | 2948 | 2883 |
| .986 | 3617 | 3560 | 3502 | 3443 | 3384 | 3323 | 3262 | 3200 | 3138 | 3075 | 3012 | 2948 | 2884 |
| .987 | 3618 | 3561 | 3503 | 3444 | 3385 | 3324 | 3263 | 3201 | 3139 | 3076 | 3013 | 2949 | 2885 |
| .988 | 3619 | 3562 | 3504 | 3445 | 3385 | 3325 | 3264 | 3202 | 3140 | 3077 | 3013 | 2950 | 2885 |
| .989 | 3620 | 3563 | 3505 | 3446 | 3386 | 3326 | 3265 | 3203 | 3140 | 3078 | 3014 | 2950 | 2886 |
| .990 | 3622 | 3564 | 3506 | 3447 | 3387 | 3327 | 3265 | 3204 | 3141 | 3078 | 3015 | 2951 | 2887 |
| .991 | 3623 | 3565 | 3507 | 3448 | 3388 | 3328 | 3266 | 3204 | 3142 | 3079 | 3016 | 2952 | 2887 |
| .992 | 3624 | 3566 | 3508 | 3449 | 3389 | 3328 | 3267 | 3205 | 3143 | 3080 | 3016 | 2952 | 2888 |
| .993 | 3625 | 3567 | 3509 | 3450 | 3390 | 3329 | 3268 | 3206 | 3143 | 3080 | 3017 | 2953 | 2889 |
| .994 | 3626 | 3568 | 3510 | 3451 | 3391 | 3330 | 3269 | 3207 | 3144 | 3081 | 3018 | 2954 | 2889 |
| .995 | 3627 | 3569 | 3511 | 3452 | 3392 | 3331 | 3269 | 3207 | 3145 | 3082 | 3018 | 2954 | 2890 |
| .996 | 3628 | 3570 | 3512 | 3453 | 3393 | 3332 | 3270 | 3208 | 3146 | 3083 | 3019 | 2955 | 2891 |
| .997 | 3628 | 3571 | 3513 | 3453 | 3393 | 3332 | 3271 | 3209 | 3146 | 3083 | 3020 | 2956 | 2891 |
| .998 | 3629 | 3572 | 3514 | 3454 | 3394 | 3333 | 3272 | 3210 | 3147 | 3084 | 3020 | 2956 | 2892 |
| .999 | 3630 | 3573 | 3515 | 3455 | 3395 | 3334 | 3273 | 3210 | 3148 | 3085 | 3021 | 2957 | 2892 |
| 1.000 | 3631 | 3574 | 3515 | 3456 | 3396 | 3335 | 3273 | 3211 | 3148 | 3085 | 3022 | 2958 | 2893 |

S = 0.901 to 1.000

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 1.001 | 3632 | 3575 | 3516 | 3457 | 3397 | 3336 | 3274 | 3212 | 3149 | 3086 | 3022 | 2958 | 2894 |
| .002 | 3633 | 3575 | 3517 | 3458 | 3397 | 3336 | 3275 | 3213 | 3150 | 3087 | 3023 | 2959 | 2894 |
| .003 | 3634 | 3576 | 3518 | 3458 | 3398 | 3337 | 3275 | 3213 | 3151 | 3087 | 3024 | 2959 | 2895 |
| .004 | 3634 | 3577 | 3519 | 3459 | 3399 | 3338 | 3276 | 3214 | 3151 | 3088 | 3024 | 2960 | 2895 |
| .005 | 3635 | 3578 | 3520 | 3460 | 3400 | 3339 | 3277 | 3215 | 3152 | 3089 | 3025 | 2961 | 2896 |
| .006 | 3636 | 3579 | 3520 | 3461 | 3400 | 3339 | 3278 | 3215 | 3153 | 3089 | 3025 | 2961 | 2897 |
| .007 | 3637 | 3579 | 3521 | 3461 | 3401 | 3340 | 3278 | 3216 | 3153 | 3090 | 3026 | 2962 | 2897 |
| .008 | 3637 | 3580 | 3522 | 3462 | 3402 | 3341 | 3279 | 3217 | 3154 | 3090 | 3027 | 2962 | 2898 |
| .009 | 3638 | 3581 | 3523 | 3463 | 3403 | 3341 | 3280 | 3217 | 3154 | 3091 | 3027 | 2963 | 2898 |
| .010 | 3639 | 3582 | 3523 | 3464 | 3403 | 3342 | 3280 | 3218 | 3155 | 3092 | 3028 | 2964 | 2899 |
| .011 | 3639 | 3582 | 3524 | 3464 | 3404 | 3343 | 3281 | 3219 | 3156 | 3092 | 3028 | 2964 | 2899 |
| .012 | 3640 | 3583 | 3525 | 3465 | 3405 | 3343 | 3282 | 3219 | 3156 | 3093 | 3029 | 2965 | 2900 |
| .013 | 3641 | 3584 | 3525 | 3466 | 3405 | 3344 | 3282 | 3220 | 3157 | 3093 | 3030 | 2965 | 2900 |
| .014 | 3641 | 3584 | 3526 | 3466 | 3406 | 3345 | 3283 | 3220 | 3157 | 3094 | 3030 | 2966 | 2901 |
| .015 | 3642 | 3585 | 3527 | 3467 | 3406 | 3345 | 3283 | 3221 | 3158 | 3095 | 3031 | 2966 | 2901 |
| .016 | 3642 | 3585 | 3527 | 3468 | 3407 | 3346 | 3284 | 3222 | 3159 | 3095 | 3031 | 2967 | 2902 |
| .017 | 3643 | 3586 | 3528 | 3468 | 3408 | 3346 | 3285 | 3222 | 3159 | 3096 | 3032 | 2967 | 2903 |
| .018 | 3643 | 3587 | 3528 | 3469 | 3408 | 3347 | 3285 | 3223 | 3160 | 3096 | 3032 | 2968 | 2903 |
| .019 | 3644 | 3587 | 3529 | 3469 | 3409 | 3348 | 3286 | 3223 | 3160 | 3097 | 3033 | 2968 | 2904 |
| .020 | 3644 | 3588 | 3530 | 3470 | 3409 | 3348 | 3286 | 3224 | 3161 | 3097 | 3033 | 2969 | 2904 |
| .021 | 3645 | 3588 | 3530 | 3470 | 3410 | 3349 | 3287 | 3224 | 3161 | 3098 | 3034 | 2969 | 2905 |
| .022 | 3645 | 3589 | 3531 | 3471 | 3411 | 3349 | 3287 | 3225 | 3162 | 3098 | 3034 | 2970 | 2905 |
| .023 | 3646 | 3589 | 3531 | 3471 | 3411 | 3350 | 3288 | 3225 | 3162 | 3099 | 3035 | 2970 | 2906 |
| .024 | 3646 | 3590 | 3532 | 3472 | 3412 | 3350 | 3288 | 3226 | 3163 | 3099 | 3035 | 2971 | 2906 |
| .025 | 3647 | 3590 | 3532 | 3472 | 3412 | 3351 | 3289 | 3226 | 3163 | 3100 | 3036 | 2971 | 2906 |
| .026 | 3647 | 3590 | 3533 | 3473 | 3413 | 3351 | 3289 | 3227 | 3164 | 3100 | 3036 | 2972 | 2907 |
| .027 | 3647 | 3591 | 3533 | 3473 | 3413 | 3352 | 3290 | 3227 | 3164 | 3101 | 3037 | 2972 | 2907 |
| .028 | 3648 | 3591 | 3533 | 3474 | 3413 | 3352 | 3290 | 3228 | 3165 | 3101 | 3037 | 2973 | 2908 |
| .029 | 3648 | 3592 | 3534 | 3474 | 3414 | 3353 | 3291 | 3228 | 3165 | 3102 | 3038 | 2973 | 2908 |
| .030 | 3648 | 3592 | 3534 | 3475 | 3414 | 3353 | 3291 | 3229 | 3166 | 3102 | 3038 | 2974 | 2909 |
| .031 | 3649 | 3592 | 3535 | 3475 | 3415 | 3354 | 3292 | 3229 | 3166 | 3103 | 3039 | 2974 | 2909 |
| .032 | 3649 | 3593 | 3535 | 3475 | 3415 | 3354 | 3292 | 3230 | 3167 | 3103 | 3039 | 2975 | 2910 |
| .033 | 3649 | 3593 | 3535 | 3476 | 3416 | 3354 | 3293 | 3230 | 3167 | 3104 | 3040 | 2975 | 2910 |
| .034 | 3649 | 3593 | 3536 | 3476 | 3416 | 3355 | 3293 | 3231 | 3168 | 3104 | 3040 | 2976 | 2911 |
| .035 | 3650 | 3594 | 3536 | 3477 | 3416 | 3355 | 3293 | 3231 | 3168 | 3104 | 3040 | 2976 | 2911 |
| .036 | 3650 | 3594 | 3536 | 3477 | 3417 | 3356 | 3294 | 3231 | 3168 | 3105 | 3041 | 2976 | 2911 |
| .037 | 3650 | 3594 | 3537 | 3477 | 3417 | 3356 | 3294 | 3232 | 3169 | 3105 | 3041 | 2977 | 2912 |
| .038 | 3650 | 3594 | 3537 | 3477 | 3417 | 3356 | 3295 | 3232 | 3169 | 3106 | 3042 | 2977 | 2912 |
| .039 | 3650 | 3594 | 3537 | 3478 | 3418 | 3357 | 3295 | 3233 | 3170 | 3106 | 3042 | 2978 | 2913 |
| .040 | 3650 | 3595 | 3537 | 3478 | 3418 | 3357 | 3295 | 3233 | 3170 | 3107 | 3043 | 2978 | 2913 |
| .041 | 3651 | 3595 | 3537 | 3478 | 3418 | 3357 | 3296 | 3233 | 3170 | 3107 | 3043 | 2978 | 2913 |
| .042 | 3651 | 3595 | 3538 | 3479 | 3419 | 3358 | 3296 | 3234 | 3171 | 3107 | 3043 | 2979 | 2914 |
| .043 | 3651 | 3595 | 3538 | 3479 | 3419 | 3358 | 3296 | 3234 | 3171 | 3108 | 3044 | 2979 | 2914 |
| .044 | 3651 | 3595 | 3538 | 3479 | 3419 | 3358 | 3297 | 3234 | 3171 | 3108 | 3044 | 2980 | 2914 |
| .045 | 3651 | 3595 | 3538 | 3479 | 3419 | 3358 | 3297 | 3235 | 3172 | 3108 | 3044 | 2980 | 2915 |
| .046 | 3651 | 3595 | 3538 | 3479 | 3420 | 3359 | 3297 | 3235 | 3172 | 3109 | 3045 | 2980 | 2915 |
| .047 | 3651 | 3595 | 3538 | 3480 | 3420 | 3359 | 3298 | 3235 | 3172 | 3109 | 3045 | 2981 | 2916 |
| .048 | 3651 | 3595 | 3539 | 3480 | 3420 | 3359 | 3298 | 3236 | 3173 | 3109 | 3045 | 2981 | 2916 |
| .049 | 3651 | 3595 | 3539 | 3480 | 3420 | 3359 | 3298 | 3236 | 3173 | 3110 | 3046 | 2981 | 2916 |
| .050 | 3651 | 3595 | 3539 | 3480 | 3420 | 3360 | 3298 | 3236 | 3173 | 3110 | 3046 | 2982 | 2917 |

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| 1.051 | 3651 | 3595 | 3539 | 3480 | 3421 | 3360 | 3299 | 3236 | 3174 | 3110 | 3046 | 2982 | 2917 |
| .052 | 3650 | 3595 | 3539 | 3480 | 3421 | 3360 | 3299 | 3236 | 3174 | 3111 | 3047 | 2982 | 2917 |
| .053 | 3650 | 3595 | 3539 | 3480 | 3421 | 3360 | 3299 | 3236 | 3174 | 3111 | 3047 | 2983 | 2918 |
| .054 | 3650 | 3595 | 3539 | 3480 | 3421 | 3360 | 3299 | 3236 | 3174 | 3111 | 3047 | 2983 | 2918 |
| .055 | 3650 | 3595 | 3539 | 3480 | 3421 | 3361 | 3299 | 3237 | 3175 | 3111 | 3048 | 2983 | 2918 |
| .056 | 3650 | 3595 | 3539 | 3480 | 3421 | 3361 | 3300 | 3238 | 3175 | 3112 | 3048 | 2984 | 2919 |
| .057 | 3650 | 3595 | 3539 | 3481 | 3421 | 3361 | 3300 | 3238 | 3175 | 3112 | 3048 | 2984 | 2919 |
| .058 | 3649 | 3595 | 3539 | 3481 | 3421 | 3361 | 3300 | 3238 | 3175 | 3112 | 3049 | 2984 | 2919 |
| .059 | 3649 | 3595 | 3539 | 3481 | 3421 | 3361 | 3300 | 3238 | 3176 | 3113 | 3049 | 2984 | 2919 |
| .060 | 3649 | 3595 | 3539 | 3481 | 3421 | 3361 | 3300 | 3238 | 3176 | 3113 | 3049 | 2985 | 2920 |
| .061 | 3649 | 3594 | 3539 | 3481 | 3421 | 3361 | 3300 | 3239 | 3176 | 3113 | 3049 | 2985 | 2920 |
| .062 | 3648 | 3594 | 3538 | 3480 | 3422 | 3361 | 3301 | 3239 | 3176 | 3113 | 3050 | 2985 | 2920 |
| .063 | 3648 | 3594 | 3538 | 3480 | 3422 | 3361 | 3301 | 3239 | 3176 | 3113 | 3050 | 2986 | 2921 |
| .064 | 3648 | 3594 | 3538 | 3480 | 3422 | 3362 | 3301 | 3239 | 3177 | 3114 | 3050 | 2986 | 2921 |
| .065 | 3647 | 3594 | 3538 | 3480 | 3422 | 3362 | 3301 | 3239 | 3177 | 3114 | 3050 | 2986 | 2921 |
| .066 | 3647 | 3593 | 3538 | 3480 | 3422 | 3362 | 3301 | 3239 | 3177 | 3114 | 3050 | 2986 | 2921 |
| .067 | 3647 | 3593 | 3538 | 3480 | 3421 | 3362 | 3301 | 3239 | 3177 | 3114 | 3051 | 2986 | 2922 |
| .068 | 3646 | 3593 | 3537 | 3480 | 3421 | 3362 | 3301 | 3240 | 3177 | 3114 | 3051 | 2987 | 2922 |
| .069 | 3646 | 3592 | 3537 | 3480 | 3421 | 3362 | 3301 | 3240 | 3177 | 3115 | 3051 | 2987 | 2922 |
| .070 | 3645 | 3592 | 3537 | 3480 | 3421 | 3362 | 3301 | 3240 | 3178 | 3115 | 3051 | 2987 | 2922 |
| .071 | 3645 | 3592 | 3537 | 3479 | 3421 | 3362 | 3301 | 3240 | 3178 | 3115 | 3052 | 2987 | 2923 |
| .072 | 3644 | 3591 | 3536 | 3479 | 3421 | 3362 | 3301 | 3240 | 3178 | 3115 | 3052 | 2988 | 2923 |
| .073 | 3644 | 3591 | 3536 | 3479 | 3421 | 3362 | 3301 | 3240 | 3178 | 3115 | 3052 | 2988 | 2923 |
| .074 | 3643 | 3590 | 3536 | 3479 | 3421 | 3362 | 3301 | 3240 | 3178 | 3115 | 3052 | 2988 | 2923 |
| .075 | 3643 | 3590 | 3535 | 3479 | 3421 | 3361 | 3301 | 3240 | 3178 | 3116 | 3052 | 2988 | 2923 |
| .076 | 3642 | 3590 | 3535 | 3478 | 3421 | 3361 | 3301 | 3240 | 3178 | 3116 | 3052 | 2988 | 2924 |
| .077 | 3642 | 3589 | 3535 | 3478 | 3420 | 3361 | 3301 | 3240 | 3178 | 3116 | 3053 | 2989 | 2924 |
| .078 | 3641 | 3589 | 3534 | 3478 | 3420 | 3361 | 3301 | 3240 | 3178 | 3116 | 3053 | 2989 | 2924 |
| .079 | 3641 | 3588 | 3534 | 3478 | 3420 | 3361 | 3301 | 3240 | 3178 | 3116 | 3053 | 2989 | 2924 |
| .080 | 3640 | 3588 | 3534 | 3477 | 3420 | 3361 | 3301 | 3240 | 3179 | 3116 | 3053 | 2989 | 2924 |
| .081 | 3639 | 3587 | 3533 | 3477 | 3420 | 3361 | 3301 | 3240 | 3179 | 3116 | 3053 | 2989 | 2925 |
| .082 | 3639 | 3587 | 3533 | 3477 | 3419 | 3361 | 3301 | 3240 | 3179 | 3116 | 3053 | 2989 | 2925 |
| .083 | 3638 | 3586 | 3532 | 3476 | 3419 | 3361 | 3301 | 3240 | 3179 | 3116 | 3053 | 2989 | 2925 |
| .084 | 3637 | 3585 | 3532 | 3476 | 3419 | 3360 | 3301 | 3240 | 3179 | 3116 | 3053 | 2990 | 2925 |
| .085 | 3637 | 3585 | 3531 | 3476 | 3419 | 3360 | 3301 | 3240 | 3179 | 3117 | 3054 | 2990 | 2925 |
| .086 | 3636 | 3584 | 3531 | 3475 | 3418 | 3360 | 3301 | 3240 | 3179 | 3117 | 3054 | 2990 | 2925 |
| .087 | 3635 | 3584 | 3530 | 3475 | 3418 | 3360 | 3300 | 3240 | 3179 | 3117 | 3054 | 2990 | 2926 |
| .088 | 3634 | 3583 | 3530 | 3474 | 3418 | 3360 | 3300 | 3240 | 3179 | 3117 | 3054 | 2990 | 2926 |
| .089 | 3634 | 3582 | 3529 | 3474 | 3417 | 3359 | 3300 | 3240 | 3179 | 3117 | 3054 | 2990 | 2926 |
| .090 | 3633 | 3582 | 3529 | 3474 | 3417 | 3359 | 3300 | 3240 | 3179 | 3117 | 3054 | 2990 | 2926 |
| .091 | 3632 | 3581 | 3528 | 3473 | 3417 | 3359 | 3300 | 3240 | 3179 | 3117 | 3054 | 2990 | 2926 |
| .092 | 3631 | 3580 | 3528 | 3473 | 3416 | 3359 | 3300 | 3240 | 3179 | 3117 | 3054 | 2991 | 2926 |
| .093 | 3630 | 3579 | 3527 | 3472 | 3416 | 3358 | 3299 | 3239 | 3179 | 3117 | 3054 | 2991 | 2926 |
| .094 | 3629 | 3579 | 3526 | 3472 | 3416 | 3358 | 3299 | 3239 | 3178 | 3117 | 3054 | 2991 | 2926 |
| .095 | 3628 | 3578 | 3526 | 3471 | 3415 | 3358 | 3299 | 3239 | 3178 | 3117 | 3054 | 2991 | 2926 |
| .096 | 3627 | 3577 | 3525 | 3471 | 3415 | 3357 | 3299 | 3239 | 3178 | 3117 | 3054 | 2991 | 2927 |
| .097 | 3627 | 3576 | 3524 | 3470 | 3414 | 3357 | 3299 | 3239 | 3178 | 3117 | 3054 | 2991 | 2927 |
| .098 | 3626 | 3576 | 3524 | 3470 | 3414 | 3357 | 3298 | 3239 | 3178 | 3117 | 3054 | 2991 | 2927 |
| .099 | 3625 | 3575 | 3523 | 3469 | 3414 | 3356 | 3298 | 3239 | 3178 | 3117 | 3054 | 2991 | 2927 |
| .100 | 3624 | 3574 | 3522 | 3468 | 3413 | 3356 | 3298 | 3238 | 3178 | 3117 | 3054 | 2991 | 2927 |

S = 1.001 to 1.100

TABLE I. - Continued. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| .101 | 3623 | 3573 | 3522 | 3468 | 3413 | 3356 | 3298 | 3238 | 3178 | 3117 | 3054 | 2991 | 2927 |
| .102 | 3622 | 3573 | 3521 | 3468 | 3412 | 3356 | 3297 | 3238 | 3178 | 3116 | 3054 | 2991 | 2927 |
| .103 | 3622 | 3572 | 3521 | 3467 | 3412 | 3355 | 3297 | 3238 | 3178 | 3116 | 3054 | 2991 | 2927 |
| .104 | 3621 | 3571 | 3520 | 3467 | 3412 | 3355 | 3297 | 3238 | 3177 | 3116 | 3054 | 2991 | 2927 |
| .105 | 3620 | 3571 | 3520 | 3466 | 3411 | 3355 | 3297 | 3237 | 3177 | 3116 | 3054 | 2991 | 2927 |
| .106 | 3619 | 3570 | 3519 | 3466 | 3411 | 3354 | 3296 | 3237 | 3177 | 3116 | 3054 | 2991 | 2927 |
| .107 | 3619 | 3569 | 3518 | 3465 | 3410 | 3354 | 3296 | 3237 | 3177 | 3116 | 3054 | 2991 | 2927 |
| .108 | 3618 | 3569 | 3518 | 3465 | 3410 | 3354 | 3296 | 3237 | 3177 | 3116 | 3054 | 2991 | 2927 |
| .109 | 3617 | 3568 | 3517 | 3464 | 3410 | 3353 | 3296 | 3237 | 3177 | 3116 | 3054 | 2991 | 2927 |
| .110 | 3616 | 3567 | 3517 | 3464 | 3409 | 3353 | 3295 | 3236 | 3176 | 3116 | 3054 | 2991 | 2927 |
| .111 | 3616 | 3567 | 3516 | 3463 | 3409 | 3352 | 3295 | 3236 | 3176 | 3116 | 3054 | 2991 | 2927 |
| .112 | 3615 | 3566 | 3515 | 3462 | 3408 | 3352 | 3295 | 3236 | 3176 | 3115 | 3054 | 2991 | 2927 |
| .113 | 3614 | 3565 | 3515 | 3462 | 3408 | 3352 | 3294 | 3236 | 3176 | 3115 | 3054 | 2991 | 2927 |
| .114 | 3613 | 3565 | 3514 | 3461 | 3407 | 3351 | 3294 | 3235 | 3176 | 3115 | 3053 | 2991 | 2927 |
| .115 | 3612 | 3564 | 3513 | 3461 | 3407 | 3351 | 3294 | 3235 | 3175 | 3115 | 3053 | 2991 | 2927 |
| .116 | 3612 | 3563 | 3513 | 3460 | 3406 | 3350 | 3293 | 3235 | 3175 | 3115 | 3053 | 2991 | 2927 |
| .117 | 3611 | 3562 | 3512 | 3460 | 3406 | 3350 | 3293 | 3234 | 3175 | 3115 | 3053 | 2991 | 2927 |
| .118 | 3610 | 3561 | 3511 | 3459 | 3405 | 3349 | 3292 | 3234 | 3175 | 3114 | 3053 | 2991 | 2927 |
| .119 | 3609 | 3561 | 3511 | 3458 | 3404 | 3349 | 3292 | 3234 | 3175 | 3114 | 3053 | 2990 | 2927 |
| .120 | 3608 | 3560 | 3510 | 3458 | 3404 | 3348 | 3292 | 3233 | 3174 | 3114 | 3053 | 2990 | 2927 |
| .121 | 3607 | 3559 | 3509 | 3457 | 3403 | 3348 | 3291 | 3233 | 3174 | 3114 | 3053 | 2990 | 2927 |
| .122 | 3606 | 3558 | 3508 | 3456 | 3403 | 3347 | 3291 | 3233 | 3174 | 3114 | 3052 | 2990 | 2927 |
| .123 | 3605 | 3557 | 3508 | 3456 | 3402 | 3347 | 3290 | 3232 | 3173 | 3113 | 3052 | 2990 | 2927 |
| .124 | 3604 | 3557 | 3507 | 3455 | 3402 | 3346 | 3290 | 3232 | 3173 | 3113 | 3052 | 2990 | 2927 |
| .125 | 3603 | 3556 | 3506 | 3454 | 3401 | 3346 | 3290 | 3232 | 3173 | 3113 | 3052 | 2990 | 2927 |
| .126 | 3602 | 3555 | 3505 | 3454 | 3400 | 3345 | 3289 | 3231 | 3173 | 3113 | 3052 | 2990 | 2926 |
| .127 | 3602 | 3554 | 3504 | 3453 | 3400 | 3345 | 3289 | 3231 | 3172 | 3112 | 3052 | 2989 | 2926 |
| .128 | 3601 | 3553 | 3504 | 3452 | 3399 | 3344 | 3288 | 3231 | 3172 | 3112 | 3051 | 2989 | 2926 |
| .129 | 3600 | 3552 | 3503 | 3451 | 3398 | 3344 | 3288 | 3230 | 3172 | 3112 | 3051 | 2989 | 2926 |
| .130 | 3599 | 3551 | 3502 | 3451 | 3398 | 3343 | 3287 | 3230 | 3171 | 3112 | 3051 | 2989 | 2926 |
| .131 | 3598 | 3550 | 3501 | 3450 | 3397 | 3342 | 3287 | 3229 | 3171 | 3111 | 3051 | 2989 | 2926 |
| .132 | 3596 | 3549 | 3500 | 3449 | 3396 | 3342 | 3286 | 3229 | 3171 | 3111 | 3050 | 2989 | 2926 |
| .133 | 3595 | 3548 | 3499 | 3448 | 3396 | 3341 | 3286 | 3228 | 3170 | 3111 | 3050 | 2989 | 2926 |
| .134 | 3594 | 3547 | 3498 | 3447 | 3395 | 3341 | 3285 | 3228 | 3170 | 3110 | 3050 | 2988 | 2926 |
| .135 | 3593 | 3546 | 3498 | 3447 | 3394 | 3340 | 3285 | 3228 | 3169 | 3110 | 3050 | 2988 | 2925 |
| .136 | 3592 | 3545 | 3497 | 3446 | 3394 | 3339 | 3284 | 3227 | 3169 | 3110 | 3049 | 2988 | 2925 |
| .137 | 3591 | 3544 | 3496 | 3445 | 3393 | 3339 | 3283 | 3227 | 3169 | 3110 | 3049 | 2988 | 2925 |
| .138 | 3590 | 3543 | 3495 | 3444 | 3392 | 3338 | 3283 | 3226 | 3168 | 3109 | 3049 | 2988 | 2925 |
| .139 | 3589 | 3542 | 3494 | 3443 | 3391 | 3337 | 3282 | 3226 | 3168 | 3109 | 3049 | 2987 | 2925 |
| .140 | 3588 | 3541 | 3493 | 3442 | 3390 | 3337 | 3282 | 3225 | 3167 | 3108 | 3048 | 2987 | 2925 |
| .141 | 3587 | 3540 | 3492 | 3442 | 3390 | 3336 | 3281 | 3225 | 3167 | 3108 | 3048 | 2987 | 2925 |
| .142 | 3586 | 3539 | 3491 | 3441 | 3389 | 3335 | 3280 | 3224 | 3167 | 3108 | 3048 | 2987 | 2924 |
| .143 | 3584 | 3538 | 3490 | 3440 | 3388 | 3335 | 3280 | 3224 | 3166 | 3107 | 3048 | 2986 | 2924 |
| .144 | 3583 | 3537 | 3489 | 3439 | 3387 | 3334 | 3279 | 3223 | 3166 | 3107 | 3047 | 2986 | 2924 |
| .145 | 3582 | 3536 | 3488 | 3438 | 3386 | 3333 | 3279 | 3222 | 3165 | 3107 | 3047 | 2986 | 2924 |
| .146 | 3581 | 3535 | 3487 | 3437 | 3386 | 3332 | 3278 | 3222 | 3165 | 3106 | 3047 | 2986 | 2924 |
| .147 | 3580 | 3534 | 3486 | 3436 | 3385 | 3332 | 3277 | 3221 | 3164 | 3106 | 3046 | 2985 | 2923 |
| .148 | 3578 | 3532 | 3485 | 3435 | 3384 | 3331 | 3277 | 3221 | 3164 | 3105 | 3046 | 2985 | 2923 |
| .149 | 3577 | 3531 | 3484 | 3434 | 3383 | 3330 | 3276 | 3220 | 3163 | 3105 | 3046 | 2985 | 2923 |
| .150 | 3576 | 3530 | 3483 | 3433 | 3382 | 3329 | 3275 | 3220 | 3163 | 3105 | 3045 | 2985 | 2923 |

TABLE I. - Concluded. IDEAL COMBUSTION-TEMPERATURE RISE, AT COMBUSTION PRESSURE OF 1 ATMOSPHERE

| Fraction of stoichiometric fuel-air ratio, S | Ideal combustion-temperature rise, ΔT, °R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet-air temperature, °R | | | | | | | | | | | | |
| | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 |
| .151 | 3575 | 3529 | 3482 | 3432 | 3381 | 3329 | 3275 | 3219 | 3162 | 3104 | 3045 | 2984 | 2923 |
| .152 | 3573 | 3528 | 3480 | 3431 | 3380 | 3328 | 3274 | 3218 | 3162 | 3104 | 3045 | 2984 | 2922 |
| .153 | 3572 | 3527 | 3479 | 3430 | 3379 | 3327 | 3273 | 3218 | 3161 | 3103 | 3044 | 2984 | 2922 |
| .154 | 3571 | 3525 | 3478 | 3429 | 3379 | 3326 | 3272 | 3217 | 3161 | 3103 | 3044 | 2983 | 2922 |
| .155 | 3570 | 3524 | 3477 | 3428 | 3378 | 3325 | 3272 | 3217 | 3160 | 3102 | 3043 | 2983 | 2922 |
| .156 | 3568 | 3523 | 3476 | 3427 | 3377 | 3325 | 3271 | 3216 | 3160 | 3102 | 3043 | 2983 | 2921 |
| .157 | 3567 | 3522 | 3475 | 3426 | 3376 | 3324 | 3270 | 3215 | 3159 | 3102 | 3043 | 2983 | 2921 |
| .158 | 3566 | 3521 | 3474 | 3425 | 3375 | 3323 | 3270 | 3215 | 3158 | 3101 | 3042 | 2982 | 2921 |
| .159 | 3564 | 3519 | 3472 | 3424 | 3374 | 3322 | 3269 | 3214 | 3158 | 3101 | 3042 | 2982 | 2921 |
| .160 | 3563 | 3518 | 3471 | 3423 | 3373 | 3321 | 3268 | 3213 | 3157 | 3100 | 3041 | 2982 | 2920 |
| .161 | 3562 | 3517 | 3470 | 3422 | 3372 | 3320 | 3267 | 3213 | 3157 | 3100 | 3041 | 2981 | 2920 |
| .162 | 3560 | 3515 | 3469 | 3421 | 3371 | 3319 | 3266 | 3212 | 3156 | 3099 | 3041 | 2981 | 2920 |
| .163 | 3559 | 3514 | 3468 | 3420 | 3370 | 3318 | 3266 | 3211 | 3156 | 3099 | 3040 | 2980 | 2919 |
| .164 | 3557 | 3513 | 3466 | 3418 | 3369 | 3317 | 3265 | 3211 | 3155 | 3098 | 3040 | 2980 | 2919 |
| .165 | 3556 | 3511 | 3465 | 3417 | 3368 | 3317 | 3264 | 3210 | 3154 | 3097 | 3039 | 2980 | 2919 |
| .166 | 3555 | 3510 | 3464 | 3416 | 3367 | 3316 | 3263 | 3209 | 3154 | 3097 | 3039 | 2979 | 2918 |
| .167 | 3553 | 3509 | 3463 | 3415 | 3366 | 3315 | 3262 | 3208 | 3153 | 3096 | 3038 | 2979 | 2918 |
| .168 | 3552 | 3507 | 3461 | 3414 | 3365 | 3314 | 3261 | 3208 | 3152 | 3096 | 3038 | 2979 | 2918 |
| .169 | 3550 | 3506 | 3460 | 3413 | 3364 | 3313 | 3261 | 3207 | 3152 | 3095 | 3037 | 2978 | 2918 |
| .170 | 3549 | 3505 | 3459 | 3411 | 3362 | 3312 | 3260 | 3206 | 3151 | 3095 | 3037 | 2978 | 2917 |
| .171 | 3547 | 3503 | 3458 | 3410 | 3361 | 3311 | 3259 | 3205 | 3150 | 3094 | 3036 | 2977 | 2917 |
| .172 | 3546 | 3502 | 3456 | 3409 | 3360 | 3310 | 3258 | 3205 | 3150 | 3094 | 3036 | 2977 | 2916 |
| .173 | 3544 | 3500 | 3455 | 3408 | 3359 | 3309 | 3257 | 3204 | 3149 | 3093 | 3035 | 2977 | 2916 |
| .174 | 3543 | 3499 | 3454 | 3407 | 3358 | 3308 | 3256 | 3203 | 3148 | 3092 | 3035 | 2976 | 2916 |
| .175 | 3541 | 3497 | 3452 | 3405 | 3357 | 3307 | 3255 | 3202 | 3148 | 3092 | 3034 | 2976 | 2915 |
| .176 | 3540 | 3496 | 3451 | 3404 | 3356 | 3306 | 3254 | 3201 | 3147 | 3091 | 3034 | 2975 | 2915 |
| .177 | 3538 | 3495 | 3449 | 3403 | 3354 | 3305 | 3253 | 3201 | 3146 | 3091 | 3033 | 2975 | 2915 |
| .178 | 3536 | 3493 | 3448 | 3401 | 3353 | 3304 | 3252 | 3200 | 3146 | 3090 | 3033 | 2974 | 2914 |
| .179 | 3535 | 3492 | 3447 | 3400 | 3352 | 3303 | 3251 | 3199 | 3145 | 3089 | 3032 | 2974 | 2914 |
| .180 | 3533 | 3490 | 3445 | 3399 | 3351 | 3301 | 3251 | 3198 | 3144 | 3089 | 3032 | 2973 | 2914 |
| .181 | 3532 | 3488 | 3444 | 3398 | 3350 | 3300 | 3250 | 3197 | 3143 | 3088 | 3031 | 2973 | 2913 |
| .182 | 3530 | 3487 | 3442 | 3396 | 3349 | 3299 | 3249 | 3196 | 3143 | 3087 | 3031 | 2972 | 2913 |
| .183 | 3528 | 3485 | 3441 | 3395 | 3347 | 3298 | 3248 | 3195 | 3142 | 3087 | 3030 | 2972 | 2912 |
| .184 | 3527 | 3484 | 3439 | 3393 | 3346 | 3297 | 3247 | 3195 | 3141 | 3086 | 3030 | 2971 | 2912 |
| .185 | 3525 | 3482 | 3438 | 3392 | 3345 | 3296 | 3246 | 3194 | 3140 | 3085 | 3029 | 2971 | 2912 |
| .186 | 3524 | 3481 | 3436 | 3391 | 3344 | 3295 | 3245 | 3193 | 3140 | 3085 | 3028 | 2970 | 2911 |
| .187 | 3522 | 3479 | 3435 | 3389 | 3342 | 3294 | 3244 | 3192 | 3139 | 3084 | 3028 | 2970 | 2911 |
| .188 | 3520 | 3478 | 3433 | 3388 | 3341 | 3293 | 3243 | 3191 | 3138 | 3083 | 3027 | 2969 | 2910 |
| .189 | 3518 | 3476 | 3432 | 3387 | 3340 | 3291 | 3241 | 3190 | 3137 | 3083 | 3027 | 2969 | 2910 |
| .190 | 3517 | 3474 | 3430 | 3385 | 3338 | 3290 | 3240 | 3189 | 3136 | 3082 | 3026 | 2968 | 2909 |
| .191 | 3515 | 3473 | 3429 | 3384 | 3337 | 3289 | 3239 | 3188 | 3135 | 3081 | 3025 | 2968 | 2909 |
| .192 | 3513 | 3471 | 3427 | 3382 | 3336 | 3288 | 3238 | 3187 | 3135 | 3080 | 3025 | 2967 | 2908 |
| .193 | 3512 | 3469 | 3426 | 3381 | 3334 | 3287 | 3237 | 3186 | 3134 | 3080 | 3024 | 2967 | 2908 |
| .194 | 3510 | 3468 | 3424 | 3379 | 3333 | 3285 | 3236 | 3185 | 3133 | 3079 | 3023 | 2966 | 2908 |
| .195 | 3508 | 3466 | 3423 | 3378 | 3332 | 3284 | 3235 | 3184 | 3132 | 3078 | 3023 | 2966 | 2907 |
| .196 | 3506 | 3464 | 3421 | 3376 | 3330 | 3283 | 3234 | 3183 | 3131 | 3077 | 3022 | 2965 | 2907 |
| .197 | 3504 | 3463 | 3419 | 3375 | 3329 | 3282 | 3233 | 3182 | 3130 | 3077 | 3021 | 2965 | 2906 |
| .198 | 3503 | 3461 | 3418 | 3373 | 3328 | 3280 | 3232 | 3181 | 3129 | 3076 | 3021 | 2964 | 2906 |
| .199 | 3501 | 3459 | 3416 | 3372 | 3326 | 3279 | 3230 | 3180 | 3129 | 3075 | 3020 | 2963 | 2905 |
| .200 | 3499 | 3457 | 3414 | 3370 | 3325 | 3278 | 3229 | 3179 | 3128 | 3074 | 3019 | 2963 | 2905 |

S = 1.101 to 1.200

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TABLE II. - ENTHALPY OF AIR

| T, °R | Enthalpy difference, $(\Delta h_T^o)_a$, Btu/lb | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 400 | 0.0 | 0.2 | 0.5 | 0.7 | 1.0 | 1.2 | 1.4 | 1.7 | 1.9 | 2.2 |
| 10 | 2.4 | 2.6 | 2.9 | 3.1 | 3.4 | 3.6 | 3.8 | 4.1 | 4.3 | 4.6 |
| 20 | 4.8 | 5.0 | 5.3 | 5.5 | 5.8 | 6.0 | 6.2 | 6.5 | 6.7 | 6.9 |
| 30 | 7.2 | 7.4 | 7.7 | 7.9 | 8.1 | 8.4 | 8.6 | 8.9 | 9.1 | 9.3 |
| 40 | 9.6 | 9.8 | 0.1 | 0.3 | 0.5 | 0.8 | 1.0 | 1.3 | 1.5 | 1.7 |
| 50 | 12.0 | 2.2 | 2.5 | 2.7 | 2.9 | 3.2 | 3.4 | 3.7 | 3.9 | 4.1 |
| 60 | 4.4 | 4.6 | 4.9 | 5.1 | 5.3 | 5.6 | 5.8 | 6.1 | 6.3 | 6.5 |
| 70 | 6.8 | 7.0 | 7.3 | 7.5 | 7.7 | 8.0 | 8.2 | 8.5 | 8.7 | 8.9 |
| 80 | 9.2 | 9.4 | 9.7 | 9.9 | 0.1 | 0.4 | 0.6 | 0.9 | 1.1 | 1.3 |
| 90 | 21.6 | 1.8 | 2.1 | 2.3 | 2.5 | 2.8 | 3.0 | 3.3 | 3.5 | 3.7 |
| 500 | 4.0 | 4.2 | 4.4 | 4.7 | 4.9 | 5.2 | 5.4 | 5.6 | 5.9 | 6.1 |
| 10 | 6.4 | 6.6 | 6.8 | 7.1 | 7.3 | 7.6 | 7.8 | 8.0 | 8.3 | 8.5 |
| 20 | 8.8 | 9.0 | 9.2 | 9.5 | 9.7 | 0.0 | 0.2 | 0.4 | 0.7 | 0.9 |
| 30 | 31.2 | 1.4 | 1.6 | 1.9 | 2.1 | 2.4 | 2.6 | 2.8 | 3.1 | 3.3 |
| 40 | 3.6 | 3.8 | 4.0 | 4.3 | 4.5 | 4.8 | 5.0 | 5.2 | 5.5 | 5.7 |
| 50 | 6.0 | 6.2 | 6.4 | 6.7 | 6.9 | 7.2 | 7.4 | 7.6 | 7.9 | 8.1 |
| 60 | 8.4 | 8.6 | 8.8 | 9.1 | 9.3 | 9.6 | 9.8 | 0.0 | 0.3 | 0.5 |
| 70 | 40.8 | 1.0 | 1.2 | 1.5 | 1.7 | 2.0 | 2.2 | 2.4 | 2.7 | 2.9 |
| 80 | 3.2 | 3.4 | 3.6 | 3.9 | 4.1 | 4.4 | 4.6 | 4.8 | 5.1 | 5.3 |
| 90 | 5.6 | 5.8 | 6.0 | 6.3 | 6.5 | 6.8 | 7.0 | 7.2 | 7.5 | 7.7 |
| 600 | 8.0 | 8.2 | 8.5 | 8.7 | 8.9 | 9.2 | 9.4 | 9.7 | 9.9 | 0.1 |
| 10 | 50.4 | 0.6 | 0.9 | 1.1 | 1.3 | 1.6 | 1.8 | 2.1 | 2.3 | 2.5 |
| 20 | 2.8 | 3.0 | 3.3 | 3.5 | 3.7 | 4.0 | 4.2 | 4.5 | 4.7 | 5.0 |
| 30 | 5.2 | 5.4 | 5.7 | 5.9 | 6.2 | 6.4 | 6.6 | 6.9 | 7.1 | 7.4 |
| 40 | 7.6 | 7.8 | 8.1 | 8.3 | 8.6 | 8.8 | 9.1 | 9.3 | 9.5 | 9.8 |
| 50 | 60.0 | 0.3 | 0.5 | 0.7 | 1.0 | 1.2 | 1.5 | 1.7 | 1.9 | 2.2 |
| 60 | 2.4 | 2.7 | 2.9 | 3.2 | 3.4 | 3.6 | 3.9 | 4.1 | 4.4 | 4.6 |
| 70 | 4.8 | 5.1 | 5.3 | 5.6 | 5.8 | 6.1 | 6.3 | 6.5 | 6.8 | 7.0 |
| 80 | 7.3 | 7.5 | 7.7 | 8.0 | 8.2 | 8.5 | 8.7 | 9.0 | 9.2 | 9.4 |
| 90 | 9.7 | 9.9 | 0.2 | 0.4 | 0.6 | 0.9 | 1.1 | 1.4 | 1.6 | 1.9 |
| 700 | 72.1 | 2.3 | 2.6 | 2.8 | 3.1 | 3.3 | 3.5 | 3.8 | 4.0 | 4.3 |
| 10 | 4.5 | 4.8 | 5.0 | 5.2 | 5.5 | 5.7 | 6.0 | 6.2 | 6.4 | 6.7 |
| 20 | 6.9 | 7.1 | 7.4 | 7.6 | 7.9 | 8.1 | 8.4 | 8.6 | 8.8 | 9.1 |
| 30 | 9.3 | 9.6 | 9.8 | 0.1 | 0.3 | 0.5 | 0.8 | 1.0 | 1.3 | 1.5 |
| 40 | 81.8 | 2.0 | 2.2 | 2.5 | 2.7 | 3.0 | 3.2 | 3.5 | 3.7 | 3.9 |
| 50 | 4.2 | 4.4 | 4.7 | 4.9 | 5.1 | 5.4 | 5.6 | 5.9 | 6.1 | 6.4 |
| 60 | 6.6 | 6.8 | 7.1 | 7.3 | 7.6 | 7.8 | 8.1 | 8.3 | 8.6 | 8.8 |
| 70 | 9.0 | 9.3 | 9.5 | 9.8 | 0.0 | 0.3 | 0.5 | 0.5 | 1.0 | 1.2 |
| 80 | 91.5 | 1.7 | 2.0 | 2.2 | 2.4 | 2.7 | 2.9 | 3.2 | 3.4 | 3.7 |
| 90 | 3.9 | 4.1 | 4.4 | 4.6 | 4.9 | 5.1 | 5.4 | 5.6 | 5.9 | 6.1 |
| 800 | 6.3 | 6.6 | 6.8 | 7.1 | 7.3 | 7.6 | 7.8 | 8.0 | 8.3 | 8.5 |
| 10 | 8.8 | 9.0 | 9.3 | 9.5 | 9.8 | 0.0 | 0.2 | 0.5 | 0.7 | 1.0 |
| 20 | 101.2 | 1.5 | 1.7 | 2.0 | 2.2 | 2.4 | 2.7 | 2.9 | 3.2 | 3.4 |
| 30 | 3.7 | 3.9 | 4.2 | 4.4 | 4.6 | 4.9 | 5.1 | 5.4 | 5.6 | 5.9 |
| 40 | 6.1 | 6.4 | 6.6 | 6.8 | 7.1 | 7.3 | 7.6 | 7.8 | 8.1 | 8.3 |
| 50 | 8.6 | 8.8 | 9.0 | 9.3 | 9.5 | 9.8 | 0.0 | 0.3 | 0.5 | 0.8 |
| 60 | 111.0 | 1.2 | 1.5 | 1.7 | 2.0 | 2.2 | 2.5 | 2.7 | 3.0 | 3.2 |
| 70 | 3.5 | 3.7 | 3.9 | 4.2 | 4.4 | 4.7 | 4.9 | 5.2 | 5.4 | 5.7 |
| 80 | 5.9 | 6.2 | 6.4 | 6.6 | 6.9 | 7.1 | 7.4 | 7.6 | 7.9 | 8.1 |
| 90 | 8.4 | 8.6 | 8.9 | 9.1 | 9.3 | 9.6 | 9.8 | 0.1 | 0.3 | 0.6 |
| 900 | 120.8 | 1.0 | 1.3 | 1.5 | 1.8 | 2.0 | 2.3 | 2.5 | 2.8 | 3.0 |
| 10 | 3.3 | 3.5 | 3.7 | 4.0 | 4.2 | 4.5 | 4.7 | 5.0 | 5.2 | 5.5 |
| 20 | 5.7 | 6.0 | 6.2 | 6.5 | 6.7 | 7.0 | 7.2 | 7.4 | 7.7 | 7.9 |
| 30 | 8.2 | 8.4 | 8.7 | 8.9 | 9.2 | 9.4 | 9.7 | 9.9 | 0.2 | 0.4 |
| 40 | 130.7 | 0.9 | 1.1 | 1.4 | 1.6 | 1.9 | 2.1 | 2.4 | 2.6 | 2.9 |
| 50 | 3.1 | 3.4 | 3.6 | 3.9 | 4.1 | 4.4 | 4.6 | 4.9 | 5.1 | 5.4 |
| 60 | 5.6 | 5.8 | 6.1 | 6.3 | 6.6 | 6.8 | 7.1 | 7.3 | 7.6 | 7.8 |
| 70 | 8.1 | 8.3 | 8.6 | 8.8 | 9.1 | 9.3 | 9.6 | 9.8 | 0.1 | 0.3 |
| 80 | 140.6 | 0.8 | 1.1 | 1.3 | 1.6 | 1.8 | 2.0 | 2.3 | 2.5 | 2.8 |
| 90 | 3.0 | 3.3 | 3.5 | 3.8 | 4.0 | 4.3 | 4.5 | 4.8 | 5.0 | 5.3 |

| T, °R | Emthalpy difference, $(\Delta h_T^o)_a$, Btu/lb | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1000 | 145.5 | 5.8 | 6.0 | 6.3 | 6.5 | 6.8 | 7.0 | 7.3 | 7.5 | 7.8 |
| 10 | 8.0 | 8.3 | 8.5 | 8.8 | 9.0 | 9.3 | 9.5 | 9.8 | 0.0 | 0.3 |
| 20 | 150.5 | 0.8 | 1.0 | 1.3 | 1.5 | 1.8 | 2.0 | 2.3 | 2.5 | 2.8 |
| 30 | 3.0 | 3.3 | 3.5 | 3.8 | 4.0 | 4.3 | 4.5 | 4.8 | 5.0 | 5.3 |
| 40 | 5.5 | 5.8 | 6.0 | 6.3 | 6.5 | 6.8 | 7.0 | 7.3 | 7.5 | 7.8 |
| 50 | 8.0 | 8.3 | 8.5 | 8.8 | 9.0 | 9.3 | 9.5 | 9.8 | 0.0 | 0.3 |
| 60 | 160.5 | 0.8 | 1.0 | 1.3 | 1.5 | 1.8 | 2.0 | 2.3 | 2.5 | 2.8 |
| 70 | 3.0 | 3.3 | 3.5 | 3.8 | 4.0 | 4.3 | 4.5 | 4.8 | 5.0 | 5.3 |
| 80 | 5.5 | 5.8 | 6.0 | 6.3 | 6.5 | 6.8 | 7.0 | 7.3 | 7.5 | 7.8 |
| 90 | 8.0 | 8.3 | 8.5 | 8.8 | 9.0 | 9.3 | 9.5 | 9.8 | 0.0 | 0.3 |
| 1100 | 170.5 | 0.8 | 1.0 | 1.3 | 1.5 | 1.8 | 2.0 | 2.3 | 2.5 | 2.8 |
| 10 | 3.1 | 3.3 | 3.6 | 3.8 | 4.1 | 4.3 | 4.6 | 4.8 | 5.1 | 5.3 |
| 20 | 5.6 | 5.8 | 6.1 | 6.3 | 6.6 | 6.8 | 7.1 | 7.3 | 7.6 | 7.8 |
| 30 | 8.1 | 8.3 | 8.6 | 8.9 | 9.1 | 9.4 | 9.6 | 9.9 | 0.1 | 0.4 |
| 40 | 180.6 | 0.9 | 1.1 | 1.4 | 1.6 | 1.9 | 2.1 | 2.4 | 2.6 | 2.9 |
| 50 | 3.2 | 3.4 | 3.7 | 3.9 | 4.2 | 4.4 | 4.7 | 4.9 | 5.2 | 5.4 |
| 60 | 5.7 | 5.9 | 6.2 | 6.5 | 6.7 | 7.0 | 7.2 | 7.5 | 7.7 | 8.0 |
| 70 | 8.2 | 8.5 | 8.7 | 9.0 | 9.2 | 9.5 | 9.8 | 0.0 | 0.3 | 0.5 |
| 80 | 190.8 | 1.0 | 1.3 | 1.5 | 1.8 | 2.0 | 2.3 | 2.5 | 2.8 | 3.1 |
| 90 | 3.3 | 3.6 | 3.8 | 4.1 | 4.3 | 4.6 | 4.8 | 5.1 | 5.3 | 5.6 |
| 1200 | 5.9 | 6.1 | 6.4 | 6.6 | 6.9 | 7.1 | 7.4 | 7.6 | 7.9 | 8.2 |
| 10 | 8.4 | 8.7 | 8.9 | 9.2 | 9.4 | 9.7 | 9.9 | 0.2 | 0.5 | 0.7 |
| 20 | 201.0 | 1.2 | 1.5 | 1.7 | 2.0 | 2.2 | 2.5 | 2.8 | 3.0 | 3.3 |
| 30 | 3.5 | 3.8 | 4.0 | 4.3 | 4.5 | 4.8 | 5.1 | 5.3 | 5.6 | 5.8 |
| 40 | 6.1 | 6.3 | 6.6 | 6.8 | 7.1 | 7.4 | 7.6 | 7.9 | 8.1 | 8.4 |
| 50 | 8.6 | 8.9 | 9.2 | 9.4 | 9.7 | 9.9 | 0.2 | 0.4 | 0.7 | 0.9 |
| 60 | 211.2 | 1.5 | 1.7 | 2.0 | 2.2 | 2.5 | 2.7 | 3.0 | 3.3 | 3.5 |
| 70 | 3.8 | 4.0 | 4.3 | 4.5 | 4.8 | 5.1 | 5.3 | 5.6 | 5.8 | 6.1 |
| 80 | 6.3 | 6.6 | 6.9 | 7.1 | 7.4 | 7.6 | 7.9 | 8.1 | 8.4 | 8.7 |
| 90 | 8.9 | 9.2 | 9.4 | 9.7 | 0.0 | 0.2 | 0.5 | 0.7 | 1.0 | 1.2 |
| 1300 | 221.5 | 1.8 | 2.0 | 2.3 | 2.5 | 2.8 | 3.0 | 3.3 | 3.6 | 3.8 |
| 10 | 4.1 | 4.3 | 4.6 | 4.9 | 5.1 | 5.4 | 5.6 | 5.9 | 6.1 | 6.4 |
| 20 | 6.7 | 6.9 | 7.2 | 7.4 | 7.7 | 8.0 | 8.2 | 8.5 | 8.7 | 9.0 |
| 30 | 9.3 | 9.5 | 9.8 | 0.0 | 0.3 | 0.5 | 0.8 | 1.1 | 1.3 | 1.6 |
| 40 | 231.8 | 2.1 | 2.4 | 2.6 | 2.9 | 3.1 | 3.4 | 3.7 | 3.9 | 4.2 |
| 50 | 4.4 | 4.7 | 5.0 | 5.2 | 5.5 | 5.7 | 6.0 | 6.3 | 6.5 | 6.8 |
| 60 | 7.0 | 7.3 | 7.6 | 7.8 | 8.1 | 8.3 | 8.6 | 8.9 | 9.1 | 9.4 |
| 70 | 9.6 | 9.9 | 0.2 | 0.4 | 0.7 | 0.9 | 1.2 | 1.5 | 1.7 | 2.0 |
| 80 | 242.2 | 2.5 | 2.8 | 3.0 | 3.3 | 3.5 | 3.8 | 4.1 | 4.3 | 4.6 |
| 90 | 4.8 | 5.1 | 5.4 | 5.6 | 5.9 | 6.1 | 6.4 | 6.7 | 6.9 | 7.2 |
| 1400 | 7.5 | 7.7 | 8.0 | 8.2 | 8.5 | 8.8 | 9.0 | 9.3 | 9.5 | 9.8 |
| 10 | 250.1 | 0.3 | 0.6 | 0.9 | 1.1 | 1.4 | 1.6 | 1.9 | 2.2 | 2.4 |
| 20 | 2.7 | 2.9 | 3.2 | 3.5 | 3.7 | 4.0 | 4.3 | 4.5 | 4.8 | 5.0 |
| 30 | 5.3 | 5.6 | 5.8 | 6.1 | 6.4 | 6.6 | 6.9 | 7.1 | 7.4 | 7.7 |
| 40 | 7.9 | 8.2 | 8.5 | 8.7 | 9.0 | 9.2 | 9.5 | 9.8 | 0.0 | 0.3 |
| 50 | 260.6 | 0.8 | 1.1 | 1.3 | 1.6 | 1.9 | 2.1 | 2.4 | 2.7 | 2.9 |
| 60 | 3.2 | 3.5 | 3.7 | 4.0 | 4.2 | 4.5 | 4.8 | 5.0 | 5.3 | 5.6 |
| 70 | 5.8 | 6.1 | 6.3 | 6.6 | 6.9 | 7.1 | 7.4 | 7.7 | 7.9 | 8.2 |
| 80 | 8.5 | 8.7 | 9.0 | 9.2 | 9.5 | 9.8 | 0.0 | 0.3 | 0.6 | 0.8 |
| 90 | 271.1 | 1.4 | 1.6 | 1.9 | 2.1 | 2.4 | 2.7 | 2.9 | 3.2 | 3.5 |
| 1500 | 3.7 | 4.0 | 4.3 | 4.5 | 4.8 | 5.1 | 5.3 | 5.6 | 5.8 | 6.1 |
| 10 | 6.4 | 6.6 | 6.9 | 7.2 | 7.4 | 7.7 | 8.0 | 8.2 | 8.5 | 8.8 |
| 20 | 9.0 | 9.3 | 9.6 | 9.8 | 0.1 | 0.3 | 0.6 | 0.9 | 1.1 | 1.4 |
| 30 | 281.7 | 1.9 | 2.2 | 2.5 | 2.7 | 3.0 | 3.3 | 3.5 | 3.8 | 4.1 |
| 40 | 4.3 | 4.6 | 4.9 | 5.1 | 5.4 | 5.6 | 5.9 | 6.2 | 6.4 | 6.7 |
| 50 | 7.0 | 7.2 | 7.5 | 7.8 | 8.0 | 8.3 | 8.6 | 8.8 | 9.1 | 9.4 |
| 60 | 9.6 | 9.9 | 0.2 | 0.4 | 0.7 | 1.0 | 1.2 | 1.5 | 1.8 | 2.0 |
| 70 | 292.3 | 2.6 | 2.8 | 3.1 | 3.4 | 3.6 | 3.9 | 4.2 | 4.4 | 4.7 |
| 80 | 5.0 | 5.2 | 5.5 | 5.8 | 6.0 | 6.3 | 6.6 | 6.8 | 7.1 | 7.4 |
| 90 | 7.6 | 7.9 | 8.2 | 8.4 | 8.7 | 9.0 | 9.2 | 9.5 | 9.8 | 0.0 |

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TABLE III. - ENTHALPY OF LIQUID FUEL

FOR A STOICHIOMETRIC MIXTURE

| Fuel temperature, $T_f$, °R | Enthalpy difference, $f'(\Delta h^{\circ}_{T})_f$, Btu/lb-air |
|---|---|
| 400 | -4.4 |
| 410 | -4.1 |
| 420 | -3.8 |
| 430 | -3.5 |
| 440 | -3.2 |
| 450 | -2.9 |
| 460 | -2.6 |
| 470 | -2.3 |
| 480 | -2.0 |
| 490 | -1.7 |
| 500 | -1.3 |
| 510 | -1.0 |
| 520 | -.7 |
| 530 | -.3 |
| 540 | 0 |
| 550 | .3 |
| 560 | .7 |
| 570 | 1.0 |
| 580 | 1.4 |
| 590 | 1.7 |
| 600 | 2.1 |

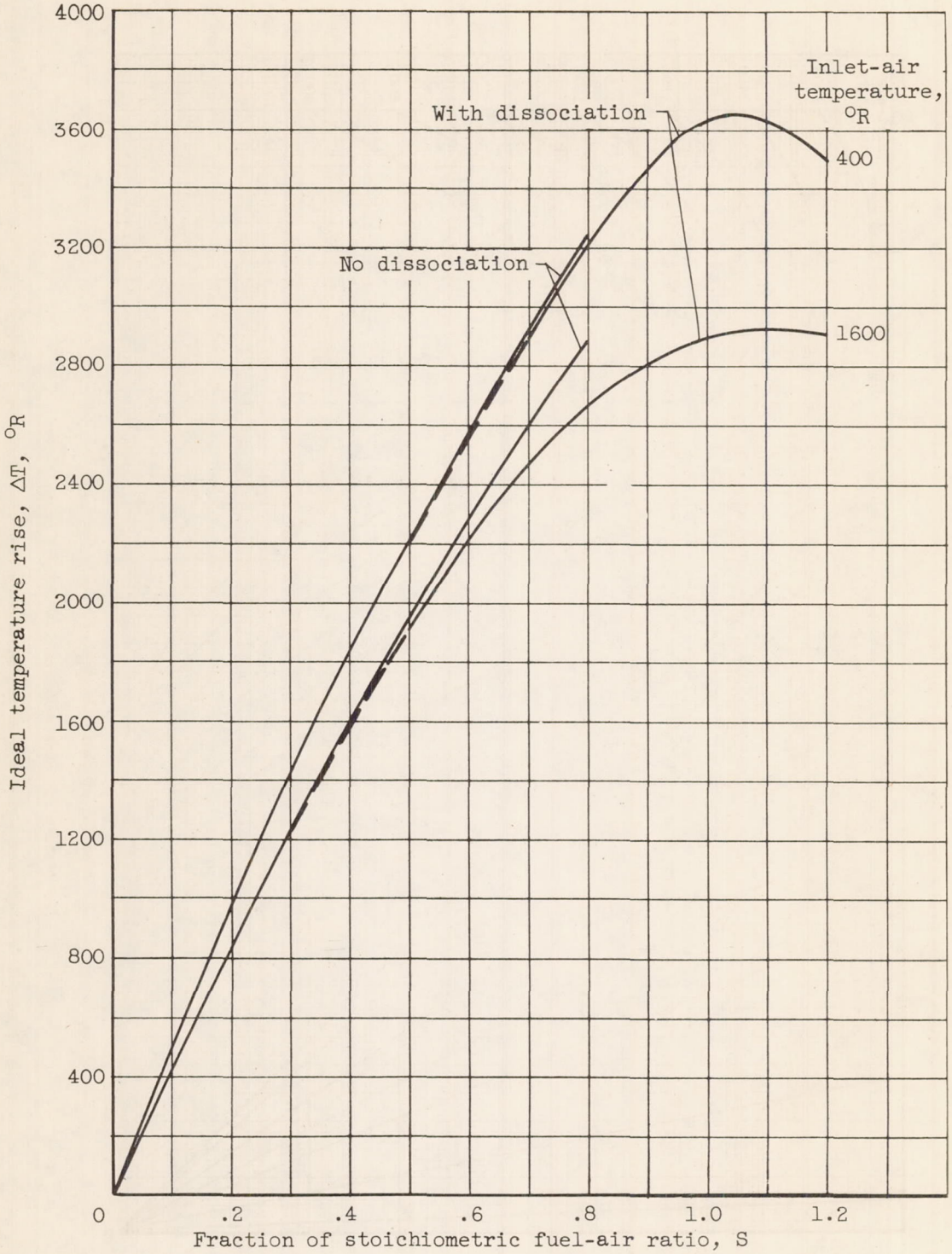
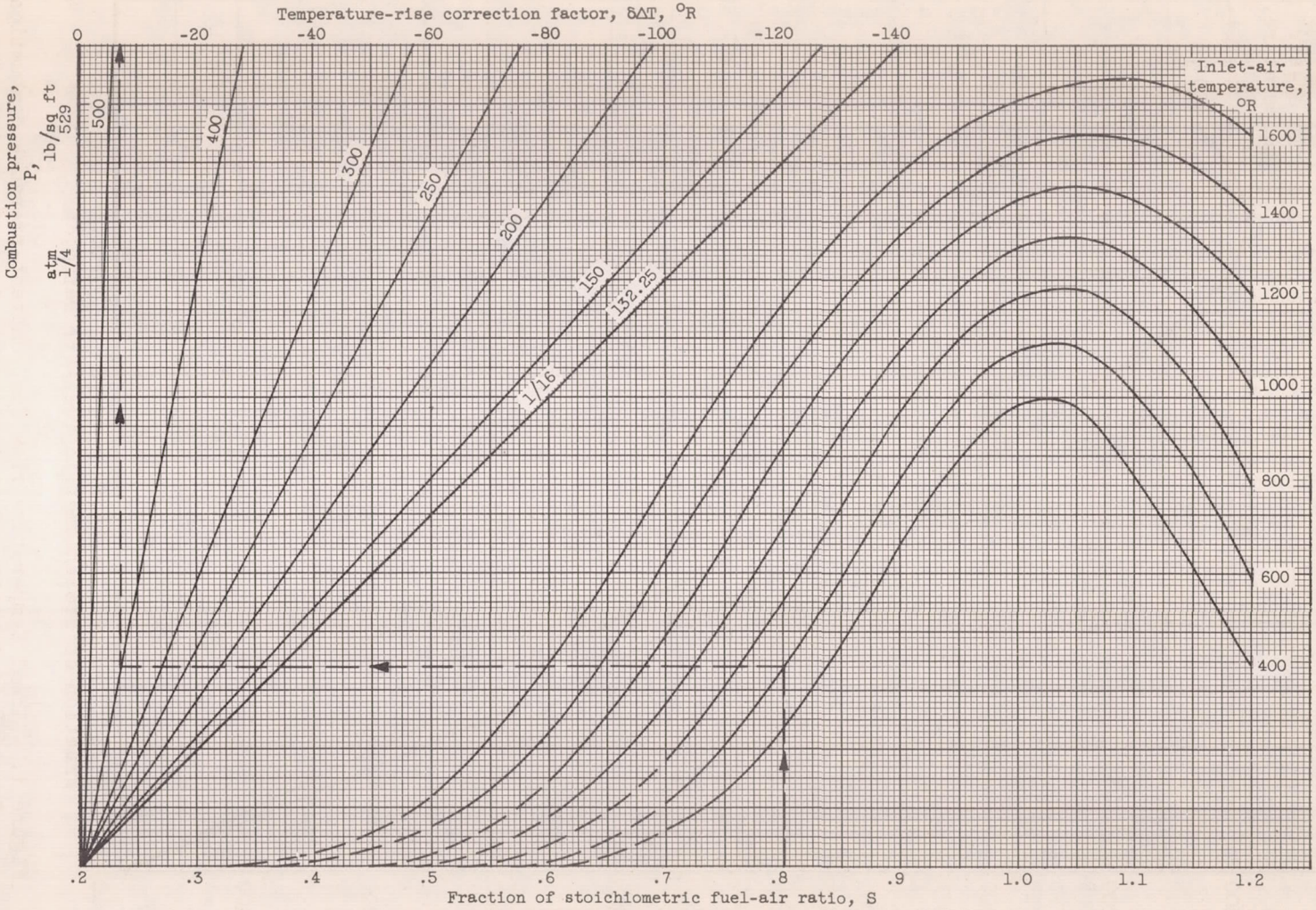
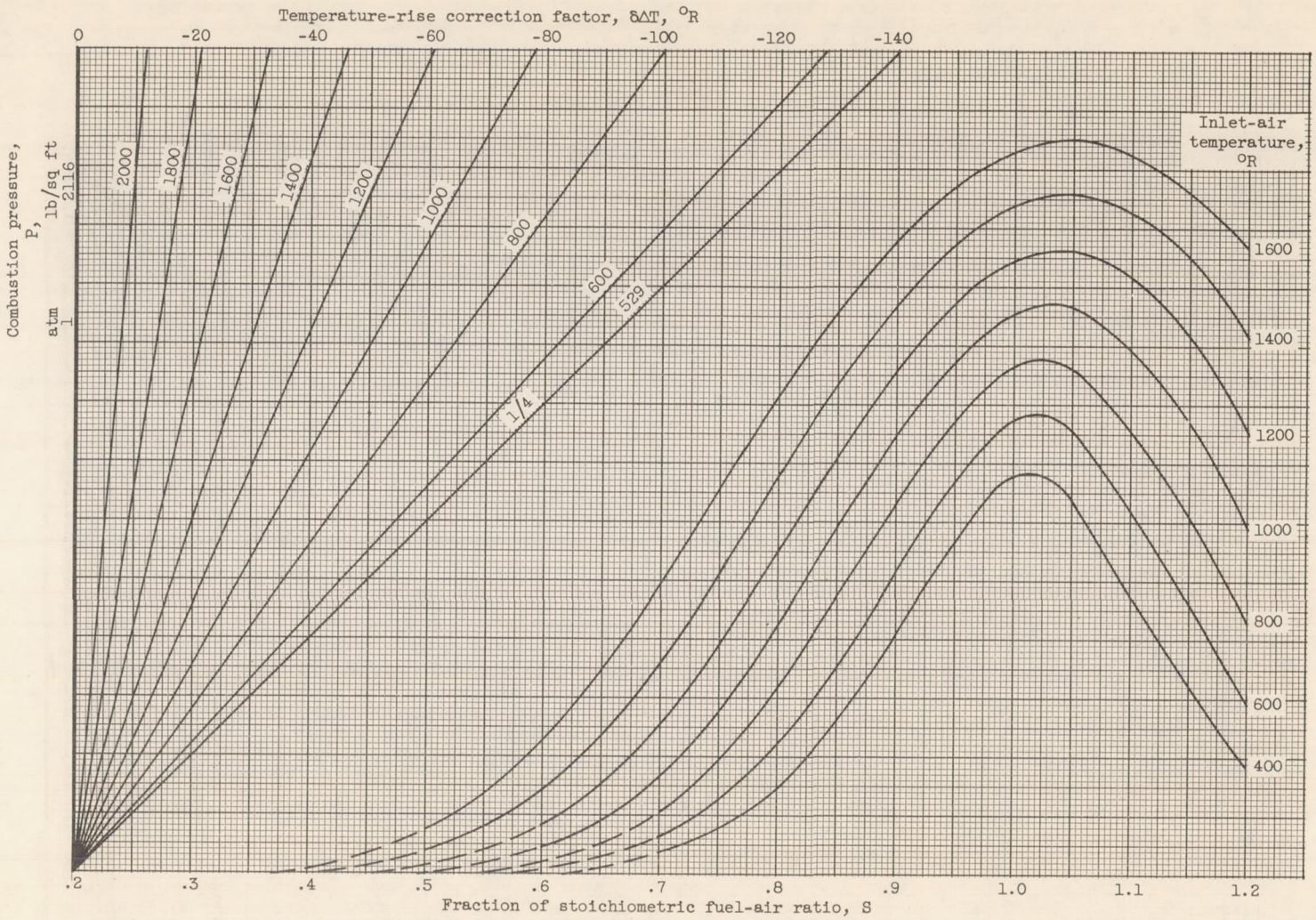



Figure 1. - Ideal temperature rise for constant-pressure combustion as function of fraction of stoichiometric fuel-air ratio. Combustion pressure, 1 atmosphere.



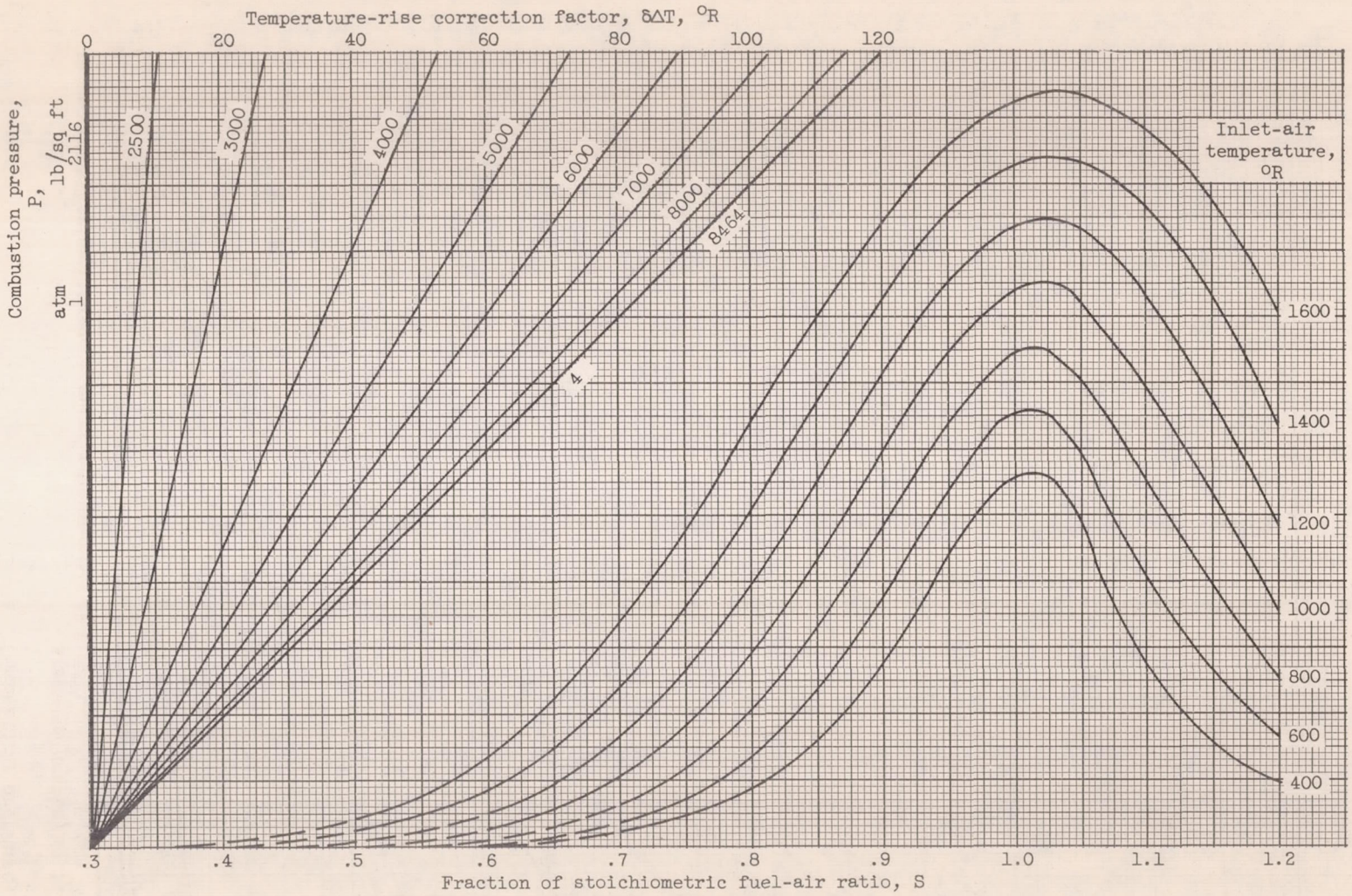

(a) Combustion pressures from 1/4 to 1/16 atmosphere.

Figure 2. - Temperature-rise correction factors as function of fuel-air ratio.




(b) Combustion pressures from 1 to 1/4 atmosphere.

Figure 2. - Continued. Temperature-rise correction factors as function of fuel-air ratio.




(c) Combustion pressures from 1 to 4 atmospheres.

Figure 2. - Continued. Temperature-rise correction factors as function of fuel-air ratio.



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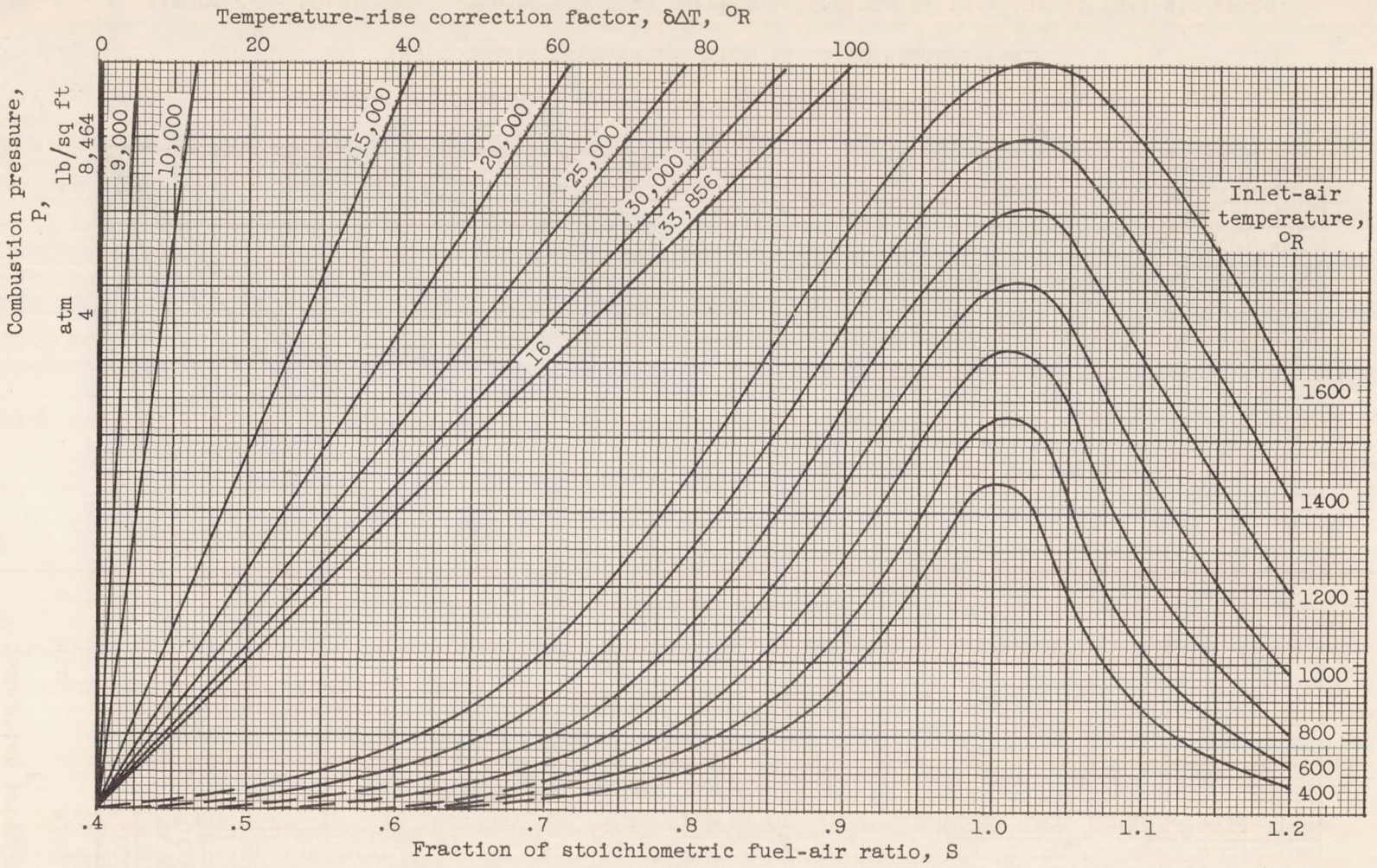
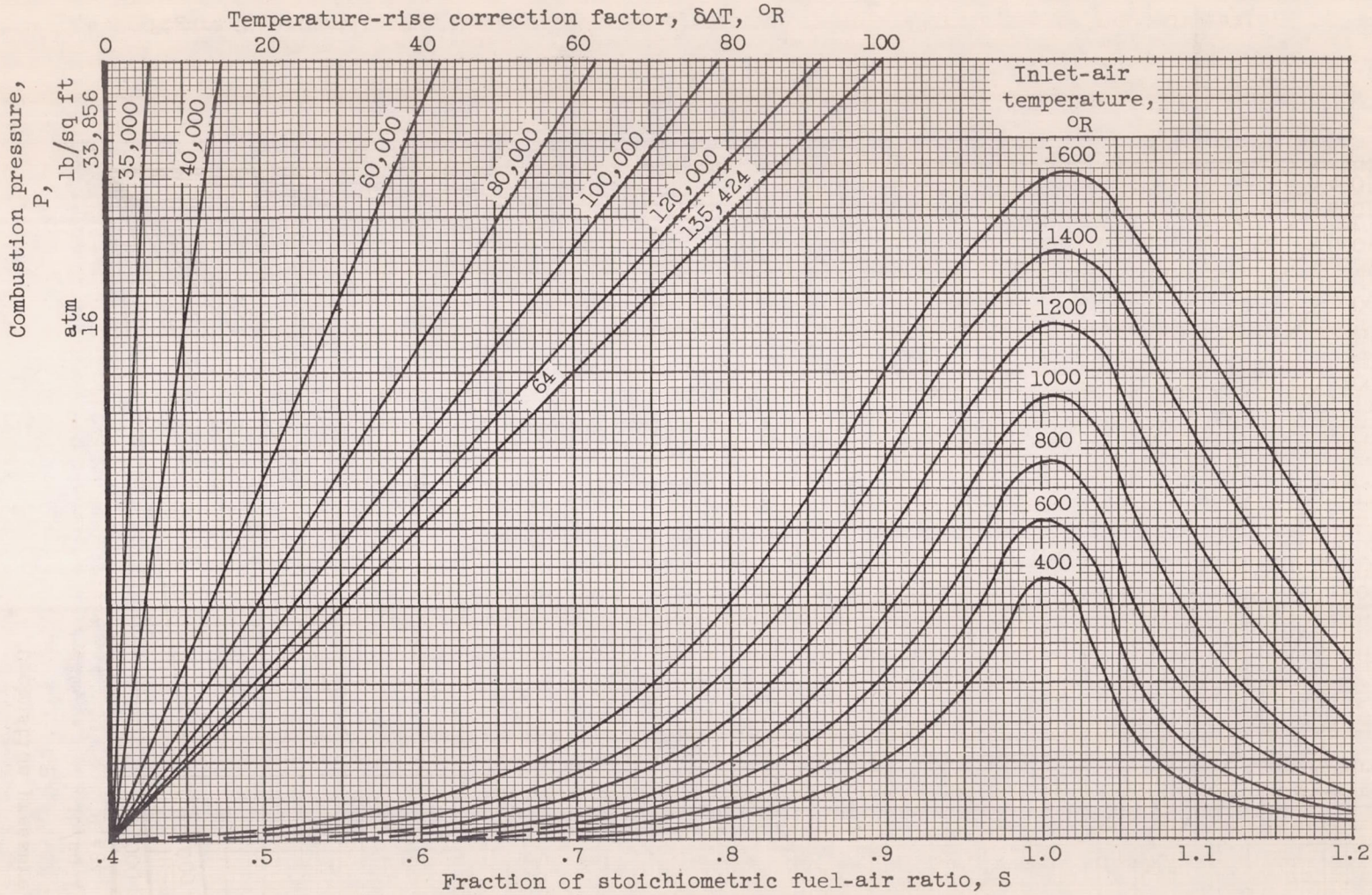


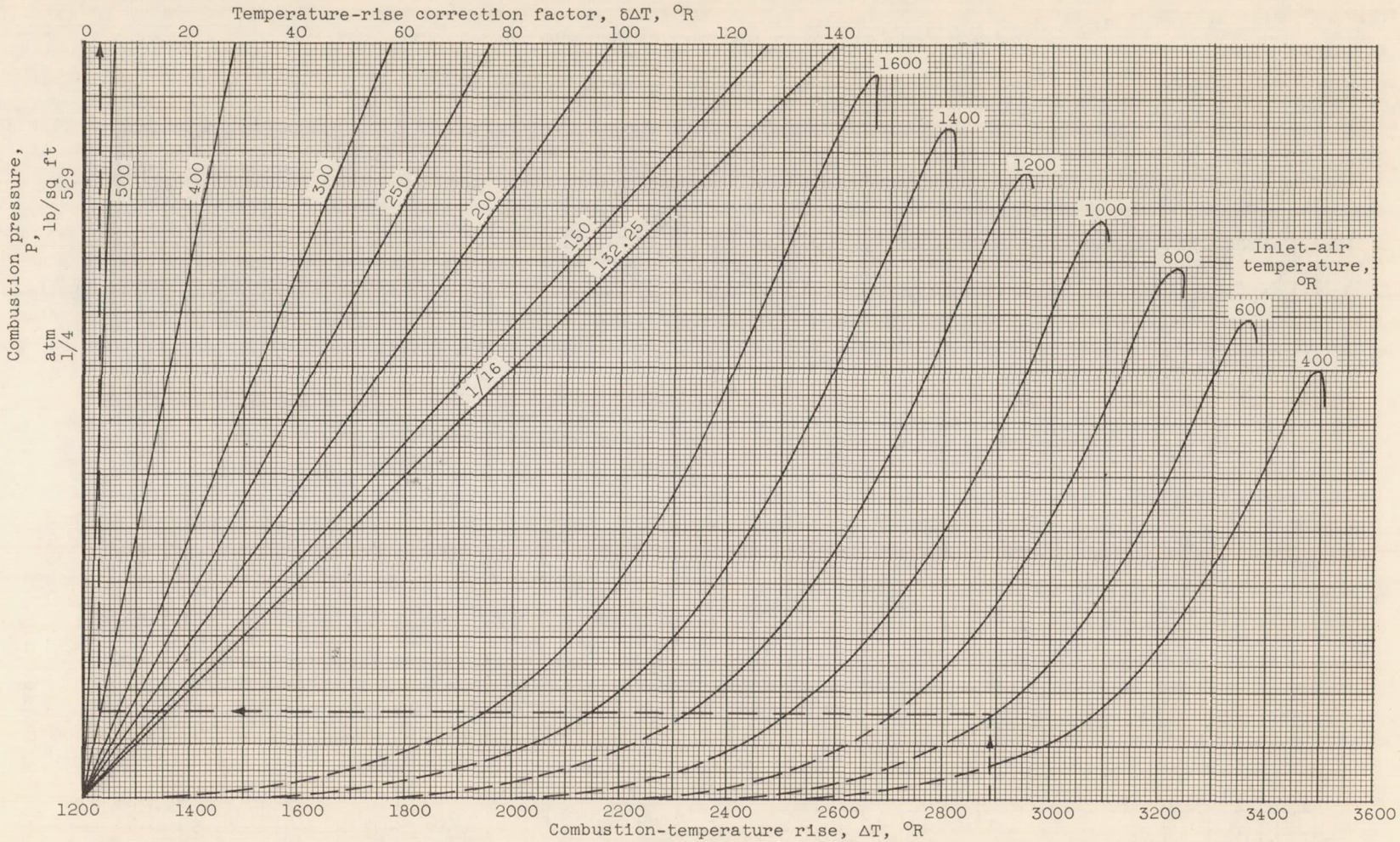

(d) Combustion pressures from 4 to 16 atmospheres.

Figure 2. - Continued. Temperature-rise correction factors as function of fuel-air ratio.



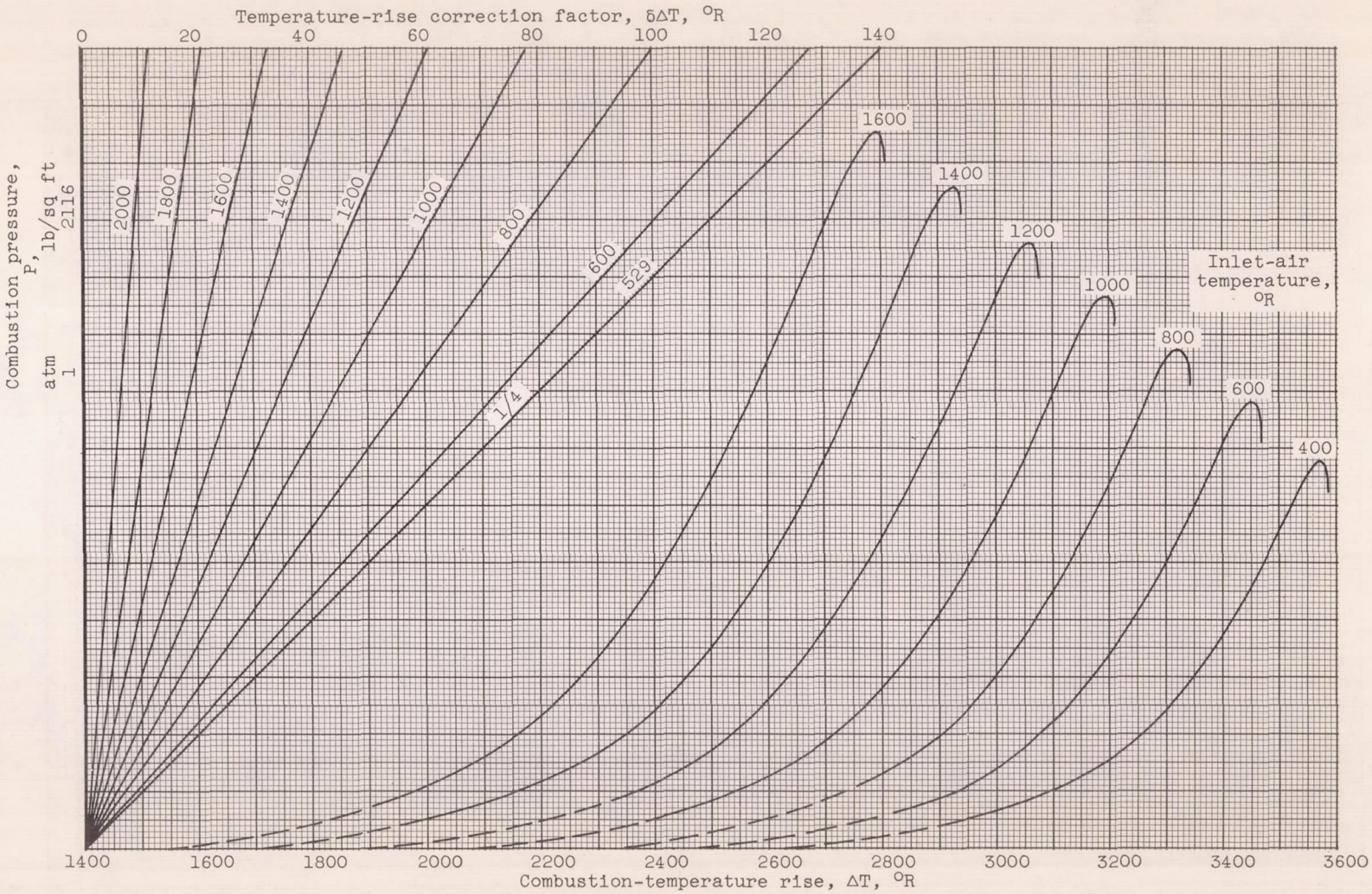

(e) Combustion pressures from 16 to 64 atmospheres.

Figure 2. - Concluded. Temperature-rise correction factors as function of fuel-air ratio.



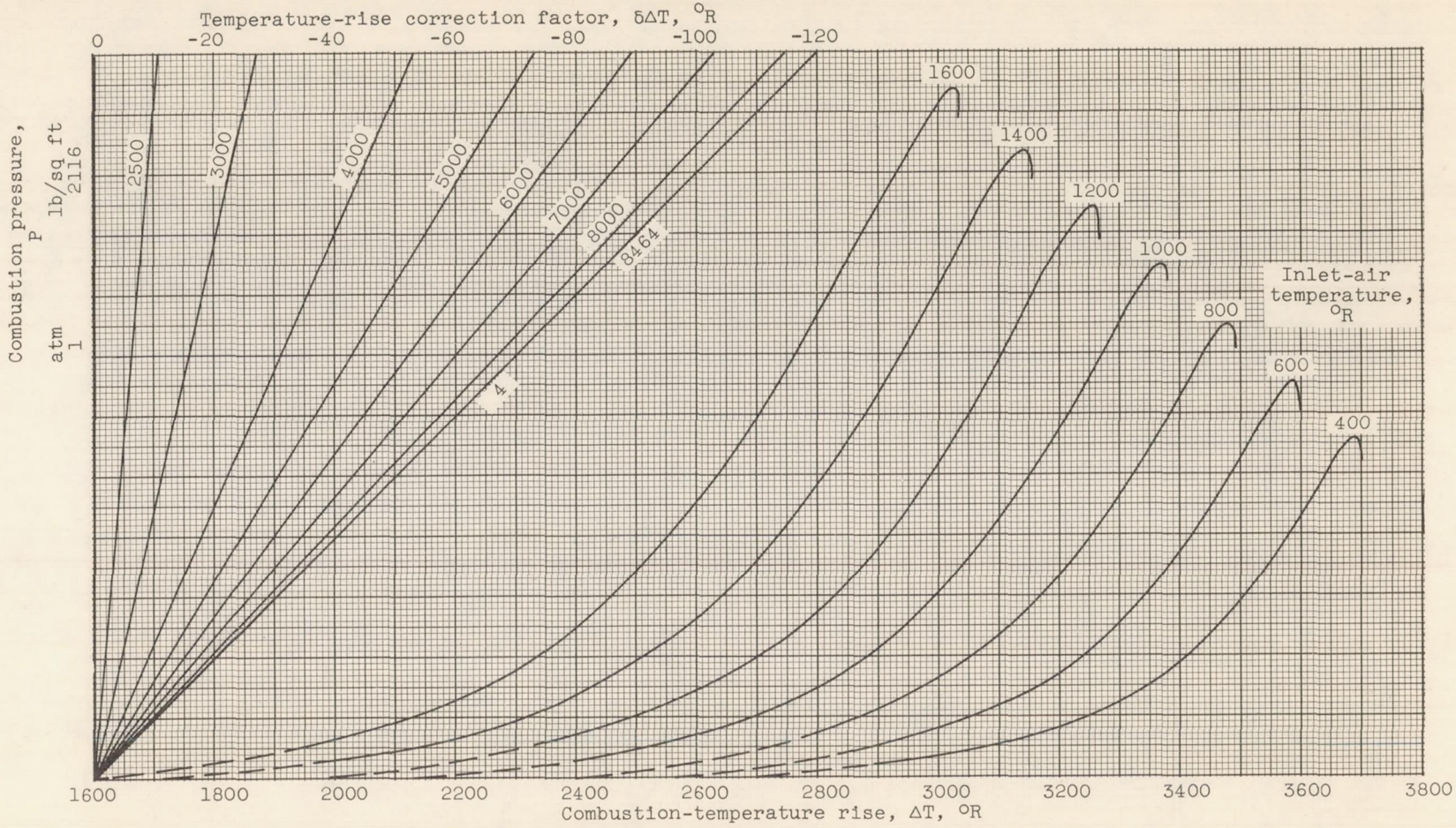

(a) Combustion pressures from 1/4 to 1/16 atmosphere.

Figure 3. - Temperature-rise correction factors as function of combustion-temperature rise.



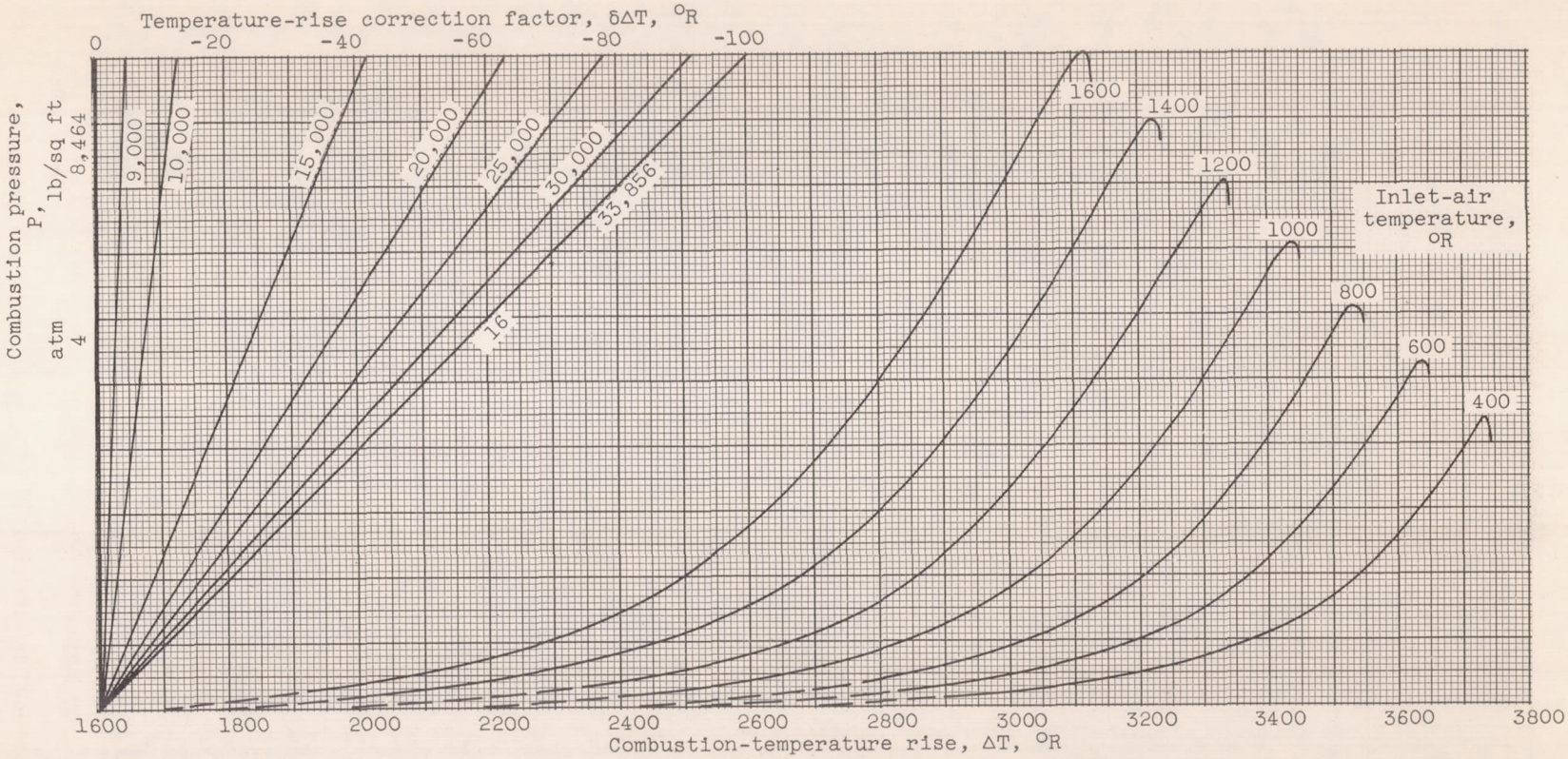

(b) Combustion pressures from 1 to 1/4 atmosphere.

Figure 3. - Continued. Temperature-rise correction factors as function of combustion-temperature rise.



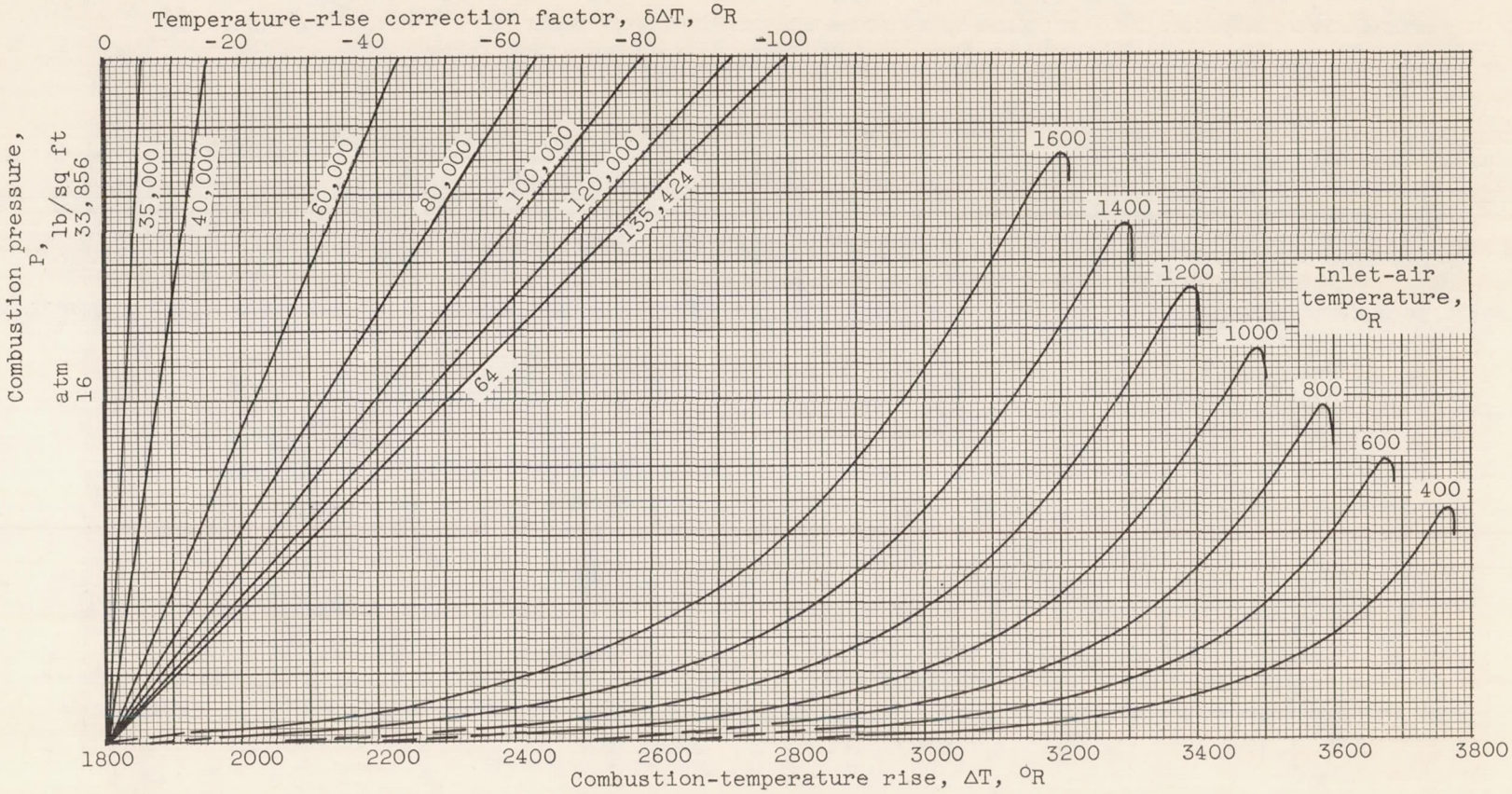

(c) Combustion pressures from 1 to 4 atmospheres.

Figure 3. - Continued. Temperature-rise correction factors as function of combustion-temperature rise.




(d) Combustion pressures from 4 to 16 atmospheres.

Figure 3. - Continued. Temperature-rise correction factors as function of combustion-temperature rise.




(e) Combustion pressures from 16 to 64 atmospheres.

Figure 3. - Concluded. Temperature-rise correction factors as function of combustion-temperature rise.

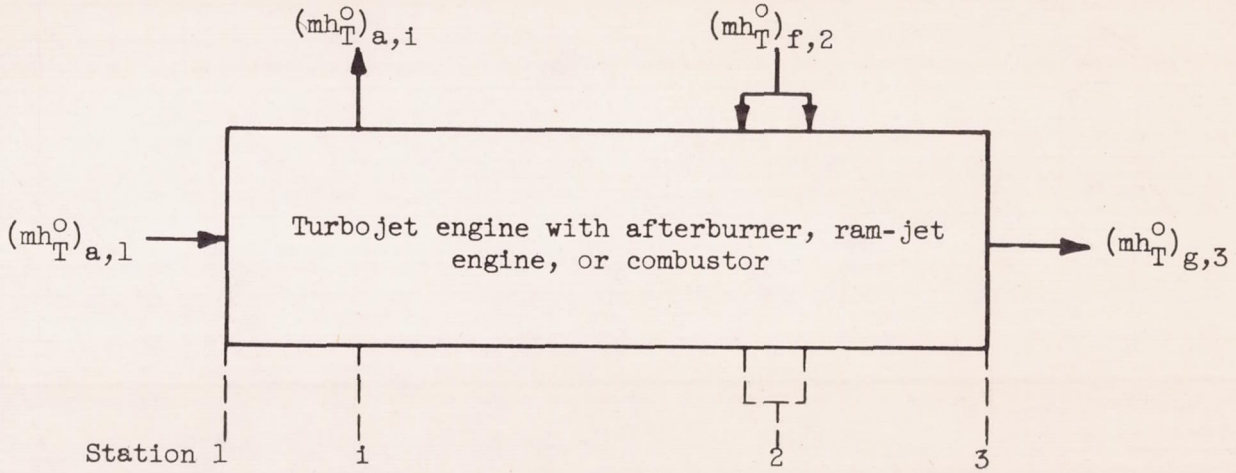



Figure 4. - General system showing entering and leaving enthalpies.



NACA - Langley Field, Va.