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TABLES OF ISENTROPIC EXPANSIONS OF PARAHYDROGEN AND RELATED
TRANSPORT PROPERTIES FOR TOTAL TEMPERATURES FROM 25 K TO 300 K
AND FOR TOTAL PRESSURES FROM 1 ATM TO 10 ATM

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TABLES OF ISENTROPIC EXPANSIONS OF PARAHYDROGEN AND RELATED TRANSPORT
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SUMMARY

The isentropic expansions of parahydrogen at various total pressures and total temperatures were numerically determined by iterating Mach number and by using a modified interval halving method. The calculated isentropic values and related properties are presented in tabulated form.

INTRODUCTION

The wind-tunnel has been the primary tool for experimental aerodynamic research and development for many decades. Because of the increase in size and speed of aircraft in recent years, a need has developed for an increase ground testing capability in terms of Reynolds number. This need has been well documented, for example, in reference 1 and 2. The need for a higher Reynolds number testing capability than presently exists is particularly apparent in programs aimed at the development of efficient transport aircraft or maneuvering fighter aircraft designed to operate at transonic speeds. A major problem in the transonic region is the effect of Reynolds number on shock boundary layer interactions, and in turn, on the aircraft stability and performance characteristics.

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At a given Mach number, the Reynolds number may be increased by using a heavy gas rather than air as the test gas, by increasing the size of the tunnel and model, by increasing the operating pressure of the tunnel, and by reducing the test temperature. The method chosen to increase Reynolds number will, in general, also affect dynamic pressure, mass flow rate, and the power consumption of the tunnel per unit run time. The use of a heavy gas is a well-known method of achieving high Reynolds number. However, the differences in the ratio of specific heats becomes important when compressibility effects become significant, thus making Freon-12 a questionable transonic test medium. The more common approaches of increased size and increased stagnation pressures involve serious problems related to such questions as construction and operating costs, model and support loads, and the possibility of providing continuous-flow capability. The fourth method, that of reduced test temperature, appears to offer an attractive solution to the preceding problems. However, as the test temperature is reduced, the properties of the test gas will begin, at some point, to deviate from the properties of an ideal gas. At cryogenic temperature real-gas effects may become appreciable and these effects on the aerodynamic test results must therefore be analyzed in order to determine if a particular gas is acceptable as a wind-tunnel test gas at cryogenic temperatures.

A cryogenic wind-tunnel concept has evolved at NASA-Langley Research Center in which liquid nitrogen is sprayed directly into the tunnel circuit to cool the tunnel structure, remove the heat input from the drive fan, and balance the heat conducted through the tunnel walls. Nitrogen is the

resulting test gas using this cooling procedure. Throughout the evolution of the cryogenic wind-tunnel concept at NASA-Langley Research Center, experimental and theoretical studies have been made to assess the suitability of cryogenic nitrogen as a test gas. After analyzing real-gas isentropic and normal shock solutions, and performing two-dimensional airfoil pressure tests, Adcock, Kilgore, and Ray in reference 3 concluded that the real-gas effects of nitrogen pose no problem as far as its use in a transonic wind tunnel operating at cryogenic temperatures and at stagnation pressures up to 5 atmospheres.

Nitrogen is, of course, not the only gas which might be considered for use at cryogenic temperatures. However, in order to assure similarity between the flow over the model in the wind-tunnel and the vehicle in flight, it is essential that any candidate test gas behave, for all practical purposes, like an ideal diatomic gas.

In addition to nitrogen, one of the most promising diatomic gases is hydrogen. Due to its very low vapor temperature it is possible to achieve even higher test Reynolds numbers at a given total pressure by using cryogenic hydrogen rather than cryogenic nitrogen as the test gas. Alternatively, for a given size tunnel it is possible to achieve a required test Reynolds number at a lower total pressure in hydrogen than in nitrogen thus reducing model, sting, and balance loads.

As a part of a larger program aimed at determining the suitability as well as the practicality of using cryogenic hydrogen as a wind-tunnel

test gas, the various ratios describing isentropic expansions of parahydrogen* at various total pressures and temperatures have been determined up to Mach 2 and compared with the corresponding values for an ideal diatomic gas. In addition, the local isentropic expansion coefficient, viscosity, thermal conductivity, and Prandtl number have also been determined for the various combinations of pressure, temperature and Mach number.

The purpose of this report is to present in tabular form the various isentropic expansion ratios and the corresponding transport properties of parahydrogen.

In order to expedite the publication of the tabular results no analysis is made in this paper.

SYMBOLS

A	area
c	speed of sound
H	enthalpy
M	Mach number

*Equilibrium hydrogen consists of ortho- and parahydrogen molecules. The difference in the direction of spin of the protons in the hydrogen molecule results in the two forms of hydrogen; ortho, in which the spins are in the same direction, and para, where the spins are in opposing directions. When liquid hydrogen evaporates, the equilibrium condition is essentially pure parahydrogen. This stable condition can even be maintained at ambient temperatures.

P pressure

S entropy

T temperature

Δ increment (i.e. ΔT increment of temperature)

ζ local isentropic expansion coefficient

ρ density

Subscripts:

i iteration value

o value used in subroutine ISENT

t total conditions

Superscript:

* sonic conditions

REAL-GAS ISENEROPIC SOLUTIONS

A computer program giving the thermodynamic and related properties of parahydrogen from the triple point to 300 K at pressures to 1000 bar was obtained from the National Bureau of Standards (NBS). The NBS program is an updated version of the one used by Weber in reference 4. Although the NBS program is slightly different from the one used by Weber, the uncertainty in the results are the same in each program and are discussed in the report by Weber. In order to make use of the NBS program, it was modified into a subprogram form (subprogram THERMO). The inputs to this subprogram are temperature and pressure, and the outputs are the thermodynamic and related properties.

Besides the main program, a subprogram (ISENT) was also developed that made use of THERMO. By using a modified interval halving technique, ISENT calculates pressure and other thermodynamic properties for a given temperature and entropy.

The main program basically centers around ISENT. By iterating on Mach number and employing a modified interval halving technique, the isentropic expansion of parahydrogen at various total temperatures and total pressures is calculated.

Other converging techniques, such as the Newton-Raphson and Müller methods were considered along with the interval halving technique. But, because of the additional calculations involved, which would mean calling THERMO more often, and due to the fact that a good first approximation could be made through the use of the ideal gas equations, the interval halving technique was selected.

Since the only region under consideration is in the gaseous phase, the saturation boundary was considered as the lower temperature and pressure limit and the calculations were stopped when the static pressure was within 10% of the saturation pressure at the particular static temperature. From a temperature point of view, this means that the static temperature was within approximately 1 K of the saturated condition.

Generalized flow charts for both the main program and subprogram ISENT are given in figure 1.

For the main program, the values of the total temperature and total pressure are initialized in step 1. The resulting total conditions (density, sound velocity, etc.) are then computed in step 2 using subprogram THERMO. In steps 3 through 7 the sonic conditions are determined using the interval halving technique. Step 8 is the start of the Mach number iteration and in steps 9 through 12 the conditions at the iterated Mach number are determined by using the interval halving method to converge on the corresponding static temperature. The ratios to the ideal gas values are computed in step 13 and the values are then printed in step 15.

ADDITIONAL FLOW AND TRANSPORT PROPERTIES

Local Isentropic Expansion Coefficient

The pressure and density relationship for the isentropic expansion of a real-gas may adequately be described by the exponential equation

$$P \propto \rho^\zeta$$

where ζ is defined as the local isentropic expansion coefficient. For ideal gases this coefficient is constant and equal to the specific heat ratio. For real-gases, the coefficient of isentropic expansion is, in general, not equal to the specific heat ratio, and may vary. In this report the local isentropic expansion coefficient is defined as:

$$\frac{P_{i-1}}{P_i} = \left(\frac{\rho_{i-1}}{\rho_i} \right)^\zeta$$

The values of this coefficient are listed on the second page of each table in the second column.

It was previously stated that to assure similarity between the flow over a model in the wind-tunnel and the vehicle in flight, it is essential that any candidate test gas behave, for all practical purposes, like an ideal diatomic gas. In addition to this requirement, the transport properties of the test gas should vary approximately the same as the transport properties of the atmosphere. In particular, for heat transfer studies the variations of the thermal conductivity and Prandtl number are of importance. Similarly, for the study of viscous effects, the variations of viscosity and Reynolds number should be considered.

The program supplied by the National Bureau of Standards does not calculate the transport properties. The viscosity is determined using the equation given by McCarty in reference 5. In his report McCarty discusses the development by Diller in obtaining this equation and the estimation of the error involved.

Roder, McCarty, and Hall give a linear interpolation subprogram for thermal conductivity in reference 6. Reference 6 also contains a discussion of the sources of the data and an estimation of the error to be expected.

USE OF TABLES

The tables are separated by total pressure conditions and subdivided by total temperature values. The divisions are as follows:

Table number	Total pressure, atm	Subdivision	Total temperature, K
I	1.0	A	25.0
		B	30.0
		C	40.0
		D	60.0
		E	80.0
		F	100.0
		G	200.0
		H	300.0
II	3.0	A	30.0
		B	35.0
		C	40.0
		D	60.0
		E	80.0
		F	100.0
		G	200.0
		H	300.0
III	5.0	A	35.0
		B	40.0
		C	60.0
		D	80.0
		E	100.0
		F	200.0
		G	300.0
		H	300.0
IV	8.0	A	40.0
		B	45.0
		C	50.0
		D	60.0
		E	80.0
		F	100.0
		G	200.0
		H	300.0

Table number	Total pressure, atm	Subdivision	Total temperature, K
V	10.0	A	45.0
		B	50.0
		C	60.0
		D	80.0
		E	100.0
		F	200.0
		G	300.0

An explanation of the column headings is given in the section entitled Computer Output Dictionary, which immediately precedes the tables.

The last five columns of the first page of each table give the values of the various isentropic expansion ratios relative to the ideal diatomic gas values. For example, table II F at a Mach number of 1.0 gives a value of 0.9513 for the relative pressure ratio. This means that the real gas value of the pressure ratio necessary to expand to Mach 1.0 differs from the ideal gas value by 4.87%.

Some tables, for example table I A, have the statement "saturation boundary reached" printed on the last line. This means that at the last Mach number listed the static pressure is within 10% of the saturation pressure at that particular static temperature.

CONCLUDING REMARKS

The isentropic expansions of parahydrogen at various total pressures and temperatures were determined numerically by iterating Mach number and using a modified interval halving technique. These basic real-gas solutions and comparisons with the ideal diatomic gas solutions are

presented in tabular form for a range of total temperatures from 25 K to 300 K and a range of total pressures from 1 atm to 10 atm. Also included in the tables are the corresponding values of viscosity, thermal conductivity, Reynolds number per unit length, Prandtl number, and local expansion coefficient.

REFERENCES

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COMPUTER OUTPUT DICTIONARY

A*/A	ratio of critical area (where the local speed is equal to the local speed of sound) to the local area
CP/CV	ratio of the specific heat at constant pressure to the specific heat at constant volume
MACH	Mach number
PT	total pressure, atm (1 atm = 101.3×10^3 N/m ²)
P/PT	ratio of static pressure to total pressure
RE/M	Reynolds number per meter, m ⁻¹
RHOT	total density g/cm ³
RHO/RHOT	ratio of static density to total density
SVT	sound velocity at total conditions, m/sec
SV/SVT	ratio of the sound velocity at static conditions to the sound velocity at total conditions
TT	total temperature, K
T/TT	ratio of the static temperature to the total temperature
Z	compressibility factor, P/ρRT

MAIN PROGRAM

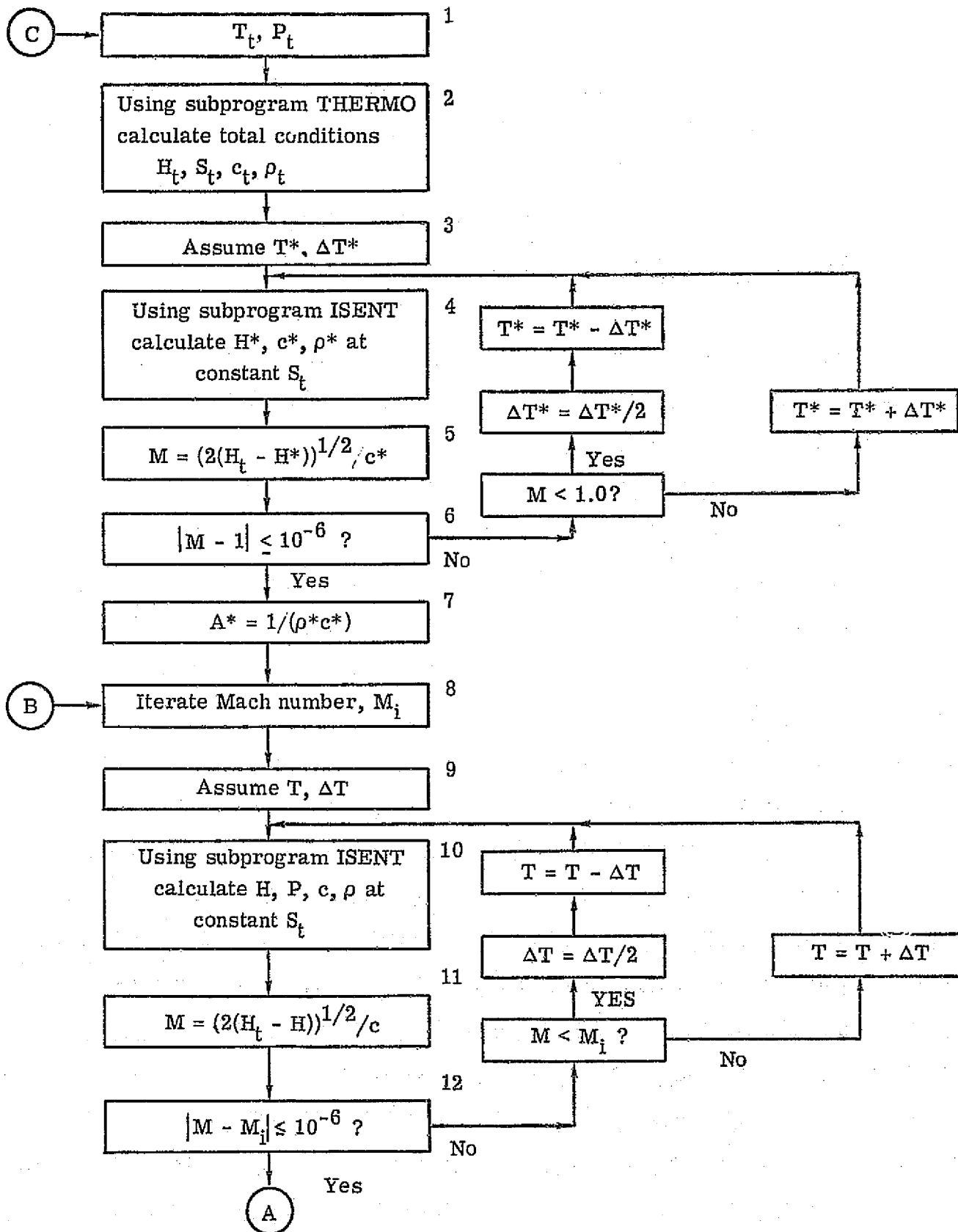
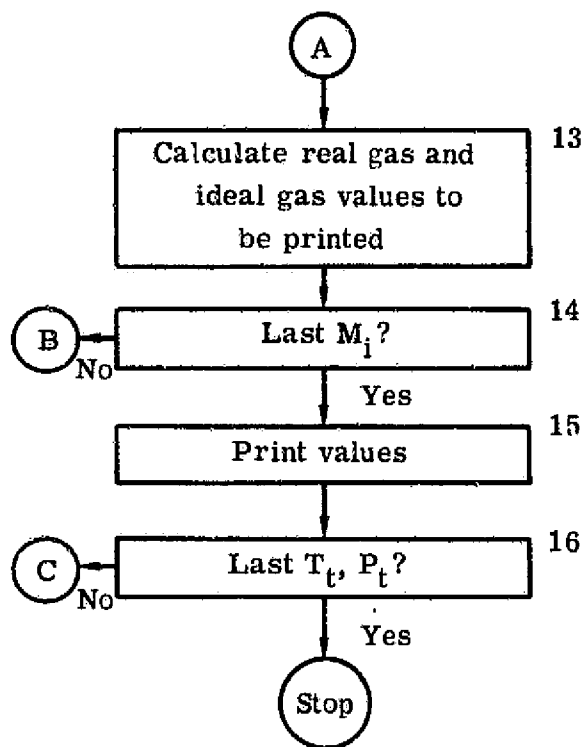


Figure 1. Flow charts.

MAIN PROGRAM, continued



SUBPROGRAM ISENT

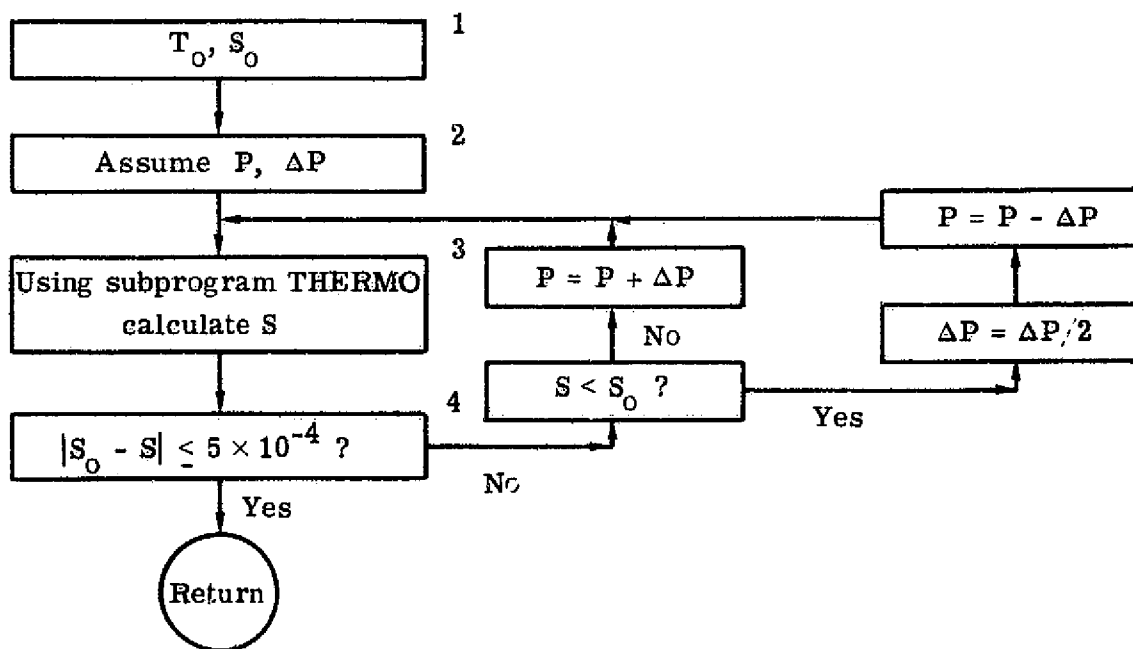


Figure 1. Concluded.

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. $TT = 25.0 \text{ K}$ $PT = 1.0 \text{ ATM}$ $\rho_{HOT} = .104E-07 \text{ G/CM}^3$ $SVT = 404.179 \text{ M/SEC}$

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9456	1.7767	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.157E+08	.9456	1.7767	.9996	.9979	.9997	.9999	.0889	.9998	.9997	.9997	1.0000	1.0303
.100	.305E+08	.9456	1.7766	.9993	.9916	.9966	.9949	.1769	.9993	.9986	.9986	.9999	1.0297
.150	.455E+08	.9456	1.7765	.9962	.9813	.9925	.9884	.2631	.9984	.9969	.9969	1.0000	1.0288
.200	.603E+08	.9456	1.7764	.9932	.9672	.9867	.9802	.3467	.9972	.9945	.9946	1.0000	1.0275
.250	.748E+08	.9456	1.7762	.9895	.9496	.9794	.9696	.4271	.9956	.9918	.9916	1.0002	1.0262
.300	.889E+08	.9456	1.7760	.9849	.9284	.9706	.9566	.5033	.9937	.9882	.9881	1.0002	1.0242
.350	.103E+09	.9456	1.7759	.9796	.9045	.9604	.9419	.5750	.9916	.9844	.9839	1.0006	1.0224
.400	.116E+09	.9456	1.7755	.9737	.8777	.9489	.9251	.6415	.9891	.9800	.9793	1.0009	1.0202
.450	.129E+09	.9455	1.7752	.9670	.8488	.9362	.9067	.7026	.9864	.9753	.9741	1.0013	1.0178
.500	.141E+09	.9455	1.7749	.9598	.8181	.9224	.8849	.7579	.9835	.9704	.9685	1.0020	1.0155
.550	.152E+09	.9455	1.7745	.9519	.7858	.9077	.8659	.8072	.9803	.9652	.9626	1.0028	1.0130
.600	.163E+09	.9455	1.7741	.9436	.7526	.8920	.8438	.8507	.9769	.9600	.9563	1.0040	1.0107
.650	.174E+09	.9455	1.7737	.9347	.7188	.8757	.8210	.8882	.9734	.9548	.9497	1.0055	1.0087
.700	.183E+09	.9455	1.7732	.9255	.6845	.8587	.7973	.9197	.9698	.9495	.9428	1.0072	1.0065
.750	.193E+09	.9455	1.7728	.9158	.6504	.8411	.7733	.9458	.9660	.9445	.9358	1.0094	1.0048
.800	.201E+09	.9456	1.7723	.9059	.6163	.8232	.7487	.9662	.9621	.9395	.9285	1.0118	1.0032
.850	.209E+09	.9456	1.7719	.8956	.5827	.8049	.7240	.9815	.9581	.9346	.9212	1.0146	1.0018
.900	.216E+09	.9456	1.7714	.8851	.5499	.7864	.6993	.9920	.9541	.9301	.9138	1.0179	1.0008
.950	.223E+09	.9456	1.7710	.8744	.5181	.7678	.6748	.9981	.9501	.9260	.9063	1.0217	1.0003
1.000	.229E+09	.9456	1.7705	.8636	.4871	.7491	.6503	1.0000	.9460	.9221	.8989	1.0258	1.0000
1.050	.235E+09	.9457	1.7702	.8526	.4574	.7304	.6262	.9983	.9419	.9187	.8914	1.0306	1.0003
1.100	.240E+09	.9457	1.7699	.8415	.4288	.7118	.6025	.9931	.9379	.9157	.8840	1.0357	1.0010

SATURATION BOUNDARY REACHED.

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.13738E-04	.48514E-04	.7561
.050	1.6967	.13726E-04	.48474E-04	.7561
.100	1.6554	.13693E-04	.48351E-04	.7562
.150	1.6768	.13637E-04	.48149E-04	.7563
.200	1.6724	.13560E-04	.47869E-04	.7564
.250	1.6856	.13462E-04	.47514E-04	.7565
.300	1.6656	.13344E-04	.47084E-04	.7567
.350	1.6804	.13207E-04	.46586E-04	.7570
.400	1.6716	.13052E-04	.46021E-04	.7573
.450	1.6729	.12881E-04	.45396E-04	.7576
.500	1.6721	.12694E-04	.44716E-04	.7581
.550	1.6713	.12493E-04	.43984E-04	.7585
.600	1.6730	.12279E-04	.43207E-04	.7591
.650	1.6742	.12055E-04	.42390E-04	.7597
.700	1.6698	.11820E-04	.41538E-04	.7604
.750	1.6743	.11577E-04	.40658E-04	.7611
.800	1.6692	.11328E-04	.39753E-04	.7620
.850	1.6682	.11072E-04	.38829E-04	.7629
.900	1.6687	.10812E-04	.38075E-04	.7607
.950	1.6711	.10549E-04	.37390E-04	.7558
1.000	1.6667	.10284E-04	.36711E-04	.7511
1.050	1.6692	.10018E-04	.36041E-04	.7460
1.100	1.6665	.97519E-05	.35381E-04	.7406

SATURATION BOUNDARY REACHED.

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

B. TT = 30.0 K PT = 1.0 ATM RHOT = .847E-03 G/CM³ SVT = 447.506 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9664	1.7347	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.117E+08	.9664	1.7347	.9996	.9979	.9992	.9988	.0888	.9998	.9997	.9997	1.0000	1.0300
.100	.233E+08	.9664	1.7346	.9983	.9916	.9966	.9949	.1768	.9993	.9986	.9986	.9999	1.0294
.150	.348E+08	.9664	1.7346	.9962	.9813	.9925	.9888	.2630	.9984	.9969	.9970	1.0000	1.0285
.200	.461E+08	.9664	1.7345	.9933	.9672	.9867	.9802	.3466	.9972	.9945	.9946	1.0000	1.0273
.250	.572E+08	.9664	1.7345	.9895	.9496	.9794	.9696	.4270	.9957	.9918	.9917	1.0002	1.0260
.300	.680E+08	.9663	1.7343	.9850	.9284	.9706	.9566	.5032	.9938	.9882	.9881	1.0002	1.0240
.350	.784E+08	.9663	1.7342	.9798	.9045	.9604	.9418	.5749	.9917	.9844	.9840	1.0006	1.0222
.400	.885E+08	.9663	1.7341	.9738	.8777	.9490	.9251	.6414	.9893	.9800	.9793	1.0009	1.0200
.450	.981E+08	.9662	1.7339	.9672	.8488	.9363	.9067	.7025	.9866	.9753	.9742	1.0013	1.0177
.500	1.07E+09	.9662	1.7337	.9600	.8181	.9225	.8879	.7579	.9837	.9704	.9686	1.0020	1.0154
.550	.116E+09	.9662	1.7335	.9522	.7858	.9077	.8659	.8072	.9806	.9652	.9627	1.0029	1.0130
.600	.124E+09	.9662	1.7333	.9439	.7526	.8921	.8439	.8507	.9772	.9600	.9563	1.0041	1.0108
.650	.132E+09	.9661	1.7331	.9351	.7187	.8757	.8209	.8882	.9738	.9547	.9497	1.0055	1.0086
.700	.139E+09	.9661	1.7329	.9258	.6844	.8587	.7977	.9198	.9701	.9493	.9429	1.0072	1.0066
.750	.146E+09	.9661	1.7325	.9162	.6501	.8411	.7731	.9457	.9664	.9442	.9358	1.0093	1.0048
.800	.153E+09	.9661	1.7323	.9063	.6161	.8232	.7487	.9663	.9625	.9391	.9285	1.0117	1.0022
.850	.158E+09	.9661	1.7320	.8961	.5825	.8048	.7240	.9816	.9586	.9342	.9211	1.0145	1.0019
.900	.164E+09	.9661	1.7316	.8856	.5497	.7863	.6993	.9922	.9546	.9297	.9137	1.0178	1.0009
.950	.169E+09	.9661	1.7313	.8749	.5177	.7676	.6747	.9982	.9506	.9254	.9061	1.0215	1.0003
1.000	.173E+09	.9661	1.7310	.8641	.4867	.7488	.6501	1.0000	.9465	.9213	.8986	1.0255	1.0000
1.050	.177E+09	.9661	1.7306	.8531	.4569	.7301	.6260	.9982	.9425	.9177	.8911	1.0302	1.0003
1.100	.181E+09	.9662	1.7303	.8420	.4284	.7114	.6023	.9931	.9384	.9146	.8836	1.0354	1.0010
1.150	.184E+09	.9662	1.7300	.8309	.4011	.6928	.5790	.9849	.9344	.9119	.8761	1.0411	1.0021
1.200	.187E+09	.9662	1.7296	.8198	.3751	.6745	.5563	.9742	.9303	.9097	.8687	1.0474	1.0038
1.250	.190E+09	.9663	1.7293	.8086	.3505	.6564	.5341	.9610	.9264	.9079	.8615	1.0540	1.0059
1.300	.192E+09	.9663	1.7290	.7975	.3272	.6385	.5125	.9458	.9225	.9065	.8543	1.0613	1.0085
1.350	.194E+09	.9664	1.7287	.7864	.3052	.6209	.4916	.9290	.9186	.9058	.8473	1.0691	1.0117
1.400	.196E+09	.9664	1.7284	.7754	.2846	.6037	.4714	.9109	.9148	.9056	.8404	1.0777	1.0156
1.450	.198E+09	.9665	1.7282	.7644	.2652	.5868	.4519	.8916	.9111	.9059	.8336	1.0867	1.0199
1.500	.199E+09	.9665	1.7279	.7535	.2470	.5704	.4330	.8713	.9074	.9067	.8270	1.0963	1.0248
1.550	.200E+09	.9666	1.7278	.7428	.2300	.5543	.4149	.8503	.9038	.9081	.8206	1.1064	1.0302
1.600	.201E+09	.9666	1.7276	.7322	.2140	.5386	.3974	.8287	.9003	.9098	.8143	1.1170	1.0360

SATURATION BOUNDARY REACHED.

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

P. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.16211E-04	.57156E-04	.7345
.050	1.6953	.16198E-04	.57109E-04	.7346
.100	1.6551	.16161E-04	.56969E-04	.7347
.150	1.6765	.16098E-04	.56737E-04	.7348
.200	1.6720	.16012E-04	.56415E-04	.7350
.250	1.6853	.15902E-04	.56007E-04	.7352
.300	1.6655	.15769E-04	.55515E-04	.7354
.350	1.6808	.15615E-04	.54945E-04	.7357
.400	1.6720	.15440E-04	.54302E-04	.7360
.450	1.6736	.15247E-04	.53590E-04	.7364
.500	1.6737	.15036E-04	.52817E-04	.7367
.550	1.6725	.14809E-04	.51987E-04	.7371
.600	1.6748	.14567E-04	.51108E-04	.7374
.650	1.6730	.14313E-04	.50185E-04	.7377
.700	1.6721	.14047E-04	.49213E-04	.7382
.750	1.6727	.13771E-04	.48201E-04	.7388
.800	1.6723	.13487E-04	.47160E-04	.7394
.850	1.6712	.13196E-04	.46095E-04	.7401
.900	1.6721	.12899E-04	.45013E-04	.7408
.950	1.6709	.12599E-04	.43917E-04	.7415
1.000	1.6678	.12295E-04	.42813E-04	.7422
1.050	1.6710	.11990E-04	.41706E-04	.7429
1.100	1.6701	.11684E-04	.40601E-04	.7436
1.150	1.6694	.11378E-04	.39501E-04	.7443
1.200	1.6704	.11074E-04	.38409E-04	.7451
1.250	1.6675	.10772E-04	.37519E-04	.7420
1.300	1.6672	.10472E-04	.36789E-04	.7357
1.350	1.6681	.10176E-04	.36079E-04	.7291
1.400	1.6700	.98842E-05	.35389E-04	.7222
1.450	1.6683	.95966E-05	.34719E-04	.7149
1.500	1.6679	.93142E-05	.34070E-04	.7073
1.550	1.6674	.90370E-05	.33441E-04	.6994
1.600	1.6654	.87655E-05	.32832E-04	.6913

SATURATION BOUNDARY REACHED.

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAMYDROGEN

C. TT = 40.0 K PT = 1.0 ATM RHOT = .624E-03 G/CM3 SVT = 521.238 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9845	1.6993	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.781E+07	.9845	1.6993	.9996	.9979	.9992	.9988	.0888	.9998	.9997	.9997	1.0000	1.0295
.100	.156E+08	.9845	1.6993	.9983	.9916	.9967	.9949	.1767	.9993	.9986	.9987	.9999	1.0288
.150	.232E+08	.9845	1.6993	.9962	.9813	.9925	.9888	.2629	.9985	.9969	.9970	.9999	1.0280
.200	.308E+08	.9845	1.6993	.9933	.9674	.9868	.9804	.3465	.9973	.9948	.9947	1.0002	1.0270
.250	.382E+08	.9845	1.6994	.9896	.9496	.9795	.9696	.4268	.9958	.9918	.9917	1.0002	1.0254
.300	.454E+08	.9844	1.6994	.9852	.9286	.9707	.9567	.5031	.9940	.9885	.9882	1.0004	1.0236
.350	.523E+08	.9844	1.6994	.9800	.9045	.9606	.9417	.5747	.9919	.9844	.9841	1.0005	1.0217
.400	.590E+08	.9844	1.6994	.9741	.8779	.9491	.9251	.6413	.9895	.9802	.9795	1.0009	1.0197
.450	.653E+08	.9843	1.6993	.9675	.8489	.9365	.9067	.7023	.9869	.9755	.9744	1.0013	1.0175
.500	.714E+08	.9843	1.6993	.9603	.8182	.9227	.8869	.7577	.9840	.9705	.9689	1.0020	1.0152
.550	.771E+08	.9842	1.6993	.9525	.7861	.9080	.8660	.8072	.9809	.9655	.9629	1.0030	1.0130
.600	.825E+08	.9842	1.6992	.9443	.7526	.8924	.8437	.8505	.9777	.9600	.9567	1.0039	1.0105
.650	.876E+08	.9841	1.6991	.9355	.7187	.8760	.8207	.8879	.9742	.9547	.9501	1.0053	1.0084
.700	.923E+08	.9841	1.6990	.9263	.6845	.8591	.7972	.9197	.9706	.9495	.9432	1.0071	1.0065
.750	.967E+08	.9840	1.6989	.9167	.6501	.8415	.7730	.9455	.9669	.9442	.9362	1.0090	1.0045
.800	.101E+09	.9840	1.6988	.9068	.6161	.8236	.7485	.9661	.9631	.9391	.9290	1.0115	1.0038
.850	.104E+09	.9840	1.6987	.8966	.5825	.8053	.7238	.9815	.9592	.9342	.9216	1.0143	1.0018
.900	.108E+09	.9839	1.6985	.8862	.5497	.7867	.6991	.9921	.9553	.9297	.9142	1.0176	1.0009
.950	.111E+09	.9839	1.6984	.8755	.5177	.7680	.6745	.9981	.9513	.9254	.9067	1.0213	1.0003
1.000	.114E+09	.9838	1.6982	.8647	.4867	.7493	.6500	1.0000	.9472	.9213	.8991	1.0254	1.0000
1.050	.116E+09	.9838	1.6981	.8537	.4569	.7305	.6259	.9983	.9432	.9177	.8916	1.0301	1.0003
1.100	.118E+09	.9838	1.6979	.8427	.4282	.7119	.6020	.9929	.9391	.9143	.8841	1.0350	1.0008
1.150	.120E+09	.9838	1.6978	.8316	.4010	.6933	.5799	.9849	.9351	.9118	.8767	1.0408	1.0021
1.200	.122E+09	.9838	1.6976	.8204	.3750	.6749	.5561	.9741	.9311	.9094	.8693	1.0470	1.0037
1.250	.123E+09	.9838	1.6974	.8093	.3504	.6568	.5339	.9609	.9272	.9076	.8620	1.0536	1.0058
1.300	.125E+09	.9838	1.6972	.7982	.3271	.6389	.5123	.9458	.9232	.9062	.8549	1.0609	1.0085
1.350	.126E+09	.9838	1.6971	.7871	.3051	.6214	.4914	.9290	.9194	.9054	.8478	1.0687	1.0117
1.400	.127E+09	.9838	1.6969	.7760	.2844	.6041	.4712	.9107	.9156	.9051	.8409	1.0771	1.0154
1.450	.127E+09	.9838	1.6967	.7651	.2650	.5872	.4516	.8914	.9119	.9053	.8342	1.0861	1.0197
1.500	.128E+09	.9838	1.6965	.7542	.2468	.5707	.4328	.8711	.9082	.9061	.8275	1.0957	1.0246
1.550	.129E+09	.9838	1.6964	.7435	.2298	.5546	.4147	.8501	.9046	.9073	.8211	1.1059	1.0300
1.600	.129E+09	.9838	1.6962	.7328	.2139	.5389	.3972	.8285	.9011	.9090	.8148	1.1165	1.0359
1.650	.129E+09	.9839	1.6960	.7223	.1990	.5236	.3804	.8067	.8977	.9114	.8086	1.1278	1.0424
1.700	.129E+09	.9839	1.6959	.7119	.1852	.5087	.3644	.7846	.8943	.9142	.8027	1.1397	1.0495
1.750	.129E+09	.9839	1.6957	.7017	.1723	.4942	.3491	.7624	.8911	.9175	.7969	1.1522	1.0571
1.800	.129E+09	.9839	1.6955	.6916	.1603	.4801	.3342	.7402	.8879	.9213	.7912	1.1651	1.0651
1.850	.129E+09	.9840	1.6954	.6817	.1492	.4665	.3201	.7183	.8848	.9258	.7857	1.1790	1.0740
1.900	.129E+09	.9840	1.6952	.6720	.1389	.4532	.3065	.6964	.8818	.9305	.7804	1.1929	1.0831
1.950	.129E+09	.9841	1.6951	.6624	.1293	.4404	.2937	.6750	.8789	.9360	.7753	1.2079	1.0931
2.000	.129E+09	.9841	1.6950	.6530	.1203	.4279	.2813	.6537	.8760	.9416	.7703	1.2230	1.1031

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

C. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.20797E-04	.73845E-04	.7120
.050	1.6920	.20782E-04	.73788E-04	.7121
.100	1.6516	.20737E-04	.73615E-04	.7122
.150	1.6734	.20663E-04	.73329E-04	.7124
.200	1.6886	.20560E-04	.72933E-04	.7126
.250	1.6671	.20429E-04	.72430E-04	.7129
.300	1.6762	.20271E-04	.71826E-04	.7133
.350	1.6568	.20087E-04	.71126E-04	.7137
.400	1.6752	.19879E-04	.70336E-04	.7141
.450	1.6717	.19647E-04	.69463E-04	.7146
.500	1.6721	.19395E-04	.68514E-04	.7151
.550	1.6757	.19123E-04	.67497E-04	.7156
.600	1.6661	.18834E-04	.66419E-04	.7161
.650	1.6722	.18528E-04	.65289E-04	.7166
.700	1.6753	.18209E-04	.64114E-04	.7170
.750	1.6687	.17877E-04	.62902E-04	.7174
.800	1.6720	.17534E-04	.61659E-04	.7178
.850	1.6720	.17183E-04	.60392E-04	.7180
.900	1.6722	.16824E-04	.59039E-04	.7191
.950	1.6713	.16460E-04	.57671E-04	.7201
1.000	1.6690	.16091E-04	.56296E-04	.7210
1.050	1.6717	.15719E-04	.54921E-04	.7219
1.100	1.6664	.15346E-04	.53548E-04	.7227
1.150	1.6735	.14973E-04	.52184E-04	.7235
1.200	1.6690	.14600E-04	.50831E-04	.7241
1.250	1.6688	.14229E-04	.49495E-04	.7247
1.300	1.6687	.13860E-04	.48137E-04	.7257
1.350	1.5694	.13495E-04	.46787E-04	.7269
1.400	1.6686	.13134E-04	.45458E-04	.7280
1.450	1.6695	.12776E-04	.44154E-04	.7290
1.500	1.6693	.12427E-04	.42876E-04	.7300
1.550	1.6685	.12081E-04	.41625E-04	.7310
1.600	1.6668	.11742E-04	.40403E-04	.7316
1.650	1.6690	.11409E-04	.39211E-04	.7326
1.700	1.6686	.11083E-04	.38051E-04	.7333
1.750	1.6579	.10765E-04	.37079E-04	.7308
1.800	1.6665	.10453E-04	.36367E-04	.7234
1.850	1.6706	.10149E-04	.35680E-04	.7158
1.900	1.6647	.98517E-05	.35017E-04	.7080
1.950	1.6705	.95623E-05	.34377E-04	.6999
2.000	1.6642	.92804E-05	.33760E-04	.6916

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. TT = 60.0 K PT = 1.0 ATM RHOT = .41E-03 G/CM3 SVT = 635.721 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9954	1.6482	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.453E+07	.9954	1.6484	.9996	.9979	.9992	.9987	.0682	.9999	.9997	.9997	1.0000	1.0221
.100	.903E+07	.9954	1.6488	.9986	.9918	.9968	.9950	.1755	.9996	.9988	.9988	1.0000	1.0218
.150	.135E+08	.9954	1.6495	.9968	.9818	.9929	.9889	.2612	.9990	.9974	.9973	1.0001	1.0214
.200	.178E+08	.9954	1.6506	.9943	.9679	.9974	.9874	.3444	.9983	.9953	.9953	1.0001	1.0206
.250	.221E+08	.9954	1.6518	.9911	.9503	.9804	.9694	.4243	.9973	.9926	.9926	1.0000	1.0195
.300	.263E+08	.9953	1.6533	.9873	.9296	.9719	.9565	.5005	.9961	.9895	.9894	1.0002	1.0185
.350	.303E+08	.9953	1.6550	.9827	.9058	.9621	.9416	.5771	.9947	.9859	.9857	1.0003	1.0172
.400	.341E+08	.9953	1.6568	.9775	.8793	.9510	.9248	.6388	.9931	.9818	.9814	1.0006	1.0157
.450	.378E+08	.9952	1.6586	.9717	.8505	.9387	.9063	.7000	.9912	.9773	.9767	1.0009	1.0141
.500	.412E+08	.9952	1.6606	.9652	.8199	.9252	.8864	.7556	.9890	.9726	.9715	1.0014	1.0125
.550	.445E+08	.9951	1.6625	.9581	.7878	.9107	.8653	.8055	.9867	.9676	.9658	1.0022	1.0108
.600	.476E+08	.9951	1.6644	.9505	.7543	.8953	.8428	.8491	.9841	.9622	.9598	1.0028	1.0089
.650	.504E+08	.9950	1.6662	.9423	.7204	.8791	.8198	.8870	.9813	.9569	.9534	1.0041	1.0073
.700	.531E+08	.9950	1.6680	.9337	.6860	.8622	.7960	.9190	.9784	.9515	.9467	1.0056	1.0057
.750	.555E+08	.9949	1.6696	.9246	.6515	.8448	.7716	.9451	.9752	.9461	.9398	1.0072	1.0041
.800	.577E+08	.9949	1.6710	.9150	.6172	.8268	.7469	.9658	.9718	.9408	.9326	1.0093	1.0027
.850	.597E+08	.9948	1.6723	.9051	.5834	.8085	.7220	.9817	.9683	.9356	.9253	1.0117	1.0015
.900	.615E+08	.9948	1.6735	.8950	.5503	.7899	.6971	.9918	.9647	.9307	.9179	1.0146	1.0006
.950	.631E+08	.9947	1.6744	.8845	.5182	.7712	.6724	.9980	.9610	.9262	.9104	1.0181	1.0002
1.000	.646E+08	.9947	1.6753	.8733	.4871	.7524	.6479	1.0000	.9572	.9220	.9028	1.0220	1.0000
1.050	.658E+08	.9946	1.6759	.8629	.4570	.7335	.6236	.9980	.9533	.9180	.8953	1.0262	1.0001
1.100	.669E+08	.9946	1.6765	.8519	.4284	.7148	.5998	.9929	.9494	.9146	.8878	1.0311	1.0008
1.150	.679E+08	.9945	1.6769	.8408	.4010	.6961	.5766	.9848	.9455	.9118	.8803	1.0367	1.0020
1.200	.687E+08	.9945	1.6772	.8296	.3749	.6777	.5537	.9738	.9416	.9091	.8729	1.0425	1.0034
1.250	.694E+08	.9945	1.6775	.8184	.3502	.6595	.5316	.9607	.9376	.9072	.8656	1.0492	1.0057
1.300	.699E+08	.9944	1.6776	.8072	.3269	.6415	.5100	.9455	.9338	.9057	.8584	1.0562	1.0082
1.350	.703E+08	.9944	1.6777	.7961	.3049	.6239	.4892	.9288	.9299	.9049	.8513	1.0640	1.0114
1.400	.707E+08	.9944	1.6778	.7849	.2842	.6066	.4691	.9105	.9261	.9045	.8444	1.0723	1.0152
1.450	.709E+08	.9944	1.6779	.7739	.2648	.5896	.4495	.8910	.9224	.9045	.8376	1.0810	1.0193
1.500	.710E+08	.9943	1.6778	.7629	.2466	.5731	.4307	.8707	.9187	.9052	.8310	1.0905	1.0241
1.550	.711E+08	.9943	1.6778	.7521	.2295	.5569	.4127	.8497	.9151	.9064	.8245	1.1006	1.0295
1.600	.711E+08	.9943	1.6778	.7413	.2136	.5411	.3953	.8282	.9115	.9081	.8182	1.1112	1.0354
1.650	.711E+08	.9943	1.6777	.7307	.1988	.5258	.3786	.8063	.9081	.9104	.8120	1.1224	1.0419
1.700	.710E+08	.9943	1.6777	.7202	.1850	.5108	.3626	.7847	.9047	.9131	.8061	1.1342	1.0490
1.750	.708E+08	.9943	1.6776	.7099	.1721	.4963	.3472	.7620	.9014	.9164	.8002	1.1465	1.0565
1.800	.706E+08	.9943	1.6776	.6997	.1602	.4822	.3326	.7399	.8982	.9203	.7946	1.1595	1.0647
1.850	.703E+08	.9942	1.6775	.6897	.1490	.4685	.3185	.7178	.8951	.9245	.7891	1.1730	1.0733
1.900	.700E+08	.9942	1.6774	.6798	.1387	.4552	.3050	.6960	.8921	.9293	.7838	1.1870	1.0824
1.950	.697E+08	.9942	1.6774	.6701	.1291	.4423	.2922	.6745	.8891	.9347	.7787	1.2018	1.0923
2.000	.694E+08	.9942	1.6773	.6606	.1202	.4298	.2800	.6534	.8862	.9404	.7737	1.2170	1.1025

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.28843E-04	.10789E-03	.6847
.050	1.6379	.28825E-04	.10780E-03	.6847
.100	1.6428	.28771E-04	.10754E-03	.6847
.150	1.6487	.28681E-04	.10711E-03	.6849
.200	1.6401	.28556E-04	.10651E-03	.6850
.250	1.6379	.28397E-04	.10575E-03	.6853
.300	1.6473	.28204E-04	.10484E-03	.6856
.350	1.6465	.27978E-04	.10377E-03	.6860
.400	1.6477	.27722E-04	.10256E-03	.6866
.450	1.6485	.27436E-04	.10121E-03	.6873
.500	1.6526	.27122E-04	.99442E-04	.6902
.550	1.6564	.26783E-04	.97976E-04	.6905
.600	1.6507	.26420E-04	.96417E-04	.6909
.650	1.6610	.26035E-04	.94776E-04	.6914
.700	1.6597	.25630E-04	.93068E-04	.6920
.750	1.6591	.25208E-04	.91302E-04	.6927
.800	1.6611	.24771E-04	.89488E-04	.6935
.850	1.6624	.24322E-04	.87638E-04	.6944
.900	1.6638	.23862E-04	.85762E-04	.6954
.950	1.6676	.23393E-04	.83843E-04	.6966
1.000	1.6659	.22918E-04	.81912E-04	.6980
1.050	1.6640	.22438E-04	.79895E-04	.7001
1.100	1.6679	.21955E-04	.77991E-04	.7013
1.150	1.6699	.21471E-04	.76100E-04	.7026
1.200	1.6652	.20986E-04	.74227E-04	.7037
1.250	1.6699	.20503E-04	.72378E-04	.7049
1.300	1.6665	.20022E-04	.70556E-04	.7059
1.350	1.6702	.19544E-04	.68758E-04	.7069
1.400	1.6688	.19071E-04	.66992E-04	.7079
1.450	1.6657	.18603E-04	.65263E-04	.7087
1.500	1.6693	.18140E-04	.63571E-04	.7093
1.550	1.6680	.17684E-04	.61920E-04	.7099
1.600	1.6682	.17235E-04	.60309E-04	.7103
1.650	1.6686	.16793E-04	.58664E-04	.7114
1.700	1.6679	.16359E-04	.57035E-04	.7128
1.750	1.6672	.15933E-04	.55451E-04	.7148
1.800	1.6689	.15516E-04	.53911E-04	.7151
1.850	1.6665	.15107E-04	.52416E-04	.7160
1.900	1.6667	.14707E-04	.50966E-04	.7169
1.950	1.6692	.14315E-04	.49568E-04	.7175
2.000	1.6670	.13933E-04	.48166E-04	.7185

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. TT = 80.0 K PT = 1.0 ATM PHOT = .308E-03 G/CM3 SVT = 713.835 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9986	1.5489	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.306E+07	.9985	1.5492	.9998	.9981	.9993	.9988	.8867	1.0000	.9998	.9998	1.0000	1.0049
.100	.610E+07	.9985	1.5501	.9990	.9923	.9973	.9950	.1726	1.0000	.9993	.9993	1.0000	1.0049
.150	.910E+07	.9985	1.5516	.9978	.9828	.9939	.9889	.2570	1.0000	.9984	.9984	1.0000	1.0050
.200	.121E+08	.9985	1.5536	.9960	.9696	.9892	.9803	.3391	1.0000	.9971	.9971	1.0000	1.0049
.250	.149E+08	.9985	1.5562	.9938	.9530	.9831	.9695	.4183	1.0000	.9954	.9954	1.0000	1.0049
.300	.177E+08	.9985	1.5593	.9910	.9331	.9758	.9564	.4938	.9999	.9933	.9933	1.0000	1.0048
.350	.204E+08	.9985	1.5630	.9878	.9103	.9672	.9413	.5651	.9998	.9908	.9909	1.0000	1.0048
.400	.230E+08	.9984	1.5672	.9840	.8847	.9577	.9242	.6317	.9997	.9878	.9880	1.0000	1.0045
.450	.255E+08	.9984	1.5718	.9798	.8569	.9463	.9056	.6934	.9994	.9846	.9846	1.0001	1.0044
.500	.278E+08	.9984	1.5769	.9750	.8268	.9342	.8853	.7494	.9991	.9808	.9809	1.0001	1.0041
.550	.300E+08	.9983	1.5824	.9697	.7952	.9210	.8637	.7999	.9986	.9767	.9767	1.0003	1.0038
.600	.320E+08	.9983	1.5882	.9640	.7623	.9068	.8409	.8445	.9981	.9723	.9720	1.0005	1.0035
.650	.339E+08	.9982	1.5942	.9577	.7282	.8916	.8170	.8831	.9973	.9673	.9670	1.0007	1.0029
.700	.357E+08	.9982	1.6004	.9508	.6938	.8756	.7925	.9161	.9964	.9624	.9614	1.0013	1.0026
.750	.373E+08	.9982	1.6067	.9435	.6589	.8589	.7678	.9430	.9952	.9569	.9555	1.0018	1.0019
.800	.387E+08	.9981	1.6131	.9357	.6241	.8415	.7420	.9645	.9938	.9514	.9492	1.0027	1.0014
.850	.401E+08	.9981	1.6193	.9275	.5897	.8236	.7164	.9807	.9922	.9458	.9426	1.0039	1.0009
.900	.412E+08	.9980	1.6253	.9187	.5559	.8052	.6907	.9917	.9904	.9402	.9357	1.0053	1.0005
.950	.422E+08	.9980	1.6311	.9096	.5228	.7865	.6651	.9980	.9883	.9345	.9285	1.0070	1.0001
1.000	.431E+08	.9979	1.6366	.9000	.4908	.7676	.6398	1.0000	.9859	.9291	.9211	1.0093	1.0000
1.050	.439E+08	.9979	1.6417	.8901	.4601	.7485	.6151	.9982	.9834	.9241	.9136	1.0122	1.0002
1.100	.446E+08	.9979	1.6463	.8799	.4306	.7295	.5907	.9927	.9806	.9193	.9060	1.0154	1.0006
1.150	.451E+08	.9978	1.6505	.8694	.4025	.7104	.5670	.9843	.9776	.9151	.8983	1.0194	1.0015
1.200	.456E+08	.9978	1.6541	.8587	.3758	.6915	.5438	.9730	.9745	.9112	.8907	1.0238	1.0027
1.250	.459E+08	.9978	1.6574	.8478	.3505	.6728	.5213	.9594	.9713	.9079	.8831	1.0289	1.0043
1.300	.462E+08	.9977	1.6601	.8368	.3268	.6544	.4997	.9440	.9679	.9053	.8756	1.0349	1.0066
1.350	.464E+08	.9977	1.6625	.8257	.3044	.6363	.4788	.9267	.9645	.9032	.8682	1.0413	1.0092
1.400	.465E+08	.9977	1.6645	.8145	.2834	.6185	.4587	.9082	.9610	.9019	.8609	1.0486	1.0126
1.450	.466E+08	.9976	1.6661	.8033	.2638	.6011	.4392	.8885	.9575	.9011	.8539	1.0563	1.0164
1.500	.466E+08	.9976	1.6674	.7922	.2455	.5841	.4207	.8688	.9539	.9011	.8469	1.0650	1.0209
1.550	.466E+08	.9976	1.6685	.7811	.2283	.5675	.4027	.8467	.9504	.9015	.8402	1.0741	1.0258
1.600	.465E+08	.9975	1.6693	.7701	.2124	.5514	.3856	.8251	.9469	.9028	.8336	1.0840	1.0315
1.650	.463E+08	.9975	1.6700	.7591	.1976	.5356	.3692	.8031	.9434	.9046	.8273	1.0946	1.0378
1.700	.462E+08	.9975	1.6705	.7483	.1837	.5203	.3535	.7809	.9400	.9070	.8211	1.1057	1.0445
1.750	.460E+08	.9975	1.6709	.7376	.1709	.5055	.3384	.7587	.9367	.9099	.8151	1.1175	1.0519
1.800	.458E+08	.9975	1.6711	.7271	.1590	.4911	.3241	.7365	.9334	.9134	.8093	1.1298	1.0598
1.850	.455E+08	.9974	1.6713	.7167	.1479	.4771	.3103	.7145	.9302	.9175	.8037	1.1429	1.0683
1.900	.452E+08	.9974	1.6715	.7065	.1376	.4636	.2973	.6929	.9271	.9223	.7983	1.1567	1.0776
1.950	.450E+08	.9974	1.6716	.6964	.1281	.4504	.2847	.6714	.9240	.9274	.7930	1.1708	1.0872
2.000	.446E+08	.9974	1.6716	.6865	.1192	.4377	.2727	.6503	.9211	.9331	.7879	1.1856	1.0974

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.75851E-04	.14507E-03	.6952
.050	1.5471	.75832E-04	.14495E-03	.6952
.100	1.5517	.75778E-04	.14457E-03	.6953
.150	1.5493	.75687E-04	.14395E-03	.6953
.200	1.5486	.75560E-04	.14308E-03	.6953
.250	1.5536	.75398E-04	.14197E-03	.6955
.300	1.5539	.75200E-04	.14063E-03	.6956
.350	1.5592	.74967E-04	.13922E-03	.6951
.400	1.5597	.74701E-04	.13776E-03	.6938
.450	1.5697	.74400E-04	.13612E-03	.6924
.500	1.5700	.74060E-04	.13431E-03	.6910
.550	1.5782	.73704E-04	.13234E-03	.6896
.600	1.5830	.73310E-04	.13022E-03	.6883
.650	1.5857	.72888E-04	.12796E-03	.6870
.700	1.5987	.72439E-04	.12558E-03	.6860
.750	1.5987	.71965E-04	.12308E-03	.6851
.800	1.6072	.71469E-04	.12049E-03	.6845
.850	1.6141	.70952E-04	.11786E-03	.6839
.900	1.6200	.70419E-04	.11522E-03	.6834
.950	1.6228	.70870E-04	.11253E-03	.6831
1.000	1.6306	.70309E-04	.10988E-03	.6833
1.050	1.6374	.70739E-04	.10705E-03	.6838
1.100	1.6389	.70162E-04	.10430E-03	.6847
1.150	1.6468	.70580E-04	.10155E-03	.6860
1.200	1.6471	.70996E-04	.98690E-04	.6885
1.250	1.6508	.70412E-04	.96182E-04	.6891
1.300	1.6570	.70829E-04	.93709E-04	.6899
1.350	1.6561	.70250E-04	.91278E-04	.6908
1.400	1.6614	.70676E-04	.88895E-04	.6919
1.450	1.6601	.70107E-04	.86562E-04	.6931
1.500	1.6647	.70544E-04	.84273E-04	.6944
1.550	1.6613	.70990E-04	.82023E-04	.6960
1.600	1.6664	.70443E-04	.79792E-04	.6978
1.650	1.6665	.70906E-04	.77677E-04	.6992
1.700	1.6651	.70377E-04	.75622E-04	.7005
1.750	1.6656	.70858E-04	.73625E-04	.7018
1.800	1.6663	.70348E-04	.71686E-04	.7029
1.850	1.6670	.70849E-04	.69804E-04	.7040
1.900	1.6697	.70360E-04	.67975E-04	.7050
1.950	1.6660	.70880E-04	.66191E-04	.7060
2.000	1.6672	.70411E-04	.64469E-04	.7067

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

P. TT = 100.0 K PT = 1.0 ATM RHOT = .246E-03 G/CM3 SVT = 772.508 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9997	1.4478	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.225E+07	.9997	1.4480	.9999	.9982	.9994	.9987	.0857	1.0000	.9999	.9999	1.0000	.9931
.100	.448E+07	.9997	1.4487	.9997	.9978	.9978	.9950	.1706	1.0002	.9998	.9998	1.0000	.9933
.150	.669E+07	.9997	1.4499	.9987	.9878	.9950	.9888	.2540	1.0004	.9994	.9995	.9999	.9934
.200	.886E+07	.9997	1.4515	.9968	.9716	.9911	.9883	.3354	1.0008	.9991	.9990	1.0000	.9939
.250	.110E+08	.9997	1.4536	.9950	.9560	.9861	.9694	.4138	1.0012	.9984	.9985	1.0000	.9943
.300	.130E+08	.9997	1.4562	.9928	.9372	.9881	.9563	.4887	1.0017	.9975	.9977	.9999	.9946
.350	.150E+08	.9997	1.4593	.9902	.9157	.9730	.9412	.5598	1.0023	.9966	.9968	.9999	.9953
.400	.169E+08	.9996	1.4629	.9873	.8915	.9648	.9241	.6262	1.0029	.9954	.9957	.9998	.9958
.450	.186E+08	.9996	1.4671	.9839	.8649	.9556	.9052	.6878	1.0037	.9939	.9943	.9996	.9963
.500	.203E+08	.9996	1.4717	.9802	.8364	.9455	.8847	.7441	1.0044	.9921	.9927	.9995	.9970
.550	.219E+08	.9996	1.4769	.9761	.8080	.9347	.8628	.7948	1.0052	.9899	.9908	.9992	.9975
.600	.234E+08	.9995	1.4827	.9716	.7741	.9222	.8396	.8399	1.0060	.9874	.9886	.9989	.9980
.650	.247E+08	.9995	1.4891	.9668	.7412	.9093	.8153	.8792	1.0068	.9845	.9861	.9986	.9985
.700	.260E+08	.9995	1.4960	.9616	.7075	.8954	.7903	.9129	1.0076	.9813	.9831	.9984	.9991
.750	.271E+08	.9994	1.5034	.9560	.6731	.8807	.7644	.9406	1.0084	.9775	.9798	.9979	.9993
.800	.281E+08	.9994	1.5114	.9501	.6385	.8657	.7382	.9628	1.0091	.9733	.9760	.9975	.9996
.850	.290E+08	.9994	1.5198	.9438	.6040	.8491	.7116	.9795	1.0097	.9687	.9718	.9971	.9998
.900	.297E+08	.9993	1.5288	.9371	.5698	.8323	.6849	.9912	1.0101	.9637	.9671	.9969	1.0000
.950	.304E+08	.9993	1.5381	.9300	.5331	.8149	.6582	.9979	1.0105	.9583	.9620	.9966	1.0000
1.000	.310E+08	.9993	1.5477	.9228	.5032	.7970	.6316	1.0000	1.0106	.9525	.9564	.9964	1.0000
1.050	.315E+08	.9992	1.5575	.9148	.4712	.7786	.6055	.9979	1.0106	.9464	.9503	.9964	1.0000
1.100	.319E+08	.9992	1.5674	.9066	.4404	.7608	.5799	.9923	1.0103	.9404	.9439	.9969	1.0002
1.150	.322E+08	.9992	1.5773	.8980	.4108	.7410	.5547	.9831	1.0098	.9341	.9370	.9974	1.0002
1.200	.324E+08	.9991	1.5870	.8891	.3827	.7220	.5304	.9711	1.0090	.9281	.9299	.9986	1.0006
1.250	.326E+08	.9991	1.5964	.8798	.3560	.7029	.5068	.9564	1.0079	.9221	.9225	1.0002	1.0011
1.300	.327E+08	.9991	1.6054	.8702	.3308	.6838	.4841	.9397	1.0066	.9165	.9149	1.0024	1.0020
1.350	.327E+08	.9990	1.6138	.8603	.3071	.6649	.4622	.9212	1.0049	.9114	.9072	1.0053	1.0032
1.400	.327E+08	.9990	1.6216	.8501	.2850	.6462	.4413	.9013	1.0030	.9068	.8995	1.0088	1.0049
1.450	.327E+08	.9990	1.6288	.8395	.2647	.6278	.4213	.8804	1.0009	.9030	.8918	1.0133	1.0072
1.500	.326E+08	.9990	1.6352	.8292	.2451	.6098	.4023	.8586	.9985	.8998	.8842	1.0184	1.0099
1.550	.325E+08	.9989	1.6408	.8186	.2273	.5922	.3841	.8363	.9960	.8974	.8767	1.0244	1.0133
1.600	.324E+08	.9989	1.6458	.8078	.2108	.5750	.3669	.8138	.9933	.8960	.8694	1.0315	1.0175
1.650	.322E+08	.9989	1.6501	.7970	.1955	.5587	.3505	.7910	.9905	.8953	.8623	1.0391	1.0221
1.700	.320E+08	.9989	1.6537	.7852	.1814	.5421	.3349	.7682	.9876	.8954	.8554	1.0477	1.0275
1.750	.318E+08	.9989	1.6568	.7754	.1684	.5263	.3202	.7456	.9846	.8964	.8487	1.0572	1.0337
1.800	.316E+08	.9988	1.6594	.7647	.1563	.5111	.3061	.7231	.9816	.8982	.8423	1.0673	1.0405
1.850	.314E+08	.9988	1.6615	.7540	.1452	.4967	.2928	.7010	.9786	.9009	.8361	1.0785	1.0481
1.900	.311E+08	.9988	1.6637	.7435	.1349	.4821	.2807	.6791	.9756	.9041	.8301	1.0902	1.0562
1.950	.309E+08	.9988	1.6646	.7330	.1254	.4683	.2691	.6577	.9726	.9082	.8244	1.1027	1.0651
2.000	.306E+08	.9988	1.6657	.7227	.1167	.4549	.2567	.6367	.9697	.9128	.8188	1.1157	1.0744

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.42160E-04	.19153E-03	.7065
.050	1.4467	.42143E-04	.19140E-03	.7064
.100	1.4516	.42092E-04	.19100E-03	.7063
.150	1.4412	.42008E-04	.19034E-03	.7060
.200	1.4578	.41889E-04	.18941E-03	.7057
.250	1.4518	.41734E-04	.18823E-03	.7053
.300	1.4508	.41552E-04	.18678E-03	.7048
.350	1.4599	.41334E-04	.18509E-03	.7042
.400	1.4609	.41083E-04	.18314E-03	.7035
.450	1.4627	.40799E-04	.18095E-03	.7028
.500	1.4697	.40484E-04	.17853E-03	.7020
.550	1.4729	.40136E-04	.17587E-03	.7012
.600	1.4784	.39758E-04	.17299E-03	.7004
.650	1.4851	.39349E-04	.16989E-03	.6996
.700	1.4942	.38910E-04	.16659E-03	.6989
.750	1.4969	.38442E-04	.16317E-03	.6979
.800	1.5068	.37946E-04	.15964E-03	.6968
.850	1.5144	.37423E-04	.15595E-03	.6958
.900	1.5247	.36875E-04	.15211E-03	.6951
.950	1.5322	.36302E-04	.14813E-03	.6946
1.000	1.5410	.35708E-04	.14404E-03	.6946
1.050	1.5506	.35093E-04	.13985E-03	.6950
1.100	1.5634	.34461E-04	.13634E-03	.6922
1.150	1.5697	.33814E-04	.13282E-03	.6895
1.200	1.5820	.33156E-04	.12928E-03	.6873
1.250	1.5898	.32488E-04	.12572E-03	.6856
1.300	1.5992	.31815E-04	.12216E-03	.6844
1.350	1.6080	.31140E-04	.11867E-03	.6837
1.400	1.6157	.30464E-04	.11531E-03	.6829
1.450	1.6249	.29791E-04	.11201E-03	.6827
1.500	1.6293	.29124E-04	.10876E-03	.6830
1.550	1.6360	.28463E-04	.10560E-03	.6838
1.600	1.6433	.27812E-04	.10250E-03	.6850
1.650	1.6449	.27170E-04	.99497E-04	.6867
1.700	1.6493	.26539E-04	.96642E-04	.6882
1.750	1.6541	.25921E-04	.94009E-04	.6890
1.800	1.6555	.25314E-04	.91460E-04	.6899
1.850	1.6604	.24719E-04	.88992E-04	.6911
1.900	1.6598	.24137E-04	.86605E-04	.6923
1.950	1.6624	.23568E-04	.84298E-04	.6937
2.000	1.6615	.23012E-04	.82036E-04	.6952

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

G. TT = 200.0 K PT = 1.0 ATM RHOT = .123E-03 G/CM3 SVT = 1054.285 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0007	1.3458	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.948E+06	1.0007	1.3457	.9998	.9992	.9996	.9996	.0059	1.0000	.9999	1.0001	.9999	.9951
.100	.189E+07	1.0007	1.3456	.9991	.9993	.9983	.9950	.1710	1.0001	1.0003	1.0003	1.0000	.9953
.150	.282E+07	1.0007	1.3454	.9979	.9950	.9961	.9888	.2545	1.0002	1.0006	1.0006	1.0000	.9954
.200	.373E+07	1.0007	1.3452	.9963	.9735	.9931	.9603	.3359	1.0003	1.0011	1.0011	1.0000	.9955
.250	.461E+07	1.0007	1.3449	.9943	.9589	.9893	.9693	.4143	1.0005	1.0015	1.0017	.9998	.9955
.300	.546E+07	1.0006	1.3445	.9918	.9416	.9847	.9562	.4893	1.0007	1.0022	1.0024	.9998	.9957
.350	.627E+07	1.0006	1.3440	.9889	.9218	.9797	.9417	.5603	1.0010	1.0033	1.0033	1.0000	.9962
.400	.705E+07	1.0006	1.3435	.9856	.8993	.9732	.9242	.6266	1.0013	1.0042	1.0043	.9999	.9963
.450	.777E+07	1.0006	1.3430	.9819	.8747	.9663	.9052	.6879	1.0016	1.0051	1.0055	.9997	.9965
.500	.845E+07	1.0006	1.3424	.9779	.8483	.9588	.8848	.7440	1.0020	1.0063	1.0068	.9996	.9969
.550	.908E+07	1.0006	1.3418	.9735	.8204	.9507	.8631	.7947	1.0025	1.0076	1.0082	.9996	.9973
.600	.965E+07	1.0005	1.3412	.9687	.7910	.9419	.8399	.8395	1.0030	1.0089	1.0097	.9993	.9975
.650	.102E+08	1.0005	1.3406	.9637	.7607	.9326	.8158	.8788	1.0036	1.0104	1.0114	.9993	.9980
.700	.106E+08	1.0005	1.3400	.9584	.7294	.9227	.7907	.9122	1.0042	1.0118	1.0131	.9989	.9983
.750	.110E+08	1.0005	1.3395	.9527	.6978	.9124	.7650	.9401	1.0049	1.0135	1.0150	.9987	.9988
.800	.114E+08	1.0005	1.3389	.9469	.6660	.9016	.7388	.9625	1.0057	1.0152	1.0170	.9984	.9993
.850	.117E+08	1.0004	1.3384	.9408	.6339	.8904	.7121	.9793	1.0065	1.0166	1.0191	.9979	.9995
.900	.119E+08	1.0004	1.3380	.9345	.6020	.8789	.6852	.9911	1.0074	1.0182	1.0212	.9973	.9998
.950	.121E+08	1.0004	1.3377	.9280	.5704	.8670	.6581	.9978	1.0083	1.0196	1.0235	.9970	1.0000
1.000	.123E+08	1.0004	1.3374	.9214	.5393	.8548	.6311	1.0000	1.0094	1.0209	1.0258	.9955	1.0000
1.050	.124E+08	1.0003	1.3373	.9146	.5088	.8424	.6042	.9978	1.0104	1.0219	1.0281	.9943	.9999
1.100	.124E+08	1.0003	1.3374	.9077	.4790	.8297	.5776	.9917	1.0116	1.0227	1.0305	.9929	.9995
1.150	.124E+08	1.0003	1.3376	.9007	.4502	.8168	.5514	.9822	1.0128	1.0236	1.0328	.9914	.9993
1.200	.124E+08	1.0003	1.3380	.8935	.4227	.8037	.5257	.9697	1.0141	1.0241	1.0352	.9897	.9988
1.250	.124E+08	1.0003	1.3385	.8863	.3954	.7905	.5004	.9534	1.0154	1.0242	1.0375	.9876	.9980
1.300	.123E+08	1.0002	1.3393	.8790	.3697	.7771	.4759	.9352	1.0168	1.0242	1.0398	.9855	.9972
1.350	.121E+08	1.0002	1.3404	.8717	.3450	.7636	.4520	.9147	1.0183	1.0238	1.0420	.9830	.9962
1.400	.120E+08	1.0002	1.3417	.8643	.3215	.7501	.4288	.8924	1.0198	1.0231	1.0441	.9804	.9950
1.450	.118E+08	1.0002	1.3433	.8569	.2991	.7364	.4064	.8684	1.0213	1.0218	1.0460	.9774	.9934
1.500	.116E+08	1.0002	1.3453	.8495	.2779	.7226	.3847	.8431	1.0229	1.0201	1.0478	.9741	.9916
1.550	.114E+08	1.0002	1.3476	.8420	.2577	.7088	.3638	.8160	1.0246	1.0177	1.0494	.9703	.9893
1.600	.112E+08	1.0001	1.3503	.8346	.2388	.6949	.3438	.7894	1.0262	1.0148	1.0507	.9664	.9869
1.650	.109E+08	1.0001	1.3534	.8271	.2209	.6810	.3245	.7616	1.0279	1.0114	1.0518	.9621	.9842
1.700	.107E+08	1.0001	1.3570	.8197	.2041	.6670	.3062	.7336	1.0297	1.0074	1.0526	.9577	.9813
1.750	.104E+08	1.0001	1.3611	.8122	.1884	.6531	.2886	.7055	1.0314	1.0030	1.0538	.9530	.9782
1.800	.102E+08	1.0001	1.3656	.8048	.1736	.6390	.2719	.6774	1.0331	.9978	1.0531	.9480	.9747
1.850	.991E+07	1.0001	1.3707	.7974	.1599	.6250	.2559	.6497	1.0349	.9917	1.0528	.9425	.9707
1.900	.964E+07	1.0001	1.3764	.7900	.1470	.6109	.2408	.6216	1.0366	.9853	1.0520	.9372	.9668
1.950	.937E+07	1.0001	1.3827	.7826	.1351	.5968	.2265	.5943	1.0384	.9780	1.0507	.9313	.9624
2.000	.910E+07	1.0001	1.3896	.7752	.1240	.5827	.2129	.5676	1.0401	.9701	1.0490	.9254	.9578

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

G. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.68161E-04	.37298E-03	.7022
.050	1.3157	.68141E-04	.37290E-03	.7022
.100	1.3601	.68081E-04	.37266E-03	.7022
.150	1.3462	.67981E-04	.37225E-03	.7022
.200	1.3461	.67842E-04	.37169E-03	.7022
.250	1.3412	.67665E-04	.37096E-03	.7022
.300	1.3456	.67450E-04	.37009E-03	.7022
.350	1.3498	.67199E-04	.36907E-03	.7022
.400	1.3431	.66912E-04	.36791E-03	.7022
.450	1.3415	.66591E-04	.36662E-03	.7021
.500	1.3441	.66238E-04	.36520E-03	.7019
.550	1.3436	.65853E-04	.36365E-03	.7017
.600	1.3412	.65439E-04	.36172E-03	.7019
.650	1.3438	.64996E-04	.35894E-03	.7035
.700	1.3401	.64526E-04	.35600E-03	.7050
.750	1.3417	.64033E-04	.35293E-03	.7066
.800	1.3417	.63515E-04	.34972E-03	.7082
.850	1.3391	.62976E-04	.34639E-03	.7096
.900	1.3400	.62416E-04	.34295E-03	.7110
.950	1.3383	.61838E-04	.33941E-03	.7123
1.000	1.3375	.61243E-04	.33579E-03	.7134
1.050	1.3373	.60631E-04	.33208E-03	.7143
1.100	1.3368	.60003E-04	.32830E-03	.7150
1.150	1.3384	.59362E-04	.32446E-03	.7154
1.200	1.3375	.58709E-04	.32057E-03	.7155
1.250	1.3378	.58042E-04	.31663E-03	.7152
1.300	1.3400	.57364E-04	.31265E-03	.7146
1.350	1.3402	.56677E-04	.30863E-03	.7135
1.400	1.3415	.55980E-04	.30459E-03	.7120
1.450	1.3426	.55273E-04	.30052E-03	.7100
1.500	1.3444	.54557E-04	.29642E-03	.7075
1.550	1.3456	.53837E-04	.28994E-03	.7102
1.600	1.3490	.53099E-04	.28337E-03	.7126
1.650	1.3518	.52357E-04	.27677E-03	.7147
1.700	1.3557	.51608E-04	.27015E-03	.7164
1.750	1.3600	.50851E-04	.26352E-03	.7176
1.800	1.3636	.50086E-04	.25688E-03	.7184
1.850	1.3673	.49312E-04	.25022E-03	.7189
1.900	1.3747	.48531E-04	.24356E-03	.7188
1.950	1.3793	.47742E-04	.23688E-03	.7183
2.000	1.3860	.46945E-04	.23021E-03	.7174

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TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

H. TT = 300.0 K PT = 1.0 ATM RHOT = .818E-04 G/CN3 SVT = 1309.789 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0006	1.3697	1.0008	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.597E+06	1.0006	1.3849	.9997	.9982	.9995	.9987	.0863	1.0000	.9999	1.0000	1.0000	.9999
.100	.119E+07	1.0006	1.3848	.9990	.9931	.9981	.9950	.1718	1.0000	1.0000	1.0001	1.0000	1.0004
.150	.178E+07	1.0006	1.3846	.9977	.9845	.9957	.9888	.2558	1.0000	1.0001	1.0002	.9999	1.0004
.200	.235E+07	1.0006	1.3844	.9960	.9728	.9924	.9803	.3376	.9999	1.0003	1.0003	1.0000	1.0004
.250	.290E+07	1.0006	1.3840	.9937	.9579	.9881	.9694	.4164	.9999	1.0005	1.0005	1.0000	1.0004
.300	.344E+07	1.0006	1.3837	.9910	.9401	.9830	.9564	.4915	.9999	1.0007	1.0007	1.0000	1.0003
.350	.395E+07	1.0006	1.3832	.9878	.9196	.9770	.9413	.5626	.9998	1.0009	1.0010	1.0000	1.0002
.400	.444E+07	1.0006	1.3827	.9842	.8966	.9702	.9242	.6290	.9998	1.0012	1.0013	.9999	1.0002
.450	.490E+07	1.0006	1.3821	.9801	.8718	.9626	.9056	.6985	.9997	1.0017	1.0016	1.0001	1.0003
.500	.533E+07	1.0005	1.3814	.9756	.8447	.9543	.8851	.7464	.9997	1.0019	1.0021	1.0000	1.0001
.550	.573E+07	1.0005	1.3806	.9707	.8161	.9453	.8634	.7968	.9996	1.0024	1.0025	.9999	1.0000
.600	.609E+07	1.0005	1.3797	.9654	.7863	.9357	.8404	.8416	.9996	1.0030	1.0031	1.0000	1.0000
.650	.642E+07	1.0005	1.3788	.9598	.7556	.9255	.8165	.8806	.9995	1.0036	1.0037	1.0001	1.0000
.700	.671E+07	1.0005	1.3778	.9538	.7240	.9147	.7916	.9137	.9995	1.0042	1.0044	1.0000	.9999
.750	.697E+07	1.0005	1.3767	.9475	.6919	.9035	.7659	.9489	.9994	1.0048	1.0051	.9998	.9997
.800	.720E+07	1.0004	1.3754	.9418	.6598	.8918	.7399	.9629	.9994	1.0057	1.0060	.9999	.9997
.850	.739E+07	1.0004	1.3741	.9341	.6277	.8798	.7136	.9795	.9993	1.0066	1.0069	.9999	.9997
.900	.755E+07	1.0004	1.3727	.9270	.5959	.8674	.6872	.9912	.9993	1.0079	1.0079	1.0002	1.0000
.950	.767E+07	1.0004	1.3717	.9197	.5644	.8548	.6605	.9977	.9993	1.0089	1.0090	1.0001	.9999
1.000	.777E+07	1.0004	1.3697	.9123	.5337	.8419	.6341	1.0000	.9993	1.0102	1.0103	1.0002	1.0000
1.050	.784E+07	1.0004	1.3680	.9046	.5037	.8288	.6078	.9981	.9994	1.0116	1.0116	1.0003	1.0001
1.100	.788E+07	1.0003	1.3663	.8968	.4744	.8156	.5818	.9921	.9994	1.0128	1.0130	1.0001	1.0000
1.150	.789E+07	1.0003	1.3645	.8888	.4461	.8023	.5561	.9827	.9995	1.0142	1.0145	.9999	.9999
1.200	.788E+07	1.0003	1.3627	.8808	.4188	.7890	.5310	.9704	.9996	1.0157	1.0162	.9998	.9999
1.250	.785E+07	1.0003	1.3608	.8727	.3927	.7756	.5065	.9552	.9998	1.0173	1.0179	.9997	.9999
1.300	.779E+07	1.0003	1.3589	.8649	.3677	.7622	.4826	.9376	1.0000	1.0188	1.0198	.9994	.9998
1.350	.772E+07	1.0003	1.3570	.8562	.3438	.7488	.4593	.9178	1.0002	1.0202	1.0217	.9989	.9995
1.400	.763E+07	1.0002	1.3550	.8480	.3211	.7355	.4367	.8963	1.0005	1.0218	1.0238	.9984	.9993
1.450	.753E+07	1.0002	1.3531	.8397	.2995	.7222	.4148	.8732	1.0008	1.0231	1.0259	.9976	.9989
1.500	.741E+07	1.0002	1.3512	.8314	.2791	.7091	.3938	.8490	1.0012	1.0246	1.0282	.9969	.9985
1.550	.728E+07	1.0002	1.3494	.8232	.2598	.6960	.3733	.8235	1.0016	1.0256	1.0305	.9957	.9976
1.600	.714E+07	1.0002	1.3476	.8149	.2416	.6831	.3538	.7975	1.0021	1.0268	1.0328	.9945	.9971
1.650	.699E+07	1.0002	1.3459	.8067	.2245	.6703	.3358	.7710	1.0026	1.0279	1.0353	.9933	.9963
1.700	.683E+07	1.0002	1.3442	.7986	.2084	.6576	.3178	.7448	1.0032	1.0285	1.0377	.9916	.9952
1.750	.667E+07	1.0002	1.3428	.7905	.1933	.6451	.2998	.7169	1.0038	1.0291	1.0402	.9898	.9940
1.800	.650E+07	1.0001	1.3414	.7825	.1791	.6327	.2833	.6897	1.0045	1.0293	1.0428	.9876	.9925
1.850	.633E+07	1.0001	1.3402	.7745	.1659	.6205	.2675	.6627	1.0053	1.0294	1.0453	.9853	.9909
1.900	.616E+07	1.0001	1.3392	.7667	.1536	.6085	.2525	.6359	1.0061	1.0290	1.0477	.9826	.9890
1.950	.598E+07	1.0001	1.3383	.7589	.1420	.5965	.2382	.6095	1.0069	1.0283	1.0502	.9797	.9869
2.000	.581E+07	1.0001	1.3377	.7512	.1313	.5848	.2245	.5835	1.0078	1.0273	1.0526	.9765	.9846

TABLE I. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

H. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/GM-SEC-K	PRANDTL NUMBER
0.000	I	.89603E-04	.46141E-03	.7096
.050	1.3616	.89583E-04	.46128E-03	.6893
.100	1.3698	.89496E-04	.46090E-03	.6893
.150	1.3845	.89352E-04	.46026E-03	.6893
.200	1.3885	.89151E-04	.45938E-03	.6894
.250	1.3847	.88894E-04	.45825E-03	.6895
.300	1.3839	.88583E-04	.45688E-03	.6897
.350	1.3834	.88219E-04	.45529E-03	.6898
.400	1.3830	.87805E-04	.45348E-03	.6900
.450	1.3868	.87342E-04	.45147E-03	.6903
.500	1.3794	.86833E-04	.44925E-03	.6905
.550	1.3808	.86280E-04	.44686E-03	.6908
.600	1.3814	.85686E-04	.44429E-03	.6911
.650	1.3806	.85053E-04	.44159E-03	.6915
.700	1.3774	.84385E-04	.43886E-03	.6916
.750	1.3756	.83684E-04	.43602E-03	.6919
.800	1.3775	.82954E-04	.43307E-03	.6921
.850	1.3753	.82196E-04	.43002E-03	.6924
.900	1.3762	.81414E-04	.42689E-03	.6928
.950	1.3715	.80611E-04	.42368E-03	.6931
1.000	1.3721	.79790E-04	.42042E-03	.6935
1.050	1.3705	.78952E-04	.41712E-03	.6939
1.100	1.3665	.78100E-04	.41377E-03	.6943
1.150	1.3651	.77238E-04	.41041E-03	.6948
1.200	1.3644	.76366E-04	.40702E-03	.6952
1.250	1.3627	.75487E-04	.40356E-03	.6957
1.300	1.3603	.74603E-04	.39978E-03	.6960
1.350	1.3574	.73715E-04	.39599E-03	.6979
1.400	1.3568	.72825E-04	.39223E-03	.6988
1.450	1.3535	.71934E-04	.38848E-03	.6997
1.500	1.3531	.71044E-04	.38476E-03	.7005
1.550	1.3497	.70154E-04	.38107E-03	.7011
1.600	1.3487	.69268E-04	.37741E-03	.7016
1.650	1.3477	.68384E-04	.37379E-03	.7020
1.700	1.3445	.67504E-04	.37021E-03	.7021
1.750	1.3443	.66628E-04	.36666E-03	.7020
1.800	1.3418	.65756E-04	.36316E-03	.7015
1.850	1.3420	.64888E-04	.35822E-03	.7037
1.900	1.3402	.64026E-04	.35284E-03	.7065
1.950	1.3396	.63168E-04	.34752E-03	.7090
2.000	1.3394	.62314E-04	.34227E-03	.7112

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. $TT = 30.0 \text{ K}$ $PT = 3.0 \text{ ATM}$ $RHOT = .275E-02 \text{ G/CM}^3$ $SVT = 433.065 \text{ M/SEC}$

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.8930	1.9215	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.357E+08	.8929	1.9215	.9995	.9979	.9991	.9988	.8897	.9998	.9996	.9996	1.0000	1.0341
.100	.712E+08	.8929	1.9214	.9987	.9915	.9966	.9950	.1775	.9992	.9985	.9986	1.0000	1.0334
.150	.106E+09	.8928	1.9214	.9960	.9811	.9924	.9888	.2640	.9982	.9967	.9968	1.0000	1.0324
.200	.141E+09	.8927	1.9214	.9928	.9670	.9865	.9804	.3479	.9968	.9943	.9944	1.0002	1.0311
.250	.175E+09	.8926	1.9213	.9889	.9489	.9791	.9696	.4284	.9950	.9911	.9913	1.0001	1.0293
.300	.208E+09	.8925	1.9211	.9841	.9276	.9702	.9566	.5048	.9929	.9873	.9876	1.0003	1.0272
.350	.240E+09	.8923	1.9210	.9786	.9033	.9599	.9418	.5765	.9905	.9832	.9834	1.0006	1.0250
.400	.270E+09	.8921	1.9208	.9723	.8765	.9482	.9252	.6431	.9877	.9786	.9786	1.0010	1.0226
.450	.300E+09	.8919	1.9205	.9653	.8474	.9354	.9069	.7041	.9847	.9737	.9733	1.0016	1.0200
.500	.328E+09	.8917	1.9202	.9577	.8164	.9215	.8872	.7593	.9814	.9685	.9676	1.0023	1.0174
.550	.355E+09	.8915	1.9198	.9495	.7841	.9066	.8662	.8085	.9778	.9630	.9615	1.0032	1.0146
.600	.380E+09	.8913	1.9193	.9408	.7509	.8909	.8444	.8519	.9741	.9577	.9551	1.0047	1.0122
.650	.404E+09	.8911	1.9187	.9316	.7168	.8744	.8215	.8891	.9702	.9522	.9483	1.0062	1.0096
.700	.427E+09	.8909	1.9180	.9220	.6827	.8574	.7991	.9206	.9661	.9469	.9414	1.0082	1.0074
.750	.448E+09	.8907	1.9171	.9119	.6483	.8398	.7740	.9461	.9619	.9416	.9343	1.0104	1.0052
.800	.467E+09	.8905	1.9161	.9016	.6145	.8218	.7498	.9665	.9576	.9367	.9270	1.0132	1.0035
.850	.485E+09	.8903	1.9151	.8910	.5811	.8036	.7253	.9817	.9532	.9320	.9197	1.0164	1.0020
.900	.502E+09	.8902	1.9139	.8801	.5485	.7851	.7008	.9921	.9487	.9277	.9123	1.0200	1.0009
.950	.517E+09	.8900	1.9127	.8691	.5169	.7666	.6764	.9982	.9443	.9239	.9050	1.0242	1.0003
1.000	.531E+09	.8899	1.9113	.8579	.4862	.7480	.6522	1.0000	.9398	.9203	.8976	1.0280	1.0000
1.050	.543E+09	.8897	1.9100	.8466	.4567	.7295	.6293	.9983	.9353	.9174	.8904	1.0340	1.0003
1.100	.555E+09	.8896	1.9087	.8353	.4285	.7111	.6048	.9932	.9309	.9149	.8832	1.0398	1.0011

SATURATION BOUNDARY REACHED.

TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.16676E-04	.61100E-04	.8029
.050	1.6971	.16662E-04	.61049E-04	.8029
.100	1.6918	.16622E-04	.60897E-04	.8030
.150	1.6954	.16555E-04	.60644E-04	.8031
.200	1.7087	.16463E-04	.60295E-04	.8032
.250	1.6890	.16345E-04	.59847E-04	.8034
.300	1.6941	.16203E-04	.59306E-04	.8037
.350	1.6970	.16038E-04	.58680E-04	.8041
.400	1.6965	.15853E-04	.57988E-04	.8043
.450	1.6929	.15647E-04	.57215E-04	.8046
.500	1.6927	.15423E-04	.56369E-04	.8051
.550	1.6887	.15183E-04	.55453E-04	.8058
.600	1.6947	.14928E-04	.54476E-04	.8066
.650	1.6872	.14659E-04	.53442E-04	.8077
.700	1.6903	.14380E-04	.52455E-04	.8076
.750	1.6822	.14091E-04	.51429E-04	.8076
.800	1.6863	.13794E-04	.50340E-04	.8084
.850	1.6833	.13491E-04	.49191E-04	.8099
.900	1.6805	.13183E-04	.47990E-04	.8123
.950	1.6805	.12872E-04	.46745E-04	.8155
1.000	1.6757	.12558E-04	.45468E-04	.8197
1.050	1.6762	.12244E-04	.44147E-04	.8249
1.100	1.6738	.11931E-04	.42977E-04	.8288

SATURATION BOUNDARY REACHED.

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

B. TT = 35.0 K PT = 3.0 ATM RHOT = .276E-02 G/CM3 SVT = 477.003 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9310	1.8249	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.284E+08	.9310	1.8248	.9996	.9979	.9991	.9987	.0091	.9998	.9996	.9996	.9996	1.0000
.100	.567E+08	.9310	1.8248	.9982	.9917	.9966	.9951	.1773	.9992	.9987	.9986	1.0001	1.0324
.150	.847E+08	.9309	1.8247	.9960	.9813	.9924	.9889	.2638	.9982	.9968	.9969	1.0001	1.0314
.200	.112E+09	.9308	1.8245	.9929	.9670	.9866	.9804	.3475	.9969	.9943	.9944	1.0001	1.0300
.250	.139E+09	.9307	1.8243	.9890	.9491	.9797	.9696	.4280	.9951	.9912	.9914	1.0002	1.0283
.300	.165E+09	.9306	1.8240	.9842	.9277	.9703	.9566	.5043	.9931	.9875	.9877	1.0003	1.0262
.350	.191E+09	.9304	1.8237	.9787	.9035	.9600	.9417	.5759	.9907	.9834	.9835	1.0005	1.0240
.400	.215E+09	.9303	1.8234	.9725	.8758	.9484	.9253	.6426	.9880	.9790	.9787	1.0011	1.0218
.450	.238E+09	.9301	1.8233	.9657	.8477	.9356	.9069	.7036	.9851	.9740	.9735	1.0015	1.0193
.500	.261E+09	.9299	1.8230	.9582	.8168	.9217	.8872	.7588	.9819	.9689	.9678	1.0023	1.0167
.550	.282E+09	.9297	1.8228	.9502	.7844	.9068	.8661	.8080	.9785	.9634	.9617	1.0031	1.0141
.600	.302E+09	.9296	1.8225	.9416	.7510	.8911	.8441	.8514	.9749	.9579	.9553	1.0044	1.0116
.650	.320E+09	.9294	1.8222	.9325	.7170	.8746	.8212	.8887	.9711	.9524	.9486	1.0059	1.0092
.700	.338E+09	.9292	1.8219	.9231	.6828	.8576	.7978	.9203	.9672	.9472	.9416	1.0079	1.0072
.750	.354E+09	.9290	1.8216	.9132	.6485	.8399	.7738	.9461	.9632	.9418	.9344	1.0101	1.0052
.800	.369E+09	.9288	1.8211	.9030	.6144	.8219	.7493	.9664	.9591	.9366	.9271	1.0126	1.0033
.850	.383E+09	.9287	1.8207	.8926	.5809	.8035	.7248	.9816	.9549	.9316	.9196	1.0156	1.0019
.900	.396E+09	.9285	1.8202	.8819	.5481	.7849	.7002	.9920	.9506	.9270	.9121	1.0191	1.0008
.950	.408E+09	.9284	1.8196	.8710	.5163	.7662	.6757	.9981	.9463	.9228	.9045	1.0231	1.0003
1.000	.419E+09	.9283	1.8190	.8599	.4855	.7475	.6514	1.0000	.9420	.9189	.8970	1.0275	1.0000
1.050	.428E+09	.9281	1.8183	.8488	.4558	.7287	.6274	.9983	.9377	.9156	.8894	1.0326	1.0003
1.100	.437E+09	.9280	1.8176	.8376	.4274	.7101	.6039	.9932	.9334	.9126	.8819	1.0381	1.0011
1.150	.445E+09	.9280	1.8168	.8263	.4003	.6916	.5806	.9850	.9291	.9100	.8745	1.0440	1.0022
1.200	.452E+09	.9279	1.8159	.8150	.3745	.6733	.5580	.9743	.9249	.9081	.8672	1.0506	1.0039
1.250	.458E+09	.9278	1.8151	.8037	.3501	.6553	.5360	.9614	.9207	.9058	.8601	1.0579	1.0063
1.300	.463E+09	.9278	1.8142	.7924	.3270	.6375	.5146	.9464	.9166	.9059	.8538	1.0657	1.0092
1.350	.468E+09	.9278	1.8133	.7813	.3051	.6201	.4938	.9298	.9126	.9056	.8461	1.0740	1.0126
1.400	.472E+09	.9278	1.8124	.7701	.2846	.6030	.4736	.9116	.9086	.9056	.8393	1.0827	1.0163
1.450	.475E+09	.9277	1.8116	.7591	.2653	.5863	.4542	.8924	.9048	.9064	.8328	1.0922	1.0209
1.500	.478E+09	.9277	1.8108	.7482	.2472	.5699	.4353	.8722	.9010	.9076	.8264	1.1021	1.0259
1.550	.480E+09	.9277	1.8101	.7374	.2303	.5540	.4173	.8514	.8973	.9095	.8201	1.1128	1.0316

SATURATION BOUNDARY REACHED.

TABLE II. PEAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

B. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.18949E-04	.68541E-04	.7620
.050	1.6895	.18934E-04	.68483E-04	.7620
.100	1.7153	.18891E-04	.68314E-04	.7621
.150	1.6882	.18818E-04	.68030E-04	.7624
.200	1.6879	.18718E-04	.67637E-04	.7627
.250	1.6922	.18590E-04	.67138E-04	.7631
.300	1.6874	.18437E-04	.66537E-04	.7636
.350	1.6902	.18258E-04	.65842E-04	.7641
.400	1.6976	.18057E-04	.65080E-04	.7646
.450	1.6868	.17833E-04	.64236E-04	.7650
.500	1.6886	.17590E-04	.63318E-04	.7653
.550	1.6857	.17328E-04	.62367E-04	.7653
.600	1.6873	.17049E-04	.61349E-04	.7653
.650	1.6864	.16756E-04	.60267E-04	.7655
.700	1.6904	.16450E-04	.59130E-04	.7659
.750	1.6846	.16132E-04	.57938E-04	.7664
.800	1.6822	.15806E-04	.56703E-04	.7670
.850	1.6828	.15471E-04	.55438E-04	.7679
.900	1.6817	.15130E-04	.54127E-04	.7689
.950	1.6830	.14786E-04	.52801E-04	.7701
1.000	1.6795	.14437E-04	.51457E-04	.7716
1.050	1.6810	.14087E-04	.50130E-04	.7728
1.100	1.6790	.13737E-04	.48861E-04	.7732
1.150	1.6752	.13386E-04	.47594E-04	.7737
1.200	1.6763	.13038E-04	.46329E-04	.7744
1.250	1.6773	.12692E-04	.45071E-04	.7753
1.300	1.6747	.12349E-04	.43823E-04	.7763
1.350	1.6733	.12011E-04	.42588E-04	.7776
1.400	1.6684	.11676E-04	.41370E-04	.7790
1.450	1.6724	.11348E-04	.40172E-04	.7806
1.500	1.6676	.11025E-04	.39021E-04	.7819
1.550	1.6702	.10708E-04	.38143E-04	.7783

SATURATION BOUNDARY REACHED.

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

C. TT = 40.0 K PT = 3.0 ATM PHOT = .193E-02 G/CM3 SVT = 515.384 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9528	1.7759	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.236E+08	.9528	1.7759	.9996	.9979	.9997	.9987	.0896	.9998	.9996	.9997	1.0000	1.0323
.100	.470E+08	.9527	1.7759	.9987	.9917	.9966	.9951	.1772	.9992	.9987	.9986	1.0001	1.0318
.150	.701E+08	.9527	1.7758	.9960	.9813	.9924	.9889	.2636	.9983	.9968	.9969	1.0001	1.0308
.200	.929E+08	.9526	1.7758	.9930	.9670	.9866	.9803	.3474	.9970	.9943	.9945	1.0000	1.0294
.250	.115E+09	.9525	1.7757	.9891	.9491	.9792	.9695	.4277	.9953	.9912	.9915	1.0001	1.0277
.300	.137E+09	.9524	1.7756	.9845	.9279	.9704	.9567	.5041	.9933	.9877	.9878	1.0003	1.0259
.350	.158E+09	.9522	1.7754	.9791	.9037	.9601	.9418	.5758	.9910	.9836	.9836	1.0005	1.0237
.400	.178E+09	.9521	1.7752	.9729	.8768	.9485	.9251	.6423	.9884	.9790	.9789	1.0009	1.0214
.450	.197E+09	.9519	1.7750	.9661	.8478	.9358	.9069	.7034	.9855	.9742	.9736	1.0015	1.0190
.500	.215E+09	.9517	1.7748	.9586	.8169	.9219	.8871	.7587	.9823	.9691	.9680	1.0022	1.0165
.550	.233E+09	.9516	1.7745	.9506	.7845	.9070	.8661	.8079	.9789	.9636	.9619	1.0031	1.0138
.600	.249E+09	.9514	1.7742	.9421	.7513	.8913	.8442	.8513	.9754	.9583	.9555	1.0044	1.0116
.650	.264E+09	.9512	1.7738	.9330	.7173	.8749	.8213	.8886	.9717	.9529	.9488	1.0059	1.0092
.700	.279E+09	.9510	1.7734	.9236	.6830	.8578	.7977	.9201	.9678	.9474	.9419	1.0077	1.0069
.750	.292E+09	.9508	1.7730	.9137	.6487	.8402	.7736	.9459	.9638	.9420	.9347	1.0099	1.0049
.800	.304E+09	.9507	1.7727	.9035	.6147	.8222	.7492	.9663	.9597	.9369	.9274	1.0125	1.0033
.850	.315E+09	.9505	1.7723	.8932	.5811	.8039	.7247	.9816	.9556	.9320	.9200	1.0155	1.0019
.900	.326E+09	.9503	1.7720	.8826	.5483	.7853	.7000	.9920	.9514	.9273	.9125	1.0188	1.0008
.950	.335E+09	.9502	1.7716	.8718	.5164	.7666	.6754	.9980	.9472	.9230	.9049	1.0227	1.0002
1.000	.343E+09	.9500	1.7713	.8608	.4855	.7478	.6511	1.0000	.9429	.9191	.8974	1.0271	1.0000
1.050	.351E+09	.9499	1.7709	.8497	.4558	.7290	.6271	.9982	.9387	.9156	.8898	1.0321	1.0003
1.100	.358E+09	.9498	1.7704	.8385	.4274	.7104	.5935	.9931	.9345	.9125	.8823	1.0374	1.0010
1.150	.364E+09	.9497	1.7700	.8273	.4002	.6918	.5803	.9850	.9303	.9099	.8748	1.0434	1.0022
1.200	.369E+09	.9496	1.7695	.8160	.3743	.6735	.5576	.9742	.9261	.9077	.8674	1.0499	1.0039
1.250	.374E+09	.9495	1.7690	.8048	.3498	.6554	.5356	.9613	.9220	.9061	.8602	1.0570	1.0062
1.300	.378E+09	.9495	1.7685	.7936	.3266	.6375	.5141	.9462	.9179	.9050	.8538	1.0646	1.0090
1.350	.381E+09	.9495	1.7679	.7824	.3047	.6200	.4932	.9295	.9139	.9044	.8468	1.0727	1.0122
1.400	.384E+09	.9494	1.7673	.7713	.2842	.6028	.4730	.9113	.9100	.9043	.8391	1.0814	1.0161
1.450	.387E+09	.9494	1.7668	.7603	.2649	.5860	.4536	.8922	.9062	.9049	.8324	1.0909	1.0206
1.500	.389E+09	.9494	1.7662	.7494	.2468	.5696	.4348	.8720	.9024	.9059	.8259	1.1008	1.0256
1.550	.390E+09	.9494	1.7656	.7386	.2298	.5535	.4166	.8511	.8987	.9074	.8195	1.1112	1.0311
1.600	.392E+09	.9494	1.7650	.7280	.2140	.5379	.3992	.8297	.8951	.9095	.8133	1.1223	1.0373
1.650	.393E+09	.9494	1.7644	.7175	.1992	.5226	.3825	.8079	.8916	.9122	.8072	1.1340	1.0440
1.700	.393E+09	.9495	1.7638	.7071	.1855	.5078	.3665	.7860	.8882	.9154	.8014	1.1464	1.0513
1.750	.393E+09	.9495	1.7633	.6969	.1726	.4934	.3510	.7634	.8849	.9190	.7956	1.1590	1.0590
1.800	.393E+09	.9495	1.7628	.6868	.1607	.4794	.3363	.7418	.8817	.9233	.7901	1.1725	1.0674
1.850	.393E+09	.9496	1.7623	.6769	.1496	.4659	.3222	.7198	.8786	.9279	.7848	1.1865	1.0763
1.900	.393E+09	.9496	1.7620	.6672	.1393	.4527	.3087	.6981	.8755	.9332	.7796	1.2010	1.0857
1.950	.392E+09	.9496	1.7616	.6576	.1297	.4400	.2958	.6767	.8726	.9389	.7746	1.2162	1.0957

SATURATION BOUNDARY REACHED.

TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

C. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.71135E-04	.76359E-04	.7381
.050	1.6841	.71119E-04	.76296E-04	.7382
.100	1.7097	.21072E-04	.76109E-04	.7383
.150	1.6833	.20995E-04	.75797E-04	.7386
.200	1.6834	.20887E-04	.75365E-04	.7389
.250	1.6877	.20750E-04	.74817E-04	.7393
.300	1.6925	.20585E-04	.74159E-04	.7399
.350	1.6871	.20393E-04	.73397E-04	.7405
.400	1.6873	.20176E-04	.72560E-04	.7409
.450	1.6908	.19936E-04	.71638E-04	.7414
.500	1.6857	.19674E-04	.70633E-04	.7419
.550	1.6831	.19392E-04	.69555E-04	.7424
.600	1.6901	.19092E-04	.68414E-04	.7430
.650	1.6839	.18776E-04	.67215E-04	.7436
.700	1.6830	.18446E-04	.65966E-04	.7443
.750	1.6823	.18103E-04	.64678E-04	.7449
.800	1.6833	.17751E-04	.63356E-04	.7455
.850	1.6821	.17389E-04	.62008E-04	.7460
.900	1.6785	.17020E-04	.60623E-04	.7466
.950	1.6806	.16645E-04	.59208E-04	.7474
1.000	1.6806	.16267E-04	.57769E-04	.7484
1.050	1.6797	.15886E-04	.56314E-04	.7496
1.100	1.6778	.15504E-04	.54896E-04	.7502
1.150	1.6762	.15127E-04	.53487E-04	.7508
1.200	1.6761	.14741E-04	.52089E-04	.7514
1.250	1.6775	.14363E-04	.50706E-04	.7519
1.300	1.6752	.13987E-04	.49341E-04	.7523
1.350	1.6735	.13615E-04	.47987E-04	.7529
1.400	1.6733	.13247E-04	.46649E-04	.7535
1.450	1.6749	.12885E-04	.45330E-04	.7542
1.500	1.6727	.12528E-04	.44031E-04	.7550
1.550	1.6704	.12178E-04	.42756E-04	.7559
1.600	1.6713	.11834E-04	.41507E-04	.7568
1.650	1.6709	.11497E-04	.40286E-04	.7578
1.700	1.6715	.11167E-04	.39094E-04	.7589
1.750	1.6667	.10845E-04	.38077E-04	.7570
1.800	1.6701	.10530E-04	.37265E-04	.7516
1.850	1.6677	.10222E-04	.36488E-04	.7458
1.900	1.6680	.99226E-05	.35745E-04	.7397
1.950	1.6682	.96307E-05	.35033E-04	.7333

SATURATION BOUNDARY REACHED.

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAMYDROGEN

D. TT = 60.0 K PT = 3.0 ATM RHOT = .125E-02 G/CM3 SVT = 634.987 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9864	1.6746	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.136E+08	.9864	1.6748	.9996	.9979	.9992	.9987	.0883	.9999	.9996	.9997	.9999	1.0239
.100	.271E+08	.9863	1.6752	.9985	.9917	.9968	.9949	.1758	.9995	.9987	.9988	.9999	1.0235
.150	.404E+08	.9863	1.6760	.9967	.9816	.9928	.9888	.2616	.9989	.9977	.9973	1.0000	1.0230
.200	.536E+08	.9862	1.6770	.9941	.9676	.9872	.9803	.3449	.9981	.9950	.9951	1.0000	1.0221
.250	.664E+08	.9861	1.6783	.9909	.9500	.9802	.9695	.4250	.9970	.9923	.9924	1.0000	1.0211
.300	.788E+08	.9860	1.6797	.9869	.9292	.9717	.9566	.5012	.9957	.9891	.9892	1.0002	1.0200
.350	.908E+08	.9859	1.6814	.9822	.9053	.9618	.9417	.5729	.9942	.9853	.9854	1.0004	1.0186
.400	.102E+09	.9858	1.6832	.9769	.8786	.9506	.9248	.6395	.9924	.9810	.9810	1.0006	1.0169
.450	.113E+09	.9857	1.6850	.9709	.8498	.9382	.9064	.7008	.9903	.9765	.9762	1.0010	1.0152
.500	.124E+09	.9855	1.6869	.9642	.8190	.9246	.8866	.7564	.9880	.9716	.9709	1.0016	1.0134
.550	.134E+09	.9854	1.6888	.9570	.7867	.9101	.8653	.8060	.9855	.9662	.9651	1.0021	1.0114
.600	.143E+09	.9852	1.6907	.9492	.7533	.8946	.8430	.8496	.9828	.9608	.9590	1.0031	1.0095
.650	.151E+09	.9850	1.6925	.9409	.7193	.8783	.8200	.8874	.9798	.9554	.9526	1.0044	1.0078
.700	.159E+09	.9849	1.6941	.9320	.6848	.8614	.7962	.9192	.9766	.9499	.9458	1.0058	1.0060
.750	.167E+09	.9847	1.6957	.9227	.6503	.8439	.7719	.9454	.9733	.9444	.9388	1.0077	1.0044
.800	.173E+09	.9845	1.6970	.9130	.6161	.8259	.7474	.9661	.9697	.9392	.9316	1.0100	1.0030
.850	.179E+09	.9844	1.6982	.9030	.5823	.8075	.7225	.9814	.9661	.9339	.9242	1.0125	1.0017
.900	.185E+09	.9842	1.6992	.8927	.5492	.7889	.6977	.9919	.9623	.9289	.9167	1.0155	1.0007
.950	.190E+09	.9840	1.7001	.8821	.5172	.7702	.6731	.9981	.9584	.9244	.9092	1.0191	1.0003
1.000	.194E+09	.9839	1.7008	.8712	.4861	.7514	.6486	1.0000	.9544	.9201	.9016	1.0231	1.0000
1.050	.198E+09	.9837	1.7013	.8603	.4562	.7325	.6245	.9982	.9504	.9164	.8941	1.0277	1.0003
1.100	.201E+09	.9836	1.7017	.8492	.4276	.7138	.6008	.9930	.9463	.9130	.8865	1.0328	1.0009
1.150	.204E+09	.9835	1.7020	.8380	.4003	.6952	.5776	.9850	.9423	.9102	.8790	1.0385	1.0022
1.200	.206E+09	.9833	1.7021	.8267	.3743	.6767	.5548	.9740	.9382	.9077	.8716	1.0446	1.0036
1.250	.209E+09	.9832	1.7022	.8154	.3497	.6585	.5328	.9610	.9342	.9059	.8643	1.0515	1.0059
1.300	.210E+09	.9831	1.7022	.8042	.3265	.6406	.5113	.9459	.9302	.9045	.8572	1.0588	1.0086
1.350	.212E+09	.9830	1.7022	.7929	.3045	.6230	.4905	.9291	.9263	.9037	.8501	1.0667	1.0119
1.400	.213E+09	.9829	1.7021	.7818	.2839	.6057	.4703	.9110	.9224	.9035	.8432	1.0753	1.0157
1.450	.213E+09	.9828	1.7019	.7707	.2645	.5888	.4509	.8917	.9185	.9038	.8364	1.0843	1.0200
1.500	.214E+09	.9828	1.7018	.7597	.2464	.5723	.4321	.8714	.9148	.9046	.8298	1.0940	1.0249
1.550	.214E+09	.9827	1.7016	.7488	.2294	.5562	.4141	.8505	.9111	.9059	.8234	1.1044	1.0305
1.600	.214E+09	.9826	1.7014	.7381	.2136	.5404	.3967	.8290	.9075	.9078	.8171	1.1152	1.0364
1.650	.214E+09	.9826	1.7013	.7274	.1988	.5251	.3801	.8073	.9048	.9103	.8110	1.1268	1.0432
1.700	.214E+09	.9825	1.7011	.7169	.1850	.5102	.3648	.7851	.9006	.9130	.8050	1.1386	1.0501
1.750	.213E+09	.9825	1.7009	.7066	.1722	.4957	.3487	.7631	.8973	.9166	.7993	1.1513	1.0580
1.800	.213E+09	.9825	1.7007	.6964	.1602	.4816	.3340	.7409	.8941	.9205	.7936	1.1644	1.0661
1.850	.212E+09	.9824	1.7005	.6864	.1491	.4679	.3199	.7189	.8909	.9249	.7882	1.1781	1.0749
1.900	.211E+09	.9824	1.7003	.6766	.1388	.4546	.3065	.6973	.8878	.9300	.7829	1.1927	1.0845
1.950	.210E+09	.9824	1.7001	.6669	.1292	.4418	.2936	.6757	.8849	.9354	.7778	1.2075	1.0942
2.000	.209E+09	.9824	1.6999	.6574	.1203	.4293	.2814	.6547	.8820	.9415	.7728	1.2232	1.1040

TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.29071E-04	.11020E-03	.6885
.050	1.6234	.29052E-04	.11011E-03	.6885
.100	1.6467	.28997E-04	.10984E-03	.6886
.150	1.6585	.28905E-04	.10940E-03	.6887
.200	1.6520	.28776E-04	.10879E-03	.6888
.250	1.6546	.28613E-04	.10801E-03	.6890
.300	1.6681	.28415E-04	.10706E-03	.6892
.350	1.6575	.28184E-04	.10597E-03	.6896
.400	1.6547	.27922E-04	.10472E-03	.6901
.450	1.6629	.27629E-04	.10334E-03	.6907
.500	1.6626	.27309E-04	.10099E-03	.6972
.550	1.6592	.26962E-04	.99487E-04	.6975
.600	1.6650	.26591E-04	.97885E-04	.6979
.650	1.6693	.26199E-04	.96200E-04	.6983
.700	1.6667	.25787E-04	.94455E-04	.6989
.750	1.6697	.25358E-04	.92647E-04	.6995
.800	1.6727	.24914E-04	.90796E-04	.7003
.850	1.6678	.24457E-04	.88912E-04	.7011
.900	1.6714	.23990E-04	.86998E-04	.7020
.950	1.6745	.23515E-04	.85020E-04	.7033
1.000	1.6718	.23034E-04	.83029E-04	.7048
1.050	1.6742	.22548E-04	.80774E-04	.7086
1.100	1.6727	.22059E-04	.78828E-04	.7099
1.150	1.6758	.21569E-04	.76897E-04	.7112
1.200	1.6705	.21080E-04	.74984E-04	.7124
1.250	1.6754	.20591E-04	.73097E-04	.7136
1.300	1.6727	.20106E-04	.71239E-04	.7147
1.350	1.6731	.19624E-04	.69413E-04	.7157
1.400	1.6731	.19146E-04	.67620E-04	.7166
1.450	1.6721	.18674E-04	.65864E-04	.7174
1.500	1.6720	.18208E-04	.64147E-04	.7181
1.550	1.6724	.17748E-04	.62469E-04	.7186
1.600	1.6709	.17295E-04	.60833E-04	.7190
1.650	1.6735	.16851E-04	.59171E-04	.7200
1.700	1.6677	.16413E-04	.57531E-04	.7212
1.750	1.6729	.15985E-04	.55934E-04	.7223
1.800	1.6686	.15564E-04	.54382E-04	.7232
1.850	1.6700	.15153E-04	.52872E-04	.7241
1.900	1.6729	.14750E-04	.51406E-04	.7248
1.950	1.6676	.14356E-04	.49983E-04	.7254
2.000	1.6727	.13972E-04	.48580E-04	.7263

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. TT = 80.0 K PT = 3.0 ATM RHO T = .925E-03 G/CM3 SVT = 714.525 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	F/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9957	1.5608	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.917E+07	.9957	1.5611	.9997	.9980	.9993	.9987	.0862	1.0000	.9998	.9998	1.0000	1.0059
.100	.183E+08	.9956	1.5619	.9990	.9923	.9973	.9951	.1728	1.0000	.9993	.9993	1.0001	1.0059
.150	.273E+08	.9956	1.5634	.9977	.9876	.9938	.9887	.2572	.9999	.9981	.9983	.9999	1.0057
.200	.361E+08	.9956	1.5655	.9959	.969E	.9891	.9804	.3394	.9999	.9970	.9970	1.0001	1.0059
.250	.448E+08	.9955	1.5681	.9936	.9528	.9830	.9694	.4186	.9998	.9951	.9953	1.0000	1.0057
.300	.531E+08	.9954	1.5713	.9908	.9328	.9756	.9563	.4941	.9997	.9929	.9932	1.0000	1.0055
.350	.612E+08	.9954	1.5750	.9875	.9100	.9669	.9414	.5655	.9995	.9905	.9906	1.0001	1.0055
.400	.690E+08	.9953	1.5792	.9836	.8843	.9570	.9243	.6322	.9993	.9874	.9877	1.0001	1.0052
.450	.764E+08	.9952	1.5839	.9793	.8563	.9460	.9057	.6937	.9989	.9840	.9843	1.0002	1.0050
.500	.834E+08	.9951	1.5890	.9744	.8262	.9338	.8853	.7498	.9985	.9801	.9805	1.0002	1.0045
.550	.899E+08	.9950	1.5945	.9690	.7945	.9205	.8637	.8001	.9979	.9758	.9762	1.0003	1.0041
.600	.961E+08	.9948	1.6003	.9631	.7614	.9062	.8409	.8447	.9972	.9712	.9715	1.0006	1.0036
.650	.102E+09	.9947	1.6064	.9567	.7274	.8910	.8172	.8833	.9963	.9663	.9663	1.0009	1.0031
.700	.107E+09	.9946	1.6127	.9498	.6929	.8750	.7928	.9162	.9952	.9612	.9607	1.0015	1.0026
.750	.112E+09	.9945	1.6190	.9423	.6581	.8582	.7678	.9432	.9939	.9558	.9548	1.0023	1.0020
.800	.116E+09	.9943	1.6253	.9344	.6233	.8408	.7423	.9645	.9924	.9501	.9484	1.0031	1.0014
.850	.120E+09	.9942	1.6316	.9260	.5888	.8228	.7165	.9805	.9907	.9443	.9417	1.0042	1.0007
.900	.124E+09	.9941	1.6376	.9172	.5550	.8044	.6911	.9915	.9887	.9387	.9347	1.0059	1.0003
.950	.127E+09	.9939	1.6434	.9079	.5221	.7857	.6656	.9979	.9865	.9332	.9275	1.0078	1.0000
1.000	.129E+09	.9938	1.6488	.8983	.4902	.7668	.6405	1.0000	.9840	.9279	.9201	1.0103	1.0000
1.050	.132E+09	.9937	1.6538	.8887	.4594	.7477	.6157	.9981	.9813	.9228	.9126	1.0132	1.0001
1.100	.134E+09	.9935	1.6584	.8780	.4300	.7286	.5914	.9927	.9784	.9180	.9050	1.0166	1.0006
1.150	.135E+09	.9934	1.6625	.8674	.4019	.7096	.5676	.9842	.9754	.9138	.8973	1.0207	1.0014
1.200	.137E+09	.9933	1.6662	.8566	.3753	.6907	.5446	.9731	.9722	.9101	.8897	1.0254	1.0027
1.250	.138E+09	.9932	1.6693	.8456	.3501	.6721	.5222	.9594	.9688	.9068	.8821	1.0306	1.0043
1.300	.139E+09	.9931	1.6720	.8346	.3264	.6536	.5006	.9441	.9654	.9043	.8746	1.0367	1.0067
1.350	.139E+09	.9930	1.6743	.8234	.3041	.6355	.4798	.9270	.9618	.9024	.8672	1.0434	1.0095
1.400	.140E+09	.9929	1.6762	.8122	.2832	.6178	.4597	.9085	.9583	.9011	.8600	1.0508	1.0129
1.450	.140E+09	.9928	1.6778	.8010	.2636	.6004	.4403	.8888	.9547	.9004	.8529	1.0588	1.0167
1.500	.140E+09	.9927	1.6790	.7898	.2453	.5835	.4216	.8682	.9511	.9004	.8460	1.0674	1.0212
1.550	.140E+09	.9926	1.6800	.7787	.2282	.5669	.4038	.8472	.9475	.9011	.8393	1.0770	1.0264
1.600	.140E+09	.9925	1.6807	.7677	.2123	.5508	.3867	.8255	.9439	.9024	.8328	1.0870	1.0321
1.650	.139E+09	.9925	1.6813	.7567	.1975	.5351	.3703	.8036	.9404	.9043	.8265	1.0978	1.0385
1.700	.139E+09	.9924	1.6817	.7459	.1837	.5198	.3546	.7815	.9370	.9068	.8203	1.1091	1.0453
1.750	.138E+09	.9923	1.6820	.7352	.1709	.5050	.3395	.7593	.9336	.9099	.8144	1.1210	1.0528
1.800	.138E+09	.9923	1.6822	.7247	.1590	.4907	.3252	.7373	.9303	.9137	.8086	1.1338	1.0610
1.850	.137E+09	.9922	1.6823	.7143	.1488	.4767	.3114	.7153	.9271	.9179	.8030	1.1470	1.0696
1.900	.136E+09	.9922	1.6824	.7041	.1377	.4632	.2983	.6937	.9239	.9227	.7976	1.1609	1.0789
1.950	.135E+09	.9922	1.6824	.6940	.1282	.4501	.2858	.6722	.9209	.9278	.7924	1.1751	1.0885
2.000	.134E+09	.9921	1.6824	.6841	.1193	.4374	.2738	.6511	.9179	.9336	.7873	1.1900	1.0987

TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.36024E-04	.14648E-03	.6980
.050	1.5471	.36006E-04	.14635E-03	.6980
.100	1.5599	.35950E-04	.14597E-03	.6980
.150	1.5390	.35857E-04	.14533E-03	.6981
.200	1.5708	.35728E-04	.14445E-03	.6981
.250	1.5563	.35563E-04	.14331E-03	.6982
.300	1.5594	.35361E-04	.14194E-03	.6984
.350	1.5715	.35124E-04	.14052E-03	.6978
.400	1.5671	.34853E-04	.13903E-03	.6964
.450	1.5745	.34547E-04	.13737E-03	.6958
.500	1.5769	.34209E-04	.13553E-03	.6935
.550	1.5833	.33840E-04	.13354E-03	.6921
.600	1.5896	.33440E-04	.13139E-03	.6907
.650	1.5944	.33011E-04	.12910E-03	.6894
.700	1.6037	.32556E-04	.12668E-03	.6883
.750	1.6079	.32076E-04	.12415E-03	.6874
.800	1.6122	.31574E-04	.12152E-03	.6868
.850	1.6173	.31052E-04	.11888E-03	.6850
.900	1.6263	.30513E-04	.11622E-03	.6853
.950	1.6311	.29959E-04	.11352E-03	.6858
1.000	1.6372	.29393E-04	.11077E-03	.6850
1.050	1.6408	.28817E-04	.10800E-03	.6854
1.100	1.6450	.28235E-04	.10523E-03	.6862
1.150	1.6493	.27649E-04	.10246E-03	.6874
1.200	1.6540	.27061E-04	.99325E-04	.6916
1.250	1.6543	.26474E-04	.96793E-04	.6921
1.300	1.6616	.25888E-04	.94298E-04	.6929
1.350	1.6619	.25305E-04	.91850E-04	.6938
1.400	1.6635	.24728E-04	.89450E-04	.6949
1.450	1.6633	.24156E-04	.87102E-04	.6960
1.500	1.6650	.23592E-04	.84798E-04	.6974
1.550	1.6685	.23035E-04	.82513E-04	.6990
1.600	1.6678	.22486E-04	.80172E-04	.7016
1.650	1.6685	.21946E-04	.78040E-04	.7030
1.700	1.6678	.21416E-04	.75966E-04	.7044
1.750	1.6685	.20895E-04	.73953E-04	.7056
1.800	1.6714	.20384E-04	.71998E-04	.7068
1.850	1.6687	.19882E-04	.70101E-04	.7079
1.900	1.6703	.19392E-04	.68256E-04	.7089
1.950	1.6671	.18911E-04	.66468E-04	.7098
2.000	1.6679	.18440E-04	.64734E-04	.7106

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. TT = 100.0 K PT = 3.0 ATM RHOT = .738E-03 G/CM3 SVT = 773.711 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9992	1.4538	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.674E+07	.9992	1.4540	.999A	.9982	.9994	.9988	.0857	1.0000	1.0000	.9999	1.0000	.9940
.100	.134E+08	.9992	1.4547	.9992	.9927	.9978	.9949	.1707	1.0002	.9996	.9998	.9999	.9940
.150	.200E+08	.9992	1.4559	.9987	.9879	.9950	.9889	.2543	1.0004	.9995	.9994	1.0001	.9944
.200	.265E+08	.9991	1.4575	.9967	.9715	.9911	.9804	.3357	1.0007	.9990	.9990	1.0001	.9947
.250	.329E+08	.9991	1.4596	.9949	.9557	.9861	.9694	.4141	1.0011	.9982	.9984	.9999	.9950
.300	.390E+08	.9990	1.4622	.9926	.9370	.9800	.9563	.4891	1.0015	.9974	.9976	1.0000	.9954
.350	.449E+08	.9990	1.4653	.9900	.9154	.9728	.9417	.5681	1.0021	.9963	.9967	.9999	.9959
.400	.505E+08	.9989	1.4690	.9870	.8911	.9646	.9241	.6266	1.0026	.9950	.9955	.9998	.9964
.450	.559E+08	.9988	1.4731	.9836	.8646	.9554	.9053	.6882	1.0033	.9935	.9941	.9998	.9970
.500	.609E+08	.9987	1.4778	.9798	.8358	.9452	.8847	.7444	1.0040	.9914	.9924	.9994	.9973
.550	.657E+08	.9987	1.4830	.9756	.8055	.9340	.8629	.7953	1.0047	.9894	.9905	.9994	.9980
.600	.700E+08	.9986	1.4884	.9710	.7736	.9219	.8397	.8403	1.0054	.9868	.9882	.9992	.9984
.650	.741E+08	.9985	1.4952	.9661	.7406	.9088	.8155	.8796	1.0061	.9838	.9856	.9988	.9988
.700	.778E+08	.9984	1.5021	.9608	.7068	.8949	.7904	.9130	1.0068	.9804	.9826	.9985	.9992
.750	.811E+08	.9983	1.5096	.9552	.6724	.8802	.7646	.9408	1.0074	.9765	.9793	.9982	.9995
.800	.841E+08	.9982	1.5176	.9491	.6379	.8647	.7385	.9630	1.0080	.9724	.9754	.9979	.9999
.850	.868E+08	.9981	1.5261	.9427	.6033	.8485	.7118	.9797	1.0085	.9677	.9712	.9975	.9999
.900	.891E+08	.9980	1.5351	.9359	.5691	.8317	.6851	.9912	1.0089	.9625	.9664	.9972	1.0000
.950	.912E+08	.9979	1.5444	.9288	.5355	.8143	.6585	.9980	1.0091	.9572	.9612	.9971	1.0001
1.000	.929E+08	.9978	1.5540	.9213	.5025	.7953	.6320	1.0000	1.0092	.9513	.9556	.9969	1.0000
1.050	.943E+08	.9977	1.5639	.9134	.4706	.7780	.6059	.9980	1.0091	.9453	.9495	.9971	1.0001
1.100	.955E+08	.9976	1.5738	.9051	.4399	.7593	.5803	.9923	1.0087	.9392	.9430	.9976	1.0002
1.150	.965E+08	.9975	1.5837	.8965	.4104	.7403	.5552	.9831	1.0081	.9330	.9362	.9983	1.0003
1.200	.972E+08	.9974	1.5934	.8875	.3823	.7213	.5310	.9712	1.0072	.9270	.9290	.9997	1.0006
1.250	.977E+08	.9973	1.6028	.8781	.3556	.7027	.5074	.9566	1.0060	.9211	.9216	1.0014	1.0013
1.300	.980E+08	.9972	1.6117	.8685	.3305	.6831	.4847	.9399	1.0046	.9156	.9140	1.0038	1.0022
1.350	.982E+08	.9971	1.6201	.8585	.3068	.6642	.4629	.9215	1.0029	.9105	.9064	1.0067	1.0035
1.400	.982E+08	.9970	1.6279	.8483	.2847	.6456	.4420	.9017	1.0009	.9061	.8986	1.0105	1.0053
1.450	.981E+08	.9969	1.6350	.8379	.2641	.6277	.4221	.8808	.9987	.9024	.8919	1.0151	1.0076
1.500	.979E+08	.9968	1.6414	.8274	.2449	.6092	.4030	.8591	.9963	.8994	.8834	1.0203	1.0104
1.550	.976E+08	.9968	1.6470	.8167	.2272	.5916	.3849	.8368	.9937	.8969	.8759	1.0265	1.0139
1.600	.972E+08	.9967	1.6519	.8059	.2107	.5745	.3677	.8143	.9909	.8955	.8686	1.0336	1.0180
1.650	.967E+08	.9966	1.6562	.7951	.1955	.5578	.3513	.7916	.9881	.8950	.8615	1.0416	1.0230
1.700	.962E+08	.9966	1.6598	.7842	.1814	.5416	.3358	.7690	.9851	.8954	.8546	1.0504	1.0286
1.750	.956E+08	.9965	1.6628	.7734	.1684	.5259	.3210	.7463	.9821	.8964	.8480	1.0600	1.0348
1.800	.949E+08	.9964	1.6653	.7627	.1563	.5107	.3070	.7238	.9791	.8983	.8416	1.0703	1.0416
1.850	.942E+08	.9964	1.6674	.7520	.1452	.4959	.2937	.7017	.9761	.9010	.8354	1.0815	1.0492
1.900	.935E+08	.9963	1.6690	.7415	.1350	.4817	.2818	.6800	.9730	.9044	.8295	1.0935	1.0576
1.950	.927E+08	.9963	1.6704	.7311	.1255	.4679	.2689	.6585	.9700	.9084	.8238	1.1060	1.0663
2.000	.920E+08	.9963	1.6714	.7208	.1167	.4546	.2575	.6375	.9671	.9132	.8183	1.1193	1.0758

TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.42301E-04	.19268E-03	.7079
.050	1.4600	.42284E-04	.19254E-03	.7079
.100	1.4398	.42232E-04	.19213E-03	.7077
.150	1.4669	.42146E-04	.19146E-03	.7075
.200	1.4566	.42026E-04	.19052E-03	.7071
.250	1.4522	.41871E-04	.18931E-03	.7067
.300	1.4611	.41683E-04	.18785E-03	.7062
.350	1.4616	.41462E-04	.18612E-03	.7056
.400	1.4657	.41207E-04	.18415E-03	.7049
.450	1.4711	.40919E-04	.18193E-03	.7042
.500	1.4703	.40599E-04	.17947E-03	.7034
.550	1.4820	.40247E-04	.17677E-03	.7026
.600	1.4832	.39864E-04	.17385E-03	.7018
.650	1.4891	.39450E-04	.17071E-03	.7010
.700	1.4958	.39005E-04	.16737E-03	.7003
.750	1.5034	.38532E-04	.16392E-03	.6993
.800	1.5127	.38031E-04	.16035E-03	.6981
.850	1.5180	.37503E-04	.15662E-03	.6972
.900	1.5266	.36949E-04	.15274E-03	.6964
.950	1.5379	.36372E-04	.14873E-03	.6960
1.000	1.5442	.35773E-04	.14460E-03	.6960
1.050	1.5560	.35154E-04	.14037E-03	.6965
1.100	1.5659	.34517E-04	.13607E-03	.6934
1.150	1.5741	.33866E-04	.13334E-03	.6907
1.200	1.5861	.33204E-04	.12978E-03	.6884
1.250	1.5929	.32533E-04	.12621E-03	.6867
1.300	1.6032	.31857E-04	.12264E-03	.6855
1.350	1.6108	.31178E-04	.11912E-03	.6848
1.400	1.6195	.30500E-04	.11577E-03	.6839
1.450	1.6275	.29826E-04	.11246E-03	.6836
1.500	1.6313	.29156E-04	.10921E-03	.6838
1.550	1.6387	.28494E-04	.10603E-03	.6846
1.600	1.6436	.27840E-04	.10293E-03	.6858
1.650	1.6501	.27197E-04	.99915E-04	.6874
1.700	1.6535	.26565E-04	.96930E-04	.6897
1.750	1.6553	.25945E-04	.94289E-04	.6905
1.800	1.6570	.25337E-04	.91732E-04	.6915
1.850	1.6605	.24742E-04	.89257E-04	.6926
1.900	1.6634	.24159E-04	.86865E-04	.6938
1.950	1.6615	.23589E-04	.84541E-04	.6951
2.000	1.6643	.23032E-04	.82274E-04	.6967

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

G. TT = 200.0 K PT = 3.0 ATM RHOT = .368E-03 G/CM³ SVT = 1056.041 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0020	1.3467	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.284E+07	1.0020	1.3466	.9998	.9998	.9996	.9986	.0859	1.0000	1.0000	1.0000	.9999	.9957
.100	.566E+07	1.0020	1.3465	.9991	.9991	.9973	.9983	.1710	1.0001	1.0003	1.0003	1.0000	.9958
.150	.845E+07	1.0020	1.3467	.9979	.9979	.9849	.9961	.2547	1.0001	1.0005	1.0006	.9999	.9958
.200	.112E+08	1.0020	1.3461	.9963	.9935	.9931	.9803	.3361	1.0003	1.0010	1.0011	1.0000	.9960
.250	.138E+08	1.0019	1.3458	.9942	.9588	.9893	.9693	.4145	1.0004	1.0014	1.0017	.9999	.9960
.300	.164E+08	1.0019	1.3454	.9917	.9416	.9847	.9563	.4896	1.0006	1.0022	1.0024	1.0000	.9963
.350	.188E+08	1.0018	1.3449	.9888	.9216	.9793	.9412	.5604	1.0008	1.0030	1.0033	.9999	.9965
.400	.211E+08	1.0018	1.3444	.9854	.8991	.9731	.9241	.6268	1.0011	1.0039	1.0043	.9998	.9967
.450	.233E+08	1.0017	1.3439	.9817	.8745	.9663	.9053	.6861	1.0014	1.0049	1.0054	.9998	.9969
.500	.253E+08	1.0017	1.3433	.9776	.8482	.9587	.8850	.7443	1.0018	1.0061	1.0067	.9997	.9972
.550	.272E+08	1.0016	1.3427	.9732	.8207	.9506	.8632	.7949	1.0022	1.0074	1.0081	.9997	.9976
.600	.289E+08	1.0016	1.3421	.9688	.7907	.9418	.8400	.8398	1.0026	1.0086	1.0096	.9994	.9978
.650	.305E+08	1.0015	1.3415	.9633	.7603	.9324	.8158	.8789	1.0031	1.0099	1.0112	.9992	.9981
.700	.319E+08	1.0014	1.3408	.9579	.7292	.9226	.7909	.9124	1.0037	1.0115	1.0130	.9991	.9986
.750	.331E+08	1.0014	1.3403	.9522	.6975	.9127	.7651	.9401	1.0044	1.0129	1.0149	.9987	.9988
.800	.342E+08	1.0013	1.3397	.9463	.6656	.9014	.7389	.9625	1.0051	1.0146	1.0168	.9985	.9993
.850	.351E+08	1.0012	1.3392	.9407	.6335	.8902	.7122	.9793	1.0058	1.0161	1.0189	.9980	.9995
.900	.358E+08	1.0012	1.3388	.9338	.6016	.8787	.6853	.9910	1.0067	1.0176	1.0210	.9974	.9998
.950	.364E+08	1.0011	1.3384	.9273	.5701	.8668	.6593	.9978	1.0075	1.0190	1.0233	.9967	1.0000
1.000	.368E+08	1.0010	1.3382	.9206	.5390	.8546	.6313	1.0000	1.0085	1.0203	1.0256	.9958	1.0000
1.050	.371E+08	1.0010	1.3380	.9138	.5086	.8422	.6045	.9988	1.0095	1.0215	1.0279	.9948	1.0000
1.100	.373E+08	1.0009	1.3380	.9068	.4788	.8295	.5778	.9918	1.0106	1.0223	1.0302	.9933	.9996
1.150	.373E+08	1.0008	1.3382	.8998	.4500	.8166	.5517	.9822	1.0118	1.0231	1.0326	.9919	.9993
1.200	.373E+08	1.0008	1.3386	.8926	.4221	.8036	.5260	.9695	1.0130	1.0237	1.0350	.9903	.9990
1.250	.371E+08	1.0007	1.3392	.8854	.3953	.7903	.5008	.9537	1.0143	1.0239	1.0373	.9884	.9983
1.300	.368E+08	1.0007	1.3400	.8781	.3695	.7769	.4762	.9354	1.0157	1.0238	1.0396	.9862	.9974
1.350	.364E+08	1.0006	1.3410	.8707	.3449	.7635	.4524	.9151	1.0171	1.0236	1.0418	.9840	.9965
1.400	.360E+08	1.0006	1.3423	.8633	.3214	.7499	.4292	.8927	1.0186	1.0229	1.0439	.9813	.9953
1.450	.355E+08	1.0005	1.3439	.8559	.2990	.7367	.4068	.8687	1.0201	1.0216	1.0458	.9783	.9937
1.500	.349E+08	1.0005	1.3458	.8484	.2778	.7225	.3851	.8433	1.0216	1.0198	1.0476	.9758	.9919
1.550	.342E+08	1.0004	1.3481	.8409	.2577	.7087	.3642	.8169	1.0232	1.0176	1.0492	.9714	.9897
1.600	.336E+08	1.0004	1.3508	.8335	.2388	.6948	.3442	.7898	1.0249	1.0148	1.0505	.9676	.9874
1.650	.328E+08	1.0003	1.3540	.8260	.2209	.6809	.3249	.7619	1.0265	1.0113	1.0516	.9632	.9846
1.700	.321E+08	1.0003	1.3575	.8185	.2041	.6669	.3066	.7340	1.0282	1.0074	1.0524	.9589	.9818
1.750	.313E+08	1.0002	1.3616	.8111	.1884	.6529	.2898	.7059	1.0299	1.0030	1.0529	.9543	.9787
1.800	.305E+08	1.0002	1.3661	.8036	.1737	.6389	.2723	.6777	1.0317	.9978	1.0529	.9494	.9753
1.850	.297E+08	1.0002	1.3712	.7962	.1599	.6249	.2563	.6497	1.0334	.9919	1.0526	.9441	.9714
1.900	.289E+08	1.0001	1.3769	.7888	.1471	.6108	.2412	.6220	1.0351	.9854	1.0518	.9386	.9674
1.950	.281E+08	1.0001	1.3832	.7814	.1351	.5968	.2268	.5948	1.0368	.9782	1.0506	.9329	.9631
2.000	.273E+08	1.0001	1.3901	.7741	.1240	.5827	.2133	.5681	1.0385	.9705	1.0488	.9271	.9587

TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

G. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.68237E-04	.37355E-03	.7025
.050	1.3223	.68213E-04	.37347E-03	.7025
.100	1.3638	.68153E-04	.37322E-03	.7025
.150	1.3410	.68052E-04	.37281E-03	.7025
.200	1.3530	.67913E-04	.37224E-03	.7025
.250	1.3445	.67734E-04	.37151E-03	.7025
.300	1.3514	.67518E-04	.37063E-03	.7025
.350	1.3472	.67265E-04	.36961E-03	.7025
.400	1.3461	.66976E-04	.36844E-03	.7024
.450	1.3460	.66653E-04	.36713E-03	.7023
.500	1.3470	.66298E-04	.36570E-03	.7021
.550	1.3458	.65911E-04	.36414E-03	.7019
.600	1.3432	.65494E-04	.36218E-03	.7021
.650	1.3436	.65049E-04	.35939E-03	.7037
.700	1.3447	.64577E-04	.35644E-03	.7053
.750	1.3421	.64081E-04	.35335E-03	.7068
.800	1.3431	.63561E-04	.35013E-03	.7084
.850	1.3415	.63020E-04	.34678E-03	.7098
.900	1.3410	.62458E-04	.34333E-03	.7112
.950	1.3403	.61877E-04	.33978E-03	.7125
1.000	1.3393	.61280E-04	.33614E-03	.7136
1.050	1.3399	.60665E-04	.33242E-03	.7145
1.100	1.3380	.60036E-04	.32862E-03	.7151
1.150	1.3393	.59393E-04	.32477E-03	.7155
1.200	1.3397	.58738E-04	.32087E-03	.7156
1.250	1.3397	.58069E-04	.31691E-03	.7153
1.300	1.3401	.57390E-04	.31291E-03	.7147
1.350	1.3424	.56701E-04	.30889E-03	.7136
1.400	1.3420	.56002E-04	.30483E-03	.7121
1.450	1.3436	.55294E-04	.30074E-03	.7101
1.500	1.3449	.54577E-04	.29664E-03	.7076
1.550	1.3472	.53851E-04	.29012E-03	.7103
1.600	1.3501	.53116E-04	.28353E-03	.7128
1.650	1.3516	.52374E-04	.27693E-03	.7148
1.700	1.3568	.51623E-04	.27030E-03	.7164
1.750	1.3608	.50865E-04	.26366E-03	.7177
1.800	1.3642	.50099E-04	.25700E-03	.7185
1.850	1.3686	.49325E-04	.25034E-03	.7189
1.900	1.3741	.48543E-04	.24367E-03	.7189
1.950	1.3804	.47753E-04	.23699E-03	.7184
2.000	1.3875	.46956E-04	.23031E-03	.7175

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TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

H. TT = 300.0 K PT = 3.0 ATM RHO_T = .245E-03 G/CM³ SVT = 1311.496 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHO _T	A*/A	SV/SVT	P/PT	T/TT	RHO/RHO _T	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0018	1.3699	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.179E+07	1.0018	1.3652	.9997	.9982	.9995	.9987	.0863	1.0000	1.0000	1.0000	.9999	1.0000
.100	.357E+07	1.0018	1.3651	.9990	.9930	.9981	.9949	.1719	1.0000	1.0000	1.0001	.9999	1.0007
.150	.532E+07	1.0018	1.3850	.9977	.9845	.9957	.9888	.2559	.9999	1.0001	1.0002	1.0000	1.0008
.200	.704E+07	1.0017	1.3847	.9959	.9727	.9924	.9802	.3377	.9999	1.0002	1.0003	.9999	1.0007
.250	.871E+07	1.0017	1.3844	.9937	.9578	.9881	.9694	.4165	.9999	1.0004	1.0005	1.0000	1.0007
.300	.103E+08	1.0017	1.3840	.9909	.9399	.9870	.9563	.4916	.9998	1.0005	1.0007	.9999	1.0006
.350	.119E+08	1.0017	1.3836	.9877	.9194	.9737	.9412	.5627	.9997	1.0007	1.0009	.9999	1.0005
.400	.133E+08	1.0016	1.3830	.9840	.8967	.9702	.9244	.6293	.9996	1.0012	1.0012	1.0001	1.0006
.450	.147E+08	1.0016	1.3824	.9799	.8716	.9626	.9056	.6907	.9996	1.0015	1.0016	1.0001	1.0006
.500	.160E+08	1.0016	1.3817	.9754	.8446	.9543	.8853	.7467	.9995	1.0019	1.0020	1.0001	1.0004
.550	.172E+08	1.0015	1.3809	.9705	.8160	.9453	.8634	.7970	.9994	1.0022	1.0025	1.0000	1.0002
.600	.183E+08	1.0015	1.3801	.9651	.7862	.9356	.8405	.8418	.9993	1.0028	1.0030	1.0001	1.0002
.650	.192E+08	1.0014	1.3791	.9595	.7553	.9254	.8164	.8806	.9992	1.0032	1.0036	1.0000	1.0001
.700	.201E+08	1.0014	1.3781	.9535	.7237	.9146	.7916	.9137	.9991	1.0038	1.0043	1.0000	.9999
.750	.209E+08	1.0013	1.3770	.9472	.6916	.9034	.7668	.9410	.9990	1.0044	1.0050	.9999	.9998
.800	.216E+08	1.0013	1.3757	.9406	.6596	.8917	.7401	.9631	.9989	1.0054	1.0059	1.0001	.9999
.850	.222E+08	1.0012	1.3744	.9337	.6275	.8797	.7138	.9797	.9989	1.0064	1.0068	1.0002	.9999
.900	.226E+08	1.0012	1.3730	.9266	.5957	.8673	.6873	.9912	.9988	1.0075	1.0078	1.0003	1.0000
.950	.230E+08	1.0011	1.3715	.9192	.5643	.8547	.6607	.9979	.9988	1.0086	1.0089	1.0004	1.0000
1.000	.233E+08	1.0010	1.3699	.9117	.5335	.8418	.6342	1.0000	.9987	1.0098	1.0101	1.0004	1.0000
1.050	.235E+08	1.0010	1.3683	.9040	.5034	.8287	.6080	.9981	.9987	1.0112	1.0114	1.0005	1.0001
1.100	.236E+08	1.0009	1.3666	.8962	.4742	.8155	.5820	.9923	.9988	1.0125	1.0129	1.0005	1.0001
1.150	.237E+08	1.0009	1.3648	.8882	.4459	.8022	.5563	.9828	.9988	1.0138	1.0144	1.0003	1.0000
1.200	.236E+08	1.0008	1.3629	.8802	.4187	.7889	.5312	.9703	.9989	1.0152	1.0161	1.0001	.9999
1.250	.235E+08	1.0008	1.3611	.8720	.3925	.7755	.5067	.9552	.9990	1.0168	1.0178	1.0000	.9998
1.300	.234E+08	1.0007	1.3591	.8638	.3676	.7621	.4829	.9379	.9992	1.0186	1.0197	1.0000	1.0000
1.350	.232E+08	1.0007	1.3572	.8555	.3437	.7487	.4596	.9180	.9994	1.0200	1.0216	.9995	.9997
1.400	.229E+08	1.0007	1.3553	.8473	.3210	.7354	.4378	.8965	.9996	1.0215	1.0237	.9990	.9995
1.450	.226E+08	1.0006	1.3533	.8390	.2995	.7222	.4151	.8734	.9999	1.0230	1.0258	.9984	.9992
1.500	.222E+08	1.0006	1.3515	.8307	.2790	.7090	.3940	.8491	1.0003	1.0243	1.0281	.9976	.9987
1.550	.218E+08	1.0005	1.3496	.8224	.2597	.6960	.3737	.8238	1.0007	1.0256	1.0304	.9966	.9981
1.600	.214E+08	1.0005	1.3478	.8142	.2416	.6830	.3541	.7978	1.0011	1.0267	1.0328	.9955	.9974
1.650	.210E+08	1.0005	1.3461	.8060	.2245	.6703	.3354	.7713	1.0016	1.0278	1.0352	.9942	.9967
1.700	.205E+08	1.0004	1.3444	.7978	.2084	.6576	.3173	.7444	1.0022	1.0287	1.0377	.9927	.9957
1.750	.200E+08	1.0004	1.3429	.7897	.1933	.6451	.3000	.7171	1.0028	1.0290	1.0402	.9906	.9943
1.800	.195E+08	1.0004	1.3416	.7817	.1792	.6327	.2836	.6900	1.0035	1.0294	1.0427	.9886	.9929
1.850	.190E+08	1.0004	1.3404	.7737	.1659	.6205	.2678	.6630	1.0042	1.0294	1.0452	.9863	.9913
1.900	.185E+08	1.0003	1.3393	.7659	.1536	.6084	.2528	.6363	1.0050	1.0293	1.0477	.9838	.9896
1.950	.179E+08	1.0003	1.3385	.7581	.1421	.5965	.2385	.6098	1.0058	1.0286	1.0502	.9809	.9875
2.000	.174E+08	1.0003	1.3378	.7504	.1313	.5848	.2249	.5837	1.0067	1.0275	1.0526	.9776	.9850

TABLE II. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

H. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.89634E-04	.46160E-03	.7098
.050	1.3681	.89632E-04	.46147E-03	.6896
.100	1.3842	.89545E-04	.46109E-03	.6896
.150	1.3923	.89400E-04	.46045E-03	.6897
.200	1.3838	.89198E-04	.45956E-03	.6898
.250	1.3907	.88940E-04	.45843E-03	.6899
.300	1.3838	.88628E-04	.45706E-03	.6900
.350	1.3860	.88263E-04	.45547E-03	.6902
.400	1.3891	.87847E-04	.45365E-03	.6904
.450	1.3855	.87383E-04	.45163E-03	.6906
.500	1.3833	.86872E-04	.44941E-03	.6908
.550	1.3814	.86318E-04	.44701E-03	.6911
.600	1.3834	.85722E-04	.44444E-03	.6914
.650	1.3797	.85088E-04	.44174E-03	.6917
.700	1.3797	.84418E-04	.43902E-03	.6919
.750	1.3777	.83716E-04	.43617E-03	.6921
.800	1.3797	.82984E-04	.43322E-03	.6924
.850	1.3775	.82225E-04	.43017E-03	.6927
.900	1.3761	.81442E-04	.42704E-03	.6930
.950	1.3740	.80637E-04	.42383E-03	.6933
1.000	1.3721	.79814E-04	.42057E-03	.6937
1.050	1.3715	.78974E-04	.41726E-03	.6941
1.100	1.3686	.78122E-04	.41392E-03	.6945
1.150	1.3660	.77258E-04	.41054E-03	.6949
1.200	1.3643	.76385E-04	.40716E-03	.6953
1.250	1.3633	.75505E-04	.40369E-03	.6959
1.300	1.3633	.74620E-04	.39991E-03	.6970
1.350	1.3580	.73732E-04	.39612E-03	.6980
1.400	1.3571	.72841E-04	.39235E-03	.6990
1.450	1.3549	.71949E-04	.38860E-03	.6998
1.500	1.3527	.71058E-04	.38488E-03	.7006
1.550	1.3511	.70168E-04	.38119E-03	.7012
1.600	1.3491	.69281E-04	.37752E-03	.7017
1.650	1.3479	.68397E-04	.37390E-03	.7021
1.700	1.3461	.67517E-04	.37032E-03	.7022
1.750	1.3428	.66640E-04	.36677E-03	.7020
1.800	1.3432	.65768E-04	.36327E-03	.7016
1.850	1.3419	.64900E-04	.35832E-03	.7037
1.900	1.3416	.64037E-04	.35293E-03	.7065
1.950	1.3397	.63179E-04	.34762E-03	.7090
2.000	1.3390	.62325E-04	.34236E-03	.7112

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TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. $TT = 35.0 \text{ K}$ $PT = 5.0 \text{ ATM}$ $\rho_{HOT} = .398E-02 \text{ G/CM}^3$ $SVT = 467.465 \text{ M/SEC}$

MACH	PE/PA	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9809	1.9733	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.480E+02	.8808	1.9732	.9995	.9979	.9991	.9998	.0895	.9998	.9996	.9996	1.0000	1.0372
.100	.957E+02	.8807	1.9730	.9981	.9914	.9955	.9950	.1780	.9991	.9984	.9985	1.0000	1.0364
.150	.143E+03	.8806	1.9729	.9957	.9809	.9923	.9888	.2647	.9979	.9964	.9967	1.0000	1.0352
.200	.189E+03	.8804	1.9727	.9924	.9664	.9924	.9803	.3488	.9963	.9938	.9942	1.0000	1.0336
.250	.235E+03	.8801	1.9724	.9882	.9485	.9789	.9697	.4294	.9943	.9906	.9911	1.0003	1.0318
.300	.279E+03	.8799	1.9720	.9831	.9268	.9699	.9566	.5058	.9919	.9865	.9873	1.0003	1.0293
.350	.321E+03	.8795	1.9716	.9772	.9024	.9595	.9419	.5775	.9891	.9822	.9830	1.0006	1.0268
.400	.363E+03	.8792	1.9712	.9706	.8754	.9479	.9254	.6441	.9860	.9775	.9781	1.0012	1.0242
.450	.402E+03	.8788	1.9716	.9635	.8459	.9349	.9070	.7049	.9828	.9721	.9728	1.0016	1.0212
.500	.440E+03	.8784	1.9717	.9557	.8149	.9209	.8874	.7601	.9793	.9666	.9670	1.0025	1.0184
.550	.475E+03	.8779	1.9719	.9473	.7825	.9060	.8666	.8094	.9755	.9611	.9608	1.0036	1.0157
.600	.509E+03	.8775	1.9719	.9384	.7489	.8902	.8445	.8524	.9715	.9552	.9542	1.0048	1.0128
.650	.541E+03	.8770	1.9721	.9290	.7149	.8736	.8219	.8896	.9674	.9496	.9474	1.0067	1.0103
.700	.570E+03	.8766	1.9721	.9191	.6805	.8565	.7985	.9209	.9631	.9440	.9404	1.0087	1.0079
.750	.598E+03	.8762	1.9721	.9089	.6462	.8388	.7745	.9465	.9587	.9384	.9332	1.0110	1.0056
.800	.624E+03	.8757	1.9720	.8984	.6122	.8207	.7503	.9667	.9542	.9332	.9258	1.0139	1.0037
.850	.647E+03	.8753	1.9717	.8876	.5788	.8024	.7259	.9819	.9496	.9283	.9183	1.0173	1.0022
.900	.669E+03	.8749	1.9712	.8766	.5462	.7839	.7016	.9922	.9450	.9238	.9108	1.0211	1.0010
.950	.689E+03	.8745	1.9706	.8654	.5146	.7652	.6773	.9983	.9403	.9198	.9033	1.0256	1.0004
1.000	.707E+03	.8741	1.9698	.8541	.4840	.7466	.6533	1.0002	.9356	.9162	.8959	1.0305	1.0002
1.050	.724E+03	.8738	1.9687	.8426	.4545	.7280	.6294	.9982	.9309	.9129	.8885	1.0358	1.0003
1.100	.739E+03	.8735	1.9674	.8311	.4264	.7095	.6060	.9932	.9262	.9104	.8812	1.0418	1.0011
1.150	.752E+03	.8732	1.9660	.8196	.3996	.6912	.5832	.9853	.9216	.9085	.8740	1.0485	1.0025
1.200	.764E+03	.8730	1.9645	.8080	.3741	.6732	.5608	.9747	.9170	.9072	.8670	1.0558	1.0044
1.250	.774E+03	.8727	1.9628	.7965	.3500	.6554	.5389	.9619	.9125	.9065	.8602	1.0636	1.0068
1.300	.783E+03	.8725	1.9611	.7851	.3271	.6379	.5176	.9471	.9081	.9063	.8536	1.0720	1.0099

SATURATION BOUNDARY REACHED.

TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.19442E-04	.72465E-04	.8131
.050	1.7253	.19381E-04	.72223E-04	.8133
.100	1.7089	.19335E-04	.72035E-04	.8135
.150	1.7153	.19258E-04	.71725E-04	.8139
.200	1.7171	.19152E-04	.71293E-04	.8144
.250	1.7271	.19017E-04	.70745E-04	.8152
.300	1.7043	.18854E-04	.70075E-04	.8161
.350	1.7170	.18666E-04	.69297E-04	.8174
.400	1.7175	.18454E-04	.68414E-04	.8189
.450	1.7017	.18219E-04	.67423E-04	.8206
.500	1.7119	.17963E-04	.66344E-04	.8223
.550	1.7112	.17689E-04	.65364E-04	.8221
.600	1.7031	.17397E-04	.64307E-04	.8219
.650	1.7096	.17091E-04	.63183E-04	.8219
.700	1.7040	.16772E-04	.61994E-04	.8221
.750	1.7005	.16441E-04	.60748E-04	.8226
.800	1.7010	.16101E-04	.59454E-04	.8233
.850	1.6998	.15755E-04	.58118E-04	.8244
.900	1.6975	.15402E-04	.56750E-04	.8258
.950	1.6971	.15046E-04	.55390E-04	.8270
1.000	1.6942	.14688E-04	.54010E-04	.8286
1.050	1.6871	.14328E-04	.52808E-04	.8276
1.100	1.6890	.13969E-04	.51551E-04	.8277
1.150	1.6869	.13611E-04	.50239E-04	.8290
1.200	1.6835	.13256E-04	.48883E-04	.8316
1.250	1.6799	.12905E-04	.47492E-04	.8354
1.300	1.6766	.12557E-04	.46076E-04	.8405

SATURATION BOUNDARY REACHED.

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TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

B. TT = 40.0 K PT = 5.0 ATM RHOT = .334E-02 G/CM3 SVT = 509.634 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9199	1.8676	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.395E+08	.9198	1.8676	.9995	.9979	.9991	.9985	.0894	.9998	.9996	.9996	1.0000	1.0360
.100	.788E+08	.9198	1.8675	.9981	.9914	.9966	.9959	.1778	.9991	.9984	.9986	.9999	1.0352
.150	.118E+09	.9196	1.8674	.9958	.9811	.9923	.9889	.2645	.9981	.9966	.9968	1.0001	1.0343
.200	.156E+09	.9195	1.8673	.9926	.9666	.9864	.9804	.3485	.9966	.9940	.9943	1.0001	1.0327
.250	.193E+09	.9193	1.8671	.9885	.9485	.9789	.9695	.4290	.9947	.9906	.9912	1.0001	1.0308
.300	.229E+09	.9190	1.8670	.9836	.9272	.9700	.9568	.5055	.9924	.9869	.9874	1.0000	1.0288
.350	.265E+09	.9187	1.8667	.9779	.9028	.9596	.9420	.5773	.9898	.9826	.9831	1.0000	1.0264
.400	.298E+09	.9184	1.8664	.9714	.8756	.9479	.9252	.6437	.9869	.9777	.9782	1.0010	1.0236
.450	.331E+09	.9181	1.8660	.9643	.8463	.9350	.9069	.7047	.9836	.9725	.9729	1.0016	1.0208
.500	.361E+09	.9177	1.8656	.9565	.8154	.9210	.8874	.7599	.9801	.9672	.9671	1.0025	1.0181
.550	.390E+09	.9174	1.8651	.9481	.7829	.9061	.8664	.8090	.9764	.9616	.9609	1.0034	1.0152
.600	.418E+09	.9170	1.8646	.9392	.7495	.8903	.8445	.8521	.9725	.9560	.9544	1.0048	1.0125
.650	.444E+09	.9166	1.8641	.9299	.7155	.8738	.8218	.8893	.9684	.9504	.9476	1.0065	1.0100
.700	.468E+09	.9162	1.8634	.9201	.6811	.8567	.7983	.9206	.9641	.9448	.9406	1.0085	1.0074
.750	.490E+09	.9158	1.8628	.9099	.6470	.8390	.7745	.9464	.9598	.9396	.9334	1.0110	1.0055
.800	.510E+09	.9155	1.8624	.8996	.6129	.8210	.7501	.9666	.9554	.9342	.9261	1.0137	1.0035
.850	.529E+09	.9151	1.8621	.8889	.5794	.8026	.7256	.9817	.9510	.9292	.9186	1.0168	1.0020
.900	.547E+09	.9148	1.8618	.8781	.5467	.7840	.7012	.9922	.9465	.9246	.9110	1.0206	1.0010
.950	.563E+09	.9144	1.8614	.8671	.5149	.7653	.6767	.9981	.9421	.9203	.9034	1.0247	1.0002
1.000	.577E+09	.9141	1.8611	.8559	.4841	.7465	.6525	1.0000	.9376	.9164	.8959	1.0293	1.0000
1.050	.590E+09	.9138	1.8606	.8446	.4545	.7278	.6286	.9982	.9331	.9129	.8883	1.0345	1.0002
1.100	.602E+09	.9136	1.8601	.8333	.4262	.7092	.6051	.9932	.9287	.9100	.8808	1.0403	1.0010
1.150	.612E+09	.9133	1.8595	.8219	.3992	.6907	.5820	.9851	.9243	.9075	.8734	1.0465	1.0023
1.200	.621E+09	.9131	1.8589	.8106	.3735	.6724	.5596	.9745	.9199	.9057	.8661	1.0535	1.0042
1.250	.629E+09	.9129	1.8581	.7992	.3491	.6544	.5376	.9616	.9156	.9043	.8589	1.0609	1.0065
1.300	.636E+09	.9127	1.8572	.7879	.3261	.6367	.5163	.9468	.9113	.9036	.8518	1.0691	1.0096
1.350	.642E+09	.9126	1.8562	.7766	.3044	.6192	.4955	.9302	.9072	.9034	.8449	1.0777	1.0130
1.400	.648E+09	.9124	1.8552	.7654	.2840	.6022	.4755	.9123	.9031	.9038	.8382	1.0870	1.0171
1.450	.652E+09	.9123	1.8541	.7543	.2648	.5855	.4560	.8931	.8991	.9047	.8317	1.0967	1.0217
1.500	.655E+09	.9122	1.8530	.7434	.2469	.5692	.4374	.8733	.8951	.9064	.8253	1.1074	1.0271
1.550	.658E+09	.9122	1.8518	.7325	.2301	.5533	.4193	.8525	.8913	.9083	.8191	1.1183	1.0328
1.600	.661E+09	.9121	1.8507	.7219	.2144	.5378	.4020	.8313	.8876	.9111	.8132	1.1300	1.0393
1.650	.662E+09	.9120	1.8496	.7113	.1997	.5227	.3853	.8097	.8840	.9143	.8074	1.1422	1.0462
1.700	.663E+09	.9120	1.8485	.7009	.1860	.5081	.3693	.7879	.8805	.9182	.8018	1.1551	1.0538

SATURATION BOUNDARY REACHED.

TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

B. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.21553E-04	.79421E-04	.7683
.050	1.7137	.21489E-04	.79158E-04	.7685
.100	1.6975	.21440E-04	.78955E-04	.7687
.150	1.7263	.21359E-04	.78623E-04	.7690
.200	1.7068	.21246E-04	.78159E-04	.7694
.250	1.7045	.21102E-04	.77570E-04	.7699
.300	1.7170	.20930E-04	.76864E-04	.7706
.350	1.7093	.20730E-04	.76043E-04	.7714
.400	1.7028	.20504E-04	.75158E-04	.7718
.450	1.7039	.20253E-04	.74174E-04	.7725
.500	1.7080	.19981E-04	.73093E-04	.7733
.550	1.7004	.19688E-04	.71953E-04	.7740
.600	1.7023	.19377E-04	.70742E-04	.7748
.650	1.7025	.19050E-04	.69464E-04	.7757
.700	1.6965	.18709E-04	.68127E-04	.7768
.750	1.7010	.18355E-04	.66743E-04	.7780
.800	1.6924	.17992E-04	.65315E-04	.7793
.850	1.6939	.17619E-04	.63869E-04	.7803
.900	1.6941	.17239E-04	.62466E-04	.7805
.950	1.6913	.16855E-04	.61072E-04	.7803
1.000	1.6904	.16466E-04	.59646E-04	.7804
1.050	1.6892	.16076E-04	.58194E-04	.7808
1.100	1.6891	.15685E-04	.56723E-04	.7814
1.150	1.6862	.15295E-04	.55238E-04	.7824
1.200	1.6869	.14906E-04	.53749E-04	.7836
1.250	1.6838	.14520E-04	.52260E-04	.7851
1.300	1.6840	.14137E-04	.50857E-04	.7857
1.350	1.6799	.13759E-04	.49427E-04	.7871
1.400	1.6799	.13386E-04	.47973E-04	.7895
1.450	1.6767	.13019E-04	.46559E-04	.7917
1.500	1.6791	.12658E-04	.45240E-04	.7930
1.550	1.6722	.12304E-04	.43955E-04	.7945
1.600	1.6741	.11957E-04	.42687E-04	.7963
1.650	1.6714	.11617E-04	.41444E-04	.7984
1.700	1.6707	.11285E-04	.40228E-04	.8008

SATURATION BOUNDARY REACHED.

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TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

C. TT = 60.0 K PT = 5.0 ATM RHOT = .209E-02 G/CM3 SVT = 634.456 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9774	1.7017	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.226E+08	.9774	1.7027	.9996	.9979	.9992	.9987	.0885	.9999	.9996	.9997	.9999	1.0259
.100	.452E+08	.9773	1.7028	.9985	.9916	.9968	.9949	.1761	.9995	.9986	.9987	.9999	1.0254
.150	.674E+08	.9773	1.7035	.9966	.9815	.9927	.9889	.2621	.9988	.9970	.9972	1.0000	1.0248
.200	.893E+08	.9771	1.7046	.9940	.9674	.9871	.9803	.3455	.9979	.9948	.9950	1.0000	1.0239
.250	.111E+09	.9770	1.7059	.9906	.9498	.9800	.9696	.4258	.9967	.9920	.9973	1.0002	1.0229
.300	.131E+09	.9769	1.7077	.9865	.9227	.9714	.9566	.5020	.9953	.9886	.9889	1.0003	1.0215
.350	.151E+09	.9766	1.7098	.9817	.9047	.9615	.9417	.5737	.9936	.9847	.9850	1.0005	1.0200
.400	.171E+09	.9764	1.7108	.9762	.8780	.9502	.9249	.6404	.9917	.9803	.9806	1.0007	1.0183
.450	.189E+09	.9762	1.7126	.9700	.8489	.9377	.9064	.7015	.9894	.9754	.9757	1.0010	1.0163
.500	.206E+09	.9759	1.7145	.9632	.8180	.9241	.8866	.7571	.9870	.9703	.9703	1.0016	1.0143
.550	.223E+09	.9756	1.7165	.9559	.7856	.9094	.8654	.8066	.9842	.9649	.9644	1.0023	1.0123
.600	.238E+09	.9753	1.7183	.9478	.7522	.8939	.8433	.8503	.9813	.9595	.9582	1.0034	1.0103
.650	.252E+09	.9750	1.7201	.9392	.7180	.8775	.8202	.8879	.9781	.9538	.9517	1.0046	1.0083
.700	.266E+09	.9747	1.7217	.9302	.6836	.8605	.7955	.9196	.9747	.9482	.9449	1.0053	1.0064
.750	.278E+09	.9744	1.7232	.9209	.6491	.8430	.7724	.9457	.9712	.9427	.9378	1.0083	1.0047
.800	.289E+09	.9741	1.7245	.9109	.6148	.8249	.7478	.9662	.9674	.9372	.9305	1.0106	1.0032
.850	.299E+09	.9738	1.7256	.9007	.5812	.8066	.7232	.9817	.9636	.9321	.9231	1.0134	1.0019
.900	.308E+09	.9735	1.7265	.8902	.5482	.7880	.6984	.9921	.9596	.9271	.9156	1.0166	1.0009
.950	.316E+09	.9732	1.7272	.8794	.5161	.7692	.6739	.9982	.9555	.9225	.9080	1.0203	1.0004
1.000	.324E+09	.9730	1.7278	.8685	.4851	.7504	.6494	1.0000	.9514	.9182	.9004	1.0244	1.0000
1.050	.330E+09	.9727	1.7282	.8574	.4553	.7315	.6254	.9982	.9472	.9145	.8929	1.0292	1.0003
1.100	.336E+09	.9724	1.7285	.8462	.4268	.7128	.6018	.9931	.9430	.9112	.8853	1.0345	1.0010
1.150	.341E+09	.9722	1.7286	.8349	.3995	.6942	.5786	.9850	.9388	.9084	.8778	1.0404	1.0022
1.200	.345E+09	.9720	1.7286	.8235	.3737	.6758	.5560	.9742	.9346	.9062	.8705	1.0468	1.0039
1.250	.348E+09	.9718	1.7286	.8122	.3492	.6577	.5340	.9612	.9305	.9044	.8632	1.0539	1.0062
1.300	.351E+09	.9716	1.7284	.8008	.3260	.6398	.5127	.9463	.9264	.9033	.8560	1.0616	1.0091
1.350	.353E+09	.9714	1.7282	.7896	.3042	.6222	.4919	.9296	.9223	.9026	.8490	1.0697	1.0123
1.400	.355E+09	.9712	1.7280	.7784	.2836	.6050	.4718	.9115	.9183	.9025	.8421	1.0785	1.0163
1.450	.357E+09	.9711	1.7277	.7672	.2643	.5881	.4524	.8923	.9144	.9030	.8354	1.0879	1.0208
1.500	.358E+09	.9709	1.7274	.7562	.2462	.5716	.4336	.8721	.9106	.9038	.8288	1.0978	1.0257
1.550	.358E+09	.9708	1.7270	.7453	.2293	.5555	.4156	.8513	.9069	.9055	.8224	1.1084	1.0314
1.600	.358E+09	.9707	1.7268	.7345	.2135	.5398	.3983	.8299	.9032	.9075	.8162	1.1195	1.0376
1.650	.358E+09	.9706	1.7265	.7239	.1988	.5245	.3816	.8082	.8997	.9101	.8101	1.1313	1.0443
1.700	.358E+09	.9705	1.7262	.7134	.1850	.5096	.3656	.7862	.8962	.9131	.8042	1.1435	1.0516
1.750	.357E+09	.9704	1.7259	.7031	.1722	.4951	.3503	.7642	.8928	.9168	.7984	1.1565	1.0595
1.800	.356E+09	.9704	1.7256	.6929	.1603	.4811	.3355	.7421	.8896	.9208	.7928	1.1699	1.0678
1.850	.355E+09	.9703	1.7253	.6829	.1492	.4674	.3215	.7202	.8864	.9256	.7874	1.1839	1.0768
1.900	.354E+09	.9703	1.7249	.6731	.1389	.4542	.3080	.6984	.8833	.9306	.7821	1.1985	1.0863
1.950	.352E+09	.9703	1.7246	.6635	.1293	.4414	.2952	.6771	.8803	.9364	.7771	1.2139	1.0965
2.000	.351E+09	.9702	1.7243	.6540	.1205	.4290	.2829	.6560	.8774	.9425	.7721	1.2297	1.1070

TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

C. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.29364E-04	.11279E-03	.6931
.050	1.6368	.29287E-04	.11242E-03	.6931
.100	1.6554	.29230E-04	.11214E-03	.6931
.150	1.6718	.29135E-04	.11169E-03	.6932
.200	1.6664	.29004E-04	.11106E-03	.6933
.250	1.6740	.28836E-04	.11026E-03	.6934
.300	1.6651	.28633E-04	.10929E-03	.6936
.350	1.6705	.28397E-04	.10817E-03	.6939
.400	1.6692	.28128E-04	.10689E-03	.6943
.450	1.6679	.27829E-04	.10547E-03	.6949
.500	1.6738	.27501E-04	.10254E-03	.7050
.550	1.6718	.27147E-04	.10100E-03	.7052
.600	1.6774	.26769E-04	.99351E-04	.7056
.650	1.6758	.26369E-04	.97622E-04	.7060
.700	1.6786	.25949E-04	.95839E-04	.7065
.750	1.6800	.25513E-04	.93993E-04	.7071
.800	1.6786	.25061E-04	.92104E-04	.7078
.850	1.6808	.24598E-04	.90185E-04	.7085
.900	1.6793	.24124E-04	.88234E-04	.7093
.950	1.6812	.23642E-04	.86195E-04	.7109
1.000	1.6781	.23154E-04	.84145E-04	.7124
1.050	1.6810	.22662E-04	.81713E-04	.7175
1.100	1.6811	.22168E-04	.79727E-04	.7188
1.150	1.6795	.21672E-04	.77752E-04	.7201
1.200	1.6797	.21177E-04	.75795E-04	.7214
1.250	1.6800	.20684E-04	.73862E-04	.7227
1.300	1.6807	.20194E-04	.71958E-04	.7240
1.350	1.6769	.19708E-04	.70095E-04	.7251
1.400	1.6778	.19226E-04	.68264E-04	.7261
1.450	1.6775	.18750E-04	.66474E-04	.7270
1.500	1.6742	.18280E-04	.64730E-04	.7277
1.550	1.6777	.17817E-04	.63027E-04	.7282
1.600	1.6749	.17361E-04	.61365E-04	.7286
1.650	1.6757	.16913E-04	.59688E-04	.7296
1.700	1.6733	.16473E-04	.58038E-04	.7306
1.750	1.6753	.16041E-04	.56430E-04	.7316
1.800	1.6717	.15618E-04	.54864E-04	.7324
1.850	1.6733	.15203E-04	.53339E-04	.7332
1.900	1.6721	.14798E-04	.51858E-04	.7338
1.950	1.6743	.14402E-04	.50421E-04	.7344
2.000	1.6715	.14015E-04	.49010E-04	.7351

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TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. TT = 80.0 K PT = 5.0 ATM RHOT = .155E-02 G/CM3 SVT = 715.337 M/SEC

MACH	PE/M	γ	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9979	1.5716	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.153E+08	.9979	1.5730	.9997	.9981	.9993	.9988	.0869	1.0000	.9998	.9998	1.0000	1.0071
.100	.304E+08	.9929	1.5739	.9989	.9922	.9972	.9950	.1730	.9999	.9992	.9992	1.0000	1.0070
.150	.454E+08	.9928	1.5754	.9975	.9826	.9938	.9889	.2575	.9999	.9982	.9983	1.0000	1.0070
.200	.602E+08	.9927	1.5774	.9958	.9694	.9890	.9803	.3398	.9998	.9968	.9969	1.0000	1.0069
.250	.745E+08	.9926	1.5801	.9934	.9526	.9829	.9694	.4190	.9996	.9949	.9952	1.0000	1.0067
.300	.885E+08	.9925	1.5833	.9906	.9326	.9754	.9565	.4947	.9994	.9927	.9930	1.0001	1.0067
.350	.102E+09	.9924	1.5870	.9871	.9096	.9667	.9414	.5661	.9992	.9900	.9904	1.0001	1.0064
.400	.115E+09	.9922	1.5913	.9832	.8838	.9568	.9244	.6327	.9988	.9868	.9874	1.0001	1.0060
.450	.127E+09	.9921	1.5960	.9789	.8557	.9456	.9057	.6947	.9984	.9833	.9839	1.0002	1.0057
.500	.139E+09	.9919	1.6017	.9738	.8256	.9334	.8855	.7503	.9978	.9794	.9800	1.0004	1.0053
.550	.150E+09	.9917	1.6068	.9683	.7938	.9200	.8639	.8006	.9971	.9750	.9757	1.0005	1.0047
.600	.160E+09	.9915	1.6126	.9622	.7607	.9057	.8411	.8451	.9963	.9703	.9709	1.0006	1.0042
.650	.169E+09	.9913	1.6188	.9557	.7266	.8904	.8174	.8837	.9953	.9652	.9657	1.0012	1.0035
.700	.178E+09	.9910	1.6251	.9486	.6921	.8743	.7930	.9164	.9940	.9600	.9600	1.0016	1.0029
.750	.186E+09	.9908	1.6314	.9411	.6571	.8575	.7679	.9432	.9926	.9543	.9540	1.0025	1.0021
.800	.194E+09	.9906	1.6378	.9330	.6224	.8401	.7426	.9644	.9910	.9487	.9476	1.0035	1.0015
.850	.200E+09	.9903	1.6440	.9245	.5880	.8221	.7171	.9807	.9891	.9430	.9409	1.0049	1.0010
.900	.206E+09	.9901	1.6501	.9156	.5542	.8036	.6916	.9917	.9869	.9373	.9338	1.0066	1.0005
.950	.211E+09	.9899	1.6559	.9062	.5212	.7849	.6661	.9979	.9846	.9316	.9266	1.0085	1.0000
1.000	.216E+09	.9896	1.6613	.8964	.4894	.7660	.6410	1.0000	.9820	.9264	.9191	1.0112	1.0000
1.050	.220E+09	.9894	1.6663	.8863	.4587	.7469	.6163	.9982	.9792	.9214	.9116	1.0143	1.0002
1.100	.223E+09	.9892	1.6708	.8759	.4293	.7278	.5921	.9928	.9762	.9167	.9040	1.0179	1.0007
1.150	.226E+09	.9890	1.6749	.8653	.4013	.7088	.5684	.9843	.9730	.9124	.8963	1.0220	1.0015
1.200	.228E+09	.9888	1.6785	.8544	.3747	.6899	.5454	.9732	.9697	.9088	.8887	1.0269	1.0028
1.250	.230E+09	.9886	1.6816	.8434	.3497	.6713	.5231	.9598	.9662	.9057	.8811	1.0325	1.0047
1.300	.231E+09	.9884	1.6842	.8322	.3260	.6529	.5015	.9443	.9627	.9032	.8736	1.0386	1.0069
1.350	.232E+09	.9882	1.6864	.8210	.3038	.6349	.4808	.9273	.9591	.9015	.8663	1.0456	1.0099
1.400	.233E+09	.9880	1.6882	.8098	.2829	.6171	.4606	.9088	.9554	.9002	.8591	1.0530	1.0132
1.450	.233E+09	.9879	1.6897	.7986	.2633	.5998	.4413	.8892	.9518	.8996	.8520	1.0613	1.0172
1.500	.234E+09	.9877	1.6909	.7873	.2451	.5829	.4227	.8687	.9481	.8997	.8452	1.0701	1.0216
1.550	.233E+09	.9876	1.6918	.7762	.2281	.5663	.4049	.8478	.9445	.9006	.8385	1.0799	1.0272
1.600	.233E+09	.9875	1.6925	.7652	.2122	.5503	.3878	.8263	.9409	.9021	.8320	1.0902	1.0330
1.650	.232E+09	.9874	1.6929	.7542	.1974	.5346	.3714	.8043	.9373	.9041	.8257	1.1011	1.0394
1.700	.232E+09	.9872	1.6933	.7434	.1837	.5194	.3557	.7822	.9338	.9066	.8196	1.1125	1.0463
1.750	.231E+09	.9871	1.6935	.7327	.1709	.5046	.3407	.7602	.9304	.9099	.8137	1.1249	1.0540
1.800	.230E+09	.9871	1.6936	.7222	.1590	.4902	.3263	.7381	.9271	.9137	.8079	1.1376	1.0622
1.850	.229E+09	.9870	1.6937	.7118	.1480	.4763	.3126	.7162	.9238	.9181	.8024	1.1511	1.0709
1.900	.227E+09	.9869	1.6937	.7016	.1377	.4628	.2994	.6946	.9206	.9229	.7970	1.1651	1.0802
1.950	.226E+09	.9868	1.6936	.6915	.1282	.4497	.2869	.6733	.9175	.9284	.7918	1.1798	1.0902
2.000	.224E+09	.9868	1.6935	.6817	.1194	.4371	.2749	.6522	.9145	.9343	.7867	1.1949	1.1005

TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.36269E-04	.14835E-03	.7009
.050	1.5680	.36182E-04	.14775E-03	.7009
.100	1.5576	.36125E-04	.14736E-03	.7009
.150	1.5683	.36030E-04	.14671E-03	.7009
.200	1.5654	.35899E-04	.14581E-03	.7010
.250	1.5663	.35730E-04	.14465E-03	.7011
.300	1.5749	.35525E-04	.14325E-03	.7013
.350	1.5729	.35284E-04	.14181E-03	.7006
.400	1.5753	.35007E-04	.14030E-03	.6992
.450	1.5808	.34697E-04	.13862E-03	.6977
.500	1.5876	.34353E-04	.13676E-03	.6961
.550	1.5903	.33977E-04	.13473E-03	.6946
.600	1.5965	.33572E-04	.13255E-03	.6932
.650	1.6010	.33137E-04	.13023E-03	.6919
.700	1.6097	.32676E-04	.12778E-03	.6907
.750	1.6113	.32190E-04	.12522E-03	.6898
.800	1.6204	.31681E-04	.12255E-03	.6891
.850	1.6272	.31153E-04	.11990E-03	.6883
.900	1.6312	.30608E-04	.11723E-03	.6874
.950	1.6344	.30049E-04	.11451E-03	.6870
1.000	1.6435	.29478E-04	.11174E-03	.6869
1.050	1.6477	.28897E-04	.10895E-03	.6872
1.100	1.6502	.28311E-04	.10616E-03	.6879
1.150	1.6536	.27721E-04	.10336E-03	.6891
1.200	1.6583	.27129E-04	.99962E-04	.6948
1.250	1.6620	.26537E-04	.97407E-04	.6954
1.300	1.6628	.25948E-04	.94892E-04	.6961
1.350	1.6671	.25363E-04	.92425E-04	.6970
1.400	1.6652	.24782E-04	.90009E-04	.6980
1.450	1.6684	.24208E-04	.87646E-04	.6991
1.500	1.6685	.23641E-04	.85312E-04	.7005
1.550	1.6727	.23081E-04	.83007E-04	.7021
1.600	1.6713	.22531E-04	.80556E-04	.7056
1.650	1.6699	.21989E-04	.78406E-04	.7070
1.700	1.6698	.21456E-04	.76316E-04	.7084
1.750	1.6732	.20934E-04	.74286E-04	.7096
1.800	1.6708	.20421E-04	.72315E-04	.7108
1.850	1.6717	.19918E-04	.70404E-04	.7119
1.900	1.6706	.19425E-04	.68548E-04	.7129
1.950	1.6728	.18943E-04	.66749E-04	.7138
2.000	1.6694	.18472E-04	.65005E-04	.7146

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TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. TT = 100.0 K PT = 5.0 ATM RHOT = .123E-02 G/CM3 SVT = 774.990 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9987	1.4584	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.112E+08	.9987	1.4600	.9998	.9983	.9994	.9988	.0858	1.0000	1.0000	.9999	1.0001	.9948
.100	.224E+08	.9987	1.4607	.9992	.9928	.9977	.9951	.1709	1.0002	.9998	.9997	1.0001	.9949
.150	.334E+08	.9987	1.4618	.9981	.9838	.9949	.9889	.2545	1.0003	.9994	.9994	1.0001	.9951
.200	.442E+08	.9986	1.4635	.9966	.9713	.9910	.9803	.3359	1.0006	.9988	.9989	1.0000	.9953
.250	.547E+08	.9985	1.4656	.9947	.9557	.9860	.9695	.4144	1.0009	.9982	.9983	1.0001	.9957
.300	.649E+08	.9984	1.4682	.9925	.9367	.9799	.9563	.4894	1.0013	.9971	.9975	.9999	.9959
.350	.747E+08	.9983	1.4713	.9898	.9151	.9727	.9411	.5604	1.0018	.9960	.9965	.9999	.9964
.400	.841E+08	.9982	1.4750	.9867	.8909	.9644	.9242	.6269	1.0023	.9947	.9953	.9999	.9969
.450	.930E+08	.9981	1.4792	.9832	.8641	.9552	.9052	.6884	1.0029	.9929	.9939	.9997	.9972
.500	.101E+09	.9980	1.4839	.9793	.8354	.9449	.8848	.7447	1.0035	.9910	.9922	.9996	.9977
.550	.109E+09	.9978	1.4891	.9750	.8049	.9337	.8629	.7954	1.0041	.9887	.9902	.9994	.9982
.600	.117E+09	.9977	1.4950	.9704	.7731	.9215	.8399	.8405	1.0047	.9861	.9878	.9993	.9987
.650	.123E+09	.9975	1.5014	.9654	.7400	.9084	.8156	.8797	1.0053	.9830	.9852	.9990	.9990
.700	.129E+09	.9973	1.5083	.9600	.7061	.8945	.7905	.9131	1.0059	.9795	.9821	.9987	.9993
.750	.135E+09	.9972	1.5158	.9542	.6718	.8797	.7648	.9408	1.0065	.9756	.9787	.9984	.9995
.800	.140E+09	.9970	1.5239	.9481	.6372	.8642	.7346	.9630	1.0070	.9713	.9748	.9982	.9998
.850	.145E+09	.9968	1.5324	.9416	.6026	.8480	.7121	.9796	1.0074	.9665	.9705	.9978	.9998
.900	.148E+09	.9966	1.5414	.9348	.5685	.8311	.6854	.9912	1.0076	.9614	.9657	.9977	1.0000
.950	.152E+09	.9964	1.5507	.9275	.5349	.8138	.6539	.9979	1.0078	.9560	.9605	.9977	1.0001
1.000	.155E+09	.9963	1.5604	.9199	.5020	.7957	.6324	1.0000	1.0077	.9502	.9548	.9976	1.0000
1.050	.157E+09	.9961	1.5703	.9119	.4700	.7773	.6063	.9979	1.0075	.9441	.9487	.9978	.9999
1.100	.159E+09	.9959	1.5802	.9036	.4394	.7586	.5809	.9923	1.0070	.9381	.9422	.9985	1.0002
1.150	.161E+09	.9957	1.5901	.8949	.4099	.7397	.5558	.9832	1.0063	.9320	.9353	.9994	1.0004
1.200	.162E+09	.9956	1.5998	.8858	.3818	.7206	.5315	.9711	1.0053	.9258	.9281	1.0007	1.0006
1.250	.163E+09	.9954	1.6092	.8764	.3552	.7015	.5081	.9567	1.0040	.9201	.9207	1.0027	1.0014
1.300	.163E+09	.9953	1.6182	.8667	.3301	.6825	.4854	.9401	1.0025	.9147	.9131	1.0052	1.0024
1.350	.164E+09	.9951	1.6265	.8567	.3065	.6636	.4636	.9215	1.0007	.9096	.9055	1.0082	1.0036
1.400	.164E+09	.9950	1.6343	.8465	.2845	.6450	.4428	.9010	.9987	.9053	.8978	1.0122	1.0055
1.450	.164E+09	.9948	1.6414	.8360	.2639	.6266	.4229	.8811	.9964	.9016	.8901	1.0169	1.0079
1.500	.163E+09	.9947	1.6477	.8254	.2448	.6086	.4038	.8594	.9939	.8987	.8825	1.0224	1.0108
1.550	.163E+09	.9946	1.6533	.8147	.2271	.5911	.3858	.8373	.9913	.8966	.8751	1.0289	1.0145
1.600	.162E+09	.9944	1.6582	.8039	.2106	.5740	.3685	.8148	.9885	.8952	.8678	1.0360	1.0187
1.650	.161E+09	.9943	1.6624	.7931	.1954	.5573	.3521	.7920	.9856	.8947	.8608	1.0440	1.0235
1.700	.160E+09	.9942	1.6659	.7822	.1813	.5411	.3366	.7694	.9826	.8950	.8539	1.0529	1.0291
1.750	.159E+09	.9941	1.6689	.7714	.1683	.5255	.3219	.7469	.9796	.8963	.8473	1.0627	1.0355
1.800	.158E+09	.9940	1.6714	.7607	.1563	.5103	.3078	.7245	.9765	.8983	.8409	1.0733	1.0425
1.850	.157E+09	.9940	1.6734	.7500	.1453	.4956	.2945	.7024	.9735	.9011	.8348	1.0846	1.0502
1.900	.156E+09	.9939	1.6750	.7395	.1350	.4813	.2818	.6806	.9704	.9046	.8289	1.0967	1.0586
1.950	.155E+09	.9938	1.6763	.7291	.1255	.4676	.2698	.6593	.9674	.9088	.8232	1.1095	1.0676
2.000	.154E+09	.9937	1.6773	.7188	.1168	.4543	.2583	.6383	.9644	.9137	.8177	1.1229	1.0772

TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.42520E-04	.19456E-03	.7092
.050	1.4886	.42425E-04	.19368E-03	.7093
.100	1.4553	.42373E-04	.19327E-03	.7092
.150	1.4603	.42285E-04	.19258E-03	.7089
.200	1.4573	.42163E-04	.19162E-03	.7086
.250	1.4667	.42006E-04	.19040E-03	.7082
.300	1.4603	.41815E-04	.18891E-03	.7076
.350	1.4681	.41590E-04	.18716E-03	.7070
.400	1.4737	.41332E-04	.18516E-03	.7064
.450	1.4720	.41040E-04	.18290E-03	.7056
.500	1.4791	.40715E-04	.18040E-03	.7048
.550	1.4835	.40358E-04	.17767E-03	.7040
.600	1.4909	.39970E-04	.17471E-03	.7032
.650	1.4932	.39551E-04	.17153E-03	.7024
.700	1.5005	.39102E-04	.16815E-03	.7017
.750	1.5079	.38623E-04	.16466E-03	.7007
.800	1.5162	.38117E-04	.16106E-03	.6995
.850	1.5224	.37584E-04	.15729E-03	.6985
.900	1.5328	.37025E-04	.15337E-03	.6978
.950	1.5420	.36443E-04	.14932E-03	.6974
1.000	1.5489	.35839E-04	.14516E-03	.6974
1.050	1.5584	.35215E-04	.14092E-03	.6978
1.100	1.5715	.34574E-04	.13741E-03	.6946
1.150	1.5782	.33919E-04	.13386E-03	.6919
1.200	1.5867	.33253E-04	.13028E-03	.6896
1.250	1.5992	.32579E-04	.12669E-03	.6878
1.300	1.6065	.31900E-04	.12311E-03	.6866
1.350	1.6122	.31218E-04	.11958E-03	.6859
1.400	1.6240	.30534E-04	.11623E-03	.6849
1.450	1.6299	.29861E-04	.11291E-03	.6845
1.500	1.6354	.29189E-04	.10966E-03	.6847
1.550	1.6427	.28525E-04	.10648E-03	.6854
1.600	1.6457	.27870E-04	.10337E-03	.6866
1.650	1.6493	.27225E-04	.10034E-03	.6881
1.700	1.6549	.26592E-04	.97222E-04	.6913
1.750	1.6584	.25971E-04	.94571E-04	.6921
1.800	1.6601	.25361E-04	.92007E-04	.6930
1.850	1.6630	.24765E-04	.89527E-04	.6941
1.900	1.6638	.24181E-04	.87129E-04	.6953
1.950	1.6652	.23611E-04	.84796E-04	.6966
2.000	1.6655	.23052E-04	.82516E-04	.6982

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TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAMYDROGEN

P. TT = 200.0 K PT = 5.0 ATM RHOT = .612E-03 G/CM3 SVT = 1057.808 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	F/FT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0033	1.3478	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.473E+07	1.0033	1.3475	.9999	.9993	.9996	.9997	.0859	1.0000	1.0000	1.0001	.9999	.9961
.100	.943E+07	1.0033	1.3474	.9991	.9932	.9983	.9949	.1711	1.0001	1.0002	1.0003	.9999	.9961
.150	.141E+08	1.0033	1.3472	.9979	.9850	.9961	.9889	.2548	1.0001	1.0006	1.0006	1.0000	.9963
.200	.186E+08	1.0032	1.3470	.9962	.9775	.9931	.9803	.3362	1.0002	1.0010	1.0010	1.0000	.9963
.250	.230E+08	1.0032	1.3467	.9941	.9588	.9893	.9693	.4147	1.0003	1.0014	1.0016	.9999	.9964
.300	.273E+08	1.0031	1.3462	.9916	.9414	.9846	.9563	.4897	1.0005	1.0021	1.0024	.9999	.9965
.350	.313E+08	1.0031	1.3458	.9886	.9213	.9792	.9411	.5605	1.0007	1.0028	1.0032	.9998	.9966
.400	.352E+08	1.0030	1.3453	.9853	.8959	.9731	.9241	.6268	1.0009	1.0036	1.0042	.9998	.9966
.450	.388E+08	1.0029	1.3447	.9815	.8743	.9662	.9052	.6882	1.0012	1.0046	1.0053	.9997	.9970
.500	.422E+08	1.0028	1.3442	.9773	.8479	.9587	.8849	.7443	1.0015	1.0058	1.0066	.9997	.9973
.550	.453E+08	1.0027	1.3435	.9728	.8198	.9505	.8630	.7949	1.0018	1.0069	1.0080	.9996	.9975
.600	.482E+08	1.0026	1.3429	.9680	.7905	.9417	.8401	.8398	1.0022	1.0083	1.0095	.9995	.9979
.650	.508E+08	1.0025	1.3423	.9628	.7600	.9323	.8159	.8789	1.0027	1.0096	1.0111	.9993	.9981
.700	.531E+08	1.0024	1.3416	.9574	.7290	.9224	.7910	.9125	1.0032	1.0112	1.0128	.9993	.9986
.750	.551E+08	1.0023	1.3410	.9517	.6972	.9121	.7653	.9402	1.0038	1.0126	1.0147	.9990	.9989
.800	.569E+08	1.0022	1.3405	.9457	.6653	.9013	.7390	.9624	1.0045	1.0142	1.0167	.9987	.9992
.850	.584E+08	1.0021	1.3399	.9396	.6333	.8901	.7124	.9793	1.0052	1.0157	1.0187	.9983	.9995
.900	.596E+08	1.0019	1.3395	.9332	.6015	.8785	.6856	.9971	1.0059	1.0173	1.0208	.9979	.9999
.950	.606E+08	1.0018	1.3391	.9266	.5698	.8666	.6585	.9978	1.0068	1.0185	1.0231	.9971	.9999
1.000	.613E+08	1.0017	1.3389	.9199	.5388	.8545	.6316	1.0000	1.0077	1.0199	1.0254	.9963	1.0000
1.050	.618E+08	1.0016	1.3387	.9130	.5083	.8420	.6047	.9979	1.0086	1.0210	1.0277	.9952	.9999
1.100	.621E+08	1.0015	1.3387	.9060	.4786	.8293	.5782	.9919	1.0097	1.0220	1.0300	.9940	.9997
1.150	.622E+08	1.0014	1.3389	.8989	.4498	.8164	.5520	.9823	1.0108	1.0227	1.0324	.9926	.9994
1.200	.620E+08	1.0013	1.3393	.8917	.4219	.8034	.5262	.9693	1.0120	1.0231	1.0348	.9908	.9988
1.250	.617E+08	1.0012	1.3398	.8844	.3952	.7902	.5012	.9537	1.0132	1.0236	1.0371	.9891	.9983
1.300	.613E+08	1.0011	1.3406	.8771	.3694	.7768	.4766	.9354	1.0145	1.0235	1.0393	.9869	.9974
1.350	.607E+08	1.0010	1.3416	.8697	.3448	.7633	.4527	.9150	1.0159	1.0232	1.0415	.9847	.9964
1.400	.599E+08	1.0009	1.3429	.8623	.3213	.7497	.4296	.8928	1.0173	1.0226	1.0436	.9822	.9954
1.450	.591E+08	1.0008	1.3445	.8548	.2990	.7361	.4072	.8688	1.0188	1.0214	1.0456	.9793	.9938
1.500	.581E+08	1.0007	1.3464	.8473	.2777	.7223	.3855	.8434	1.0203	1.0196	1.0474	.9760	.9920
1.550	.571E+08	1.0007	1.3487	.8398	.2577	.7085	.3647	.8171	1.0219	1.0175	1.0490	.9726	.9900
1.600	.559E+08	1.0006	1.3514	.8323	.2387	.6947	.3446	.7900	1.0235	1.0148	1.0503	.9688	.9877
1.650	.547E+08	1.0005	1.3545	.8249	.2209	.6808	.3254	.7622	1.0251	1.0113	1.0514	.9646	.9850
1.700	.535E+08	1.0004	1.3581	.8174	.2041	.6668	.3069	.7341	1.0268	1.0073	1.0522	.9601	.9820
1.750	.522E+08	1.0004	1.3621	.8099	.1884	.6528	.2895	.7062	1.0285	1.0031	1.0527	.9557	.9791
1.800	.509E+08	1.0003	1.3667	.8025	.1737	.6388	.2727	.6779	1.0302	.9979	1.0528	.9507	.9756
1.850	.496E+08	1.0003	1.3717	.7950	.1599	.6248	.2567	.6500	1.0319	.9921	1.0525	.9456	.9719
1.900	.482E+08	1.0002	1.3774	.7876	.1471	.6107	.2416	.6224	1.0336	.9857	1.0517	.9402	.9680
1.950	.469E+08	1.0002	1.3837	.7802	.1351	.5967	.2272	.5951	1.0353	.9784	1.0504	.9344	.9636
2.000	.455E+08	1.0001	1.3906	.7729	.1241	.5826	.2136	.5684	1.0369	.9707	1.0487	.9286	.9592

TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.68423E-04	.37459E-03	.7027
.050	1.3387	.68286E-04	.37403E-03	.7028
.100	1.3488	.68225E-04	.37378E-03	.7028
.150	1.3591	.68124E-04	.37337E-03	.7028
.200	1.3512	.67983E-04	.37280E-03	.7028
.250	1.3481	.67803E-04	.37206E-03	.7028
.300	1.3512	.67586E-04	.37117E-03	.7028
.350	1.3483	.67331E-04	.37014E-03	.7027
.400	1.3491	.67040E-04	.36896E-03	.7027
.450	1.3485	.66716E-04	.36764E-03	.7026
.500	1.3499	.66358E-04	.36620E-03	.7024
.550	1.3465	.65969E-04	.36463E-03	.7021
.600	1.3482	.65550E-04	.36264E-03	.7024
.650	1.3455	.65102E-04	.35984E-03	.7039
.700	1.3475	.64620E-04	.35688E-03	.7055
.750	1.3445	.64129E-04	.35377E-03	.7070
.800	1.3445	.63608E-04	.35054E-03	.7086
.850	1.3438	.63063E-04	.34718E-03	.7100
.900	1.3439	.62499E-04	.34371E-03	.7114
.950	1.3409	.61917E-04	.34014E-03	.7126
1.000	1.3414	.61317E-04	.33649E-03	.7137
1.050	1.3409	.60700E-04	.33275E-03	.7146
1.100	1.3407	.60069E-04	.32895E-03	.7152
1.150	1.3405	.59424E-04	.32508E-03	.7156
1.200	1.3390	.58767E-04	.32116E-03	.7157
1.250	1.3424	.58097E-04	.31719E-03	.7154
1.300	1.3412	.57416E-04	.31318E-03	.7147
1.350	1.3425	.56725E-04	.30914E-03	.7137
1.400	1.3443	.56025E-04	.30507E-03	.7122
1.450	1.3446	.55315E-04	.30097E-03	.7102
1.500	1.3455	.54597E-04	.29685E-03	.7077
1.550	1.3485	.53870E-04	.29030E-03	.7104
1.600	1.3509	.53134E-04	.28370E-03	.7129
1.650	1.3529	.52391E-04	.27708E-03	.7149
1.7	1.3564	.51639E-04	.27045E-03	.7165
1.750	1.3622	.50880E-04	.26380E-03	.7178
1.800	1.3641	.50113E-04	.25714E-03	.7186
1.850	1.3701	.49338E-04	.25046E-03	.7190
1.900	1.3753	.48555E-04	.24378E-03	.7190
1.950	1.3800	.47765E-04	.23710E-03	.7185
2.000	1.3879	.46967E-04	.23041E-03	.7176

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TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

TT = 300.0 K PT = 5.0 ATM $\rho_{HOT} = .408E-03$ G/CM³ SVT = 1313.208 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0030	1.3702	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.298E+07	1.0030	1.3856	.9997	.9983	.9995	.9987	.0863	1.0000	1.0000	1.0000	1.0000	1.0011
.100	.595E+07	1.0029	1.3855	.9990	.9932	.9981	.9951	.1720	1.0000	1.0002	1.0001	1.0001	1.0012
.150	.887E+07	1.0029	1.3853	.9977	.9846	.9957	.9889	.2560	.9999	1.0002	1.0002	1.0001	1.0011
.200	.117E+08	1.0029	1.3851	.9959	.9727	.9923	.9802	.3378	.9999	1.0002	1.0003	1.0000	1.0009
.250	.145E+08	1.0029	1.3848	.9936	.9576	.9881	.9693	.4165	.9998	1.0002	1.0004	.9999	1.0007
.300	.172E+08	1.0028	1.3844	.9908	.9399	.9830	.9563	.4918	.9997	1.0004	1.0007	.9999	1.0007
.350	.197E+08	1.0028	1.3839	.9876	.9194	.9770	.9417	.5628	.9996	1.0006	1.0009	.9999	1.0007
.400	.222E+08	1.0027	1.3834	.9839	.8965	.9701	.9243	.6293	.9995	1.0010	1.0012	1.0001	1.0007
.450	.245E+08	1.0026	1.3827	.9798	.8713	.9626	.9055	.6906	.9994	1.0012	1.0015	1.0000	1.0005
.500	.266E+08	1.0026	1.3820	.9752	.8444	.9542	.8852	.7467	.9993	1.0016	1.0019	1.0001	1.0004
.550	.286E+08	1.0025	1.3813	.9702	.8159	.9452	.8636	.7972	.9992	1.0021	1.0024	1.0002	1.0004
.600	.304E+08	1.0024	1.3804	.9649	.7860	.9356	.8406	.8418	.9990	1.0025	1.0029	1.0002	1.0003
.650	.321E+08	1.0023	1.3795	.9592	.7551	.9253	.8166	.8807	.9989	1.0031	1.0035	1.0002	1.0002
.700	.335E+08	1.0022	1.3784	.9531	.7235	.9146	.7917	.9137	.9988	1.0036	1.0042	1.0001	1.0000
.750	.348E+08	1.0022	1.3773	.9468	.6915	.9033	.7661	.9411	.9986	1.0042	1.0049	1.0001	.9998
.800	.359E+08	1.0021	1.3760	.9402	.6593	.8916	.7401	.9629	.9985	1.0049	1.0057	1.0001	.9997
.850	.369E+08	1.0020	1.3747	.9332	.6272	.8796	.7138	.9795	.9984	1.0060	1.0067	1.0003	.9998
.900	.377E+08	1.0019	1.3733	.9261	.5954	.8672	.6873	.9910	.9983	1.0070	1.0077	1.0004	.9998
.950	.383E+08	1.0018	1.3718	.9187	.5641	.8545	.6608	.9978	.9982	1.0082	1.0088	1.0006	.9999
1.000	.388E+08	1.0017	1.3702	.9112	.5333	.8417	.6344	1.0000	.9981	1.0095	1.0100	1.0008	1.0000
1.050	.391E+08	1.0016	1.3686	.9035	.5032	.8286	.6081	.9980	.9981	1.0108	1.0113	1.0008	1.0000
1.100	.393E+08	1.0015	1.3669	.8956	.4740	.8154	.5822	.9921	.9981	1.0121	1.0127	1.0008	1.0000
1.150	.394E+08	1.0015	1.3651	.8876	.4457	.8021	.5565	.9827	.9981	1.0134	1.0143	1.0007	.9999
1.200	.393E+08	1.0014	1.3632	.8795	.4185	.7888	.5314	.9702	.9982	1.0148	1.0159	1.0005	.9997
1.250	.392E+08	1.0013	1.3613	.8717	.3924	.7754	.5069	.9552	.9983	1.0165	1.0177	1.0005	.9998
1.300	.389E+08	1.0012	1.3594	.8631	.3675	.7620	.4832	.9378	.9984	1.0183	1.0195	1.0005	1.0000
1.350	.386E+08	1.0012	1.3574	.8548	.3436	.7486	.4599	.9179	.9986	1.0197	1.0215	1.0000	.9997
1.400	.381E+08	1.0011	1.3555	.8465	.3210	.7353	.4373	.8965	.9988	1.0214	1.0236	.9997	.9996
1.450	.376E+08	1.0010	1.3536	.8382	.2994	.7221	.4154	.8734	.9990	1.0227	1.0257	.9990	.9991
1.500	.370E+08	1.0009	1.3517	.8299	.2790	.7089	.3943	.8491	.9994	1.0241	1.0280	.9982	.9987
1.550	.364E+08	1.0009	1.3498	.8217	.2597	.6959	.3740	.8240	.9998	1.0255	1.0303	.9975	.9983
1.600	.357E+08	1.0008	1.3480	.8134	.2416	.6830	.3545	.7980	1.0002	1.0268	1.0327	.9964	.9977
1.650	.349E+08	1.0008	1.3463	.8052	.2245	.6702	.3357	.7715	1.0007	1.0279	1.0351	.9952	.9969
1.700	.342E+08	1.0007	1.3446	.7970	.2084	.6576	.3176	.7444	1.0012	1.0285	1.0376	.9935	.9957
1.750	.333E+08	1.0007	1.3431	.7889	.1933	.6451	.3003	.7173	1.0018	1.0291	1.0401	.9917	.9945
1.800	.325E+08	1.0006	1.3418	.7809	.1792	.6327	.2839	.6902	1.0025	1.0295	1.0427	.9897	.9932
1.850	.317E+08	1.0006	1.3406	.7729	.1660	.6205	.2681	.6632	1.0032	1.0295	1.0452	.9874	.9916
1.900	.308E+08	1.0005	1.3395	.7651	.1536	.6084	.2531	.6365	1.0039	1.0294	1.0477	.9849	.9899
1.950	.299E+08	1.0005	1.3387	.7573	.1421	.5965	.2388	.6100	1.0048	1.0288	1.0502	.9821	.9879
2.000	.290E+08	1.0004	1.3380	.7496	.1313	.5848	.2252	.5839	1.0056	1.0277	1.0526	.9788	.9854

TABLE III. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

G. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.89665E-04	.46180E-03	.7100
.050	1.3858	.89681E-04	.46167E-03	.6899
.100	1.4008	.89593E-04	.46128E-03	.6900
.150	1.3869	.89448E-04	.46064E-03	.6900
.200	1.3850	.89245E-04	.45975E-03	.6901
.250	1.3846	.88987E-04	.45862E-03	.6902
.300	1.3904	.88673E-04	.45724E-03	.6904
.350	1.3882	.88387E-04	.45564E-03	.6905
.400	1.3901	.87890E-04	.45382E-03	.6907
.450	1.3850	.87424E-04	.45179E-03	.6909
.500	1.3866	.86912E-04	.44957E-03	.6912
.550	1.3860	.86356E-04	.44716E-03	.6914
.600	1.3836	.85759E-04	.44458E-03	.6917
.650	1.3828	.85123E-04	.44190E-03	.6920
.700	1.3803	.84452E-04	.43918E-03	.6922
.750	1.3801	.83747E-04	.43633E-03	.6924
.800	1.3783	.83014E-04	.43337E-03	.6926
.850	1.3794	.82253E-04	.43032E-03	.6929
.900	1.3769	.81469E-04	.42719E-03	.6932
.950	1.3763	.80662E-04	.42398E-03	.6935
1.000	1.3743	.79838E-04	.42072E-03	.6939
1.050	1.3717	.78997E-04	.41741E-03	.6942
1.100	1.3699	.78144E-04	.41406E-03	.6946
1.150	1.3667	.77279E-04	.41068E-03	.6951
1.200	1.3652	.76405E-04	.40729E-03	.6955
1.250	1.3650	.75524E-04	.40382E-03	.6960
1.300	1.3639	.74638E-04	.40003E-03	.6971
1.350	1.3585	.73748E-04	.39625E-03	.6981
1.400	1.3587	.72857E-04	.39248E-03	.6991
1.450	1.3548	.71965E-04	.38873E-03	.6999
1.500	1.3535	.71073E-04	.38500E-03	.7007
1.550	1.3526	.70183E-04	.38131E-03	.7013
1.600	1.3502	.69295E-04	.37764E-03	.7018
1.650	1.3483	.68411E-04	.37402E-03	.7021
1.700	1.3451	.67530E-04	.37043E-03	.7023
1.750	1.3446	.66652E-04	.36688E-03	.7021
1.800	1.3439	.65780E-04	.36337E-03	.7016
1.850	1.3419	.64911E-04	.35841E-03	.7038
1.900	1.3419	.64048E-04	.35303E-03	.7066
1.950	1.3405	.63190E-04	.34771E-03	.7091
2.000	1.3389	.62336E-04	.34246E-03	.7112

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. $TT = 40.0 \text{ K}$ $PT = 8.0 \text{ ATM}$ $RHOT = .566E-02 \text{ G/CM}^3$ $SVT = 501.370 \text{ M/SEC}$

MACH	RE/M	γ	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.8580	2.0436	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.640E+08	.8680	2.0437	.9995	.9979	.9991	.9988	.0900	.9997	.9996	.9996	1.0000	1.0433
.100	.128E+09	.8578	2.0437	.9979	.9913	.9965	.9950	.1790	.9989	.9982	.9985	1.0000	1.0424
.150	.191E+09	.8676	2.0437	.9953	.9885	.9921	.9888	.2662	.9976	.9961	.9966	1.0000	1.0410
.200	.252E+09	.8672	2.0437	.9918	.9659	.9861	.9804	.3507	.9957	.9932	.9940	1.0002	1.0392
.250	.313E+09	.8668	2.0436	.9872	.9473	.9785	.9696	.4315	.9934	.9894	.9907	1.0002	1.0368
.300	.371E+09	.8662	2.0435	.9818	.9255	.9697	.9568	.5081	.9906	.9851	.9868	1.0004	1.0341
.350	.428E+09	.8656	2.0435	.9755	.9007	.9588	.9421	.5800	.9874	.9803	.9823	1.0008	1.0312
.400	.483E+09	.8650	2.0433	.9684	.8733	.9469	.9255	.6465	.9838	.9750	.9772	1.0013	1.0280
.450	.535E+09	.8642	2.0430	.9606	.8436	.9339	.9073	.7072	.9799	.9693	.9717	1.0020	1.0245
.500	.585E+09	.8635	2.0427	.9521	.8124	.9198	.8879	.7622	.9756	.9636	.9657	1.0031	1.0212
.550	.632E+09	.8627	2.0422	.9431	.7796	.9047	.8671	.8110	.9712	.9576	.9594	1.0043	1.0177
.600	.676E+09	.8619	2.0417	.9334	.7461	.8888	.8454	.8538	.9665	.9516	.9528	1.0059	1.0144
.650	.718E+09	.8611	2.0412	.9234	.7120	.8723	.8229	.8906	.9616	.9458	.9460	1.0079	1.0114
.700	.757E+09	.8603	2.0405	.9129	.6777	.8551	.7997	.9216	.9566	.9401	.9389	1.0103	1.0085
.750	.793E+09	.8595	2.0397	.9022	.6436	.8375	.7761	.9469	.9515	.9346	.9317	1.0131	1.0060
.800	.826E+09	.8587	2.0403	.8913	.6096	.8195	.7520	.9670	.9467	.9293	.9244	1.0163	1.0039
.850	.857E+09	.8579	2.0409	.8803	.5762	.8011	.7277	.9819	.9418	.9241	.9169	1.0198	1.0022
.900	.886E+09	.8571	2.0417	.8691	.5436	.7826	.7035	.9922	.9368	.9194	.9094	1.0239	1.0010
.950	.912E+09	.8563	2.0424	.8577	.5120	.7640	.6793	.9982	.9319	.9152	.9019	1.0286	1.0003
1.000	.935E+09	.8556	2.0429	.8462	.4814	.7453	.6552	.9999	.9270	.9112	.8943	1.0336	.9999
1.050	.957E+09	.8549	2.0433	.8347	.4521	.7267	.6317	.9982	.9221	.9080	.8869	1.0395	1.0003
1.100	.976E+09	.8543	2.0435	.8231	.4240	.7082	.6084	.9932	.9173	.9053	.8795	1.0459	1.0011
1.150	.993E+09	.8537	2.0433	.8114	.3973	.6898	.5856	.9853	.9124	.9032	.8723	1.0529	1.0025
1.200	.101E+10	.8531	2.0428	.7998	.3719	.6718	.5633	.9748	.9076	.9018	.8652	1.0605	1.0045
1.250	.102E+10	.8526	2.0420	.7881	.3479	.6540	.5416	.9622	.9029	.9012	.8583	1.0690	1.0072
1.300	.103E+10	.8521	2.0409	.7766	.3253	.6365	.5206	.9477	.8983	.9012	.8517	1.0780	1.0105
1.350	.104E+10	.8516	2.0394	.7651	.3039	.6194	.5001	.9314	.8937	.9019	.8452	1.0876	1.0143
1.400	.105E+10	.8512	2.0376	.7537	.2878	.6027	.4802	.9137	.8892	.9032	.8389	1.0979	1.0188
1.450	.106E+10	.8508	2.0357	.7424	.2650	.5864	.4611	.8951	.8849	.9054	.8329	1.1090	1.0240

SATURATION BOUNDARY REACHED.

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.22199E-04	.84287E-04	.8278
.050	1.7849	.22131E-04	.83978E-04	.8283
.100	1.7431	.22077E-04	.83773E-04	.8284
.150	1.7537	.21989E-04	.83431E-04	.8286
.200	1.7614	.21868E-04	.82953E-04	.8289
.250	1.7457	.21712E-04	.82331E-04	.8293
.300	1.7497	.21527E-04	.81566E-04	.8301
.350	1.7521	.21312E-04	.80656E-04	.8314
.400	1.7449	.21069E-04	.79593E-04	.8332
.450	1.7411	.20882E-04	.78785E-04	.8314
.500	1.7444	.20512E-04	.77706E-04	.8317
.550	1.7352	.20200E-04	.76494E-04	.8326
.600	1.7345	.19871E-04	.75157E-04	.8342
.650	1.7327	.19526E-04	.73698E-04	.8367
.700	1.7279	.19167E-04	.72133E-04	.8399
.750	1.7246	.18796E-04	.70618E-04	.8423
.800	1.7201	.18415E-04	.69032E-04	.8452
.850	1.7173	.18025E-04	.67454E-04	.8471
.900	1.7175	.17628E-04	.65976E-04	.8476
.950	1.7159	.17227E-04	.64326E-04	.8500
1.000	1.7094	.16823E-04	.62816E-04	.8505
1.050	1.7123	.16418E-04	.61292E-04	.8512
1.100	1.7071	.16013E-04	.59743E-04	.8524
1.150	1.7051	.15610E-04	.58181E-04	.8541
1.200	1.7013	.15210E-04	.56612E-04	.8563
1.250	1.7007	.14814E-04	.55046E-04	.8591
1.300	1.6970	.14423E-04	.53780E-04	.8577
1.350	1.6914	.14037E-04	.52479E-04	.8575
1.400	1.6871	.13658E-04	.51123E-04	.8590
1.450	1.6864	.1328EE-04	.49726E-04	.8621

SATURATION BOUNDARY REACHED.

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

R. TT = 45.0 K PT = 8.0 ATM RHO T = .481E-02 G/CM³ SVT = 541.451 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9087	1.9185	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.540E+08	.9086	1.9186	.9995	.9979	.9991	.9988	.0897	.9998	.9996	.9996	1.0000	1.0400
.100	.108E+09	.9085	1.9187	.9985	.9913	.9965	.9949	.1785	.9990	.9982	.9985	.9999	1.0391
.150	.161E+09	.9083	1.9188	.9956	.9808	.9922	.9889	.2655	.9978	.9963	.9967	1.0001	1.0380
.200	.213E+09	.9080	1.9189	.9922	.9661	.9862	.9804	.3497	.9962	.9935	.9941	1.0001	1.0364
.250	.264E+09	.9076	1.9190	.9873	.9478	.9787	.9696	.4305	.9941	.9899	.9909	1.0002	1.0343
.300	.313E+09	.9071	1.9191	.9828	.9261	.9696	.9568	.5070	.9916	.9858	.9870	1.0004	1.0319
.350	.361E+09	.9066	1.9193	.9769	.9014	.9591	.9420	.5789	.9887	.9811	.9826	1.0008	1.0293
.400	.407E+09	.9061	1.9193	.9700	.8741	.9473	.9254	.6454	.9854	.9760	.9776	1.0012	1.0263
.450	.451E+09	.9054	1.9193	.9626	.8446	.9343	.9072	.7063	.9819	.9705	.9721	1.0019	1.0233
.500	.493E+09	.9048	1.9192	.9544	.8133	.9207	.8877	.7614	.9780	.9648	.9662	1.0028	1.0202
.550	.532E+09	.9041	1.9190	.9457	.7806	.9051	.8668	.8104	.9738	.9588	.9599	1.0039	1.0170
.600	.569E+09	.9034	1.9188	.9364	.7471	.8892	.8458	.8533	.9695	.9529	.9532	1.0054	1.0139
.650	.604E+09	.9027	1.9184	.9266	.7129	.8726	.8223	.8903	.9650	.9469	.9463	1.0072	1.0110
.700	.636E+09	.9020	1.9180	.9164	.6786	.8554	.7991	.9215	.9603	.9413	.9392	1.0095	1.0084
.750	.666E+09	.9013	1.9174	.9059	.6443	.8377	.7754	.9469	.9555	.9357	.9320	1.0122	1.0060
.800	.694E+09	.9007	1.9168	.8951	.6194	.8196	.7513	.9670	.9507	.9304	.9246	1.0153	1.0040
.850	.719E+09	.9000	1.9161	.8840	.5970	.8013	.7271	.9820	.9458	.9255	.9171	1.0189	1.0023
.900	.743E+09	.8994	1.9153	.8728	.5745	.7828	.7028	.9922	.9408	.9208	.9096	1.0229	1.0010
.950	.764E+09	.8987	1.9144	.8614	.5528	.7641	.6786	.9981	.9359	.9167	.9021	1.0274	1.0002
1.000	.783E+09	.8981	1.9135	.8499	.5323	.7455	.6546	1.0000	.9310	.9130	.8946	1.0326	1.0000
1.050	.800E+09	.8976	1.9133	.8384	.5129	.7268	.6309	.9983	.9263	.9097	.8871	1.0382	1.0003
1.100	.816E+09	.8970	1.9131	.8270	.4927	.7092	.6075	.9933	.9216	.9069	.8796	1.0443	1.0012
1.150	.829E+09	.8965	1.9129	.8155	.4728	.6928	.5844	.9852	.9170	.9044	.8722	1.0509	1.0024
1.200	.841E+09	.8960	1.9127	.8040	.4532	.6772	.5620	.9747	.9125	.9026	.8650	1.0582	1.0043
1.250	.852E+09	.8956	1.9125	.7926	.4340	.6636	.5402	.9619	.9080	.9013	.8578	1.0661	1.0069
1.300	.861E+09	.8952	1.9120	.7812	.4150	.6508	.5188	.9471	.9036	.9006	.8508	1.0744	1.0099
1.350	.869E+09	.8948	1.9115	.7698	.3964	.6384	.4982	.9307	.8993	.9004	.8439	1.0835	1.0135
1.400	.876E+09	.8945	1.9109	.7586	.3782	.6262	.4783	.9130	.8950	.9011	.8372	1.0934	1.0179
1.450	.881E+09	.8942	1.9099	.7475	.3604	.6145	.4590	.8941	.8909	.9023	.8307	1.1037	1.0229
1.500	.886E+09	.8939	1.9089	.7365	.3432	.6032	.4402	.8742	.8868	.9040	.8244	1.1146	1.0282
1.550	.889E+09	.8936	1.9077	.7256	.3266	.5927	.4223	.8538	.8829	.9065	.8183	1.1264	1.0345
1.600	.892E+09	.8935	1.9064	.7149	.3104	.5823	.4058	.8327	.8790	.9094	.8124	1.1385	1.0410
1.650	.894E+09	.8933	1.9051	.7043	.2944	.5719	.3884	.8114	.8753	.9132	.8067	1.1515	1.0485
1.700	.895E+09	.8931	1.9036	.6939	.2788	.5617	.3724	.7897	.8717	.9174	.8012	1.1650	1.0563
1.750	.895E+09	.8930	1.9021	.6837	.2732	.5513	.3571	.7680	.8681	.9223	.7959	1.1791	1.0648
1.800	.895E+09	.8928	1.9007	.6736	.2674	.5409	.3424	.7462	.8647	.9276	.7908	1.1938	1.0738
1.850	.894E+09	.8927	1.8993	.6637	.2615	.5306	.3283	.7246	.8614	.9336	.7860	1.2091	1.0834

SATURATION BOUNDARY REACHED.

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

B. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.24137E-04	.91348E-04	.7736
.050	1.7551	.24066E-04	.91029E-04	.7740
.100	1.7157	.24011E-04	.90779E-04	.7742
.150	1.7548	.23920E-04	.90372E-04	.7747
.200	1.7346	.23793E-04	.89399E-04	.7789
.250	1.7373	.23633E-04	.88765E-04	.7790
.300	1.7341	.23440E-04	.87982E-04	.7794
.350	1.7372	.23216E-04	.87050E-04	.7801
.400	1.7321	.22964E-04	.85961E-04	.7812
.450	1.7304	.22684E-04	.84863E-04	.7815
.500	1.7307	.22380E-04	.83602E-04	.7825
.550	1.7242	.22054E-04	.82238E-04	.7837
.600	1.7253	.21708E-04	.80785E-04	.7852
.650	1.7218	.21344E-04	.79250E-04	.7869
.700	1.7231	.20966E-04	.77648E-04	.7889
.750	1.7176	.20574E-04	.76144E-04	.7894
.800	1.7157	.20171E-04	.74592E-04	.7901
.850	1.7133	.19760E-04	.72970E-04	.7913
.900	1.7089	.19342E-04	.71287E-04	.7930
.950	1.7073	.18919E-04	.69553E-04	.7952
1.000	1.7054	.18492E-04	.67870E-04	.7968
1.050	1.7038	.18062E-04	.66178E-04	.7985
1.100	1.7020	.17632E-04	.64538E-04	.7992
1.150	1.6974	.17201E-04	.62958E-04	.7992
1.200	1.6990	.16772E-04	.61359E-04	.7995
1.250	1.6975	.16346E-04	.59750E-04	.8002
1.300	1.6930	.15923E-04	.58166E-04	.8007
1.350	1.6919	.15506E-04	.56596E-04	.8014
1.400	1.6933	.15095E-04	.55030E-04	.8026
1.450	1.6893	.14689E-04	.53471E-04	.8041
1.500	1.6847	.14291E-04	.52043E-04	.8042
1.550	1.6871	.13900E-04	.50628E-04	.8048
1.600	1.6809	.13517E-04	.49180E-04	.8065
1.650	1.6826	.13142E-04	.47715E-04	.8094
1.700	1.6771	.12775E-04	.46237E-04	.8134
1.750	1.6769	.12417E-04	.44758E-04	.8185
1.800	1.6728	.12068E-04	.43430E-04	.8220
1.850	1.6718	.11728E-04	.42179E-04	.8250

SATURATION BOUNDARY REACHED.

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

C. TT = 50.0 K PT = 8.0 ATM RHOT = .421E-02 G/CM³ SVT = 576.160 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9345	1.8435	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.466E+08	.9344	1.8438	.9995	.9979	.9991	.9988	.0894	.9998	.9996	.9996	1.0000	1.0366
.100	.929E+08	.9343	1.8440	.9981	.9915	.9966	.9951	.1780	.9991	.9985	.9986	1.0001	1.0360
.150	.139E+09	.9341	1.8442	.9953	.9809	.9923	.9889	.2646	.9981	.9964	.9968	1.0000	1.0348
.200	.184E+09	.9339	1.8446	.9927	.9664	.9864	.9803	.3487	.9966	.9937	.9943	1.0001	1.0333
.250	.227E+09	.9335	1.8450	.9886	.9482	.9789	.9696	.4293	.9947	.9903	.9912	1.0002	1.0315
.300	.270E+09	.9332	1.8455	.9837	.9266	.9699	.9567	.5058	.9925	.9863	.9874	1.0003	1.0293
.350	.311E+09	.9327	1.8460	.9780	.9019	.9595	.9418	.5775	.9899	.9817	.9830	1.0005	1.0268
.400	.351E+09	.9322	1.8465	.9715	.8748	.9478	.9253	.6442	.9869	.9768	.9781	1.0011	1.0243
.450	.389E+09	.9317	1.8470	.9643	.8454	.9349	.9070	.7052	.9837	.9715	.9727	1.0017	1.0216
.500	.425E+09	.9311	1.8474	.9565	.8142	.9209	.8874	.7603	.9801	.9658	.9669	1.0025	1.0187
.550	.458E+09	.9305	1.8477	.9480	.7816	.9059	.8665	.8094	.9763	.9600	.9607	1.0036	1.0158
.600	.490E+09	.9299	1.8480	.9391	.7480	.8900	.8446	.8526	.9722	.9541	.9541	1.0050	1.0130
.650	.520E+09	.9292	1.8481	.9297	.7139	.8734	.8219	.8897	.9680	.9482	.9472	1.0067	1.0103
.700	.548E+09	.9286	1.8481	.9196	.6794	.8562	.7985	.9209	.9636	.9424	.9401	1.0088	1.0078
.750	.573E+09	.9280	1.8480	.9093	.6451	.8385	.7748	.9466	.9591	.9369	.9329	1.0114	1.0057
.800	.597E+09	.9274	1.8478	.8987	.6111	.8204	.7506	.9667	.9545	.9315	.9255	1.0143	1.0037
.850	.618E+09	.9267	1.8475	.8878	.5777	.8021	.7262	.9818	.9498	.9265	.9180	1.0177	1.0021
.900	.638E+09	.9262	1.8470	.8767	.5449	.7835	.7013	.9920	.9450	.9217	.9104	1.0215	1.0008
.950	.656E+09	.9256	1.8466	.8654	.5133	.7648	.6777	.9981	.9403	.9176	.9028	1.0261	1.0003
1.000	.672E+09	.9250	1.8469	.8540	.4827	.7461	.6536	1.0000	.9355	.9137	.8953	1.0310	1.0000
1.050	.686E+09	.9245	1.8467	.8425	.4522	.7274	.6298	.9982	.9308	.9103	.8878	1.0365	1.0002
1.100	.699E+09	.9240	1.8465	.8310	.4230	.7088	.6064	.9931	.9261	.9075	.8803	1.0425	1.0010
1.150	.710E+09	.9236	1.8468	.8195	.3941	.6904	.5835	.9851	.9215	.9052	.8730	1.0491	1.0023
1.200	.720E+09	.9232	1.8460	.8079	.3726	.6721	.5611	.9746	.9169	.9034	.8657	1.0564	1.0042
1.250	.728E+09	.9227	1.8425	.7965	.3483	.6541	.5392	.9618	.9125	.9021	.8586	1.0641	1.0067
1.300	.735E+09	.9224	1.8421	.7851	.3253	.6364	.5178	.9469	.9082	.9012	.8515	1.0723	1.0097
1.350	.741E+09	.9220	1.8417	.7739	.3036	.6189	.4971	.9305	.9040	.9010	.8445	1.0812	1.0133
1.400	.746E+09	.9217	1.8412	.7627	.2832	.6018	.4770	.9125	.8998	.9011	.8377	1.0905	1.0173
1.450	.750E+09	.9214	1.8407	.7516	.2640	.5851	.4575	.8934	.8958	.9019	.8311	1.1005	1.0220
1.500	.754E+09	.9212	1.8402	.7406	.2461	.5687	.4389	.8735	.8918	.9033	.8246	1.1112	1.0274
1.550	.756E+09	.9210	1.8396	.7298	.2293	.5528	.4209	.8529	.8879	.9053	.8184	1.1225	1.0334
1.600	.758E+09	.9207	1.8389	.7191	.2136	.5372	.4035	.8318	.8842	.9079	.8122	1.1344	1.0399
1.650	.759E+09	.9206	1.8381	.7085	.1989	.5220	.3868	.8102	.8805	.9110	.8063	1.1469	1.0470
1.700	.759E+09	.9204	1.8372	.6981	.1853	.5073	.3708	.7885	.8770	.9147	.8006	1.1600	1.0547
1.750	.759E+09	.9203	1.8363	.6879	.1726	.4930	.3555	.7667	.8735	.9190	.7950	1.1738	1.0630
1.800	.759E+09	.9202	1.8353	.6778	.1608	.4791	.3408	.7448	.8701	.9238	.7896	1.1881	1.0718
1.850	.758E+09	.9201	1.8343	.6679	.1498	.4657	.3267	.7232	.8669	.9293	.7844	1.2032	1.0813
1.900	.756E+09	.9200	1.8333	.6582	.1396	.4526	.3132	.7017	.8637	.9352	.7794	1.2187	1.0913
1.950	.754E+09	.9200	1.8323	.6486	.1301	.4400	.3002	.6804	.8606	.9415	.7746	1.2347	1.1017
2.000	.752E+09	.9199	1.8313	.6393	.1212	.4277	.2879	.6595	.8577	.9486	.7699	1.2515	1.1129

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

C. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.26049E-04	.98655E-04	.7440
.050	1.7277	.25975E-04	.98342E-04	.7441
.100	1.7349	.25918E-04	.98106E-04	.7442
.150	1.7149	.25824E-04	.97713E-04	.7442
.200	1.7203	.25693E-04	.97168E-04	.7443
.250	1.7222	.25527E-04	.96477E-04	.7445
.300	1.7196	.25327E-04	.95643E-04	.7447
.350	1.7177	.25095E-04	.94674E-04	.7450
.400	1.7249	.24832E-04	.93582E-04	.7454
.450	1.7199	.24542E-04	.92303E-04	.7464
.500	1.7174	.24225E-04	.90890E-04	.7477
.550	1.7174	.23884E-04	.89381E-04	.7492
.600	1.7162	.23522E-04	.87787E-04	.7508
.650	1.7142	.23141E-04	.85654E-04	.7566
.700	1.7130	.22744E-04	.84008E-04	.7577
.750	1.7136	.22333E-04	.82327E-04	.7588
.800	1.7083	.21909E-04	.80593E-04	.7601
.850	1.7075	.21476E-04	.78817E-04	.7616
.900	1.7039	.21034E-04	.77007E-04	.7632
.950	1.7075	.20588E-04	.75186E-04	.7649
1.000	1.7015	.20136E-04	.73437E-04	.7657
1.050	1.6994	.19682E-04	.71673E-04	.7668
1.100	1.6985	.19228E-04	.69898E-04	.7680
1.150	1.6958	.18773E-04	.68121E-04	.7693
1.200	1.6950	.18320E-04	.66347E-04	.7708
1.250	1.6930	.17869E-04	.64580E-04	.7724
1.300	1.6907	.17420E-04	.62908E-04	.7728
1.350	1.6912	.16976E-04	.61300E-04	.7727
1.400	1.6860	.16537E-04	.59684E-04	.7729
1.450	1.6869	.16104E-04	.58067E-04	.7734
1.500	1.6863	.15678E-04	.56459E-04	.7742
1.550	1.6854	.15258E-04	.54861E-04	.7753
1.600	1.6839	.14847E-04	.53281E-04	.7766
1.650	1.6814	.14443E-04	.51725E-04	.7782
1.700	1.6813	.14047E-04	.50250E-04	.7792
1.750	1.6804	.13661E-04	.48760E-04	.7812
1.800	1.6768	.13283E-04	.47368E-04	.7822
1.850	1.6782	.12914E-04	.46029E-04	.7831
1.900	1.6757	.12553E-04	.44718E-04	.7842
1.950	1.6718	.12202E-04	.43437E-04	.7855
2.000	1.6741	.11860E-04	.42188E-04	.7871

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. TT = 60.0 K PT = 8.0 ATM RHOT = .340E-02 G/CM3 SVT = 634.071 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9542	1.7450	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.363E+08	.9642	1.7457	.9996	.9979	.9992	.9987	.8887	.9998	.9996	.9997	1.0000	1.0288
.100	.723E+08	.9641	1.7462	.9984	.9915	.9967	.9949	.1766	.9994	.9985	.9987	.9999	1.0283
.150	.108E+09	.9640	1.7470	.9964	.9813	.9926	.9888	.2628	.9986	.9968	.9971	1.0000	1.0276
.200	.143E+09	.9638	1.7481	.9936	.9671	.9870	.9804	.3464	.9976	.9945	.9948	1.0001	1.0266
.250	.177E+09	.9635	1.7494	.9901	.9493	.9797	.9696	.4268	.9962	.9915	.9920	1.0002	1.0254
.300	.210E+09	.9632	1.7510	.9858	.9279	.9711	.9566	.5038	.9946	.9877	.9885	1.0003	1.0237
.350	.242E+09	.9628	1.7527	.9807	.9036	.9610	.9417	.5748	.9927	.9835	.9845	1.0005	1.0219
.400	.273E+09	.9624	1.7546	.9750	.8768	.9496	.9251	.6415	.9904	.9790	.9800	1.0009	1.0201
.450	.302E+09	.9620	1.7565	.9685	.8475	.9369	.9066	.7026	.9879	.9738	.9749	1.0012	1.0178
.500	.330E+09	.9615	1.7584	.9614	.8165	.9232	.8869	.7581	.9851	.9685	.9694	1.0020	1.0157
.550	.357E+09	.9611	1.7605	.9537	.7839	.9084	.8658	.8075	.9821	.9628	.9634	1.0027	1.0134
.600	.381E+09	.9606	1.7624	.9454	.7504	.8928	.8437	.8510	.9788	.9571	.9571	1.0038	1.0111
.650	.404E+09	.9600	1.7642	.9366	.7182	.8764	.8208	.8885	.9753	.9513	.9504	1.0054	1.0090
.700	.425E+09	.9595	1.7658	.9272	.6815	.8593	.7971	.9199	.9716	.9453	.9435	1.0069	1.0067
.750	.445E+09	.9590	1.7673	.9175	.6471	.8416	.7731	.9459	.9677	.9398	.9363	1.0092	1.0050
.800	.463E+09	.9584	1.7685	.9073	.6128	.8235	.7486	.9662	.9636	.9341	.9290	1.0117	1.0032
.850	.479E+09	.9579	1.7696	.8968	.5792	.8051	.7242	.9816	.9595	.9290	.9215	1.0148	1.0019
.900	.494E+09	.9574	1.7704	.8861	.5463	.7865	.6996	.9920	.9552	.9239	.9139	1.0182	1.0008
.950	.507E+09	.9569	1.7711	.8751	.5143	.7677	.6751	.9979	.9508	.9193	.9063	1.0221	1.0000
1.000	.519E+09	.9564	1.7715	.8639	.4836	.7489	.6510	1.0000	.9464	.9153	.8987	1.0269	1.0000
1.050	.529E+09	.9559	1.7718	.8526	.4538	.7301	.6270	.9981	.9419	.9116	.8911	1.0318	1.0001
1.100	.538E+09	.9555	1.7719	.8412	.4255	.7114	.6035	.9930	.9375	.9084	.8836	1.0375	1.0009
1.150	.546E+09	.9550	1.7718	.8297	.3984	.6929	.5805	.9849	.9330	.9057	.8762	1.0437	1.0021
1.200	.553E+09	.9546	1.7717	.8183	.3727	.6745	.5581	.9744	.9286	.9037	.8688	1.0507	1.0040
1.250	.559E+09	.9543	1.7714	.8068	.3483	.6564	.5361	.9613	.9243	.9021	.8616	1.0580	1.0063
1.300	.564E+09	.9539	1.7711	.7954	.3253	.6386	.5148	.9466	.9200	.9012	.8545	1.0661	1.0093
1.350	.568E+09	.9536	1.7706	.7840	.3035	.6211	.4942	.9300	.9158	.9008	.8475	1.0747	1.0128
1.400	.571E+09	.9533	1.7702	.7727	.2831	.6040	.4741	.9120	.9117	.9009	.8407	1.0839	1.0168
1.450	.573E+09	.9530	1.7697	.7615	.2639	.5872	.4548	.8930	.9076	.9017	.8341	1.0938	1.0216
1.500	.575E+09	.9528	1.7691	.7505	.2459	.5707	.4361	.8729	.9037	.9028	.8276	1.1041	1.0267
1.550	.576E+09	.9525	1.7686	.7395	.2292	.5547	.4182	.8524	.8998	.9048	.8212	1.1153	1.0327
1.600	.576E+09	.9523	1.7682	.7288	.2134	.5390	.4009	.8311	.8961	.9071	.8150	1.1269	1.0391
1.650	.576E+09	.9521	1.7678	.7181	.1987	.5238	.3842	.8094	.8925	.9098	.8090	1.1389	1.0459
1.700	.576E+09	.9520	1.7674	.7077	.1850	.5090	.3682	.7876	.8890	.9132	.8031	1.1516	1.0535
1.750	.575E+09	.9518	1.7670	.6974	.1722	.4945	.3528	.7656	.8855	.9171	.7975	1.1650	1.0616
1.800	.574E+09	.9517	1.7665	.6872	.1604	.4805	.3382	.7438	.8822	.9215	.7919	1.1790	1.0703
1.850	.572E+09	.9516	1.7661	.6772	.1493	.4669	.3241	.7219	.8790	.9264	.7866	1.1935	1.0794
1.900	.570E+09	.9515	1.7656	.6674	.1351	.4538	.3106	.7002	.8758	.9317	.7814	1.2084	1.0890
1.950	.568E+09	.9514	1.7651	.6578	.1295	.4410	.2977	.6790	.8728	.9378	.7763	1.2243	1.0995
2.000	.566E+09	.9514	1.7645	.6483	.1207	.4286	.2854	.6579	.8698	.9442	.7715	1.2404	1.1103

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.29733E-04	.11626E-03	.7013
.050	1.6656	.29653E-04	.11588E-03	.7013
.100	1.6725	.29594E-04	.11559E-03	.7013
.150	1.6946	.29495E-04	.11513E-03	.7013
.200	1.6917	.29359E-04	.11447E-03	.7013
.250	1.6910	.29184E-04	.11364E-03	.7014
.300	1.6821	.28974E-04	.11263E-03	.7016
.350	1.6881	.28728E-04	.11146E-03	.7018
.400	1.6933	.28450E-04	.11013E-03	.7022
.450	1.6867	.28140E-04	.10865E-03	.7027
.500	1.6938	.27802E-04	.10486E-03	.7180
.550	1.6890	.27436E-04	.10325E-03	.7182
.600	1.6932	.27046E-04	.10154E-03	.7186
.650	1.6958	.26634E-04	.99753E-04	.7191
.700	1.6901	.26203E-04	.97911E-04	.7194
.750	1.6982	.25755E-04	.96006E-04	.7200
.800	1.6917	.25292E-04	.94064E-04	.7206
.850	1.6979	.24817E-04	.92094E-04	.7212
.900	1.6919	.24333E-04	.90085E-04	.7220
.950	1.6925	.23841E-04	.87952E-04	.7237
1.000	1.6968	.23344E-04	.85818E-04	.7255
1.050	1.6905	.22842E-04	.83189E-04	.7317
1.100	1.6925	.22339E-04	.81147E-04	.7331
1.150	1.6895	.21836E-04	.79110E-04	.7345
1.200	1.6920	.21333E-04	.77085E-04	.7360
1.250	1.6872	.20833E-04	.75079E-04	.7376
1.300	1.6895	.20336E-04	.73116E-04	.7390
1.350	1.6860	.19843E-04	.71223E-04	.7400
1.400	1.6849	.19355E-04	.69359E-04	.7409
1.450	1.6852	.18874E-04	.67528E-04	.7419
1.500	1.6816	.18398E-04	.65732E-04	.7428
1.550	1.6849	.17938E-04	.63976E-04	.7436
1.600	1.6814	.17469E-04	.62257E-04	.7443
1.650	1.6791	.17016E-04	.60554E-04	.7451
1.700	1.6799	.16571E-04	.58867E-04	.7462
1.750	1.6793	.16135E-04	.57204E-04	.7474
1.800	1.6789	.15708E-04	.55618E-04	.7482
1.850	1.6772	.15290E-04	.54065E-04	.7489
1.900	1.6747	.14881E-04	.52562E-04	.7495
1.950	1.6783	.14481E-04	.51101E-04	.7501
2.000	1.6741	.14091E-04	.49682E-04	.7505

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. TT = 90.0 K PT = 8.0 ATM $\rho_{HOT} = .248E-02$ G/CM³ SVT = 716.788 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/P	T/TT	RHO/RHOT	A*/A	SV/SVT	P/P	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9890	1.5896	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.244E+08	.9889	1.5910	.9997	.9981	.9993	.9988	.0670	1.0000	.9999	.9998	1.0001	1.0090
.100	.486E+08	.9889	1.5919	.9989	.9922	.9972	.9951	.1733	.9999	.9992	.9992	1.0001	1.0089
.150	.726E+08	.9888	1.5935	.9975	.9825	.9937	.9889	.2580	.9998	.9980	.9988	1.0000	1.0087
.200	.961E+08	.9887	1.5956	.9956	.9691	.9889	.9802	.3403	.9996	.9965	.9968	1.0000	1.0085
.250	.119E+09	.9885	1.5983	.9932	.9522	.9827	.9694	.4196	.9993	.9945	.9950	1.0000	1.0083
.300	.141E+09	.9883	1.6016	.9902	.9320	.9752	.9563	.4953	.9990	.9920	.9927	.9999	1.0079
.350	.163E+09	.9881	1.6054	.9866	.9089	.9664	.9414	.5667	.9986	.9892	.9901	1.0001	1.0076
.400	.184E+09	.9878	1.6097	.9825	.8830	.9563	.9244	.6334	.9981	.9859	.9869	1.0001	1.0072
.450	.203E+09	.9875	1.6146	.9779	.8548	.9451	.9058	.6949	.9975	.9823	.9834	1.0003	1.0067
.500	.222E+09	.9872	1.6198	.9727	.8246	.9328	.8856	.7509	.9968	.9781	.9794	1.0005	1.0061
.550	.239E+09	.9869	1.6255	.9679	.7926	.9193	.8640	.8011	.9959	.9735	.9749	1.0006	1.0054
.600	.256E+09	.9865	1.6314	.9608	.7594	.9049	.8413	.8455	.9948	.9686	.9700	1.0010	1.0047
.650	.271E+09	.9862	1.6377	.9541	.7253	.8896	.8177	.8841	.9936	.9635	.9647	1.0016	1.0040
.700	.285E+09	.9858	1.6440	.9468	.6907	.8734	.7933	.9167	.9921	.9580	.9590	1.0022	1.0032
.750	.298E+09	.9854	1.6505	.9391	.6558	.8565	.7684	.9435	.9905	.9523	.9528	1.0031	1.0024
.800	.309E+09	.9850	1.6569	.9308	.6210	.8390	.7432	.9648	.9886	.9466	.9464	1.0043	1.0017
.850	.320E+09	.9846	1.6632	.9221	.5866	.8209	.7177	.9807	.9865	.9407	.9396	1.0057	1.0010
.900	.329E+09	.9842	1.6693	.9130	.5529	.8025	.6923	.9917	.9841	.9351	.9325	1.0077	1.0005
.950	.338E+09	.9838	1.6750	.9034	.5199	.7837	.6669	.9978	.9816	.9293	.9252	1.0098	1.0000
1.000	.345E+09	.9834	1.6805	.8935	.4882	.7648	.6420	1.0000	.9788	.9241	.9177	1.0126	1.0000
1.050	.351E+09	.9831	1.6854	.8832	.4576	.7457	.6173	.9981	.9758	.9190	.9101	1.0159	1.0001
1.100	.357E+09	.9827	1.6899	.8727	.4283	.7266	.5932	.9927	.9726	.9144	.9025	1.0197	1.0006
1.150	.361E+09	.9823	1.6939	.8619	.4004	.7076	.5695	.9843	.9692	.9103	.8948	1.0242	1.0015
1.200	.365E+09	.9820	1.6975	.8509	.3740	.6888	.5468	.9734	.9657	.9068	.8872	1.0294	1.0030
1.250	.368E+09	.9817	1.7005	.8398	.3489	.6702	.5245	.9600	.9621	.9039	.8796	1.0352	1.0049
1.300	.370E+09	.9813	1.7031	.8286	.3254	.6519	.5030	.9447	.9584	.9016	.8722	1.0417	1.0073
1.350	.372E+09	.9811	1.7052	.8173	.3032	.6338	.4823	.9277	.9547	.8999	.8649	1.0489	1.0103
1.400	.373E+09	.9808	1.7069	.8060	.2824	.6162	.4622	.9092	.9509	.8988	.8577	1.0566	1.0137
1.450	.374E+09	.9805	1.7083	.7947	.2638	.5989	.4430	.8899	.9472	.8985	.8507	1.0653	1.0180
1.500	.374E+09	.9803	1.7094	.7835	.2468	.5820	.4244	.8695	.9434	.8988	.8439	1.0745	1.0227
1.550	.374E+09	.9800	1.7101	.7723	.2279	.5655	.4066	.8485	.9397	.8998	.8373	1.0844	1.0281
1.600	.374E+09	.9798	1.7107	.7612	.2121	.5495	.3895	.8271	.9360	.9014	.8309	1.0950	1.0341
1.650	.373E+09	.9796	1.7111	.7502	.1974	.5339	.3732	.8054	.9324	.9037	.8246	1.1064	1.0408
1.700	.372E+09	.9794	1.7113	.7394	.1837	.5187	.3575	.7835	.9288	.9065	.8186	1.1183	1.0479
1.750	.370E+09	.9793	1.7114	.7287	.1709	.5040	.3425	.7614	.9254	.9099	.8127	1.1308	1.0557
1.800	.369E+09	.9791	1.7114	.7182	.1591	.4897	.3281	.7395	.9220	.9140	.8070	1.1439	1.0641
1.850	.367E+09	.9790	1.7114	.7078	.1481	.4758	.3143	.7176	.9187	.9185	.8015	1.1576	1.0730
1.900	.365E+09	.9788	1.7112	.6976	.1378	.4624	.3012	.6960	.9154	.9236	.7962	1.1720	1.0825
1.950	.363E+09	.9787	1.7111	.6876	.1283	.4493	.2886	.6747	.9123	.9292	.7910	1.1869	1.0925
2.000	.360E+09	.9786	1.7109	.6777	.1196	.4367	.2767	.6538	.9093	.9355	.7860	1.2027	1.1033

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.36540E-04	.15047E-03	.7054
.050	1.6075	.36450E-04	.14986E-03	.7054
.100	1.5771	.36392E-04	.14945E-03	.7054
.150	1.5700	.36295E-04	.14878E-03	.7054
.200	1.5746	.36159E-04	.14785E-03	.7055
.250	1.5823	.35986E-04	.14665E-03	.7057
.300	1.5780	.35774E-04	.14521E-03	.7059
.350	1.5894	.35527E-04	.14374E-03	.7050
.400	1.5891	.35243E-04	.14221E-03	.7035
.450	1.5945	.34925E-04	.14049E-03	.7019
.500	1.5974	.34572E-04	.13859E-03	.7003
.550	1.6006	.34188E-04	.13653E-03	.6987
.600	1.6078	.33773E-04	.13430E-03	.6972
.650	1.6151	.33329E-04	.13194E-03	.6958
.700	1.6189	.32858E-04	.12944E-03	.6946
.750	1.6239	.32363E-04	.12682E-03	.6937
.800	1.6303	.31845E-04	.12410E-03	.6930
.850	1.6348	.31308E-04	.12143E-03	.6919
.900	1.6428	.30755E-04	.11874E-03	.6908
.950	1.6430	.30187E-04	.11599E-03	.6902
1.000	1.6530	.29608E-04	.11321E-03	.6900
1.050	1.6541	.29021E-04	.11039E-03	.6902
1.100	1.6586	.28428E-04	.10755E-03	.6908
1.150	1.6627	.27831E-04	.10472E-03	.6918
1.200	1.6670	.27233E-04	.10092E-03	.7000
1.250	1.6670	.26637E-04	.98333E-04	.7006
1.300	1.6711	.26042E-04	.95787E-04	.7013
1.350	1.6718	.25452E-04	.93295E-04	.7021
1.400	1.6712	.24867E-04	.90855E-04	.7030
1.450	1.6766	.24289E-04	.88471E-04	.7040
1.500	1.6741	.23718E-04	.86101E-04	.7054
1.550	1.6748	.23155E-04	.83756E-04	.7072
1.600	1.6760	.22601E-04	.81162E-04	.7117
1.650	1.6770	.22056E-04	.78981E-04	.7131
1.700	1.6755	.21521E-04	.76860E-04	.7146
1.750	1.6749	.20996E-04	.74795E-04	.7160
1.800	1.6757	.20480E-04	.72801E-04	.7172
1.850	1.6739	.19975E-04	.70868E-04	.7184
1.900	1.6747	.19480E-04	.68996E-04	.7193
1.950	1.6740	.18996E-04	.67181E-04	.7202
2.000	1.6767	.18522E-04	.65422E-04	.7210

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. TT = 100.0 K PT = 8.0 ATM PHOT = .197E-02 G/CM3 SVT = 777.049 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9992	1.4671	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.179E+08	.9992	1.4689	.9998	.9981	.9994	.9987	.0859	1.0000	.9999	.9999	.9999	.9999
.100	.357E+08	.9981	1.4696	.9991	.9927	.9977	.9951	.1711	1.0001	.9997	.9997	1.0000	.9962
.150	.533E+08	.9980	1.4700	.9980	.9837	.9949	.9889	.2548	1.0003	.9993	.9994	1.0000	.9964
.200	.705E+08	.9979	1.4724	.9965	.9713	.9909	.9804	.3363	1.0005	.9987	.9989	1.0001	.9966
.250	.874E+08	.9978	1.4746	.9945	.9554	.9859	.9694	.4148	1.0007	.9978	.9982	1.0000	.9968
.300	1.047E+09	.9977	1.4777	.9922	.9363	.9797	.9562	.4899	1.0011	.9967	.9973	.9998	.9969
.350	1.19E+09	.9975	1.4804	.9894	.9146	.9725	.9412	.5609	1.0014	.9955	.9963	.9999	.9973
.400	1.34E+09	.9973	1.4840	.9867	.8902	.9642	.9241	.6274	1.0018	.9940	.9950	.9998	.9977
.450	1.49E+09	.9971	1.4882	.9825	.8636	.9548	.9054	.6890	1.0023	.9923	.9935	.9999	.9982
.500	1.62E+09	.9969	1.4930	.9785	.83	.9445	.8849	.7452	1.0027	.9901	.9917	.9997	.9984
.550	1.75E+09	.9966	1.4983	.9741	.804	.9337	.8679	.7958	1.0032	.9876	.9896	.9995	.9987
.600	1.86E+09	.9964	1.5042	.9694	.7721	.9209	.8399	.8408	1.0037	.9848	.9873	.9993	.9990
.650	1.97E+09	.9961	1.5106	.9642	.7391	.9078	.8159	.8801	1.0041	.9818	.9845	.9993	.9995
.700	2.07E+09	.9958	1.5176	.9587	.7052	.8938	.7908	.9135	1.0046	.9782	.9814	.9991	.9997
.750	2.16E+09	.9955	1.5252	.9528	.6708	.8790	.7652	.9411	1.0050	.9742	.9779	.9988	.9998
.800	2.24E+09	.9952	1.5333	.9465	.6361	.8634	.7389	.9630	1.0053	.9696	.9739	.9985	.9999
.850	2.31E+09	.9950	1.5419	.9399	.6017	.8471	.7126	.9799	1.0055	.9650	.9695	.9986	1.0001
.900	2.37E+09	.9947	1.5509	.9329	.5675	.8302	.6860	.9914	1.0056	.9599	.9647	.9985	1.0002
.950	2.43E+09	.9944	1.5604	.9255	.5338	.8127	.6594	.9979	1.0056	.9542	.9594	.9984	1.0000
1.000	2.47E+09	.9941	1.5701	.9178	.5010	.7947	.6330	1.0000	1.0054	.9484	.9536	.9986	1.0000
1.050	2.51E+09	.9938	1.5800	.9097	.4692	.7763	.6071	.9981	1.0050	.9424	.9475	.9991	1.0001
1.100	2.54E+09	.9935	1.5999	.9012	.4385	.7576	.5816	.9923	1.0043	.9363	.9409	.9998	1.0002
1.150	2.57E+09	.9932	1.5999	.8924	.4091	.7386	.5566	.9832	1.0035	.9301	.9340	1.0008	1.0004
1.200	2.59E+09	.9929	1.6096	.8837	.3812	.7196	.5325	.9714	1.0024	.9243	.9268	1.0025	1.0009
1.250	2.60E+09	.9927	1.6190	.8737	.3546	.7005	.5090	.9569	1.0010	.9186	.9194	1.0046	1.0016
1.300	2.61E+09	.9924	1.6279	.8639	.3296	.6815	.4864	.9403	.9993	.9132	.9119	1.0073	1.0027
1.350	2.62E+09	.9922	1.6363	.8539	.3052	.6627	.4647	.9220	.9974	.9084	.9042	1.0107	1.0041
1.400	2.62E+09	.9919	1.6440	.8436	.2841	.6440	.4440	.9024	.9953	.9042	.8965	1.0149	1.0061
1.450	2.62E+09	.9917	1.6510	.8331	.2636	.6257	.4241	.8817	.9929	.9006	.8889	1.0198	1.0086
1.500	2.61E+09	.9915	1.6573	.8224	.2446	.6078	.4050	.8600	.9903	.8977	.8813	1.0254	1.0115
1.550	2.61E+09	.9913	1.6629	.8117	.2269	.5903	.3871	.8381	.9876	.8959	.8739	1.0323	1.0154
1.600	2.60E+09	.9911	1.6677	.8008	.2105	.5737	.3698	.8156	.9847	.8946	.8667	1.0396	1.0197
1.650	2.58E+09	.9909	1.6718	.7900	.1953	.5566	.3535	.7930	.9818	.8943	.8597	1.0479	1.0248
1.700	2.57E+09	.9907	1.6753	.7791	.1813	.5405	.3380	.7705	.9787	.8950	.8529	1.0572	1.0306
1.750	2.56E+09	.9906	1.6782	.7683	.1683	.5240	.3232	.7480	.9756	.8963	.8463	1.0672	1.0371
1.800	2.54E+09	.9904	1.6806	.7575	.1564	.5097	.3092	.7256	.9725	.8984	.8400	1.0779	1.0441
1.850	2.52E+09	.9903	1.6825	.7469	.1453	.4950	.2959	.7037	.9694	.9014	.8339	1.0896	1.0521
1.900	2.50E+09	.9901	1.6841	.7364	.1351	.4809	.2831	.6818	.9663	.9050	.8260	1.1018	1.0604
1.950	2.48E+09	.9900	1.6853	.7260	.1256	.4671	.2711	.6605	.9632	.9093	.8224	1.1148	1.0695
2.000	2.46E+09	.9899	1.6863	.7157	.1169	.4539	.2596	.6397	.9602	.9145	.8170	1.1287	1.0795

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM ² -SEC-K	PRANDTL NUMBER
0.000	I	.42737E-04	.19637E-03	.7112
.050	1.4442	.42640E-04	.19539E-03	.7115
.100	1.4800	.42586E-04	.19496E-03	.7114
.150	1.4687	.42496E-04	.19426E-03	.7111
.200	1.4723	.42371E-04	.19329E-03	.7108
.250	1.4680	.42211E-04	.19203E-03	.7103
.300	1.4686	.42015E-04	.19050E-03	.7098
.350	1.4778	.41785E-04	.18871E-03	.7092
.400	1.4791	.41570E-04	.18666E-03	.7085
.450	1.4866	.41222E-04	.18436E-03	.7078
.500	1.4840	.40891E-04	.18181E-03	.7070
.550	1.4895	.40527E-04	.17902E-03	.7062
.600	1.4964	.40131E-04	.17600E-03	.7053
.650	1.5055	.39705E-04	.17277E-03	.7046
.700	1.5078	.39248E-04	.16932E-03	.7039
.750	1.5151	.38761E-04	.16578E-03	.7028
.800	1.5209	.38247E-04	.16212E-03	.7016
.850	1.5331	.37706E-04	.15829E-03	.7007
.900	1.5390	.37140E-04	.15432E-03	.7000
.950	1.5457	.36550E-04	.15021E-03	.6996
1.000	1.5560	.35939E-04	.14600E-03	.6996
1.050	1.5668	.35308E-04	.14175E-03	.6998
1.100	1.5746	.34661E-04	.13822E-03	.6966
1.150	1.5839	.34000E-04	.13465E-03	.6938
1.200	1.5960	.33329E-04	.13104E-03	.6914
1.250	1.6024	.32649E-04	.12743E-03	.6896
1.300	1.6115	.31966E-04	.12382E-03	.6884
1.350	1.6198	.31280E-04	.12028E-03	.6876
1.400	1.6282	.30595E-04	.11692E-03	.6865
1.450	1.6336	.29915E-04	.11360E-03	.6860
1.500	1.6381	.29240E-04	.11034E-03	.6861
1.550	1.6489	.28574E-04	.10715E-03	.6867
1.600	1.6487	.27916E-04	.10402E-03	.6878
1.650	1.6546	.27269E-04	.10098E-03	.6893
1.700	1.6598	.26634E-04	.97667E-04	.6937
1.750	1.6605	.26011E-04	.95002E-04	.6945
1.800	1.6621	.25400E-04	.92428E-04	.6954
1.850	1.6674	.24802E-04	.89938E-04	.6965
1.900	1.6642	.24217E-04	.87531E-04	.6976
1.950	1.6673	.23645E-04	.85183E-04	.6990
2.000	1.6709	.23085E-04	.82885E-04	.7006

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

TT = 200.0 K PT = 9.0 ATM $\rho_{HOT} = .977E-03$ G/CM³ SVT = 1060.481 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	ρ_{HOT}/ρ_{HOT}	A*/A	SV/SVT	P/PT	T/TT	ρ_{HOT}/ρ_{HOT}	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0953	1.3492	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.757E+07	1.0053	1.3489	.9998	.9993	.9996	.9998	.0860	1.0000	1.0001	1.0001	1.0000	.9969
.100	.151E+08	1.0053	1.3488	.9990	.9972	.9983	.9950	.1712	1.0000	1.0002	1.0003	1.0000	.9969
.150	.225E+08	1.0053	1.3486	.9978	.9849	.9961	.9889	.2550	1.0001	1.0005	1.0006	1.0000	.9970
.200	.297E+08	1.0052	1.3483	.9962	.9732	.9931	.9801	.3364	1.0001	1.0007	1.0010	.9999	.9968
.250	.368E+08	1.0051	1.3480	.9940	.9582	.9892	.9695	.4150	1.0002	1.0014	1.0016	1.0000	.9971
.300	.436E+08	1.0050	1.3475	.9914	.9412	.9846	.9563	.4899	1.0003	1.0019	1.0023	.9999	.9971
.350	.500E+08	1.0049	1.3471	.9884	.9212	.9792	.9412	.5609	1.0004	1.0027	1.0031	.9999	.9972
.400	.562E+08	1.0048	1.3466	.9850	.8988	.9730	.9242	.6272	1.0006	1.0035	1.0041	.9999	.9974
.450	.620E+08	1.0046	1.3460	.9811	.8741	.9661	.9054	.6886	1.0008	1.0044	1.0052	.9999	.9976
.500	.674E+08	1.0045	1.3454	.9769	.8475	.9585	.8849	.7446	1.0011	1.0053	1.0064	.9997	.9976
.550	.724E+08	1.0043	1.3448	.9724	.8194	.9503	.8631	.7951	1.0013	1.0065	1.0078	.9997	.9978
.600	.770E+08	1.0042	1.3441	.9674	.7901	.9415	.8402	.8401	1.0017	1.0078	1.0093	.9997	.9982
.650	.812E+08	1.0040	1.3435	.9622	.7576	.9321	.8160	.8792	1.0020	1.0090	1.0109	.9995	.9984
.700	.849E+08	1.0038	1.3428	.9567	.7245	.9222	.7911	.9126	1.0025	1.0105	1.0126	.9994	.9987
.750	.881E+08	1.0036	1.3422	.9509	.6968	.9119	.7654	.9403	1.0030	1.0119	1.0145	.9992	.9990
.800	.910E+08	1.0035	1.3416	.9449	.6649	.9011	.7393	.9626	1.0035	1.0136	1.0164	.9991	.9995
.850	.933E+08	1.0033	1.3411	.9386	.6328	.8899	.7125	.9793	1.0041	1.0149	1.0184	.9986	.9996
.900	.953E+08	1.0031	1.3406	.9322	.6010	.8783	.6858	.9911	1.0048	1.0164	1.0206	.9982	.9998
.950	.969E+08	1.0029	1.3402	.9255	.5694	.8664	.6588	.9977	1.0056	1.0177	1.0228	.9974	.9999
1.000	.980E+08	1.0027	1.3399	.9187	.5384	.8542	.6319	1.0000	1.0064	1.0191	1.0250	.9968	1.0000
1.050	.988E+08	1.0025	1.3397	.9118	.5078	.8418	.6050	.9977	1.0073	1.0200	1.0274	.9956	.9998
1.100	.993E+08	1.0024	1.3397	.9047	.4783	.8291	.5786	.9919	1.0083	1.0212	1.0297	.9947	.9998
1.150	.994E+08	1.0022	1.3399	.8976	.4495	.8162	.5525	.9823	1.0093	1.0220	1.0321	.9934	.9994
1.200	.992E+08	1.0020	1.3402	.8903	.4217	.8031	.5268	.9695	1.0104	1.0226	1.0344	.9918	.9990
1.250	.987E+08	1.0019	1.3408	.8830	.3949	.7899	.5017	.9538	1.0116	1.0229	1.0367	.9900	.9984
1.300	.980E+08	1.0017	1.3415	.8756	.3692	.7765	.4772	.9356	1.0128	1.0230	1.0390	.9881	.9976
1.350	.970E+08	1.0016	1.3425	.8682	.3446	.7631	.4533	.9152	1.0141	1.0227	1.0412	.9859	.9967
1.400	.958E+08	1.0014	1.3438	.8607	.3212	.7495	.4302	.8929	1.0155	1.0221	1.0433	.9835	.9956
1.450	.945E+08	1.0013	1.3454	.8532	.2988	.7358	.4078	.8690	1.0169	1.0209	1.0453	.9806	.9941
1.500	.929E+08	1.0012	1.3473	.8457	.2777	.7221	.3861	.8437	1.0184	1.0193	1.0471	.9776	.9924
1.550	.913E+08	1.0010	1.3496	.8382	.2577	.7083	.3653	.8175	1.0199	1.0173	1.0487	.9743	.9905
1.600	.895E+08	1.0009	1.3522	.8307	.2387	.6945	.3452	.7903	1.0214	1.0145	1.0510	.9704	.9880
1.650	.876E+08	1.0008	1.3553	.8232	.2209	.6806	.3260	.7627	1.0230	1.0113	1.0511	.9664	.9856
1.700	.856E+08	1.0007	1.3589	.8157	.2041	.6666	.3076	.7347	1.0246	1.0079	1.0520	.9621	.9828
1.750	.835E+08	1.0006	1.3629	.8082	.1884	.6527	.2901	.7067	1.0263	1.0032	1.0524	.9577	.9798
1.800	.814E+08	1.0005	1.3674	.8007	.1737	.6387	.2733	.6786	1.0279	.9961	1.0525	.9529	.9764
1.850	.793E+08	1.0004	1.3725	.7933	.1600	.6247	.2573	.6505	1.0296	.9923	1.0522	.9477	.9727
1.900	.772E+08	1.0003	1.3781	.7859	.1471	.6106	.2422	.6229	1.0313	.9859	1.0515	.9423	.9687
1.950	.750E+08	1.0003	1.3844	.7785	.1352	.5966	.2278	.5957	1.0329	.9789	1.0502	.9368	.9646
2.000	.729E+08	1.0002	1.3913	.7711	.1241	.5825	.2142	.5691	1.0346	.9713	1.0485	.9311	.9603

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

G. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.68533E-04	.37545E-03	.7032
.050	1.3695	.68394E-04	.37483E-03	.7032
.100	1.3497	.68333E-04	.37463E-03	.7032
.150	1.3591	.68231E-04	.37421E-03	.7032
.200	1.3487	.68089E-04	.37363E-03	.7032
.250	1.3612	.67907E-04	.37289E-03	.7032
.300	1.3511	.67687E-04	.37199E-03	.7032
.350	1.3555	.67430E-04	.37094E-03	.7031
.400	1.3547	.67137E-04	.36974E-03	.7030
.450	1.3522	.66809E-04	.36841E-03	.7029
.500	1.3499	.66448E-04	.36695E-03	.7027
.550	1.3513	.66056E-04	.36536E-03	.7025
.600	1.3524	.65633E-04	.36334E-03	.7027
.650	1.3486	.65182E-04	.36051E-03	.7043
.700	1.3498	.64704E-04	.35753E-03	.7058
.750	1.3477	.64202E-04	.35441E-03	.7073
.800	1.3487	.63677E-04	.35115E-03	.7088
.850	1.3455	.63129E-04	.34777E-03	.7103
.900	1.3459	.62561E-04	.34428E-03	.7116
.950	1.3437	.61975E-04	.34069E-03	.7129
1.000	1.3442	.61372E-04	.33702E-03	.7139
1.050	1.3420	.60753E-04	.33326E-03	.7148
1.100	1.3447	.60118E-04	.32943E-03	.7154
1.150	1.3422	.59471E-04	.32554E-03	.7158
1.200	1.3422	.58810E-04	.32160E-03	.7158
1.250	1.3431	.58138E-04	.31761E-03	.7155
1.300	1.3439	.57455E-04	.31358E-03	.7149
1.350	1.3440	.56762E-04	.30952E-03	.7138
1.400	1.3454	.56059E-04	.30543E-03	.7123
1.450	1.3460	.55347E-04	.30131E-03	.7103
1.500	1.3477	.54627E-04	.29716E-03	.7078
1.550	1.3503	.53898E-04	.29297E-03	.7106
1.600	1.3508	.53161E-04	.28896E-03	.7130
1.650	1.3551	.52415E-04	.27732E-03	.7150
1.700	1.3582	.51662E-04	.27067E-03	.7167
1.750	1.3625	.50902E-04	.26401E-03	.7179
1.800	1.3660	.50134E-04	.25733E-03	.7187
1.850	1.3698	.49358E-04	.25065E-03	.7191
1.900	1.3758	.48574E-04	.24396E-03	.7191
1.950	1.3819	.47782E-04	.23726E-03	.7186
2.000	1.3888	.46983E-04	.23056E-03	.7177

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TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

H. TT = 300.0 K PT = 8.0 ATM $\rho_{HOT} = .652E-03$ G/CM³ SVT = 1315.784 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0047	1.3706	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.477E+07	1.0047	1.37861	.9997	.9983	.9995	.9983	.0864	1.0000	1.0001	1.0000	1.0001	1.0017
.100	.951E+07	1.0047	1.3860	.9990	.9930	.9981	.9949	.1720	1.0000	.9999	1.0001	.9999	1.0015
.150	.142E+08	1.0047	1.3858	.9977	.9844	.9957	.9888	.2561	.9999	1.0000	1.0001	.9999	1.0015
.200	.188E+08	1.0046	1.3856	.9958	.9727	.9923	.9803	.3379	.9996	1.0002	1.0003	1.0001	1.0015
.250	.232E+08	1.0046	1.3853	.9935	.9576	.9881	.9693	.4167	.9997	1.0001	1.0004	.9999	1.0013
.300	.275E+08	1.0045	1.3849	.9907	.9398	.9829	.9563	.4920	.9996	1.0003	1.0006	.9999	1.0012
.350	.316E+08	1.0044	1.3844	.9874	.9193	.9769	.9413	.5631	.9995	1.0005	1.0008	1.0000	1.0011
.400	.355E+08	1.0043	1.3839	.9837	.8963	.9701	.9243	.6295	.9993	1.0008	1.0011	1.0001	1.0010
.450	.391E+08	1.0042	1.3832	.9795	.8712	.9625	.9056	.6909	.9992	1.0010	1.0015	1.0001	1.0009
.500	.426E+08	1.0041	1.3825	.9749	.8441	.9541	.8852	.7469	.9990	1.0013	1.0018	1.0001	1.0007
.550	.457E+08	1.0040	1.3818	.9699	.8155	.9451	.8635	.7973	.9988	1.0017	1.0023	1.0001	1.0006
.600	.486E+08	1.0039	1.3809	.9645	.7857	.9354	.8407	.8421	.9986	1.0022	1.0028	1.0003	1.0006
.650	.513E+08	1.0037	1.3799	.9587	.7547	.9252	.8166	.8808	.9984	1.0026	1.0034	1.0002	1.0003
.700	.536E+08	1.0036	1.3789	.9526	.7223	.9144	.7918	.9140	.9982	1.0032	1.0040	1.0003	1.0002
.750	.557E+08	1.0034	1.3777	.9462	.6912	.9032	.7663	.9412	.9980	1.0038	1.0048	1.0003	1.0000
.800	.575E+08	1.0033	1.3765	.9395	.6591	.8915	.7403	.9632	.9979	1.0046	1.0056	1.0005	1.0000
.850	.590E+08	1.0032	1.3752	.9326	.6270	.8794	.7140	.9797	.9977	1.0055	1.0065	1.0006	.9999
.900	.603E+08	1.0030	1.3737	.9254	.5951	.8670	.6875	.9911	.9975	1.0065	1.0075	1.0007	.9999
.950	.613E+08	1.0029	1.3722	.9180	.5637	.8544	.6618	.9978	.9974	1.0076	1.0086	1.0009	.9999
1.000	.621E+08	1.0027	1.3706	.9104	.5320	.8415	.6346	1.0000	.9973	1.0089	1.0098	1.0011	1.0000
1.050	.626E+08	1.0026	1.3690	.9026	.5000	.8285	.6084	.9980	.9972	1.0102	1.0111	1.0012	1.0001
1.100	.629E+08	1.0025	1.3673	.8947	.4778	.8153	.5825	.9922	.9971	1.0116	1.0126	1.0013	1.0001
1.150	.630E+08	1.0023	1.3654	.8867	.4485	.8020	.5568	.9827	.9971	1.0128	1.0141	1.0012	.9999
1.200	.629E+08	1.0022	1.3636	.8786	.4183	.7886	.5318	.9704	.9971	1.0144	1.0157	1.0012	.9999
1.250	.627E+08	1.0021	1.3617	.8703	.3923	.7752	.5073	.9553	.9971	1.0161	1.0175	1.0013	1.0000
1.300	.623E+08	1.0019	1.3597	.8621	.3674	.7619	.4835	.9380	.9972	1.0179	1.0194	1.0013	1.0002
1.350	.617E+08	1.0018	1.3578	.8539	.3434	.7485	.4602	.9180	.9973	1.0192	1.0213	1.0008	.9998
1.400	.610E+08	1.0017	1.3558	.8455	.3208	.7352	.4377	.8966	.9975	1.0209	1.0234	1.0005	.9997
1.450	.601E+08	1.0016	1.3539	.8371	.2993	.7220	.4158	.8736	.9977	1.0224	1.0256	1.0000	.9994
1.500	.592E+08	1.0015	1.3520	.8288	.2789	.7089	.3947	.8493	.9980	1.0238	1.0278	.9993	.9990
1.550	.582E+08	1.0014	1.3501	.8205	.2597	.6958	.3744	.8242	.9984	1.0253	1.0302	.9986	.9986
1.600	.571E+08	1.0013	1.3483	.8122	.2415	.6829	.3549	.7983	.9988	1.0267	1.0326	.9977	.9981
1.650	.559E+08	1.0012	1.3466	.8040	.2245	.6701	.3361	.7718	.9992	1.0278	1.0350	.9965	.9973
1.700	.547E+08	1.0011	1.3449	.7958	.2084	.6575	.3181	.7449	.9997	1.0287	1.0375	.9950	.9964
1.750	.534E+08	1.0010	1.3434	.7877	.1933	.6450	.3008	.7178	1.0003	1.0293	1.0401	.9933	.9953
1.800	.520E+08	1.0010	1.3421	.7797	.1792	.6327	.2843	.6907	1.0009	1.0297	1.0426	.9913	.9939
1.850	.507E+08	1.0009	1.3408	.7717	.1660	.6205	.2686	.6637	1.0016	1.0298	1.0452	.9891	.9923
1.900	.493E+08	1.0008	1.3398	.7639	.1537	.6084	.2536	.6370	1.0024	1.0297	1.0477	.9867	.9906
1.950	.479E+08	1.0008	1.3389	.7561	.1422	.5966	.2393	.6106	1.0032	1.0292	1.0502	.9840	.9887
2.000	.465E+08	1.0007	1.3383	.7483	.1314	.5848	.2256	.5844	1.0040	1.0281	1.0526	.9807	.9862

TABLE IV. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

H. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.89712E-04	.46209E-03	.7102
.050	1.4197	.89754E-04	.46196E-03	.6905
.100	1.3750	.89666E-04	.46157E-03	.6905
.150	1.3441	.89520E-04	.46093E-03	.6905
.200	1.3177	.89316E-04	.46003E-03	.6906
.250	1.3853	.89056E-04	.45889E-03	.6907
.300	1.3927	.88741E-04	.45751E-03	.6909
.350	1.3922	.88373E-04	.45590E-03	.6910
.400	1.3912	.87954E-04	.45407E-03	.6912
.450	1.3896	.87486E-04	.45204E-03	.6914
.500	1.3870	.86972E-04	.44980E-03	.6916
.550	1.3883	.86413E-04	.44739E-03	.6919
.600	1.3882	.85813E-04	.44480E-03	.6922
.650	1.3830	.85175E-04	.44213E-03	.6924
.700	1.3852	.84502E-04	.43941E-03	.6926
.750	1.3814	.83795E-04	.43656E-03	.6927
.800	1.3825	.83059E-04	.43361E-03	.6930
.850	1.3803	.82296E-04	.43055E-03	.6932
.900	1.3785	.81509E-04	.42742E-03	.6935
.950	1.3776	.80701E-04	.42421E-03	.6938
1.000	1.3760	.79874E-04	.42094E-03	.6941
1.050	1.3738	.79032E-04	.41762E-03	.6945
1.100	1.3717	.78176E-04	.41427E-03	.6949
1.150	1.3677	.77310E-04	.41089E-03	.6953
1.200	1.3679	.76435E-04	.40750E-03	.6957
1.250	1.3663	.75552E-04	.40402E-03	.6962
1.300	1.3649	.74665E-04	.40023E-03	.6973
1.350	1.3593	.73774E-04	.39644E-03	.6983
1.400	1.3596	.72881E-04	.39267E-03	.6992
1.450	1.3564	.71988E-04	.38892E-03	.7001
1.500	1.3546	.71095E-04	.38519E-03	.7008
1.550	1.3534	.70204E-04	.38149E-03	.7014
1.600	1.3517	.69315E-04	.37782E-03	.7019
1.650	1.3488	.68430E-04	.37419E-03	.7022
1.700	1.3473	.67549E-04	.37059E-03	.7023
1.750	1.3455	.66671E-04	.36704E-03	.7022
1.800	1.3437	.65798E-04	.36353E-03	.7017
1.850	1.3430	.64929E-04	.35856E-03	.7038
1.900	1.3423	.64065E-04	.35318E-03	.7066
1.950	1.3416	.63206E-04	.34786E-03	.7091
2.000	1.3392	.62352E-04	.34260E-03	.7113

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN
 A. $IT = 45.9 \text{ K}$ $PT = 10.0 \text{ ATM}$ $RHOT = 6.175 \cdot 10^{-2} \text{ G/CM}^3$ $SVT = 538.761 \text{ M/SEC}$

MACH	RE/M	Z	CP/CV	SV/SVT	P/P1	T/T1	RHO/RHOT	A*/A	SV/SVT	P/P1	T/T1	RHO/RHOT	A*/A	SV/SVT	P/P1	T/T1	RHO/RHOT	A*/A	
0.00	0.	0.950	2.0053	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
0.05	0.678E+08	0.849	2.0055	0.9979	0.9988	0.9991	0.9995	0.9997	0.9996	0.9982	0.9989	0.9991	0.9995	0.9996	0.9960	0.9966	0.9980	0.9985	
0.10	1.355+09	0.847	2.0057	0.9979	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912	0.9912
0.15	2.023+09	0.846	2.0065	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872
0.20	2.673+09	0.840	2.0062	0.9840	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856	0.9856
0.25	3.313+09	0.836	2.0065	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872	0.9872
0.30	3.933+09	0.829	2.0078	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817	0.9817
0.35	4.533+09	0.821	2.0071	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754	0.9754
0.40	5.113+09	0.813	2.0074	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682	0.9682
0.45	5.663+09	0.804	2.0077	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603	0.9603
0.50	6.183+09	0.795	2.0078	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517	0.9517
0.55	6.683+09	0.785	2.0079	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426	0.9426
0.60	7.153+09	0.775	2.0078	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328	0.9328
0.65	7.583+09	0.765	2.0077	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227	0.9227
0.70	7.993+09	0.756	2.0073	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121	0.9121
0.75	8.373+09	0.746	2.0069	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011	0.9011
0.80	8.723+09	0.736	2.0057	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900	0.8900
0.85	9.043+09	0.726	2.0057	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785	0.8785
0.90	9.333+09	0.717	2.0050	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669	0.8669
0.95	9.603+09	0.708	2.0041	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552	0.8552
1.00	9.843+09	0.700	2.0032	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435	0.8435
1.05	1.043+10	0.692	2.0035	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319	0.8319
1.10	1.033+10	0.684	2.0039	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202	0.8202
1.15	1.043+10	0.676	2.0043	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086	0.8086
1.20	1.063+10	0.669	2.0048	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970	0.7970
1.25	1.073+10	0.662	2.0050	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855	0.7855
1.30	1.083+10	0.655	2.0049	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748	0.7748
1.35	1.093+10	0.650	2.0047	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626	0.7626
1.40	1.103+10	0.645	2.0042	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513	0.7513
1.45	1.113+10	0.640	2.0033	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401	0.7401
1.50	1.123+10	0.636	2.0022	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290	0.7290
1.55	1.123+10	0.632	2.0007	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181	0.7181
1.60	1.123+10	0.628	1.9991	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073	0.7073
1.65	1.133+10	0.625	1.9973	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967	0.6967
1.70	1.133+10	0.622	1.9954	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863	0.6863

SATURATION BOUNDARY REACHED.

-----RELATIVE TO IDEAL GAS VALUES-----
 A*/A RHO/RHOT T/T1 P/P1 SV/SVT

TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

A. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.24535E-04	.93873E-04	.8048
.050	1.8048	.24461E-04	.93536E-04	.8053
.100	1.7541	.24403E-04	.93271E-04	.8056
.150	1.7747	.24308E-04	.92836E-04	.8062
.200	1.7649	.24176E-04	.92326E-04	.8062
.250	1.7657	.24008E-04	.91652E-04	.8065
.300	1.7581	.23806E-04	.90819E-04	.8070
.350	1.7610	.23573E-04	.89831E-04	.8079
.400	1.7613	.23310E-04	.88714E-04	.8089
.450	1.7518	.23019E-04	.87390E-04	.8109
.500	1.7556	.22704E-04	.86087E-04	.8120
.550	1.7505	.22366E-04	.84624E-04	.8139
.600	1.7443	.22007E-04	.83007E-04	.8165
.650	1.7493	.21633E-04	.81590E-04	.8168
.700	1.7378	.21242E-04	.79912E-04	.8192
.750	1.7400	.20840E-04	.78437E-04	.8191
.800	1.7357	.20427E-04	.76873E-04	.8197
.850	1.7273	.20005E-04	.75179E-04	.8213
.900	1.7293	.19578E-04	.73385E-04	.8241
.950	1.7217	.19146E-04	.71648E-04	.8261
1.000	1.7195	.18711E-04	.69863E-04	.8289
1.050	1.7133	.18272E-04	.68028E-04	.8320
1.100	1.7163	.17833E-04	.66269E-04	.8340
1.150	1.7085	.17393E-04	.64596E-04	.8348
1.200	1.7120	.16957E-04	.62993E-04	.8349
1.250	1.7067	.16524E-04	.61369E-04	.8355
1.300	1.7025	.16095E-04	.59734E-04	.8364
1.350	1.7021	.15671E-04	.58099E-04	.8379
1.400	1.7007	.15255E-04	.56473E-04	.8398
1.450	1.6962	.14845E-04	.54877E-04	.8420
1.500	1.6942	.14442E-04	.53507E-04	.8414
1.550	1.6891	.14048E-04	.52163E-04	.8411
1.600	1.6881	.13663E-04	.50773E-04	.8423
1.650	1.6841	.13286E-04	.49349E-04	.8451
1.700	1.6814	.12918E-04	.47903E-04	.8494

SATURATION BOUNDARY REACHED.

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

P. TT = 50.0 K PT = 10.0 ATM $\rho_{HOT} = .5355 \cdot 10^{-2}$ G/CM³ SVT = 574.794 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9181	1.9005	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.5845+08	.9180	1.9008	.9995	.9379	.9991	.9988	.0897	.9998	.9996	.9996	1.0000	1.0402
.100	.1165+09	.9179	1.9010	.9989	.9917	.9965	.9949	.1785	.9990	.9982	.9985	.9999	1.0393
.150	.1745+09	.9176	1.9014	.9955	.9807	.9922	.9899	.2655	.9979	.9967	.9967	1.0001	1.0382
.200	.2302+09	.9172	1.9019	.9923	.9650	.9862	.9884	.3498	.9962	.9933	.9941	1.0001	1.0366
.250	.2855+09	.9168	1.9024	.9880	.9475	.9787	.9695	.4305	.9942	.9896	.9909	1.0001	1.0344
.300	.3397+09	.9162	1.9030	.9829	.9258	.9696	.9568	.5072	.9917	.9855	.9870	1.0004	1.0321
.350	.3902+09	.9156	1.9037	.9769	.9010	.9591	.9420	.5790	.9888	.9807	.9826	1.0007	1.0295
.400	.4402+09	.9149	1.9043	.9701	.8735	.9473	.9253	.6455	.9855	.9753	.9776	1.0011	1.0265
.450	.4875+09	.9142	1.9050	.9627	.8440	.9347	.9072	.7066	.9820	.9698	.9721	1.0019	1.0236
.500	.5322+09	.9134	1.9056	.9545	.8125	.9201	.8876	.7616	.9781	.9638	.9661	1.0028	1.0204
.550	.5745+09	.9126	1.9060	.9457	.7797	.9050	.8668	.8105	.9739	.9577	.9598	1.0039	1.0172
.600	.6145+09	.9117	1.9064	.9364	.7461	.8891	.8451	.8536	.9695	.9517	.9531	1.0055	1.0142
.650	.6522+09	.9109	1.9068	.9266	.7118	.8724	.8223	.8904	.9649	.9455	.9462	1.0072	1.0111
.700	.6885+09	.9100	1.9072	.9163	.6774	.8552	.7992	.9216	.9602	.9396	.9390	1.0096	1.0085
.750	.7185+09	.9091	1.9076	.9057	.6430	.8375	.7754	.9470	.9553	.9339	.9317	1.0123	1.0061
.800	.7485+09	.9083	1.9080	.8948	.6091	.8194	.7514	.9670	.9503	.9284	.9242	1.0154	1.0039
.850	.7752+09	.9074	1.9084	.8836	.5758	.8010	.7273	.9820	.9453	.9234	.9167	1.0192	1.0023
.900	.8005+09	.9066	1.9087	.8722	.5433	.7824	.7031	.9923	.9402	.9188	.9092	1.0234	1.0011
.950	.8225+09	.9058	1.9091	.8607	.5116	.7638	.6730	.9981	.9352	.9145	.9016	1.0280	1.0002
1.000	.8422+09	.9050	1.9095	.8491	.4812	.7451	.6551	1.0000	.9301	.9108	.8941	1.0334	1.0000
1.050	.8605+09	.9042	1.9097	.8374	.4519	.7265	.6315	.9982	.9257	.9076	.8866	1.0392	1.0003
1.100	.8765+09	.9036	1.9099	.8257	.4239	.7079	.6093	.9933	.9202	.9050	.8793	1.0457	1.0011
1.150	.8915+09	.9030	1.9101	.8140	.3971	.6896	.5855	.9853	.9154	.9028	.8720	1.0527	1.0025
1.200	.9035+09	.9024	1.9103	.8024	.3717	.6715	.5632	.9749	.9106	.9014	.8648	1.0604	1.0046
1.250	.9145+09	.9018	1.9104	.7909	.3475	.6535	.5413	.9621	.9050	.9001	.8577	1.0683	1.0071
1.300	.9235+09	.9013	1.9104	.7794	.3247	.6358	.5201	.9475	.9016	.8995	.8507	1.0770	1.0103
1.350	.9315+09	.9008	1.9102	.7681	.3031	.6184	.4995	.9311	.8972	.8994	.8439	1.0863	1.0140
1.400	.9385+09	.9003	1.9099	.7569	.2828	.6014	.4794	.9133	.8930	.8998	.8371	1.0961	1.0183
1.450	.9435+09	.8999	1.9095	.7458	.2637	.5847	.4601	.8944	.8888	.9008	.8306	1.1064	1.0231
1.500	.9475+09	.8995	1.9090	.7349	.2458	.5684	.4414	.8745	.8848	.9024	.8242	1.1174	1.0286
1.550	.9512+09	.8992	1.9084	.7239	.2291	.5525	.4234	.8541	.8808	.9047	.8180	1.1292	1.0348
1.600	.9537+09	.8989	1.9077	.7132	.2135	.5370	.4061	.8331	.8770	.9076	.8120	1.1416	1.0416
1.650	.9555+09	.8986	1.9069	.7026	.1990	.5220	.3895	.8118	.8732	.9112	.8062	1.1547	1.0490
1.700	.9565+09	.8984	1.9057	.6922	.1854	.5073	.3735	.7907	.8695	.9157	.8006	1.1683	1.0569
1.750	.9567+09	.8982	1.9045	.6820	.1728	.4931	.3581	.7684	.8660	.9199	.7952	1.1825	1.0654
1.800	.9555+09	.8980	1.9033	.6719	.1610	.4794	.3434	.7467	.8626	.9251	.7900	1.1973	1.0745
1.850	.9542+09	.8978	1.9019	.6620	.1501	.4660	.3293	.7251	.8592	.9310	.7850	1.2128	1.0842
1.900	.9525+09	.8977	1.8996	.6523	.1399	.4530	.3159	.7038	.8560	.9376	.7802	1.2291	1.0946
1.950	.9502+09	.8976	1.8979	.6428	.1305	.4405	.3030	.6827	.8529	.9446	.7755	1.2459	1.1055
2.000	.9475+09	.8974	1.8979	.6335	.1217	.4284	.2906	.6619	.8499	.9522	.7711	1.2632	1.1169

TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

B. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.26381E-04	.10091E-03	.7631
.050	1.7650	.26304E-04	.10058E-03	.7632
.100	1.7184	.26245E-04	.10034E-03	.7632
.150	1.7607	.26148E-04	.99933E-04	.7633
.200	1.7462	.26012E-04	.99370E-04	.7634
.250	1.7334	.25840E-04	.98650E-04	.7635
.300	1.7494	.25633E-04	.97789E-04	.7638
.350	1.7428	.25393E-04	.96786E-04	.7641
.400	1.7364	.25121E-04	.95651E-04	.7645
.450	1.7452	.24821E-04	.94311E-04	.7657
.500	1.7365	.24494E-04	.92829E-04	.7672
.550	1.7336	.24144E-04	.91247E-04	.7690
.600	1.7374	.23772E-04	.89583E-04	.7708
.650	1.7272	.23381E-04	.87564E-04	.7752
.700	1.7327	.22973E-04	.85879E-04	.7764
.750	1.7264	.22552E-04	.84136E-04	.7776
.800	1.7240	.22119E-04	.82331E-04	.7792
.850	1.7247	.21677E-04	.80475E-04	.7811
.900	1.7204	.21227E-04	.78578E-04	.7832
.950	1.7147	.20772E-04	.76727E-04	.7848
1.000	1.7151	.20313E-04	.74968E-04	.7854
1.050	1.7113	.19852E-04	.73155E-04	.7867
1.100	1.7097	.19390E-04	.71299E-04	.7885
1.150	1.7054	.18929E-04	.69450E-04	.7904
1.200	1.7055	.18471E-04	.67648E-04	.7920
1.250	1.6992	.18013E-04	.65847E-04	.7937
1.300	1.7010	.17559E-04	.64126E-04	.7944
1.350	1.6987	.17109E-04	.62468E-04	.7945
1.400	1.6958	.16664E-04	.60804E-04	.7950
1.450	1.6928	.16226E-04	.59164E-04	.7954
1.500	1.6918	.15795E-04	.57556E-04	.7959
1.550	1.6912	.15371E-04	.55954E-04	.7968
1.600	1.6908	.14956E-04	.54367E-04	.7980
1.650	1.6876	.14549E-04	.52800E-04	.7996
1.700	1.6846	.14150E-04	.51391E-04	.7995
1.750	1.6821	.13761E-04	.49949E-04	.8006
1.800	1.6801	.13381E-04	.48487E-04	.8028
1.850	1.6792	.13010E-04	.47015E-04	.8060
1.900	1.6787	.12648E-04	.45542E-04	.8104
1.950	1.6759	.12296E-04	.44186E-04	.8136
2.000	1.6732	.11953E-04	.42930E-04	.8161

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

TT = 60.0 K PT = 10.0 ATM PHOT = .428E-02 G/CM³ SVT = 634.108 M/SEC

MACH	PE/M	γ	CP/CV	SV/SVT	P/PT	T/TT	RHO/PHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/PHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9557	1.7753	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.453E+02	.9556	1.7750	.9996	.9979	.9992	.9987	.0890	.9998	.9996	.9997	1.0000	1.0312
.100	.904E+08	.9555	1.7755	.9987	.9916	.9967	.9951	.1770	.9993	.9986	.9987	1.0001	1.0308
.150	.135E+09	.9553	1.7773	.9967	.9811	.9925	.9884	.2633	.9985	.9966	.9970	1.0000	1.0298
.200	.179E+09	.9550	1.7785	.9934	.9558	.9868	.9804	.3471	.9973	.9942	.9947	1.0001	1.0288
.250	.221E+09	.9547	1.7799	.9897	.9438	.9796	.9696	.4276	.9959	.9910	.9918	1.0002	1.0274
.300	.263E+09	.9543	1.7815	.9852	.9274	.9708	.9567	.5039	.9941	.9871	.9883	1.0003	1.0256
.350	.303E+09	.9538	1.7833	.9800	.9030	.9606	.9418	.5757	.9919	.9828	.9842	1.0006	1.0236
.400	.341E+09	.9533	1.7853	.9741	.8758	.9491	.9251	.6424	.9895	.9779	.9795	1.0008	1.0214
.450	.378E+09	.9527	1.7873	.9674	.8465	.9364	.9068	.7035	.9868	.9727	.9744	1.0014	1.0192
.500	.413E+09	.9521	1.7894	.9601	.8153	.9226	.8870	.7589	.9832	.9671	.9687	1.0021	1.0168
.550	.446E+09	.9514	1.7917	.9527	.7827	.9078	.8660	.8083	.9806	.9613	.9627	1.0030	1.0144
.600	.477E+09	.9507	1.7936	.9437	.7489	.8928	.8433	.8515	.9770	.9552	.9563	1.0040	1.0118
.650	.505E+09	.9500	1.7955	.9346	.7127	.8756	.8211	.8890	.9733	.9494	.9495	1.0057	1.0096
.700	.532E+09	.9493	1.7972	.9251	.6801	.8584	.7976	.9205	.9693	.9434	.9425	1.0076	1.0074
.750	.556E+09	.9486	1.7987	.9151	.6456	.8407	.7736	.9467	.9657	.9376	.9353	1.0099	1.0053
.800	.579E+09	.9479	1.8000	.9047	.6114	.8226	.7493	.9666	.9609	.9320	.9279	1.0126	1.0036
.850	.599E+09	.9472	1.8010	.8940	.5777	.8047	.7248	.9817	.9565	.9266	.9284	1.0157	1.0020
.900	.618E+09	.9465	1.8019	.8831	.5449	.7856	.7004	.9921	.9519	.9216	.9128	1.0194	1.0009
.950	.634E+09	.9458	1.8025	.8719	.5131	.7568	.6761	.9981	.9474	.9171	.9052	1.0237	1.0002
1.000	.649E+09	.9452	1.8029	.8606	.4823	.7480	.6529	1.0000	.9427	.9130	.8976	1.0285	1.0000
1.050	.662E+09	.9446	1.8031	.8491	.4528	.7292	.6282	.9982	.9381	.9094	.8900	1.0337	1.0002
1.100	.674E+09	.9440	1.8032	.8376	.4244	.7106	.6047	.9930	.9335	.9062	.8825	1.0396	1.0009
1.150	.684E+09	.9434	1.8030	.8260	.3975	.6921	.5818	.9850	.9289	.9037	.8751	1.0461	1.0072
1.200	.693E+09	.9429	1.8028	.8144	.3719	.6737	.5595	.9745	.9243	.9019	.8678	1.0534	1.0042
1.250	.700E+09	.9424	1.8024	.8029	.3476	.6557	.5376	.9616	.9198	.9004	.8606	1.0610	1.0065
1.300	.706E+09	.9419	1.8017	.7914	.3247	.6379	.5164	.9469	.9154	.8997	.8535	1.0694	1.0097
1.350	.711E+09	.9415	1.8014	.7799	.3031	.6205	.4958	.9304	.9111	.8994	.8466	1.0783	1.0133
1.400	.715E+09	.9411	1.8008	.7686	.2828	.6034	.4759	.9127	.9068	.8998	.8399	1.0880	1.0176
1.450	.718E+09	.9407	1.8001	.7574	.2636	.5865	.4565	.8936	.9027	.9006	.8333	1.0980	1.0222
1.500	.721E+09	.9403	1.7995	.7463	.2458	.5703	.4380	.8738	.8986	.9022	.8269	1.1089	1.0278
1.550	.722E+09	.9400	1.7988	.7353	.2290	.5547	.4200	.8532	.8947	.9043	.8206	1.1202	1.0338
1.600	.723E+09	.9397	1.7984	.7246	.2133	.5387	.4027	.8320	.8909	.9066	.8145	1.1320	1.0402
1.650	.723E+09	.9395	1.7979	.7139	.1987	.5235	.3860	.8104	.8873	.9096	.8085	1.1444	1.0473
1.700	.722E+09	.9393	1.7975	.7035	.1850	.5087	.3701	.7887	.8837	.9132	.8027	1.1576	1.0550
1.750	.721E+09	.9390	1.7970	.6932	.1723	.4947	.3547	.7669	.8802	.9173	.7970	1.1712	1.0633
1.800	.720E+09	.9389	1.7965	.6830	.1604	.4803	.3400	.7450	.8768	.9218	.7915	1.1854	1.0720
1.850	.718E+09	.9387	1.7960	.6731	.1494	.4667	.3259	.7237	.8736	.9269	.7867	1.2002	1.0814
1.900	.716E+09	.9386	1.7954	.6633	.1392	.4536	.3124	.7018	.8704	.9327	.7811	1.2158	1.0914
1.950	.713E+09	.9385	1.7948	.6537	.1297	.4408	.2995	.6805	.8673	.9388	.7761	1.2318	1.1019
2.000	.711E+09	.9384	1.7942	.6443	.1208	.4285	.2872	.6595	.8644	.9455	.7713	1.2484	1.1129

TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARALIN-5000

C. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.29990E-04	.11858E-03	.7077
.050	1.6896	.29908E-04	.11819E-03	.7077
.100	1.7151	.29847E-04	.11790E-03	.7077
.150	1.6881	.29746E-04	.11741E-03	.7076
.200	1.7086	.29606E-04	.11674E-03	.7076
.250	1.7055	.29427E-04	.11589E-03	.7077
.300	1.6982	.29210E-04	.11486E-03	.7078
.350	1.7046	.28959E-04	.11365E-03	.7080
.400	1.7017	.28673E-04	.11229E-03	.7083
.450	1.7067	.28357E-04	.11077E-03	.7088
.500	1.7035	.28010E-04	.10641E-03	.7276
.550	1.7049	.27637E-04	.10476E-03	.7279
.600	1.7015	.27239E-04	.10300E-03	.7283
.650	1.7105	.26819E-04	.10117E-03	.7287
.700	1.7066	.26380E-04	.99292E-04	.7291
.750	1.7053	.25923E-04	.97345E-04	.7296
.800	1.7070	.25453E-04	.95369E-04	.7302
.850	1.7027	.24971E-04	.93362E-04	.7307
.900	1.7053	.24479E-04	.91311E-04	.7315
.950	1.7049	.23980E-04	.89121E-04	.7334
1.000	1.7026	.23477E-04	.86929E-04	.7354
1.050	1.7003	.22969E-04	.84226E-04	.7420
1.100	1.6988	.22460E-04	.82143E-04	.7434
1.150	1.6994	.21951E-04	.80068E-04	.7449
1.200	1.6992	.21444E-04	.78013E-04	.7463
1.250	1.6938	.20939E-04	.75983E-04	.7479
1.300	1.6962	.20437E-04	.73977E-04	.7495
1.350	1.6924	.19940E-04	.72041E-04	.7506
1.400	1.6929	.19449E-04	.70122E-04	.7519
1.450	1.6869	.18963E-04	.68246E-04	.7531
1.500	1.6905	.18484E-04	.66428E-04	.7541
1.550	1.6871	.18013E-04	.64649E-04	.7550
1.600	1.6841	.17548E-04	.62904E-04	.7557
1.650	1.6846	.17092E-04	.61213E-04	.7560
1.700	1.6847	.16644E-04	.59547E-04	.7566
1.750	1.6834	.16205E-04	.57892E-04	.7575
1.800	1.6801	.15774E-04	.56257E-04	.7586
1.850	1.6809	.15354E-04	.54649E-04	.7598
1.900	1.6811	.14943E-04	.53070E-04	.7613
1.950	1.6782	.14541E-04	.51573E-04	.7622
2.000	1.6776	.14149E-04	.50150E-04	.7626

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

TT = 40.0 K PT = 10.0 ATM $\rho_{HOT} = .311E-02$ G/CM³ SVT = 717.913 M/SEC

MACH	PE/PM	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.9465	1.2017	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.395E+00	.9865	1.2031	.9997	.9999	.9997	.9998	.0877	1.0000	.9998	.9998	1.0000	1.0103
.100	.617E+00	.9864	1.2041	.9989	.9992	.9977	.9951	.1735	.9999	.9992	.9992	1.0001	1.0103
.150	.906E+00	.9863	1.2056	.9975	.9874	.9937	.9849	.2583	.9997	.9980	.9982	1.0001	1.0101
.200	.120E+00	.9861	1.2078	.9955	.9690	.9888	.9803	.3407	.9995	.9964	.9967	1.0000	1.0098
.250	.149E+00	.9859	1.2105	.9930	.9520	.9826	.9695	.4202	.9991	.9943	.9949	1.0000	1.0095
.300	.177E+00	.9856	1.2139	.9899	.9317	.9750	.9564	.4959	.9987	.9917	.9926	1.0000	1.0091
.350	.207E+00	.9853	1.2177	.9862	.9084	.9662	.9414	.5673	.9982	.9887	.9898	1.0001	1.0086
.400	.229E+00	.9850	1.2222	.9820	.8825	.9561	.9244	.6340	.9976	.9853	.9867	1.0002	1.0081
.450	.254E+00	.9846	1.2271	.9773	.8541	.9448	.9058	.6955	.9969	.9815	.9830	1.0003	1.0075
.500	.277E+00	.9842	1.2324	.9720	.8239	.9323	.8857	.7515	.9960	.9773	.9790	1.0006	1.0069
.550	.299E+00	.9838	1.2381	.9662	.7918	.9189	.8642	.8017	.9950	.9726	.9744	1.0008	1.0061
.600	.319E+00	.9833	1.2442	.9599	.7586	.9044	.8416	.8462	.9938	.9677	.9695	1.0013	1.0054
.650	.338E+00	.9829	1.2505	.9529	.7245	.8890	.8180	.8846	.9924	.9623	.9641	1.0019	1.0046
.700	.356E+00	.9824	1.2574	.9455	.6897	.8728	.7936	.9171	.9918	.9567	.9583	1.0026	1.0036
.750	.372E+00	.9819	1.2647	.9376	.6548	.8558	.7687	.9438	.9890	.9509	.9521	1.0035	1.0027
.800	.387E+00	.9814	1.2724	.9293	.6200	.8383	.7435	.9650	.9869	.9451	.9455	1.0048	1.0019
.850	.400E+00	.9808	1.2802	.9204	.5856	.8202	.7182	.9809	.9847	.9393	.9387	1.0064	1.0012
.900	.411E+00	.9803	1.2883	.9111	.5519	.8017	.6927	.9917	.9822	.9333	.9316	1.0082	1.0005
.950	.422E+00	.9798	1.2968	.9015	.5190	.7829	.6675	.9980	.9794	.9278	.9243	1.0106	1.0001
1.000	.431E+00	.9793	1.3055	.8914	.4873	.7640	.6425	1.0000	.9765	.9224	.9168	1.0136	1.0000
1.050	.439E+00	.9788	1.3142	.8811	.4568	.7449	.6180	.9981	.9734	.9174	.9092	1.0170	1.0001
1.100	.446E+00	.9784	1.3230	.8704	.4276	.7259	.5939	.9928	.9700	.9129	.9015	1.0210	1.0007
1.150	.452E+00	.9779	1.3317	.8595	.3997	.7069	.5704	.9844	.9666	.9088	.8939	1.0257	1.0016
1.200	.456E+00	.9775	1.3405	.8485	.3734	.6881	.5476	.9735	.9630	.9054	.8863	1.0311	1.0031
1.250	.460E+00	.9770	1.3495	.8373	.3485	.6695	.5255	.9603	.9593	.9026	.8787	1.0372	1.0052
1.300	.463E+00	.9766	1.3585	.8260	.3249	.6512	.5040	.9450	.9555	.9003	.8713	1.0438	1.0076
1.350	.466E+00	.9763	1.3676	.8147	.3029	.6332	.4833	.9281	.9517	.8988	.8640	1.0512	1.0107
1.400	.467E+00	.9759	1.3768	.8033	.2822	.6156	.4634	.9099	.9478	.8980	.8569	1.0593	1.0144
1.450	.468E+00	.9756	1.3861	.7920	.2628	.5983	.4441	.8904	.9440	.8976	.8499	1.0680	1.0185
1.500	.468E+00	.9752	1.3955	.7807	.2446	.5815	.4256	.8701	.9401	.8961	.8432	1.0774	1.0234
1.550	.468E+00	.9749	1.4050	.7695	.2277	.5651	.4079	.8493	.9363	.8993	.8366	1.0877	1.0290
1.600	.468E+00	.9747	1.4146	.7584	.2120	.5491	.3908	.8279	.9326	.9010	.8302	1.0985	1.0351
1.650	.467E+00	.9744	1.4242	.7475	.1973	.5335	.3744	.8062	.9289	.9033	.8240	1.1100	1.0417
1.700	.465E+00	.9742	1.4338	.7366	.1836	.5183	.3587	.7843	.9253	.9063	.8180	1.1221	1.0490
1.750	.464E+00	.9739	1.4433	.7259	.1709	.5036	.3437	.7624	.9218	.9100	.8121	1.1350	1.0571
1.800	.462E+00	.9737	1.4528	.7154	.1591	.4894	.3294	.7405	.9184	.9142	.8065	1.1484	1.0656
1.850	.460E+00	.9736	1.4623	.7050	.1481	.4755	.3156	.7188	.9151	.9189	.8010	1.1624	1.0747
1.900	.457E+00	.9734	1.4717	.6949	.1379	.4621	.3025	.6972	.9118	.9242	.7957	1.1770	1.0843
1.950	.455E+00	.9732	1.4811	.6848	.1285	.4491	.2899	.6760	.9087	.9300	.7906	1.1923	1.0946
2.000	.452E+00	.9731	1.4905	.6750	.1196	.4365	.2779	.6549	.9056	.9361	.7857	1.2079	1.1052

TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

D. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.36723E-04	.15188E-03	.7085
.050	1.5974	.36633E-04	.15126E-03	.7085
.100	1.5910	.36573E-04	.15085E-03	.7085
.150	1.5833	.36474E-04	.15016E-03	.7086
.200	1.5850	.36386E-04	.14921E-03	.7087
.250	1.5878	.36159E-04	.14799E-03	.7088
.300	1.5887	.35944E-04	.14651E-03	.7090
.350	1.5949	.35692E-04	.14504E-03	.7081
.400	1.5976	.35403E-04	.14348E-03	.7066
.450	1.6022	.35079E-04	.14174E-03	.7049
.500	1.6089	.34721E-04	.13982E-03	.7033
.550	1.6095	.34331E-04	.13772E-03	.7016
.600	1.6179	.33910E-04	.13547E-03	.7000
.650	1.6211	.33459E-04	.13307E-03	.6986
.700	1.6248	.32982E-04	.13054E-03	.6974
.750	1.6303	.32481E-04	.12788E-03	.6964
.800	1.6381	.31957E-04	.12513E-03	.6957
.850	1.6428	.31414E-04	.12245E-03	.6945
.900	1.6453	.30855E-04	.11975E-03	.6933
.950	1.6528	.30282E-04	.11699E-03	.6925
1.000	1.6578	.29698E-04	.11418E-03	.6922
1.050	1.6601	.29105E-04	.11134E-03	.6923
1.100	1.6657	.28508E-04	.10849E-03	.6929
1.150	1.6677	.27907E-04	.10563E-03	.6939
1.200	1.6720	.27305E-04	.10156E-03	.7036
1.250	1.6752	.26705E-04	.98953E-04	.7042
1.300	1.6737	.26107E-04	.96389E-04	.7049
1.350	1.6777	.25514E-04	.93878E-04	.7057
1.400	1.6781	.24926E-04	.91425E-04	.7066
1.450	1.6761	.24345E-04	.89025E-04	.7075
1.500	1.6788	.23772E-04	.86632E-04	.7090
1.550	1.6805	.23207E-04	.84260E-04	.7108
1.600	1.6788	.22651E-04	.81585E-04	.7158
1.650	1.6782	.22104E-04	.79390E-04	.7173
1.700	1.6786	.21567E-04	.77254E-04	.7187
1.750	1.6807	.21040E-04	.75176E-04	.7201
1.800	1.6785	.20523E-04	.73157E-04	.7215
1.850	1.6776	.20016E-04	.71200E-04	.7227
1.900	1.6767	.19520E-04	.69306E-04	.7238
1.950	1.6770	.19034E-04	.67479E-04	.7247
2.000	1.6739	.18559E-04	.65717E-04	.7255

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

TT = 100.0 K PT = 10.0 ATM $\rho_{HOT} = .246E-02$ G/CM³ SVT = 778.515 M/SEC

MACH	PE/PM	Z	CP/CV	SV/SVT	P/PT	T/TT	ρ_{HOT}/ρ_{HOT}	A*/A	SV/SVT	P/PT	T/TT	ρ_{HOT}/ρ_{HOT}	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	.3979	1.4728	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.224E+08	.9979	1.4748	.9998	.9997	.9994	.9988	.0860	1.0000	1.0000	.9999	1.0001	.9970
.100	.446E+08	.9979	1.4755	.9991	.9992	.9977	.9951	.1713	1.0001	.9997	.9997	1.0001	.9971
.150	.665E+08	.9977	1.4767	.9980	.9976	.9949	.9888	.2550	1.0002	.9992	.9993	1.0000	.9971
.200	.881E+08	.9976	1.4783	.9964	.9971	.9909	.9803	.3365	1.0004	.9986	.9988	1.0001	.9974
.250	1.095E+08	.9974	1.4805	.9944	.9953	.9858	.9695	.4152	1.0006	.9977	.9981	1.0001	.9976
.300	1.29E+08	.9972	1.4832	.9929	.9962	.9795	.9563	.4902	1.0008	.9965	.9972	.9999	.9976
.350	1.49E+08	.9970	1.4863	.9891	.9913	.9723	.9411	.5613	1.0011	.9951	.9961	.9998	.9979
.400	1.68E+08	.9964	1.4900	.9858	.9899	.9640	.9242	.6278	1.0015	.9936	.9948	.9999	.9982
.450	1.85E+08	.9955	1.4943	.9821	.9851	.9546	.9054	.6893	1.0018	.9918	.9933	.9999	.9986
.500	2.02E+08	.9947	1.4991	.9780	.9832	.9442	.8858	.7455	1.0022	.9896	.9914	.9998	.9989
.550	2.18E+08	.9939	1.5044	.9735	.9803	.9329	.9631	.7961	1.0026	.9870	.9893	.9996	.9991
.600	2.33E+08	.9936	1.5103	.9687	.9775	.9206	.9400	.8411	1.0029	.9841	.9869	.9995	.9994
.650	2.46E+08	.9932	1.5168	.9634	.9733	.9074	.9159	.8801	1.0033	.9807	.9841	.9993	.9995
.700	2.58E+08	.9929	1.5239	.9578	.9704	.8937	.9117	.9137	1.0036	.9773	.9819	.9993	.9999
.750	2.69E+08	.9925	1.5315	.9518	.9670	.8785	.9653	.9411	1.0039	.9730	.9773	.9990	.9998
.800	2.80E+08	.9921	1.5396	.9454	.9634	.8629	.9392	.9631	1.0041	.9686	.9733	.9989	.9999
.850	2.88E+08	.9918	1.5482	.9387	.9601	.8465	.9128	.9798	1.0042	.9638	.9689	.9989	1.0001
.900	2.96E+08	.9914	1.5573	.9316	.9568	.8296	.8863	.9913	1.0042	.9586	.9640	.9989	1.0001
.950	3.03E+08	.9910	1.5668	.9241	.9532	.8121	.8598	.9979	1.0041	.9531	.9586	.9991	1.0001
1.000	3.09E+08	.9906	1.5765	.9163	.9504	.7941	.8335	1.0000	1.0038	.9472	.9529	.9993	1.0000
1.050	3.14E+08	.9902	1.5865	.9081	.9467	.7756	.8077	.9981	1.0032	.9413	.9467	1.0000	1.0002
1.100	3.18E+08	.9898	1.5965	.8996	.9430	.7569	.7827	.9924	1.0025	.9352	.9401	1.0008	1.0002
1.150	3.21E+08	.9893	1.6064	.8907	.9406	.7380	.7572	.9832	1.0016	.9290	.9332	1.0019	1.0004
1.200	3.24E+08	.9887	1.6162	.8814	.9380	.7189	.7331	.9714	1.0003	.9232	.9260	1.0037	1.0009
1.250	3.26E+08	.9880	1.6256	.8719	.9352	.6999	.7097	.9570	.9989	.9176	.9186	1.0060	1.0018
1.300	3.27E+08	.9875	1.6345	.8620	.9322	.6809	.6872	.9405	.9971	.9123	.9110	1.0088	1.0028
1.350	3.28E+08	.9870	1.6429	.8519	.9298	.6620	.6655	.9222	.9951	.9075	.9034	1.0124	1.0044
1.400	3.28E+08	.9864	1.6506	.8416	.9278	.6435	.6447	.9025	.9929	.9033	.8957	1.0166	1.0062
1.450	3.28E+08	.9858	1.6575	.8310	.9264	.6252	.6249	.8820	.9905	.8999	.8881	1.0218	1.0090
1.500	3.27E+08	.9853	1.6634	.8204	.9254	.6073	.6059	.8605	.9878	.8972	.8806	1.0277	1.0121
1.550	3.26E+08	.9849	1.6693	.8096	.9247	.5909	.5878	.8384	.9851	.8952	.8732	1.0344	1.0158
1.600	3.25E+08	.9844	1.6741	.7987	.9244	.5729	.5707	.8162	.9821	.8944	.8660	1.0422	1.0204
1.650	3.23E+08	.9840	1.6782	.7878	.9244	.5562	.5544	.7937	.9791	.8942	.8590	1.0507	1.0256
1.700	3.22E+08	.9834	1.6817	.7770	.9244	.5401	.5389	.7711	.9760	.8948	.8522	1.0600	1.0314
1.750	3.20E+08	.9828	1.6845	.7662	.9244	.5245	.5241	.7486	.9729	.8962	.8457	1.0702	1.0380
1.800	3.18E+08	.9820	1.6869	.7554	.9244	.5094	.5091	.7264	.9698	.8985	.8394	1.0811	1.0452
1.850	3.16E+08	.9812	1.6888	.7448	.9244	.4943	.4947	.7043	.9666	.9015	.8334	1.0928	1.0531
1.900	3.13E+08	.9803	1.6903	.7342	.9244	.4791	.4806	.6827	.9635	.9054	.8275	1.1054	1.0618
1.950	3.11E+08	.9795	1.6915	.7238	.9244	.4639	.4669	.6614	.9604	.9098	.8219	1.1186	1.0710
2.000	3.08E+08	.9787	1.6924	.7136	.9244	.4487	.4536	.6405	.9574	.9149	.8165	1.1325	1.0809

TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

E. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.42882E-04	.19757E-03	.7126
.050	1.5067	.42784E-04	.19652E-03	.7130
.100	1.4764	.42730E-04	.19610E-03	.7128
.150	1.4666	.42638E-04	.19538E-03	.7126
.200	1.4778	.42511E-04	.19439E-03	.7123
.250	1.4787	.42348E-04	.19311E-03	.7118
.300	1.4730	.42150E-04	.19157E-03	.7113
.350	1.4817	.41916E-04	.18975E-03	.7107
.400	1.4867	.41648E-04	.18767E-03	.7100
.450	1.4901	.41345E-04	.18533E-03	.7092
.500	1.4917	.41009E-04	.18275E-03	.7084
.550	1.4958	.40641E-04	.17992E-03	.7076
.600	1.5020	.40240E-04	.17686E-03	.7068
.650	1.5059	.39808E-04	.17358E-03	.7060
.700	1.5170	.39346E-04	.17009E-03	.7053
.750	1.5170	.38854E-04	.16652E-03	.7043
.800	1.5283	.38335E-04	.16283E-03	.7031
.850	1.5365	.37789E-04	.15896E-03	.7021
.900	1.5436	.37217E-04	.15495E-03	.7014
.950	1.5519	.36622E-04	.15081E-03	.7011
1.000	1.5603	.36006E-04	.14656E-03	.7011
1.050	1.5717	.35371E-04	.14231E-03	.7012
1.100	1.5787	.34720E-04	.13877E-03	.6979
1.150	1.5872	.34055E-04	.13518E-03	.6950
1.200	1.5988	.33380E-04	.13155E-03	.6927
1.250	1.6078	.32697E-04	.12792E-03	.6909
1.300	1.6143	.32010E-04	.12430E-03	.6896
1.350	1.6235	.31322E-04	.12075E-03	.6887
1.400	1.6287	.30635E-04	.11739E-03	.6876
1.450	1.6395	.29953E-04	.11407E-03	.6870
1.500	1.6425	.29276E-04	.11080E-03	.6871
1.550	1.6470	.28607E-04	.10760E-03	.6876
1.600	1.6562	.27948E-04	.10447E-03	.6887
1.650	1.6574	.27300E-04	.10141E-03	.6902
1.700	1.6597	.26663E-04	.97967E-04	.6954
1.750	1.6633	.26039E-04	.95294E-04	.6962
1.800	1.6652	.25427E-04	.92714E-04	.6971
1.850	1.6665	.24828E-04	.90217E-04	.6981
1.900	1.6701	.24242E-04	.87804E-04	.6992
1.950	1.6693	.23669E-04	.85447E-04	.7006
2.000	1.6697	.23109E-04	.83136E-04	.7022

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. TT = 200.0 K PT = 10.0 ATM RHOT = .122E-02 G/CM³ SVT = 1062.277 M/SEC

MACH	PE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0067	1.3501	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.945E+07	1.0067	1.3498	.9999	.9982	.9996	.9987	.0860	1.0000	1.0000	1.0001	.9999	.9973
.100	.188E+08	1.0066	1.3497	.9990	.9932	.9983	.9950	.1713	1.0000	1.0001	1.0003	.9999	.9973
.150	.281E+08	1.0066	1.3495	.9979	.9848	.9961	.9887	.2550	1.0000	1.0004	1.0006	.9999	.9973
.200	.371E+08	1.0065	1.3492	.9961	.9733	.9931	.9802	.3365	1.0001	1.0008	1.0010	1.0000	.9974
.250	.459E+08	1.0064	1.3488	.9939	.9586	.9892	.9693	.4151	1.0001	1.0012	1.0016	.9999	.9974
.300	.544E+08	1.0063	1.3484	.9913	.9412	.9846	.9564	.4902	1.0002	1.0019	1.0023	1.0000	.9976
.350	.625E+08	1.0061	1.3479	.9883	.9211	.9791	.9413	.5611	1.0003	1.0025	1.0031	1.0000	.9976
.400	.702E+08	1.0060	1.3474	.9848	.8985	.9729	.9241	.6274	1.0004	1.0032	1.0041	.9998	.9976
.450	.775E+08	1.0058	1.3468	.9809	.8739	.9660	.9054	.6888	1.0006	1.0041	1.0051	.9999	.9978
.500	.842E+08	1.0056	1.3462	.9767	.8473	.9584	.8850	.7448	1.0008	1.0051	1.0064	.9998	.9979
.550	.905E+08	1.0054	1.3456	.9720	.8192	.9502	.8632	.7953	1.0010	1.0062	1.0077	.9997	.9981
.600	.962E+08	1.0052	1.3449	.9671	.7899	.9414	.8403	.8403	1.0013	1.0075	1.0092	.9998	.9984
.650	.101E+09	1.0050	1.3442	.9618	.7594	.9320	.8162	.8794	1.0016	1.0088	1.0108	.9997	.9986
.700	.106E+09	1.0048	1.3436	.9562	.7282	.9221	.7912	.9127	1.0020	1.0101	1.0125	.9995	.9988
.750	.110E+09	1.0046	1.3429	.9504	.6966	.9117	.7656	.9405	1.0024	1.0116	1.0143	.9994	.9992
.800	.114E+09	1.0043	1.3423	.9443	.6645	.9009	.7393	.9626	1.0029	1.0130	1.0162	.9991	.9994
.850	.117E+09	1.0041	1.3418	.9380	.6325	.8897	.7128	.9794	1.0035	1.0144	1.0183	.9988	.9996
.900	.119E+09	1.0039	1.3413	.9315	.6007	.8781	.6860	.9911	1.0041	1.0159	1.0204	.9984	.9999
.950	.121E+09	1.0036	1.3409	.9248	.5691	.8662	.6590	.9979	1.0048	1.0173	1.0226	.9979	1.0000
1.000	.122E+09	1.0034	1.3406	.9179	.5381	.8540	.6321	1.0000	1.0056	1.0186	1.0248	.9971	1.0000
1.050	.123E+09	1.0032	1.3404	.9110	.5076	.8416	.6053	.9978	1.0064	1.0196	1.0271	.9961	.9998
1.100	.124E+09	1.0030	1.3404	.9033	.4780	.8289	.5789	.9919	1.0073	1.0207	1.0295	.9951	.9997
1.150	.124E+09	1.0027	1.3405	.8967	.4492	.8160	.5527	.9822	1.0083	1.0214	1.0318	.9938	.9993
1.200	.124E+09	1.0025	1.3409	.8894	.4215	.8030	.5271	.9696	1.0094	1.0222	1.0342	.9924	.9991
1.250	.123E+09	1.0023	1.3414	.8820	.3948	.7897	.5020	.9539	1.0105	1.0225	1.0365	.9908	.9985
1.300	.122E+09	1.0021	1.3421	.8746	.3690	.7764	.4775	.9356	1.0117	1.0225	1.0388	.9888	.9977
1.350	.121E+09	1.0020	1.3431	.8671	.3445	.7629	.4537	.9153	1.0129	1.0223	1.0410	.9867	.9968
1.400	.120E+09	1.0018	1.3444	.8597	.3211	.7494	.4306	.8931	1.0143	1.0218	1.0431	.9844	.9958
1.450	.118E+09	1.0016	1.3460	.8521	.2988	.7357	.4082	.8692	1.0156	1.0207	1.0451	.9816	.9943
1.500	.116E+09	1.0014	1.3479	.8446	.2776	.7220	.3865	.8439	1.0170	1.0191	1.0469	.9785	.9926
1.550	.114E+09	1.0013	1.3501	.8371	.2576	.7082	.3657	.8177	1.0185	1.0170	1.0485	.9752	.9907
1.600	.112E+09	1.0011	1.3528	.8296	.2387	.6944	.3457	.7907	1.0200	1.0145	1.0499	.9717	.9885
1.650	.109E+09	1.0010	1.3559	.8220	.2208	.6805	.3264	.7629	1.0216	1.0111	1.0510	.9675	.9858
1.700	.107E+09	1.0009	1.3594	.8145	.2041	.6665	.3080	.7351	1.0232	1.0075	1.0518	.9635	.9832
1.750	.104E+09	1.0007	1.3634	.8070	.1884	.6526	.2905	.7071	1.0248	1.0033	1.0523	.9592	.9804
1.800	.102E+09	1.0006	1.3680	.7996	.1738	.6386	.2737	.6790	1.0264	.9984	1.0524	.9544	.9771
1.850	.992E+08	1.0005	1.3730	.7921	.1600	.6246	.2577	.6509	1.0281	.9925	1.0521	.9492	.9733
1.900	.986E+08	1.0004	1.3787	.7847	.1472	.6105	.2426	.6234	1.0297	.9863	1.0513	.9440	.9695
1.950	.984E+08	1.0003	1.3849	.7773	.1353	.5965	.2282	.5961	1.0314	.9793	1.0501	.9385	.9653
2.000	.911E+08	1.0002	1.3919	.7699	.1242	.5824	.2146	.5695	1.0330	.9716	1.0484	.9328	.9610

TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

F. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	FRANZTL NUMBER
0.000	I	.68606E-04	.37602E-03	.7034
.050	1.3451	.68467E-04	.37545E-03	.7035
.100	1.3579	.68405E-04	.37519E-03	.7035
.150	1.3571	.68302E-04	.37477E-03	.7035
.200	1.3602	.68159E-04	.37418E-03	.7034
.250	1.3568	.67976E-04	.37343E-03	.7034
.300	1.3598	.67755E-04	.37253E-03	.7034
.350	1.3567	.67496E-04	.37147E-03	.7034
.400	1.3531	.67201E-04	.37027E-03	.7033
.450	1.3562	.66671E-04	.36892E-03	.7032
.500	1.3538	.66508E-04	.36745E-03	.7029
.550	1.3533	.66113E-04	.36585E-03	.7027
.600	1.3550	.65688E-04	.36380E-03	.7030
.650	1.3518	.65235E-04	.36096E-03	.7045
.700	1.3505	.64755E-04	.35797E-03	.7060
.750	1.3511	.64251E-04	.35483E-03	.7075
.800	1.3483	.63723E-04	.35156E-03	.7090
.850	1.3485	.63173E-04	.34817E-03	.7105
.900	1.3480	.62603E-04	.34466E-03	.7118
.950	1.3463	.62015E-04	.34106E-03	.7130
1.000	1.3449	.61410E-04	.33737E-03	.7141
1.050	1.3440	.60788E-04	.33360E-03	.7149
1.100	1.3453	.60151E-04	.32975E-03	.7155
1.150	1.3431	.59502E-04	.32585E-03	.7159
1.200	1.3449	.58840E-04	.32190E-03	.7159
1.250	1.3448	.58165E-04	.31789E-03	.7156
1.300	1.3440	.57480E-04	.31385E-03	.7149
1.350	1.3454	.56786E-04	.30977E-03	.7139
1.400	1.3469	.56082E-04	.30567E-03	.7123
1.450	1.3472	.55369E-04	.30154E-03	.7103
1.500	1.3480	.54647E-04	.29735E-03	.7079
1.550	1.3509	.53917E-04	.29075E-03	.7107
1.600	1.3533	.53179E-04	.28413E-03	.7131
1.650	1.3543	.52432E-04	.27748E-03	.7151
1.700	1.3601	.51678E-04	.27082E-03	.7168
1.750	1.3634	.50917E-04	.26415E-03	.7180
1.800	1.3668	.50148E-04	.25747E-03	.7188
1.850	1.3701	.49371E-04	.25077E-03	.7192
1.900	1.3772	.48587E-04	.24408E-03	.7192
1.950	1.3822	.47794E-04	.23737E-03	.7187
2.000	1.3899	.46994E-04	.23067E-03	.7178

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

G. (CONTINUED)

MACH	LOCAL ISENTROPIC EXPANSION COEFF.	VISCOSITY G/CM-SEC	THERMAL CONDUCTIVITY CAL/CM-SEC-K	PRANDTL NUMBER
0.000	I	.89743E-04	.46228E-03	.7104
.050	1.3899	.89803E-04	.46215E-03	.6908
.100	1.3870	.89715E-04	.46176E-03	.6908
.150	1.3938	.89568E-04	.46112E-03	.6909
.200	1.3916	.89367E-04	.46022E-03	.6910
.250	1.3983	.89102E-04	.45908E-03	.6911
.300	1.3910	.88787E-04	.45769E-03	.6912
.350	1.3944	.88417E-04	.45608E-03	.6913
.400	1.3914	.87997E-04	.45424E-03	.6915
.450	1.3909	.87527E-04	.45220E-03	.6917
.500	1.3919	.87011E-04	.44996E-03	.6920
.550	1.3874	.86451E-04	.44754E-03	.6922
.600	1.3884	.85850E-04	.44494E-03	.6925
.650	1.3872	.85210E-04	.44229E-03	.6927
.700	1.3846	.84535E-04	.43957E-03	.6928
.750	1.3841	.83826E-04	.43672E-03	.6930
.800	1.3836	.83089E-04	.43376E-03	.6932
.850	1.3813	.82324E-04	.43070E-03	.6934
.900	1.3818	.81536E-04	.42757E-03	.6937
.950	1.3791	.80726E-04	.42436E-03	.6940
1.000	1.3769	.79899E-04	.42109E-03	.6943
1.050	1.3757	.79055E-04	.41777E-03	.6947
1.100	1.3704	.78198E-04	.41441E-03	.6950
1.150	1.3702	.77331E-04	.41103E-03	.6955
1.200	1.3690	.76454E-04	.40764E-03	.6958
1.250	1.3665	.75571E-04	.40415E-03	.6964
1.300	1.3654	.74683E-04	.40036E-03	.6974
1.350	1.3618	.73791E-04	.39657E-03	.6984
1.400	1.3599	.72898E-04	.39280E-03	.6993
1.450	1.3572	.72004E-04	.38904E-03	.7002
1.500	1.3555	.71110E-04	.38531E-03	.7009
1.550	1.3536	.70219E-04	.38161E-03	.7015
1.600	1.3511	.69329E-04	.37793E-03	.7020
1.650	1.3503	.68444E-04	.37430E-03	.7023
1.700	1.3487	.67562E-04	.37071E-03	.7024
1.750	1.3455	.66683E-04	.36715E-03	.7022
1.800	1.3446	.65810E-04	.36363E-03	.7018
1.850	1.3433	.64941E-04	.35866E-03	.7039
1.900	1.3427	.64074E-04	.35327E-03	.7067
1.950	1.3411	.63217E-04	.34795E-03	.7092
2.000	1.3405	.62363E-04	.34263E-03	.7113

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TABLE V. REAL-GAS ISENTROPIC EXPANSIONS OF PARAHYDROGEN

TT = 300.0 K PT = 10.0 ATM RHOT = .814E-03 G/CM3 SVT = 1317.507 M/SEC

MACH	RE/M	Z	CP/CV	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A	SV/SVT	P/PT	T/TT	RHO/RHOT	A*/A
-----RELATIVE TO IDEAL GAS VALUES-----													
0.000	0.	1.0059	1.3709	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
.050	.596E+07	1.0059	1.3865	.9997	.9982	.9995	.9987	.0864	1.0000	1.0000	1.0000	1.0000	1.0019
.100	.119E+08	1.0059	1.3864	.9989	.9930	.9981	.9949	.1721	.9999	.9999	1.0001	.9999	1.0018
.150	.177E+08	1.0058	1.3862	.9976	.9844	.9957	.9887	.2567	.9999	1.0000	1.0001	.9999	1.0017
.200	.234E+08	1.0058	1.3859	.9958	.9725	.9923	.9801	.3380	.9998	1.0000	1.0003	.9999	1.0016
.250	.290E+08	1.0057	1.3856	.9935	.9576	.9881	.9694	.4169	.9997	1.0002	1.0004	1.0000	1.0016
.300	.343E+08	1.0056	1.3852	.9907	.9397	.9829	.9563	.4921	.9995	1.0002	1.0006	.9999	1.0014
.350	.395E+08	1.0055	1.3847	.9873	.9192	.9769	.9413	.5632	.9994	1.0004	1.0008	1.0000	1.0013
.400	.443E+08	1.0054	1.3842	.9836	.8961	.9709	.9243	.6296	.9992	1.0006	1.0011	1.0000	1.0011
.450	.489E+08	1.0053	1.3836	.9794	.8709	.9624	.9055	.6909	.9990	1.0008	1.0014	1.0000	1.0009
.500	.532E+08	1.0051	1.3829	.9747	.8440	.9541	.8853	.7470	.9988	1.0011	1.0018	1.0002	1.0009
.550	.571E+08	1.0050	1.3821	.9697	.8153	.9450	.8635	.7973	.9986	1.0014	1.0022	1.0001	1.0006
.600	.608E+08	1.0048	1.3812	.9642	.7854	.9354	.8406	.8420	.9983	1.0018	1.0027	1.0002	1.0004
.650	.640E+08	1.0046	1.3802	.9584	.7545	.9251	.8167	.8808	.9981	1.0023	1.0033	1.0002	1.0003
.700	.670E+08	1.0045	1.3792	.9523	.7229	.9143	.7918	.9138	.9979	1.0027	1.0039	1.0002	1.0001
.750	.695E+08	1.0043	1.3780	.9459	.6909	.9031	.7663	.9412	.9977	1.0034	1.0047	1.0003	.9999
.800	.718E+08	1.0041	1.3768	.9391	.6588	.8914	.7404	.9630	.9974	1.0042	1.0055	1.0005	.9999
.850	.737E+08	1.0039	1.3755	.9321	.6266	.8793	.7140	.9795	.9972	1.0050	1.0064	1.0006	.9998
.900	.753E+08	1.0038	1.3740	.9249	.5949	.8669	.6877	.9911	.9970	1.0062	1.0074	1.0009	.9999
.950	.766E+08	1.0036	1.3725	.9175	.5636	.8543	.6612	.9978	.9968	1.0074	1.0085	1.0012	1.0000
1.000	.775E+08	1.0034	1.3709	.9098	.5328	.8414	.6348	1.0000	.9967	1.0086	1.0097	1.0014	1.0000
1.050	.782E+08	1.0032	1.3693	.9020	.5028	.8284	.6087	.9981	.9966	1.0100	1.0110	1.0016	1.0001
1.100	.786E+08	1.0031	1.3675	.8941	.4735	.8152	.5826	.9920	.9964	1.0111	1.0124	1.0015	.9999
1.150	.787E+08	1.0029	1.3657	.8861	.4453	.8019	.5570	.9827	.9964	1.0125	1.0140	1.0015	.9999
1.200	.786E+08	1.0027	1.3638	.8779	.4182	.7885	.5320	.9704	.9963	1.0141	1.0156	1.0017	.9999
1.250	.783E+08	1.0026	1.3619	.8697	.3921	.7752	.5075	.9553	.9963	1.0157	1.0174	1.0017	.9999
1.300	.778E+08	1.0024	1.3600	.8614	.3672	.7618	.4837	.9379	.9964	1.0175	1.0193	1.0017	1.0001
1.350	.771E+08	1.0023	1.3580	.8531	.3434	.7484	.4605	.9182	.9965	1.0191	1.0212	1.0015	.9999
1.400	.762E+08	1.0021	1.3561	.8447	.3207	.7351	.4379	.8967	.9967	1.0207	1.0233	1.0012	.9998
1.450	.752E+08	1.0020	1.3541	.8364	.2992	.7219	.4161	.8737	.9969	1.0222	1.0255	1.0007	.9995
1.500	.740E+08	1.0019	1.3522	.8281	.2789	.7088	.3950	.8495	.9971	1.0237	1.0278	1.0001	.9991
1.550	.727E+08	1.0017	1.3504	.8198	.2596	.6958	.3747	.8243	.9974	1.0251	1.0301	.9993	.9987
1.600	.713E+08	1.0016	1.3485	.8115	.2415	.6829	.3551	.7983	.9978	1.0263	1.0325	.9983	.9981
1.650	.699E+08	1.0015	1.3468	.8032	.2244	.6701	.3364	.7719	.9982	1.0276	1.0350	.9973	.9974
1.700	.683E+08	1.0014	1.3451	.7951	.2084	.6575	.3184	.7451	.9987	1.0287	1.0375	.9960	.9967
1.750	.667E+08	1.0013	1.3436	.7869	.1933	.6450	.3011	.7180	.9993	1.0293	1.0400	.9943	.9955
1.800	.650E+08	1.0012	1.3422	.7789	.1792	.6326	.2846	.6909	.9999	1.0298	1.0426	.9924	.9942
1.850	.633E+08	1.0011	1.3410	.7709	.1660	.6204	.2689	.6639	1.0006	1.0299	1.0451	.9902	.9927
1.900	.616E+08	1.0010	1.3400	.7630	.1537	.6084	.2539	.6372	1.0013	1.0298	1.0477	.9878	.9910
1.950	.598E+08	1.0009	1.3391	.7552	.1422	.5965	.2395	.6107	1.0021	1.0293	1.0501	.9850	.9890
2.000	.581E+08	1.0009	1.3384	.7475	.1314	.5848	.2259	.5847	1.0029	1.0283	1.0526	.9819	.9867