NBS TECHNICAL NOTE

361

Saturated Liquid Densities of Oxygen, Nitrogen, Argon, and Parahydrogen

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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NBS TECHNICAL NOTE 361

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SATURATED LIQUID DENSITIES OF OXYGEN, NITROGEN, ARGON, AND PARAHYDROGEN

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SATURATED LIQUID DENSITIES OF OXYGEN, NITROGEN, ARGON, AND PARAHYDROGEN

H. M. Roder, R. D. McCarty, and V. J. Johnson

Integrated tables of pressure, volume, and temperature for the saturated liquid, from the triple point to the critical point, of oxygen, nitrogen, argon, and parahydrogen are presented. The tables include entries of integral values of temperature in both Kelvin and Rankine, and integral values of pressure in both atmospheres and psia. Volumes and densities in three different units and a density ratio are tabulated for each entry. Estimates of the uncertainty of the tabulated data are given.

Key Words: Pressure, volume, density, temperature, saturated liquid, oxygen, nitrogen, argon, parahydrogen, uncertainties.

1. Introduction

In this report, standard density data for the saturated liquid of four commercially important gases are presented. The report was prepared at the specific request of users such as the Compressed Gas Association, the Department of the Air Force, and the State of California, who must either pay for goods delivered, or supervise delivery to customers. These agencies have experienced a certain amount of nonuniformity in costs and billings that arise because different suppliers use slightly different methods or values for the physical properties of these gases.

The report is a logical extension of an earlier effort, pamphlet P-6, "Standard Density Data Atmospheric Gases and Hydrogen," by the Compressed Gas Association. In this pamphlet, values of pressure, temperature, and density for the Normal Boiling Point (NBP) and Standard Temperature and Pressure (STP) were presented.

Now we need more than just the two state points NBP and STP; we need a definition of the saturated liquid curve as well. Also, the sources selected for this document are considered to be the best available today. The compilations of oxygen, argon, and parahydrogen, each

representing at least two man years of effort, were not available in 1965. The source for nitrogen remains unchanged. Numerical values differ from the earlier selections by as much as 0.1%. The advantages in using the present sources are:

1. Each of the compilations selected present a consistent set of values from a single source for each fluid.
2. All available data, in particular the correlation of the single phase PVT data with the saturation boundaries and the vapor pressure curve, have been considered, not just the value of the NBP.
3. The equations of state, in the form of computer programs, allow determination of values, both at liquid temperatures and at room temperatures.
4. The equations of state used present a consistent set of values for the saturation boundary as well as for the compressed fluid states. As flowmeter technology improves, an extension to the compressed fluid state will become imperative. Such a change can be accomplished without a further adjustment in numerical values.

We hope that the values presented here will serve as "agreed-on" values for some time to come.

Because NBS has been called upon to make a selection of values, a considerable portion of the text is devoted to discussion and an estimate of errors. This should satisfy the scholar and scientist. Because the use to which the document will be put is eminently practical, the tables and graphs are presented primarily in practical units. This, and the section on pitfalls or limitations of these tables, should thus be useful to the engineer.

2. Description of Tables and Graphs

To understand the properties that are presented in the tables and graphs, it is helpful to recall one of the "standard" phase diagrams. Try to recollect the presentation of isotherms in P-V coordinates as given in figure 1. You may recall the rectangular hyperbolas of

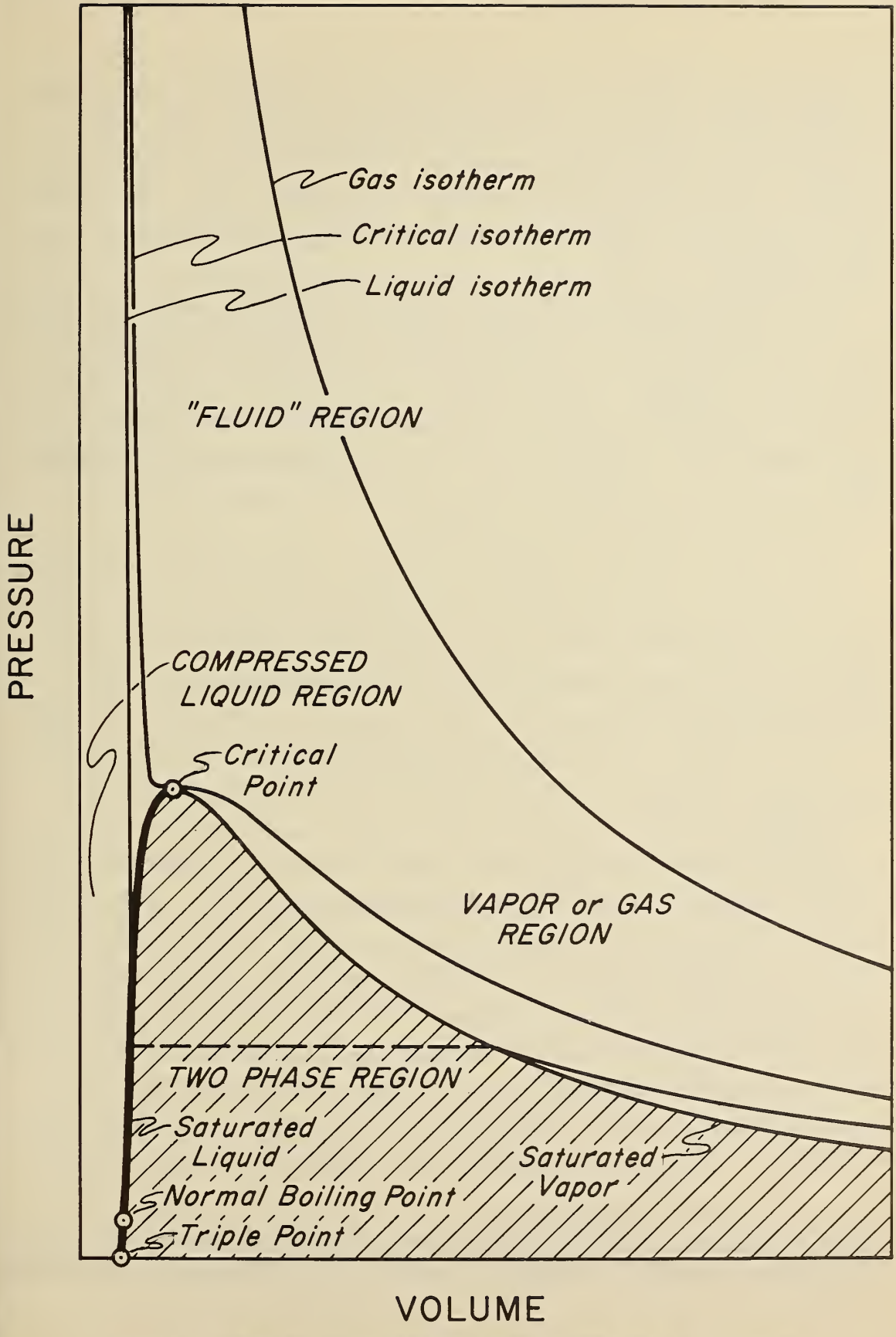

Figure 1. Generalized phase diagram; Pressure vs. Volume

PV = const of the ideal gas, and the critical isotherm first presented in a discussion of the Van der Waals equation of state. This report concerns only the equilibrium boundary between the single phase (compressed) liquid region and the two phase liquid/gas region. The boundary is emphasized in figure 1 and extends from the triple point to the critical point*.

The first table for each fluid presents values of pressure, temperature, and density near room temperature. One atmosphere is usually accepted as "standard" pressure; however, the values of temperature chosen as "standard" or "normal" vary. We, therefore, present values at 0 C, which point is usually called "Standard Temperature and Pressure" (STP), and at 68 F as well as 70 F, both of which are referred to as "Normal Temperature and Pressure" (NTP).

The second table for each fluid presents values for the uncertainties in the data. For the values of the saturated liquid, the uncertainties include both the errors in the experimental values and the contribution to the error by using an analytical function to represent the experimental values. Errors for values near room temperature are seen to be much smaller because PVT measurements near room temperature can be made to great accuracy and a better fit to the equation of state can be made.

The third and principal table presents values of increasing pressures (vapor pressure) and corresponding temperatures. These two variables define the vapor pressure curve. The table is a merged table of even values of pressure in both atmospheres and psia and of temperature in both K and R. The corresponding entries of density, volume, and density ratio follow. There are two columns of density ratios. The first column is labelled "Liquid Volume Correction Factor" and will be used as such. Physically it is the ratio of the density in question, referred to the density at the Normal Boiling Point (NBP),

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* Strictly speaking, in this phase diagram the NBP and the triple point are lines extending from liquid to vapor side at the pressure indicated.

which in turn corresponds to a pressure of 1 atmosphere. For examples of use see case 1, the alternate computation of case 3, case 4, and case 5 on page 11. The second column is labelled "NTP (70 F) Volume Correction Factor". Physically this ratio is also a ratio of densities, namely the ratio of the density in question referred to the density at NTP. For this column, NTP is selected to be 70 F and 1 atmosphere. The units of the two densities are chosen such that the NTP Volume Correction Factor yields directly the equivalent number of cubic feet of gas at NTP (70 F) per measured gallon of liquid. For an example of use, see case 3 on page 11. Entries in pressure are closely spaced so that interpolation between values should not be required. For parahydrogen, the increment in pressure is 1 psia from 1 to 150 psia, and for the other fluids the increments are 2 psia between 2 and 200 psia and 5 psia between 205 and 400 psia. The tables include entries for the Triple Point, the Normal Boiling Point, and the Critical Point, and these points are set off by double spacing in the table. Conversion of units are given in the appendix. Please note that the number of significant figures presented in the tables is not justified on the basis of accuracy, but are given to maintain internal consistency.

The first graph for each fluid is a plot of specific volume vs. pressure. The graph can be understood quite easily if you imagine figure 1 rotated about the 45° axis, i.e., the coordinates interchanged. The very practical reason behind this presentation is that the variable most easily and often measured on tanks, etc. is the pressure; thus it is sensible to have the pressure displayed as the independent variable. Because storage and transport tanks are not usually subjected to pressures in excess of 150 psi, this is the limit chosen for the graphs.

The second graph is somewhat more specialized. It gives the Liquid Volume Correction Factor (or density ratio) for a pressure range of about 50 psia from slightly below atmospheric pressure. Transfers of liquid usually take place at pressure conditions different from the Normal Boiling Point (NBP), yet the quantity of liquid transferred is desired in figures equivalent to the amount at the NBP. The graph

assumes that either a pressure or a temperature indicator may be used to determine the condition of transfer; thus it is actually a pressure-temperature plot of the saturated liquid. It is a rotation about the 45° axis of the more familiar vapor pressure vs. temperature plot with the coordinates interchanged. The temperature scale and the Liquid Volume Correction Factor scale are arranged in nomograph style for convenience of use. Also, an auxiliary scale for psig has been added at the bottom of the graph, and an extra auxiliary scale at the end of the report. If the local barometer is different from standard sea level, either psig scale can be cut out and positioned for the appropriate altitude.

3. Discussion

The nature of progress in cryogenics is such that today's "best" value may be superseded tomorrow. In the initial effort, Pamphlet P-6 of the Compressed Gas Association (1965), only values for the NBP and values at NTP were presented. The present report includes values for the saturated liquid boundary. In logical sequence, the next refinement has to include the PVT values in the compressed fluid states because we know that in many applications the fluid entering pump intakes is subcooled to prevent subsequent cavitation.

We have selected the following sources: Stewart (1966) for oxygen; Strobridge (1962) for nitrogen; Gosman, et al. (1968) for argon; and Roder, et al. (1965) as well as Hilsenrath, et al. (1955) for parahydrogen. These sources differ from the earlier selection for the CGA effort. As you can see, the compilations for oxygen, argon, and parahydrogen were not available in 1965. There is, however, a more compelling reason in selecting a compilation as a source. We now require not just a vapor pressure curve but a correlation of that curve with all available PVT data of the single phase (compressed liquid). A further reason is that these sources will permit extension into the compressed liquid states when and if such an extension becomes desirable.

One last advantage accrues when we select these compilations as sources. Except for hydrogen, we can get the values at or near room temperature, i.e., the STP and NTP values directly from the equation of state, interpolated to the accuracy of the original data.

The last point requires a bit more discussion because it ties in with the uncertainties in the values presented at or near room temperature. In the present report we have used a high order interpolation - the equation of state - to get STP and NTP values. We are justified in using a high order interpolation because the various experimenters went to considerable lengths to get the most accurate PVT values at conditions close to room temperature. According to Cragoe (1941), relative measurements of pressure and volume near room temperature can be made to a few parts per million, and the scatter between PVT values of different observers can to a large extent be explained by the use of different fundamental constants. In tables 2, 5, 8, and 11, we indicate an uncertainty of 0.01% as the uncertainty in molar volume at STP; this is the familiar 22.4 liters per mole that is encountered in elementary texts. The uncertainty is based on a consideration of the ice point temperature, T_o, rather than on a comparison of different experiments. The fundamental constant T_o is now defined to be 273.15 K, but the average over a large number of determinations of different investigators for different gases was 273.165 (Beattie, 1941). We have taken the difference between these two numbers as an indication of the true uncertainty in the molar volumes. Even if the values of different authors are compared directly, the differences are not much larger than 0.01%. Take for example hydrogen, the molar volume is 22428.5 cm^3/mole according to Woolley, et al. (1948), while it is 22433.6 cm^3/mole according to Michels, et al. (1959). The difference is 0.022%. In contrast to this there is no difference between recent measurements on oxygen by Weber (1968) and those of Michels, et al. (1954) if one uses identical values for the fundamental constants R and T_o.

The earlier effort (CGA, 1965) was slightly inconsistent in that for argon and oxygen linear interpolation* was used, while the higher order interpolations were used for hydrogen and nitrogen. The room temperature values presented in this report for NTP of oxygen and argon will differ by about 0.02% from those given CGA in 1965, while those for nitrogen and parahydrogen are unchanged. On the other hand, the densities of the saturated liquid at the NBP have changed by 0.1% for oxygen and nitrogen, and are virtually unchanged for argon and parahydrogen.

Another word on errors given in tables 2, 5, 8, and 11; in obtaining entries for our primary tables, we have assumed either temperature and density or temperature and pressure to be exact. Thus only uncertainties in pressure in the first case and density in the second case are of concern and should be presented. However, uncertainties for all three variables (P-V-T) are presented. This allows the user to enter the tables with any combination of variables and obtain the uncertainty in the resulting value. Other considerations are also important. One is that our practical temperature scales differ from the thermodynamic one--the absolute one. This is the indication in the tables of error as far as temperature is concerned. Occasionally the uncertainties given for temperature may simply indicate the extent to which we are able to measure or achieve a certain temperature. The situation with pressure is similar. In our laboratories, with high precision apparatus, we can achieve a resolution of, say, 0.001 atm. However, an equation of state is normally a function of temperature and density, that is, $P = f(T,\rho)$, leading most compilers to present uncertainties in terms of pressure deviations assuming the density to be exact! In this compilation, where deviations in pressure were available, we included them as additional information.

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* Exactly as recommended by Hilsenrath, et al. (1955), but not taking advantage of the accuracy inherent in the data.

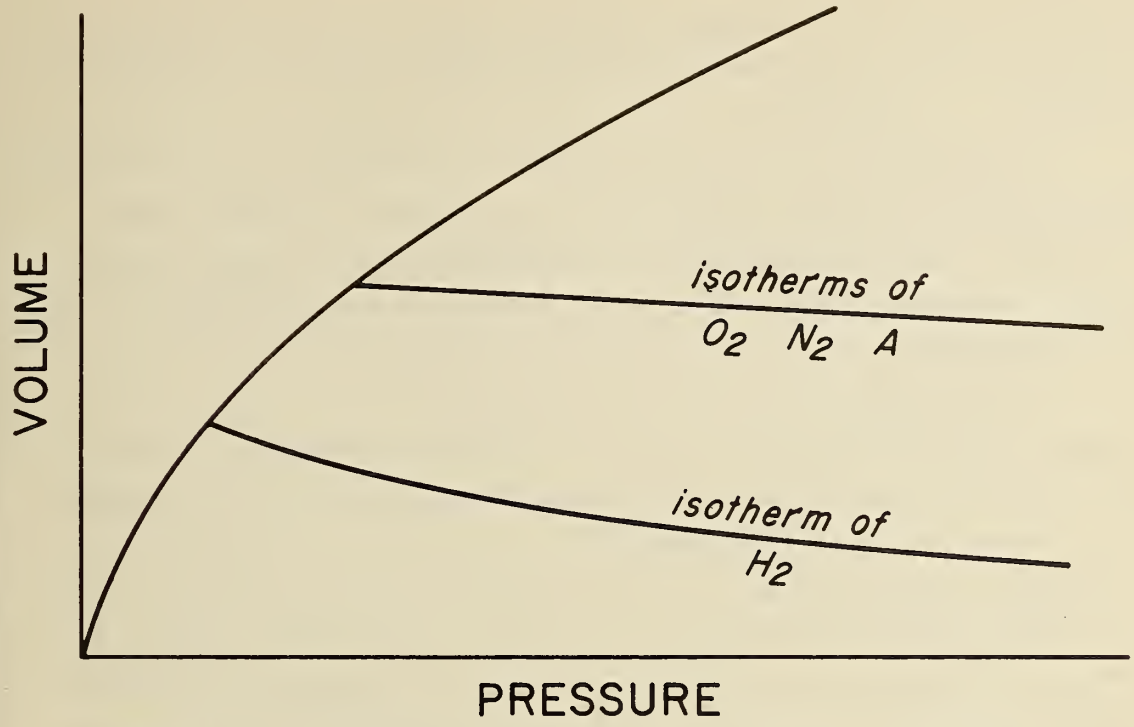


Figure 2. Generalized Phase Diagram; Volume vs. Pressure

4. Limitations and Usage

In practice, a number of problems are encountered that would introduce errors beyond what we might expect from the uncertainties inherent in the data. A few of the practical problems are indicated below.

a) The informed engineer recognizes that the processes of transfer, transport, pressurizing, siphoning, and stratification in storage tanks are all non-equilibrium events. The properties presented in this report are equilibrium properties.

b) We have indicated that pump intakes, or, for that matter, flow meter intakes, are usually subcooled to prevent cavitation. As the need arises, the user can extend the graphs of specific volume vs. pressure, figures 3, 5, 7, and 9, by adding appropriate isotherms for the compressed liquid states. This can be done by referring to the source documents and by noting that the liquid isotherms in the range of the graphs are almost straight lines. This is indicated schematically in figure 2

where the isotherms for oxygen, nitrogen, and argon are shown as straight lines. For parahydrogen the isotherms may show some slight curvature, as indicated.

c) The purity of the product will also play a role. The properties presented here are for the pure product made available under laboratory conditions, and may not be appropriate for certain purity grades of commercially available gases without some adjustment for the known impurities.

d) The values presented in this report were obtained from various computer programs. We have in the past made these programs available to any user requesting them. However, different computers will return different results from the same programs; in particular, they will round differently. The user should be aware of the following: The accuracy of the data for liquid conditions is on the order of 0.1 to 0.3%, while the accuracy of the room temperature values is on the order of 0.01 to 0.02%. We have, therefore, printed no more than 5 digits anywhere. Please bear in mind that even the fourth digit is uncertain for most values, that is, the digits printed are only to maintain internal consistency of the tables and to allow you to check out your computer programs. If occasionally pairs of values or reciprocals do not seem to correspond, then the fault can be traced to rounding errors.

Examples of usage are included because they may be of value to individuals not skilled in the use of graphs. We have mentioned the compensation for altitude. As an example, atmospheric pressure in Boulder, Colorado, is near 12 psia. If we had a pressure gage which measured pressure with respect to atmospheric pressure, i.e., a gage which reads psig and not psia, then we could cut out the extra auxiliary scales at the end of the report and paste them on graphs 4, 6, 8, and 10 over the main scale with the zero of the auxiliary scale lined up with the 12 on the primary scale.

When we use the tables and graphs to prepare billings, a number of combinations are possible. The ones likely to occur are discussed below.

Case 1. Price given in terms of gallons at NBP,
flowmeter reading 25 gallons, tank pressure reading 26 psia,
fluid liquid nitrogen, price $ 0.40 per gallon at NBP.
We would go to figure 6 and enter with 26 psia on the primary scale to read out a value of 0.970 for the liquid volume correction factor (or the use of table 6 gives a value of 0.9697).
The billing computation is:
gallons x liquid volume correction factor x price
25 gal x 0.970 x $ 0.40/gal = $ 9.70.

Case 2. Price given in terms of weight,
flowmeter reading 25 gallons, tank pressure reading 26 psia,
fluid liquid nitrogen, price $ 0.06 per pound.
We would go to table 6 enter with 26 psia and find in the columns of density 6.5341 lb/gal.
The billing computation is:
gallons x actual density x price
25 gal x 6.5341 lb/gal x $ 0.06/lb = $ 9.80.

Case 3. Price given in terms of cubic feet at NTP (70 F),
flowmeter reading 25 gallons, tank pressure 26 psia,
fluid liquid nitrogen, price $ 4.32 per 1000 ft^3 (NTP).
We would go to table 6 and enter with 26 psia to read a value of 90.19 ft^3/gal for the NTP (70 F) volume correction factor.
The billing computation is:
gallons x NTP (70 F) volume correction factor x price
25 gal x 90.19 ft^3/gal x $ 4.32/1000 ft^3 = $ 9.74.

Alternate Computation: Since the column labelled "NTP (70 F) Volume Correction Factor" is the combination of the liquid volume correction factor multiplied by the equivalent volume at NTP (70 F), we could have used figure 6 with a pressure of 26 psia to read a value of 0.970 for the liquid volume correction factor and table 4 to obtain the equivalent volume of 93.00_6 ft^3/gal for a temperature of 70 F.
The billing calculation then becomes:
gallons x liquid volume correction factor x equivalent volume x price
25 gal x 0.970 x 93.00_6 ft^3/gal x $ 4.32/1000 ft^3 = $ 9.74.

Case 4. Price given in terms of Standard Cubic Feet (SCF) at STP(0C), and our flowmeter is geared to read in cubic feet.

Flowmeter reading 2158 ft^3, tank pressure reading 26 psia, fluid liquid nitrogen, price $ 4.66 per 1000 SCF.

We will assume that the gearing ratio of the flowmeter is based on the volume change NBP to STP. If so, then the liquid volume correction factor still applies and we have to go to figure 6 (or table 6) as before to get a value of 0.970.

The billing computation is:

cubic feet x liquid volume correction factor x price

2158 ft^3 x 0.970 x $ 4.66/1000 SCF = $ 9.75.

Case 5. Any of the above, except that we have a temperature sensor on our storage or transport tank instead of the pressure gage.

The temperature reading is 148 R. We would go to figure 6 and use a straight edge to read across from the temperature scale at 148 R to the liquid volume correction factor scale to get a value of 0.972. The value obtained from table 6 for the liquid volume correction factor is 0.9717. The corresponding value for density is 6.5477 lb/gal.

5. Oxygen

The data for oxygen tabulated here are from Stewart (1966) and Weber (1968). The data for temperatures of 65 K and above were calculated by simultaneous solution of the vapor pressure equation and the equation of state reported by Stewart. These calculations were performed by first solving the vapor pressure equation for either pressure or temperature, and using the resulting P and T as input to the equation of state to obtain a corresponding density.

Table 1

Density of oxygen at 1 atmosphere near room temperature

Temperature	Density		
	gram-mole/cm^3	lb/ft^3	lb/gal
0 C	0.000044660	0.089214	0.011926
68 F	0.000041602	0.083106	0.011110
70 F	0.000041445	0.082791	0.011068
Temperature	**Volume**		
	cm^3/gram-mole	ft^3/lb	gal/lb
0 C	22391	11.209	83.849
68 F	24037	12.033	90.012
70 F	24129	12.079	90.355
Temperature	**Density Ratios and Equivalent volumes** $\frac{\text{density at NBP}}{\text{density at the temperature indicated}}$		
	dimensionless	$\frac{\text{lb/gal}}{\text{lb/ft}^3} = ft^3/gal$	
0 C	798.18	106.70	
68 F	856.85	114.54	
70 F	860.11	114.98	

Values near room temperature are given in table 1. They differ from those given in the CGA pamphlet by 0.02% primarily because a higher order interpolation is used here. Uncertainties in the data are given in table 2. The main list of values is contained in table 3. The pressure and temperature of the first two entries in table 3 are from the vapor pressure equation as described above, but the densities are from the experimental data by Weber. The value of the NBP density in table 3 is different by 0.2% from that listed in the CGA pamphlet. The present value is considered to be better because it includes additional PVT data.

Table 2

Uncertainties in the data for oxygen

variable	uncertainty	range of temperature
temperature	0.05 K	below 90 K
	0.02%	between 90 and 154 K
	0.1%	near critical
	0.015 K	room temperature
volume	0.1%	between 54.353 and 60 K
	0.5%	between 65 and 150 K
	larger than 0.5%	between 150 K and critical
	0.01%	room temperature
pressure	0.1%	below 90 K
	0.02%	between 90 and 154 K
	0.1%	near critical
	0.01%	room temperature

TABLE 3

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
0.00150	0.022	54.353	97.84	0.040835	81.573	10.9047	24.489	0.012259	0.09170	1.1455	131.71
0.00720	0.106	60.000	108.00	0.040054	80.013	10.6961	24.966	0.012498	0.09349	1.1236	129.19
0.0229	0.337	65.000	117.00	0.039315	78.537	10.4989	25.435	0.012733	0.09525	1.1029	126.81
0.0258	0.379	65.556	118.00	0.039232	78.370	10.4766	25.489	0.012760	0.09545	1.1006	126.54
0.0283	0.416	66.000	118.80	0.039166	78.238	10.4589	25.533	0.012781	0.09561	1.0987	126.33
0.0290	0.425	66.111	119.00	0.039149	78.205	10.4545	25.543	0.012787	0.09565	1.0982	126.28
0.0324	0.477	66.667	120.00	0.039067	78.042	10.4326	25.597	0.012814	0.09585	1.0959	126.01
0.0347	0.510	67.000	120.60	0.039018	77.944	10.4196	25.629	0.012830	0.09597	1.0946	125.85
0.0362	0.533	67.222	121.00	0.038986	77.879	10.4109	25.650	0.012840	0.09605	1.0937	125.75
0.0404	0.594	67.778	122.00	0.038905	77.718	10.3894	25.704	0.012867	0.09625	1.0914	125.49
0.0422	0.620	68.000	122.40	0.038873	77.653	10.3808	25.725	0.012878	0.09633	1.0905	125.38
0.0450	0.661	68.333	123.00	0.038825	77.557	10.3679	25.757	0.012894	0.09645	1.0891	125.23
0.0500	0.735	68.889	124.00	0.038745	77.397	10.3465	25.810	0.012920	0.09665	1.0869	124.97
0.0511	0.751	69.000	124.20	0.038729	77.366	10.3423	25.821	0.012926	0.09669	1.0865	124.92
0.0555	0.815	69.444	125.00	0.038665	77.238	10.3253	25.863	0.012947	0.09685	1.0847	124.71
0.0614	0.903	70.000	126.00	0.038586	77.080	10.3041	25.916	0.012974	0.09705	1.0824	124.46
0.0679	0.998	70.556	127.00	0.038507	76.922	10.2829	25.970	0.013000	0.09725	1.0802	124.20
0.0735	1.080	71.000	127.80	0.038444	76.796	10.2661	26.012	0.013022	0.09741	1.0784	124.00
0.0750	1.102	71.111	128.00	0.038428	76.764	10.2619	26.023	0.013027	0.09745	1.0780	123.95
0.0826	1.214	71.667	129.00	0.038349	76.606	10.2408	26.076	0.013054	0.09765	1.0758	123.69
0.0875	1.285	72.000	129.60	0.038302	76.512	10.2282	26.109	0.013070	0.09777	1.0745	123.54
0.0908	1.335	72.222	130.00	0.038270	76.449	10.2198	26.130	0.013081	0.09785	1.0736	123.44
0.0998	1.466	72.778	131.00	0.038191	76.292	10.1987	26.184	0.013108	0.09805	1.0714	123.19
0.104	1.522	73.000	131.40	0.038160	76.229	10.1903	26.205	0.013118	0.09813	1.0705	123.09
0.109	1.608	73.333	132.00	0.038113	76.135	10.1777	26.238	0.013135	0.09825	1.0692	122.93
0.120	1.760	73.889	133.00	0.038034	75.978	10.1567	26.292	0.013162	0.09846	1.0670	122.68
0.122	1.792	74.000	133.20	0.038018	75.946	10.1525	26.303	0.013167	0.09850	1.0665	122.63
0.131	1.925	74.444	134.00	0.037955	75.820	10.1357	26.347	0.013189	0.09866	1.0648	122.43
0.136	2.000	74.686	134.44	0.037921	75.752	10.1265	26.371	0.013201	0.09875	1.0638	122.31
0.143	2.101	75.000	135.00	0.037877	75.663	10.1147	26.402	0.013217	0.09887	1.0625	122.17
0.156	2.291	75.556	136.00	0.037798	75.505	10.0936	26.457	0.013244	0.09907	1.0603	121.92
0.167	2.452	76.000	136.80	0.037735	75.379	10.0767	26.501	0.013266	0.09924	1.0586	121.71
0.170	2.494	76.111	137.00	0.037719	75.348	10.0725	26.512	0.013272	0.09928	1.0581	121.66
0.184	2.711	76.667	138.00	0.037640	75.190	10.0514	26.568	0.013300	0.09949	1.0559	121.41
0.194	2.849	77.000	138.60	0.037592	75.095	10.0387	26.601	0.013316	0.09961	1.0546	121.25
0.200	2.944	77.222	139.00	0.037560	75.032	10.0303	26.624	0.013328	0.09970	1.0537	121.15
0.217	3.192	77.778	140.00	0.037481	74.873	10.0091	26.680	0.013356	0.09991	1.0514	120.90
0.224	3.296	78.000	140.40	0.037449	74.810	10.0006	26.703	0.013367	0.09999	1.0506	120.79
0.235	3.458	78.333	141.00	0.037402	74.714	9.9878	26.737	0.013384	0.10012	1.0492	120.64
0.254	3.740	78.889	142.00	0.037322	74.555	9.9665	26.794	0.013413	0.10034	1.0470	120.38
0.258	3.799	79.000	142.20	0.037306	74.523	9.9623	26.805	0.013419	0.10038	1.0465	120.33
0.272	4.000	79.371	142.87	0.037253	74.416	9.9480	26.844	0.013438	0.10052	1.0450	120.16
0.275	4.041	79.444	143.00	0.037242	74.395	9.9452	26.851	0.013442	0.10055	1.0447	120.12
0.297	4.360	80.000	144.00	0.037162	74.235	9.9238	26.909	0.013471	0.10077	1.0425	119.87

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
0.320	4.700	80.556	145.00	0.037082	74.075	9.9024	26.968	0.013500	0.10099	1.0402	119.61
0.339	4.987	81.000	145.80	0.037017	73.946	9.8851	27.015	0.013523	0.10116	1.0384	119.40
0.344	5.061	81.111	146.00	0.037001	73.914	9.8808	27.026	0.013529	0.10121	1.0380	119.35
0.370	5.443	81.667	147.00	0.036920	73.752	9.8593	27.085	0.013559	0.10143	1.0357	119.09
0.387	5.683	82.000	147.60	0.036872	73.655	9.8463	27.121	0.013577	0.10156	1.0343	118.93
0.398	5.847	82.222	148.00	0.036839	73.591	9.8376	27.145	0.013589	0.10165	1.0334	118.82
0.408	6.000	82.424	148.36	0.036810	73.532	9.8297	27.167	0.013600	0.10173	1.0326	118.73
0.427	6.275	82.778	149.00	0.036758	73.428	9.8159	27.205	0.013619	0.10188	1.0312	118.56
0.439	6.453	83.000	149.40	0.036725	73.363	9.8072	27.229	0.013631	0.10197	1.0302	118.46
0.458	6.728	83.333	150.00	0.036676	73.265	9.7941	27.266	0.013649	0.10210	1.0289	118.30
0.490	7.205	83.889	151.00	0.036594	73.102	9.7723	27.327	0.013680	0.10233	1.0266	118.04
0.497	7.304	84.000	151.20	0.036578	73.069	9.7679	27.339	0.013686	0.10238	1.0261	117.98
0.525	7.709	84.444	152.00	0.036512	72.938	9.7504	27.388	0.013710	0.10256	1.0243	117.77
0.544	8.000	84.752	152.55	0.036467	72.847	9.7382	27.422	0.013727	0.10269	1.0230	117.62
0.561	8.241	85.000	153.00	0.036430	72.773	9.7284	27.450	0.013741	0.10279	1.0220	117.50
0.599	8.800	85.556	154.00	0.036347	72.608	9.7063	27.512	0.013773	0.10303	1.0196	117.24
0.631	9.269	86.000	154.80	0.036281	72.475	9.6886	27.563	0.013798	0.10321	1.0178	117.02
0.639	9.389	86.111	155.00	0.036264	72.442	9.6841	27.575	0.013804	0.10326	1.0173	116.97
0.680	10.000	86.659	155.99	0.036182	72.278	9.6622	27.638	0.013835	0.10350	1.0150	116.71
0.681	10.009	86.667	156.00	0.036181	72.276	9.6619	27.639	0.013836	0.10350	1.0150	116.70
0.707	10.395	87.000	156.60	0.036131	72.176	9.6485	27.677	0.013855	0.10364	1.0136	116.54
0.725	10.659	87.222	157.00	0.036097	72.109	9.6396	27.703	0.013868	0.10374	1.0126	116.43
0.772	11.343	87.778	158.00	0.036014	71.941	9.6172	27.767	0.013900	0.10398	1.0103	116.16
0.791	11.625	88.000	158.40	0.035980	71.874	9.6082	27.793	0.013913	0.10408	1.0093	116.05
0.817	12.000	88.289	158.92	0.035936	71.787	9.5965	27.827	0.013930	0.10420	1.0081	115.91
0.821	12.059	88.333	159.00	0.035929	71.773	9.5947	27.832	0.013933	0.10422	1.0079	115.89
0.872	12.810	88.889	160.00	0.035845	71.604	9.5721	27.898	0.013966	0.10447	1.0055	115.62
0.882	12.965	89.000	160.20	0.035828	71.571	9.5676	27.911	0.013972	0.10452	1.0051	115.56
0.925	13.597	89.444	161.00	0.035760	71.435	9.5495	27.964	0.013999	0.10472	1.0032	115.34
0.953	14.000	89.720	161.50	0.035718	71.351	9.5382	27.997	0.014015	0.10484	1.0020	115.21
0.981	14.421	90.000	162.00	0.035675	71.265	9.5267	28.031	0.014032	0.10497	1.0008	115.07
1.000	14.696	90.180	162.32	0.035647	71.209	9.5193	28.053	0.014043	0.10505	1.0000	114.98
1.040	15.283	90.556	163.00	0.035589	71.094	9.5039	28.098	0.014066	0.10522	0.9984	114.79
1.089	16.000	91.000	163.80	0.035521	70.957	9.4855	28.153	0.014093	0.10542	0.9965	114.57
1.089	16.000	91.000	163.80	0.035521	70.957	9.4855	28.153	0.014093	0.10542	0.9965	114.57
1.101	16.183	91.111	164.00	0.035503	70.922	9.4809	28.166	0.014100	0.10547	0.9960	114.52
1.165	17.124	91.667	165.00	0.035417	70.750	9.4579	28.235	0.014134	0.10573	0.9936	114.24
1.205	17.709	92.000	165.60	0.035365	70.647	9.4441	28.276	0.014155	0.10589	0.9921	114.07
1.225	18.000	92.163	165.89	0.035340	70.596	9.4373	28.297	0.014165	0.10596	0.9914	113.99
1.232	18.107	92.222	166.00	0.035331	70.577	9.4348	28.304	0.014169	0.10599	0.9911	113.96
1.302	19.131	92.778	167.00	0.035244	70.404	9.4116	28.374	0.014204	0.10625	0.9887	113.68
1.331	19.554	93.000	167.40	0.035209	70.334	9.4023	28.402	0.014218	0.10636	0.9877	113.57
1.361	20.000	93.231	167.82	0.035173	70.261	9.3926	28.431	0.014233	0.10647	0.9867	113.45

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
1.375	20.200	93.333	168.00	0.035156	70.229	9.3883	28.444	0.014239	0.10652	0.9862	113.40
1.450	21.313	93.889	169.00	0.035069	70.054	9.3649	28.515	0.014275	0.10678	0.9838	113.11
1.466	21.542	94.000	169.20	0.035051	70.019	9.3602	28.530	0.014282	0.10684	0.9833	113.06
1.497	22.000	94.221	169.60	0.035016	69.949	9.3509	28.558	0.014296	0.10694	0.9823	112.95
1.529	22.473	94.444	170.00	0.034981	69.878	9.3414	28.587	0.014311	0.10705	0.9813	112.83
1.611	23.680	95.000	171.00	0.034892	69.702	9.3178	28.659	0.014347	0.10732	0.9788	112.55
1.633	24.000	95.144	171.26	0.034870	69.656	9.3117	28.678	0.014356	0.10739	0.9782	112.47
1.697	24.935	95.556	172.00	0.034804	69.525	9.2941	28.733	0.014383	0.10760	0.9763	112.26
1.768	25.975	96.000	172.80	0.034732	69.382	9.2750	28.792	0.014413	0.10782	0.9743	112.03
1.769	26.000	96.010	172.82	0.034731	69.379	9.2746	28.793	0.014414	0.10782	0.9743	112.02
1.786	26.240	96.111	173.00	0.034715	69.346	9.2703	28.806	0.014420	0.10787	0.9738	111.97
1.878	27.597	96.667	174.00	0.034625	69.168	9.2464	28.881	0.014458	0.10815	0.9713	111.68
1.905	28.000	96.828	174.29	0.034599	69.116	9.2394	28.903	0.014469	0.10823	0.9706	111.60
1.935	28.435	97.000	174.60	0.034571	69.060	9.2320	28.926	0.014480	0.10832	0.9698	111.51
1.974	29.005	97.222	175.00	0.034535	68.988	9.2223	28.956	0.014495	0.10843	0.9688	111.39
2.000	29.392	97.372	175.27	0.034511	68.939	9.2158	28.977	0.014506	0.10851	0.9681	111.31
2.041	30.000	97.602	175.68	0.034473	68.864	9.2058	29.008	0.014521	0.10863	0.9671	111.19
2.073	30.467	97.778	176.00	0.034445	68.807	9.1982	29.032	0.014533	0.10872	0.9663	111.10
2.114	31.067	98.000	176.40	0.034408	68.735	9.1885	29.063	0.014549	0.10883	0.9653	110.98
2.176	31.984	98.333	177.00	0.034354	68.626	9.1740	29.109	0.014572	0.10900	0.9637	110.81
2.177	32.000	98.339	177.01	0.034353	68.624	9.1737	29.110	0.014572	0.10901	0.9637	110.81
2.283	33.557	98.889	178.00	0.034263	68.444	9.1496	29.186	0.014610	0.10929	0.9612	110.51
2.305	33.878	99.000	178.20	0.034244	68.407	9.1447	29.202	0.014618	0.10935	0.9607	110.46
2.314	34.000	99.042	178.28	0.034238	68.394	9.1429	29.208	0.014621	0.10937	0.9605	110.43
2.394	35.187	99.444	179.00	0.034171	68.261	9.1252	29.264	0.014650	0.10959	0.9586	110.22
2.450	36.000	99.714	179.49	0.034127	68.172	9.1132	29.303	0.014669	0.10973	0.9573	110.08
2.509	36.876	100.000	180.00	0.034079	68.077	9.1006	29.343	0.014689	0.10988	0.9560	109.92
2.586	38.000	100.359	180.65	0.034019	67.958	9.0846	29.395	0.014715	0.11008	0.9543	109.73
2.628	38.624	100.556	181.00	0.033987	67.892	9.0759	29.423	0.014729	0.11018	0.9534	109.62
2.722	40.000	100.979	181.76	0.033916	67.751	9.0570	29.485	0.014760	0.11041	0.9514	109.40
2.726	40.067	101.000	181.80	0.033912	67.744	9.0561	29.488	0.014761	0.11042	0.9513	109.38
2.751	40.434	101.111	182.00	0.033894	67.707	9.0511	29.504	0.014770	0.11048	0.9508	109.32
2.858	42.000	101.577	182.84	0.033816	67.551	9.0302	29.572	0.014804	0.11074	0.9486	109.07
2.879	42.307	101.667	183.00	0.033800	67.520	9.0262	29.585	0.014810	0.11079	0.9482	109.02
2.957	43.461	102.000	183.60	0.033744	67.408	9.0111	29.635	0.014835	0.11097	0.9466	108.84
2.994	44.000	102.153	183.88	0.033718	67.356	9.0042	29.658	0.014846	0.11106	0.9459	108.76
3.000	44.088	102.178	183.92	0.033714	67.348	9.0031	29.661	0.014848	0.11107	0.9458	108.74
3.011	44.243	102.222	184.00	0.033707	67.333	9.0011	29.668	0.014852	0.11110	0.9456	108.72
3.130	46.000	102.711	184.88	0.033624	67.167	8.9790	29.741	0.014888	0.11137	0.9432	108.45
3.147	46.245	102.778	185.00	0.033612	67.145	8.9759	29.751	0.014893	0.11141	0.9429	108.42
3.203	47.064	103.000	185.40	0.033574	67.069	8.9658	29.785	0.014910	0.11153	0.9419	108.29
3.266	48.000	103.250	185.85	0.033532	66.984	8.9544	29.822	0.014929	0.11168	0.9407	108.16
3.287	48.313	103.333	186.00	0.033518	66.955	8.9506	29.835	0.014935	0.11172	0.9403	108.11
3.402	50.000	103.774	186.79	0.033442	66.805	8.9305	29.902	0.014969	0.11198	0.9381	107.87
3.433	50.449	103.889	187.00	0.033422	66.765	8.9252	29.920	0.014978	0.11204	0.9376	107.80

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
3.462	50.884	104.000	187.20	0.033403	66.727	8.9201	29.937	0.014986	0.11211	0.9371	107.74
3.538	52.000	104.281	187.71	0.033355	66.630	8.9072	29.981	0.015008	0.11227	0.9357	107.59
3.583	52.654	104.444	188.00	0.033327	66.574	8.8996	30.006	0.015021	0.11236	0.9349	107.50
3.674	54.000	104.775	188.60	0.033269	66.460	8.8844	30.058	0.015047	0.11256	0.9333	107.31
3.738	54.930	105.000	189.00	0.033230	66.382	8.8740	30.093	0.015064	0.11269	0.9322	107.18
3.811	56.000	105.255	189.46	0.033186	66.293	8.8621	30.133	0.015085	0.11284	0.9310	107.04
3.897	57.277	105.556	190.00	0.033134	66.189	8.8481	30.181	0.015108	0.11302	0.9295	106.87
3.947	58.000	105.723	190.30	0.033104	66.130	8.8403	30.207	0.015122	0.11312	0.9287	106.78
4.000	58.784	105.903	190.63	0.033073	66.067	8.8319	30.236	0.015136	0.11323	0.9278	106.68
4.029	59.208	106.000	190.80	0.033056	66.033	8.8274	30.252	0.015144	0.11328	0.9273	106.62
4.062	59.698	106.111	191.00	0.033036	65.994	8.8222	30.270	0.015153	0.11335	0.9268	106.56
4.083	60.000	106.179	191.12	0.033025	65.970	8.8190	30.281	0.015158	0.11339	0.9264	106.52
4.219	62.000	106.624	191.92	0.032946	65.814	8.7981	30.352	0.015194	0.11366	0.9242	106.27
4.232	62.194	106.667	192.00	0.032939	65.799	8.7961	30.359	0.015198	0.11369	0.9240	106.24
4.336	63.728	107.000	192.60	0.032880	65.681	8.7803	30.414	0.015225	0.11389	0.9224	106.05
4.355	64.000	107.059	192.71	0.032869	65.661	8.7776	30.423	0.015230	0.11393	0.9221	106.02
4.407	64.766	107.222	193.00	0.032840	65.603	8.7698	30.450	0.015243	0.11403	0.9213	105.93
4.491	66.000	107.483	193.47	0.032794	65.510	8.7574	30.493	0.015265	0.11419	0.9200	105.78
4.587	67.415	107.778	194.00	0.032742	65.405	8.7434	30.542	0.015289	0.11437	0.9185	105.61
4.627	68.000	107.898	194.22	0.032720	65.362	8.7377	30.562	0.015299	0.11445	0.9179	105.54
4.661	68.496	108.000	194.40	0.032702	65.326	8.7328	30.579	0.015308	0.11451	0.9174	105.48
4.763	70.000	108.305	194.95	0.032647	65.217	8.7183	30.630	0.015333	0.11470	0.9158	105.30
4.773	70.142	108.333	195.00	0.032642	65.207	8.7169	30.635	0.015336	0.11472	0.9157	105.29
4.899	72.000	108.703	195.66	0.032576	65.074	8.6992	30.698	0.015367	0.11495	0.9138	105.07
4.964	72.951	108.889	196.00	0.032542	65.007	8.6902	30.729	0.015383	0.11507	0.9129	104.97
5.000	73.480	108.992	196.19	0.032524	64.970	8.6852	30.747	0.015392	0.11514	0.9124	104.91
5.003	73.522	109.000	196.20	0.032522	64.967	8.6848	30.748	0.015392	0.11514	0.9123	104.90
5.035	74.000	109.092	196.37	0.032506	64.934	8.6804	30.764	0.015400	0.11520	0.9119	104.85
5.161	75.840	109.444	197.00	0.032442	64.806	8.6634	30.824	0.015431	0.11543	0.9101	104.64
5.171	76.000	109.475	197.05	0.032436	64.795	8.6619	30.830	0.015433	0.11545	0.9099	104.62
5.308	78.000	109.850	197.73	0.032368	64.659	8.6437	30.895	0.015466	0.11569	0.9080	104.40
5.363	78.813	110.000	198.00	0.032341	64.604	8.6364	30.921	0.015479	0.11579	0.9072	104.32
5.444	80.000	110.218	198.39	0.032301	64.525	8.6257	30.959	0.015498	0.11593	0.9061	104.19
5.571	81.870	110.556	199.00	0.032239	64.401	8.6092	31.018	0.015528	0.11615	0.9044	103.99
5.580	82.000	110.579	199.04	0.032235	64.393	8.6081	31.022	0.015530	0.11617	0.9043	103.97
5.716	84.000	110.934	199.68	0.032169	64.262	8.5906	31.085	0.015561	0.11641	0.9024	103.76
5.742	84.378	111.000	199.80	0.032157	64.238	8.5874	31.097	0.015567	0.11645	0.9021	103.72
5.785	85.013	111.111	200.00	0.032137	64.197	8.5819	31.117	0.015577	0.11652	0.9015	103.66
5.852	86.000	111.282	200.31	0.032105	64.134	8.5734	31.148	0.015592	0.11664	0.9006	103.55
5.988	88.000	111.625	200.93	0.032041	64.007	8.5564	31.210	0.015623	0.11687	0.8989	103.35
6.000	88.176	111.656	200.98	0.032036	63.995	8.5549	31.215	0.015626	0.11689	0.8987	103.33
6.005	88.244	111.667	201.00	0.032034	63.991	8.5544	31.217	0.015627	0.11690	0.8986	103.33
6.124	90.000	111.963	201.53	0.031979	63.881	8.5397	31.271	0.015654	0.11710	0.8971	103.15
6.139	90.224	112.000	201.60	0.031972	63.867	8.5378	31.278	0.015657	0.11713	0.8969	103.12
6.230	91.563	112.222	202.00	0.031930	63.784	8.5267	31.318	0.015678	0.11728	0.8957	102.99

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
6.260	92.000	112.294	202.13	0.031917	63.757	8.5231	31.332	0.015684	0.11733	0.8954	102.95
6.396	94.000	112.621	202.72	0.031855	63.635	8.5068	31.392	0.015715	0.11755	0.8936	102.75
6.462	94.972	112.778	203.00	0.031826	63.576	8.4989	31.421	0.015729	0.11766	0.8928	102.65
6.532	96.000	112.942	203.30	0.031795	63.514	8.4906	31.452	0.015744	0.11778	0.8919	102.55
6.557	96.361	113.000	203.40	0.031784	63.493	8.4877	31.462	0.015750	0.11782	0.8916	102.52
6.668	98.000	113.259	203.87	0.031735	63.395	8.4746	31.511	0.015774	0.11800	0.8903	102.36
6.701	98.473	113.333	204.00	0.031721	63.367	8.4709	31.525	0.015781	0.11805	0.8899	102.32
6.805	100.000	113.571	204.43	0.031676	63.277	8.4589	31.570	0.015804	0.11822	0.8886	102.17
6.941	102.000	113.879	204.98	0.031618	63.160	8.4432	31.628	0.015833	0.11844	0.8870	101.98
6.945	102.067	113.889	205.00	0.031616	63.156	8.4427	31.630	0.015834	0.11845	0.8869	101.98
6.995	102.797	114.000	205.20	0.031594	63.114	8.4371	31.651	0.015844	0.11852	0.8863	101.91
7.000	102.872	114.012	205.22	0.031592	63.109	8.4364	31.653	0.015846	0.11853	0.8862	101.90
7.077	104.000	114.182	205.53	0.031560	63.044	8.4278	31.686	0.015862	0.11866	0.8853	101.80
7.196	105.755	114.444	206.00	0.031509	62.944	8.4143	31.737	0.015887	0.11884	0.8839	101.63
7.213	106.000	114.481	206.07	0.031502	62.930	8.4125	31.744	0.015891	0.11887	0.8837	101.61
7.349	108.000	114.776	206.60	0.031446	62.816	8.3973	31.801	0.015919	0.11909	0.8821	101.43
7.454	109.539	115.000	207.00	0.031402	62.730	8.3858	31.845	0.015941	0.11925	0.8809	101.29
7.485	110.000	115.067	207.12	0.031389	62.704	8.3823	31.858	0.015948	0.11930	0.8806	101.25
7.621	112.000	115.354	207.64	0.031334	62.593	8.3675	31.914	0.015976	0.11951	0.8790	101.07
7.718	113.421	115.556	208.00	0.031295	62.515	8.3570	31.954	0.015996	0.11966	0.8779	100.94
7.757	114.000	115.637	208.15	0.031279	62.483	8.3528	31.971	0.016004	0.11972	0.8775	100.89
7.893	116.000	115.917	208.65	0.031224	62.374	8.3382	32.026	0.016032	0.11993	0.8759	100.71
7.934	116.598	116.000	208.80	0.031208	62.342	8.3339	32.043	0.016041	0.11999	0.8755	100.66
7.989	117.402	116.111	209.00	0.031186	62.298	8.3281	32.065	0.016052	0.12008	0.8749	100.59
8.000	117.568	116.134	209.04	0.031182	62.289	8.3269	32.070	0.016054	0.12009	0.8747	100.58
8.029	118.000	116.193	209.15	0.031170	62.266	8.3238	32.082	0.016060	0.12014	0.8744	100.54
8.165	120.000	116.466	209.64	0.031117	62.159	8.3095	32.137	0.016088	0.12034	0.8729	100.37
8.266	121.483	116.667	210.00	0.031077	62.080	8.2989	32.178	0.016108	0.12050	0.8718	100.24
8.302	122.000	116.736	210.12	0.031063	62.053	8.2953	32.192	0.016115	0.12055	0.8714	100.20
8.436	123.981	117.000	210.60	0.031011	61.949	8.2813	32.246	0.016142	0.12075	0.8699	100.03
8.438	124.000	117.003	210.60	0.031011	61.948	8.2812	32.247	0.016143	0.12076	0.8699	100.03
8.551	125.666	117.222	211.00	0.030967	61.861	8.2696	32.292	0.016165	0.12093	0.8687	99.88
8.574	126.000	117.266	211.08	0.030958	61.843	8.2672	32.301	0.016170	0.12096	0.8685	99.86
8.710	128.000	117.526	211.55	0.030907	61.740	8.2534	32.356	0.016197	0.12116	0.8670	99.69
8.843	129.952	117.778	212.00	0.030856	61.639	8.2400	32.408	0.016223	0.12136	0.8656	99.53
8.846	130.000	117.784	212.01	0.030855	61.637	8.2396	32.410	0.016224	0.12136	0.8656	99.52
8.961	131.696	118.000	212.40	0.030812	61.550	8.2281	32.455	0.016247	0.12153	0.8644	99.38
8.982	132.000	118.038	212.47	0.030804	61.535	8.2260	32.463	0.016251	0.12157	0.8641	99.36
9.000	132.264	118.072	212.53	0.030797	61.521	8.2242	32.470	0.016254	0.12159	0.8640	99.34
9.118	134.000	118.290	212.92	0.030753	61.434	8.2125	32.517	0.016278	0.12177	0.8627	99.20
9.142	134.344	118.333	213.00	0.030745	61.416	8.2102	32.526	0.016282	0.12180	0.8625	99.17
9.254	136.000	118.539	213.37	0.030703	61.333	8.1991	32.570	0.016304	0.12197	0.8613	99.03
9.390	138.000	118.786	213.81	0.030653	61.234	8.1857	32.623	0.016331	0.12216	0.8599	98.87
9.448	138.841	118.889	214.00	0.030632	61.192	8.1802	32.645	0.016342	0.12225	0.8593	98.80
9.510	139.754	119.000	214.20	0.030610	61.147	8.1741	32.669	0.016354	0.12234	0.8587	98.73

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
9.526	140.000	119.030	214.25	0.030604	61.135	8.1725	32.676	0.016357	0.12236	0.8585	98.71
9.662	142.000	119.271	214.69	0.030555	61.036	8.1594	32.728	0.016384	0.12256	0.8571	98.55
9.761	143.447	119.444	215.00	0.030519	60.966	8.1499	32.766	0.016403	0.12270	0.8561	98.44
9.799	144.000	119.510	215.12	0.030506	60.939	8.1463	32.781	0.016410	0.12275	0.8558	98.40
9.935	146.000	119.747	215.54	0.030457	60.842	8.1333	32.833	0.016436	0.12295	0.8544	98.24
10.000	146.960	119.860	215.75	0.030434	60.795	8.1271	32.858	0.016449	0.12304	0.8538	98.16
10.071	148.000	119.981	215.97	0.030409	60.745	8.1205	32.885	0.016462	0.12315	0.8531	98.08
10.082	148.162	120.000	216.00	0.030405	60.738	8.1194	32.889	0.016464	0.12316	0.8529	98.07
10.207	150.000	120.213	216.38	0.030361	60.650	8.1077	32.937	0.016488	0.12334	0.8517	97.93
10.343	152.000	120.443	216.80	0.030313	60.554	8.0950	32.989	0.016514	0.12353	0.8504	97.78
10.410	152.988	120.556	217.00	0.030290	60.508	8.0887	33.014	0.016527	0.12363	0.8497	97.70
10.479	154.000	120.671	217.21	0.030266	60.460	8.0823	33.040	0.016540	0.12373	0.8490	97.62
10.615	156.000	120.896	217.61	0.030219	60.366	8.0698	33.092	0.016566	0.12392	0.8477	97.47
10.678	156.929	121.000	217.80	0.030197	60.323	8.0639	33.116	0.016578	0.12401	0.8471	97.40
10.746	157.926	121.111	218.00	0.030174	60.276	8.0577	33.141	0.016590	0.12410	0.8465	97.33
10.751	158.000	121.119	218.01	0.030172	60.273	8.0573	33.143	0.016591	0.12411	0.8464	97.32
10.887	160.000	121.341	218.41	0.030126	60.180	8.0449	33.194	0.016617	0.12430	0.8451	97.17
11.000	161.656	121.523	218.74	0.030087	60.103	8.0346	33.237	0.016638	0.12446	0.8440	97.05
11.023	162.000	121.561	218.81	0.030079	60.087	8.0325	33.245	0.016643	0.12449	0.8438	97.02
11.090	162.978	121.667	219.00	0.030057	60.042	8.0265	33.270	0.016655	0.12459	0.8432	96.95
11.159	164.000	121.778	219.20	0.030033	59.995	8.0202	33.296	0.016668	0.12469	0.8425	96.87
11.296	166.000	121.994	219.59	0.029988	59.904	8.0080	33.347	0.016693	0.12488	0.8412	96.73
11.300	166.065	122.000	219.60	0.029986	59.901	8.0076	33.349	0.016694	0.12488	0.8412	96.72
11.432	168.000	122.208	219.97	0.029942	59.813	7.9958	33.398	0.016719	0.12507	0.8400	96.58
11.442	168.146	122.222	220.00	0.029939	59.807	7.9950	33.401	0.016720	0.12508	0.8399	96.57
11.568	170.000	122.419	220.35	0.029897	59.723	7.9838	33.448	0.016744	0.12525	0.8387	96.43
11.704	172.000	122.630	220.73	0.029852	59.633	7.9718	33.499	0.016769	0.12544	0.8374	96.29
11.801	173.430	122.778	221.00	0.029820	59.569	7.9633	33.534	0.016787	0.12558	0.8365	96.18
11.840	174.000	122.838	221.11	0.029807	59.543	7.9598	33.549	0.016794	0.12563	0.8362	96.14
11.947	175.577	123.000	221.40	0.029772	59.474	7.9505	33.588	0.016814	0.12578	0.8352	96.03
11.976	176.000	123.044	221.48	0.029763	59.455	7.9479	33.599	0.016820	0.12582	0.8349	96.00
12.000	176.352	123.080	221.54	0.029755	59.439	7.9459	33.608	0.016824	0.12585	0.8347	95.98
12.112	178.000	123.249	221.85	0.029718	59.366	7.9361	33.649	0.016845	0.12601	0.8337	95.86
12.169	178.834	123.333	222.00	0.029700	59.330	7.9312	33.670	0.016855	0.12608	0.8332	95.80
12.248	180.000	123.452	222.21	0.029674	59.278	7.9243	33.699	0.016870	0.12619	0.8324	95.71
12.384	182.000	123.654	222.58	0.029630	59.190	7.9126	33.749	0.016895	0.12638	0.8312	95.57
12.520	184.000	123.854	222.94	0.029587	59.103	7.9009	33.799	0.016920	0.12657	0.8300	95.43
12.545	184.357	123.889	223.00	0.029579	59.088	7.8989	33.808	0.016924	0.12660	0.8298	95.41
12.621	185.476	124.000	223.20	0.029555	59.039	7.8924	33.835	0.016938	0.12670	0.8291	95.33
12.657	186.000	124.053	223.29	0.029543	59.016	7.8893	33.849	0.016945	0.12675	0.8288	95.29
12.793	188.000	124.250	223.65	0.029500	58.930	7.8777	33.898	0.016969	0.12694	0.8276	95.15
12.929	190.002	124.444	224.00	0.029457	58.844	7.8663	33.948	0.016994	0.12713	0.8263	95.01
12.929	190.000	124.445	224.00	0.029457	58.844	7.8662	33.948	0.016994	0.12713	0.8263	95.01
13.000	191.048	124.546	224.18	0.029434	58.799	7.8603	33.974	0.017007	0.12722	0.8257	94.94
13.065	192.000	124.639	224.35	0.029414	58.758	7.8548	33.998	0.017019	0.12731	0.8251	94.87

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
13.201	194.000	124.831	224.70	0.029371	58.672	7.8434	34.047	0.017044	0.12750	0.8239	94.74
13.321	195.771	125.000	225.00	0.029334	58.598	7.8333	34.091	0.017066	0.12766	0.8229	94.62
13.337	196.000	125.023	225.04	0.029329	58.587	7.8320	34.096	0.017068	0.12768	0.8227	94.60
13.473	198.000	125.212	225.38	0.029286	58.503	7.8207	34.146	0.017093	0.12787	0.8216	94.46
13.609	200.000	125.401	225.72	0.029244	58.419	7.8094	34.195	0.017118	0.12805	0.8204	94.33
13.722	201.664	125.556	226.00	0.029209	58.349	7.8001	34.236	0.017138	0.12820	0.8194	94.21
13.949	205.000	125.865	226.56	0.029139	58.209	7.7815	34.318	0.017179	0.12851	0.8174	93.99
14.000	205.744	125.933	226.68	0.029124	58.178	7.7773	34.336	0.017188	0.12858	0.8170	93.94
14.049	206.470	126.000	226.80	0.029109	58.148	7.7733	34.354	0.017197	0.12865	0.8166	93.89
14.132	207.684	126.111	227.00	0.029084	58.098	7.7666	34.384	0.017212	0.12876	0.8159	93.81
14.290	210.000	126.322	227.38	0.029036	58.002	7.7537	34.441	0.017241	0.12897	0.8145	93.65
14.550	213.832	126.667	228.00	0.028957	57.844	7.7327	34.534	0.017288	0.12932	0.8123	93.40
14.630	215.000	126.771	228.19	0.028933	57.796	7.7263	34.563	0.017302	0.12943	0.8116	93.32
14.806	217.583	127.000	228.60	0.028880	57.691	7.7122	34.626	0.017334	0.12967	0.8102	93.15
14.970	220.000	127.213	228.98	0.028831	57.593	7.6990	34.685	0.017363	0.12989	0.8088	92.99
14.977	220.109	127.222	229.00	0.028828	57.588	7.6984	34.688	0.017365	0.12990	0.8087	92.99
15.000	220.440	127.251	229.05	0.028822	57.575	7.6966	34.696	0.017369	0.12993	0.8085	92.96
15.310	225.000	127.647	229.77	0.028729	57.391	7.6720	34.807	0.017424	0.13034	0.8059	92.67
15.414	226.518	127.778	230.00	0.028699	57.329	7.6638	34.845	0.017443	0.13048	0.8051	92.57
15.591	229.118	128.000	230.40	0.028647	57.225	7.6499	34.908	0.017475	0.13072	0.8036	92.40
15.651	230.000	128.075	230.53	0.028629	57.190	7.6452	34.930	0.017486	0.13080	0.8031	92.34
15.859	233.059	128.333	231.00	0.028568	57.068	7.6289	35.004	0.017523	0.13108	0.8014	92.15
15.991	235.000	128.496	231.29	0.028529	56.991	7.6186	35.052	0.017547	0.13126	0.8003	92.02
16.000	235.136	128.507	231.31	0.028527	56.985	7.6178	35.055	0.017548	0.13127	0.8003	92.01
16.313	239.735	128.889	232.00	0.028436	56.804	7.5935	35.167	0.017605	0.13169	0.7977	91.72
16.331	240.000	128.911	232.04	0.028430	56.793	7.5921	35.174	0.017608	0.13172	0.7976	91.70
16.405	241.087	129.000	232.20	0.028409	56.750	7.5864	35.200	0.017621	0.13181	0.7970	91.63
16.671	245.000	129.319	232.77	0.028332	56.597	7.5659	35.296	0.017669	0.13217	0.7948	91.39
16.777	246.548	129.444	233.00	0.028302	56.536	7.5578	35.333	0.017688	0.13231	0.7939	91.29
17.000	249.832	129.708	233.48	0.028238	56.408	7.5407	35.414	0.017728	0.13261	0.7921	91.08
17.011	250.000	129.722	233.50	0.028234	56.402	7.5398	35.418	0.017730	0.13263	0.7921	91.07
17.249	253.498	130.000	234.00	0.028166	56.266	7.5217	35.503	0.017773	0.13295	0.7901	90.85
17.352	255.000	130.119	234.21	0.028137	56.208	7.5139	35.540	0.017791	0.13309	0.7893	90.76
17.692	260.000	130.510	234.92	0.028041	56.015	7.4881	35.662	0.017852	0.13355	0.7866	90.45
17.732	260.587	130.556	235.00	0.028030	55.992	7.4851	35.677	0.017860	0.13360	0.7863	90.41
18.000	264.528	130.860	235.55	0.027954	55.841	7.4649	35.773	0.017908	0.13396	0.7842	90.17
18.032	265.000	130.896	235.61	0.027945	55.823	7.4625	35.785	0.017914	0.13400	0.7839	90.14
18.125	266.360	131.000	235.80	0.027919	55.771	7.4555	35.818	0.017930	0.13413	0.7832	90.05
18.224	267.818	131.111	236.00	0.027891	55.715	7.4481	35.854	0.017948	0.13426	0.7824	89.96
18.372	270.000	131.277	236.30	0.027849	55.632	7.4370	35.908	0.017975	0.13446	0.7812	89.83
18.713	275.000	131.652	236.97	0.027754	55.442	7.4116	36.031	0.018037	0.13492	0.7786	89.52
18.726	275.191	131.667	237.00	0.027751	55.435	7.4106	36.035	0.018039	0.13494	0.7785	89.51
19.000	279.224	131.966	237.54	0.027674	55.283	7.3902	36.135	0.018089	0.13531	0.7763	89.26
19.031	279.684	132.000	237.60	0.027666	55.265	7.3879	36.146	0.018095	0.13536	0.7761	89.24
19.053	280.000	132.023	237.64	0.027660	55.253	7.3863	36.154	0.018098	0.13539	0.7759	89.22

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
19.237	282.709	132.222	238.00	0.027609	55.151	7.3727	36.221	0.018132	0.13564	0.7745	89.05
19.393	285.000	132.389	238.30	0.027565	55.065	7.3612	36.277	0.018160	0.13585	0.7733	88.91
19.733	290.000	132.751	238.95	0.027472	54.878	7.3361	36.401	0.018222	0.13631	0.7707	88.61
19.759	290.373	132.778	239.00	0.027465	54.864	7.3342	36.411	0.018227	0.13635	0.7705	88.59
19.970	293.480	133.000	239.40	0.027406	54.748	7.3187	36.488	0.018266	0.13664	0.7688	88.40
20.000	293.920	133.031	239.46	0.027398	54.731	7.3165	36.499	0.018271	0.13668	0.7686	88.37
20.073	295.000	133.108	239.59	0.027378	54.691	7.3111	36.526	0.018285	0.13678	0.7680	88.31
20.290	298.186	133.333	240.00	0.027319	54.572	7.2953	36.605	0.018324	0.13708	0.7664	88.12
20.414	300.000	133.461	240.23	0.027285	54.505	7.2862	36.650	0.018347	0.13724	0.7654	88.01
20.754	305.000	133.809	240.86	0.027192	54.319	7.2615	36.775	0.018410	0.13771	0.7628	87.71
20.832	306.148	133.889	241.00	0.027171	54.277	7.2558	36.804	0.018424	0.13782	0.7622	87.64
20.942	307.758	134.000	241.20	0.027141	54.217	7.2478	36.845	0.018444	0.13797	0.7614	87.54
21.000	308.616	134.059	241.31	0.027125	54.186	7.2436	36.866	0.018455	0.13805	0.7609	87.49
21.094	310.000	134.154	241.48	0.027099	54.134	7.2367	36.901	0.018473	0.13818	0.7602	87.41
21.384	314.262	134.444	242.00	0.027021	53.977	7.2157	37.009	0.018526	0.13859	0.7580	87.16
21.434	315.000	134.494	242.09	0.027007	53.950	7.2121	37.027	0.018536	0.13866	0.7576	87.11
21.775	320.000	134.831	242.70	0.026915	53.766	7.1875	37.154	0.018599	0.13913	0.7550	86.81
21.947	322.529	135.000	243.00	0.026869	53.673	7.1751	37.218	0.018631	0.13937	0.7537	86.66
22.000	323.312	135.052	243.09	0.026854	53.644	7.1712	37.238	0.018641	0.13945	0.7533	86.62
22.115	325.000	135.164	243.30	0.026823	53.583	7.1629	37.281	0.018663	0.13961	0.7525	86.52
22.455	330.000	135.493	243.89	0.026731	53.399	7.1385	37.409	0.018727	0.14009	0.7499	86.22
22.520	330.951	135.556	244.00	0.026714	53.365	7.1338	37.433	0.018739	0.14018	0.7494	86.17
22.795	335.000	135.819	244.47	0.026640	53.216	7.1140	37.538	0.018791	0.14057	0.7473	85.93
22.986	337.802	136.000	244.80	0.026589	53.114	7.1003	37.610	0.018827	0.14084	0.7459	85.76
23.000	338.008	136.013	244.82	0.026585	53.107	7.0993	37.615	0.018830	0.14086	0.7458	85.75
23.104	339.531	136.111	245.00	0.026557	53.051	7.0919	37.655	0.018850	0.14101	0.7450	85.66
23.136	340.000	136.141	245.05	0.026549	53.034	7.0896	37.667	0.018856	0.14105	0.7448	85.63
23.476	345.000	136.460	245.63	0.026457	52.852	7.0652	37.797	0.018921	0.14154	0.7422	85.34
23.698	348.270	136.667	246.00	0.026398	52.732	7.0493	37.882	0.018964	0.14186	0.7405	85.15
23.816	350.000	136.775	246.20	0.026366	52.669	7.0409	37.928	0.018986	0.14203	0.7396	85.04
24.000	352.704	136.945	246.50	0.026317	52.571	7.0277	37.999	0.019022	0.14229	0.7383	84.89
24.060	353.590	137.000	246.60	0.026301	52.539	7.0234	38.022	0.019034	0.14238	0.7378	84.83
24.156	355.000	137.088	246.76	0.026275	52.487	7.0166	38.059	0.019052	0.14252	0.7371	84.75
24.304	357.170	137.222	247.00	0.026235	52.409	7.0060	38.116	0.019081	0.14273	0.7360	84.62
24.496	360.000	137.397	247.31	0.026184	52.306	6.9922	38.191	0.019118	0.14302	0.7345	84.46
24.837	365.000	137.703	247.87	0.026093	52.124	6.9679	38.324	0.019185	0.14351	0.7320	84.16
24.921	366.233	137.778	248.00	0.026071	52.079	6.9620	38.357	0.019202	0.14364	0.7314	84.09
25.000	367.400	137.849	248.13	0.026049	52.037	6.9563	38.389	0.019217	0.14375	0.7308	84.02
25.170	369.904	138.000	248.40	0.026004	51.946	6.9441	38.456	0.019251	0.14401	0.7295	83.88
25.177	370.000	138.006	248.41	0.026002	51.942	6.9436	38.459	0.019252	0.14402	0.7294	83.87
25.517	375.000	138.306	248.95	0.025911	51.760	6.9194	38.594	0.019320	0.14452	0.7269	83.58
25.549	375.461	138.333	249.00	0.025903	51.744	6.9171	38.606	0.019326	0.14457	0.7266	83.55
25.857	380.000	138.603	249.49	0.025820	51.579	6.8951	38.730	0.019388	0.14503	0.7243	83.28
26.000	382.096	138.727	249.71	0.025782	51.502	6.8849	38.787	0.019417	0.14525	0.7233	83.16
26.188	384.857	138.889	250.00	0.025732	51.402	6.8714	38.863	0.019455	0.14553	0.7218	83.00

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
26.198	385.000	138.897	250.02	0.025729	51.397	6.8707	38.867	0.019456	0.14554	0.7218	82.99
26.317	386.756	139.000	250.20	0.025697	51.333	6.8622	38.915	0.019481	0.14573	0.7209	82.89
26.538	390.000	139.189	250.54	0.025638	51.215	6.8464	39.005	0.019526	0.14606	0.7192	82.70
26.839	394.422	139.444	251.00	0.025557	51.054	6.8249	39.128	0.019587	0.14652	0.7170	82.44
26.878	395.000	139.478	251.06	0.025547	51.033	6.8221	39.144	0.019595	0.14658	0.7167	82.40
27.000	396.792	139.581	251.25	0.025514	50.967	6.8133	39.194	0.019620	0.14677	0.7157	82.30
27.218	400.000	139.764	251.58	0.025455	50.850	6.7977	39.284	0.019666	0.14711	0.7141	82.11
27.501	404.159	140.000	252.00	0.025379	50.699	6.7774	39.402	0.019724	0.14755	0.7120	81.86
27.559	405.000	140.048	252.09	0.025364	50.668	6.7733	39.426	0.019736	0.14764	0.7115	81.81
27.899	410.000	140.329	252.59	0.025273	50.485	6.7489	39.569	0.019808	0.14817	0.7090	81.52
28.000	411.488	140.412	252.74	0.025245	50.430	6.7416	39.611	0.019829	0.14833	0.7082	81.43
28.176	414.069	140.556	253.00	0.025198	50.336	6.7289	39.686	0.019867	0.14861	0.7069	81.28
28.239	415.000	140.607	253.09	0.025181	50.302	6.7244	39.713	0.019880	0.14871	0.7064	81.22
28.579	420.000	140.883	253.59	0.025089	50.118	6.6998	39.858	0.019953	0.14926	0.7038	80.92
28.724	422.125	141.000	253.80	0.025050	50.040	6.6894	39.920	0.019984	0.14949	0.7027	80.80
28.862	424.156	141.111	254.00	0.025012	49.965	6.6794	39.980	0.020014	0.14971	0.7017	80.68
28.919	425.000	141.158	254.08	0.024996	49.933	6.6751	40.006	0.020027	0.14981	0.7012	80.63
29.000	426.184	141.222	254.20	0.024975	49.891	6.6694	40.040	0.020044	0.14994	0.7006	80.56
29.260	430.000	141.429	254.57	0.024905	49.750	6.6506	40.153	0.020101	0.15036	0.6986	80.33
29.561	434.422	141.667	255.00	0.024823	49.586	6.6287	40.286	0.020167	0.15086	0.6963	80.07
29.600	435.000	141.698	255.06	0.024812	49.565	6.6259	40.303	0.020176	0.15092	0.6960	80.03
29.940	440.000	141.964	255.54	0.024719	49.380	6.6011	40.454	0.020251	0.15149	0.6934	79.73
29.986	440.669	142.000	255.60	0.024707	49.355	6.5978	40.475	0.020261	0.15157	0.6931	79.69
30.000	440.880	142.011	255.62	0.024703	49.347	6.5967	40.481	0.020265	0.15159	0.6930	79.68
30.271	444.870	142.222	256.00	0.024629	49.198	6.5769	40.603	0.020326	0.15205	0.6909	79.44
30.280	445.000	142.230	256.01	0.024626	49.193	6.5761	40.608	0.020328	0.15207	0.6908	79.43
30.621	450.000	142.492	256.48	0.024533	49.007	6.5513	40.762	0.020405	0.15264	0.6882	79.13
30.961	455.000	142.752	256.95	0.024439	48.820	6.5262	40.918	0.020484	0.15323	0.6856	78.83
30.995	455.501	142.778	257.00	0.024429	48.801	6.5237	40.934	0.020491	0.15329	0.6853	78.80
31.000	455.576	142.782	257.01	0.024428	48.798	6.5233	40.936	0.020493	0.15330	0.6853	78.79
31.288	459.806	143.000	257.40	0.024348	48.639	6.5021	41.070	0.020560	0.15380	0.6830	78.54
31.301	460.000	143.010	257.42	0.024345	48.632	6.5011	41.077	0.020563	0.15382	0.6829	78.52
31.641	465.000	143.266	257.88	0.024250	48.443	6.4759	41.237	0.020643	0.15442	0.6803	78.22
31.731	466.319	143.333	258.00	0.024225	48.393	6.4692	41.279	0.020664	0.15458	0.6796	78.14
31.981	470.000	143.521	258.34	0.024155	48.252	6.4504	41.399	0.020724	0.15503	0.6776	77.91
32.000	470.272	143.534	258.36	0.024150	48.243	6.4491	41.408	0.020728	0.15506	0.6775	77.90
32.322	475.000	143.773	258.79	0.024060	48.062	6.4249	41.564	0.020807	0.15564	0.6749	77.60
32.480	477.328	143.889	259.00	0.024015	47.974	6.4132	41.640	0.020845	0.15593	0.6737	77.46
32.631	479.552	144.000	259.20	0.023973	47.888	6.4018	41.714	0.020882	0.15621	0.6725	77.32
32.662	480.000	144.022	259.24	0.023964	47.871	6.3995	41.729	0.020889	0.15626	0.6723	77.30
33.000	484.968	144.269	259.68	0.023868	47.680	6.3739	41.896	0.020973	0.15689	0.6696	76.99
33.002	485.000	144.271	259.69	0.023867	47.678	6.3736	41.898	0.020974	0.15690	0.6695	76.98
33.242	488.528	144.444	260.00	0.023800	47.542	6.3555	42.018	0.021034	0.15734	0.6676	76.77
33.342	490.000	144.517	260.13	0.023771	47.485	6.3479	42.068	0.021059	0.15753	0.6668	76.67
33.683	495.000	144.762	260.57	0.023673	47.290	6.3217	42.242	0.021146	0.15818	0.6641	76.36

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
34.000	499.664	144.987	260.98	0.023582	47.108	6.2975	42.405	0.021228	0.15879	0.6615	76.06
34.018	499.925	145.000	261.00	0.023577	47.098	6.2961	42.414	0.021232	0.15883	0.6614	76.05
34.023	500.000	145.004	261.01	0.023575	47.094	6.2956	42.417	0.021234	0.15884	0.6613	76.04
34.363	505.000	145.245	261.44	0.023476	46.897	6.2692	42.596	0.021323	0.15951	0.6586	75.72
34.703	510.000	145.484	261.87	0.023377	46.699	6.2428	42.776	0.021414	0.16019	0.6558	75.40
34.807	511.521	145.556	262.00	0.023347	46.639	6.2348	42.831	0.021441	0.16039	0.6550	75.31
35.000	514.360	145.690	262.24	0.023291	46.526	6.2196	42.936	0.021493	0.16078	0.6534	75.12
35.044	515.000	145.721	262.30	0.023277	46.500	6.2161	42.960	0.021506	0.16087	0.6530	75.08
35.384	520.000	145.956	262.72	0.023177	46.298	6.1892	43.147	0.021599	0.16157	0.6502	74.76
35.448	520.943	146.000	262.80	0.023158	46.261	6.1842	43.182	0.021617	0.16170	0.6496	74.70
35.610	523.319	146.111	263.00	0.023110	46.165	6.1713	43.272	0.021662	0.16204	0.6483	74.54
35.724	525.000	146.190	263.14	0.023075	46.095	6.1620	43.337	0.021694	0.16228	0.6473	74.43
36.000	529.056	146.378	263.48	0.022993	45.931	6.1401	43.492	0.021772	0.16286	0.6450	74.16
36.064	530.000	146.422	263.56	0.022973	45.891	6.1347	43.530	0.021791	0.16301	0.6445	74.10
36.404	535.000	146.653	263.97	0.022870	45.685	6.1072	43.726	0.021889	0.16374	0.6416	73.77
36.427	535.324	146.667	264.00	0.022864	45.673	6.1056	43.738	0.021895	0.16378	0.6414	73.75
36.745	540.000	146.881	264.39	0.022766	45.477	6.0794	43.926	0.021989	0.16449	0.6386	73.43
36.923	542.627	147.000	264.60	0.022711	45.369	6.0649	44.031	0.022042	0.16488	0.6371	73.26
37.000	543.752	147.051	264.69	0.022688	45.321	6.0586	44.077	0.022065	0.16505	0.6365	73.18
37.085	545.000	147.108	264.80	0.022661	45.268	6.0514	44.129	0.022091	0.16525	0.6357	73.09
37.258	547.539	147.222	265.00	0.022608	45.162	6.0372	44.233	0.022143	0.16564	0.6342	72.92
37.425	550.000	147.334	265.20	0.022555	45.056	6.0231	44.336	0.022195	0.16603	0.6327	72.75
37.765	555.000	147.558	265.60	0.022448	44.843	5.9946	44.547	0.022300	0.16682	0.6297	72.41
38.000	558.448	147.710	265.88	0.022374	44.695	5.9748	44.695	0.022374	0.16737	0.6277	72.17
38.103	559.968	147.778	266.00	0.022341	44.629	5.9660	44.760	0.022407	0.16762	0.6267	72.06
38.106	560.000	147.780	266.00	0.022340	44.627	5.9657	44.763	0.022408	0.16762	0.6267	72.06
38.446	565.000	148.000	266.40	0.022231	44.409	5.9367	44.982	0.022518	0.16844	0.6236	71.71
38.446	565.001	148.000	266.40	0.022231	44.409	5.9367	44.982	0.022518	0.16844	0.6236	71.71
38.786	570.000	148.220	266.80	0.022120	44.188	5.9070	45.208	0.022631	0.16929	0.6205	71.35
38.964	572.616	148.333	267.00	0.022062	44.072	5.8916	45.326	0.022690	0.16973	0.6189	71.16
39.000	573.144	148.356	267.04	0.022051	44.049	5.8885	45.350	0.022702	0.16982	0.6186	71.12
39.126	575.000	148.438	267.19	0.022008	43.964	5.8771	45.438	0.022746	0.17015	0.6174	70.99
39.467	580.000	148.654	267.58	0.021895	43.738	5.8469	45.672	0.022863	0.17103	0.6142	70.62
39.807	585.000	148.869	267.96	0.021780	43.509	5.8163	45.913	0.022984	0.17193	0.6110	70.25
39.840	585.486	148.889	268.00	0.021770	43.488	5.8135	45.935	0.022995	0.17201	0.6107	70.22
40.000	587.840	148.989	268.18	0.021715	43.379	5.7990	46.050	0.023052	0.17244	0.6092	70.04
40.017	588.088	149.000	268.20	0.021710	43.368	5.7974	46.062	0.023059	0.17249	0.6090	70.02
40.147	590.000	149.082	268.35	0.021664	43.277	5.7853	46.158	0.023107	0.17285	0.6077	69.88
40.487	595.000	149.294	268.73	0.021547	43.042	5.7539	46.411	0.023233	0.17380	0.6044	69.50
40.731	598.585	149.444	269.00	0.021462	42.873	5.7312	46.594	0.023325	0.17448	0.6021	69.23
40.827	600.000	149.505	269.11	0.021427	42.804	5.7220	46.669	0.023363	0.17476	0.6011	69.11
41.000	602.536	149.610	269.30	0.021367	42.682	5.7058	46.802	0.023429	0.17526	0.5994	68.92
41.168	605.000	149.714	269.48	0.021306	42.561	5.6896	46.935	0.023495	0.17576	0.5977	68.72
41.508	610.000	149.921	269.86	0.021183	42.315	5.6567	47.208	0.023632	0.17678	0.5942	68.32
41.638	611.917	150.000	270.00	0.021136	42.221	5.6441	47.314	0.023685	0.17718	0.5929	68.17

TABLE 3 CONTINUED

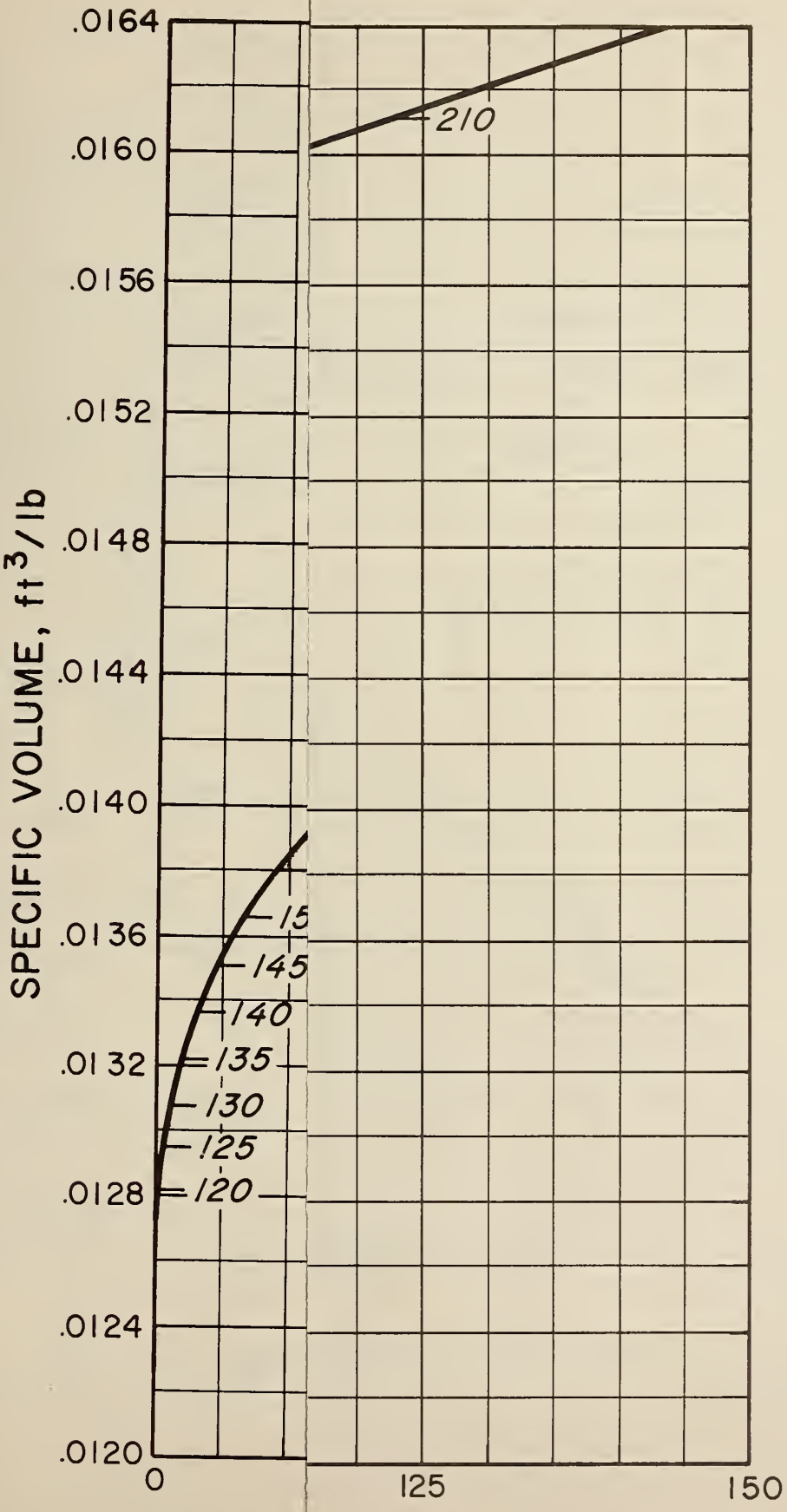
SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
41.848	615.000	150.128	270.23	0.021057	42.065	5.6232	47.489	0.023773	0.17783	0.5907	67.92
42.000	617.232	150.219	270.39	0.021001	41.953	5.6083	47.616	0.023836	0.17831	0.5891	67.74
42.188	620.000	150.333	270.60	0.020930	41.810	5.5892	47.779	0.023918	0.17892	0.5871	67.51
42.529	625.000	150.537	270.97	0.020800	41.550	5.5544	48.078	0.024068	0.18004	0.5835	67.09
42.562	625.487	150.556	271.00	0.020788	41.526	5.5512	48.105	0.024081	0.18014	0.5832	67.05
42.869	630.000	150.739	271.33	0.020667	41.286	5.5191	48.385	0.024221	0.18119	0.5798	66.66
43.000	631.928	150.816	271.47	0.020616	41.183	5.5054	48.505	0.024282	0.18164	0.5783	66.50
43.209	635.000	150.940	271.69	0.020532	41.015	5.4829	48.705	0.024381	0.18239	0.5760	66.23
43.312	636.518	151.000	271.80	0.020491	40.934	5.4720	48.801	0.024430	0.18275	0.5748	66.09
43.502	639.301	151.111	272.00	0.020414	40.780	5.4515	48.985	0.024522	0.18344	0.5727	65.85
43.549	640.000	151.140	272.05	0.020394	40.739	5.4460	49.035	0.024547	0.18362	0.5721	65.78
43.889	645.000	151.338	272.41	0.020253	40.457	5.4083	49.377	0.024718	0.18490	0.5681	65.32
44.000	646.624	151.402	272.52	0.020207	40.365	5.3961	49.489	0.024774	0.18532	0.5669	65.18
44.230	650.000	151.535	272.76	0.020107	40.167	5.3695	49.733	0.024896	0.18624	0.5641	64.86
44.459	653.365	151.667	273.00	0.020009	39.970	5.3432	49.978	0.025019	0.18715	0.5613	64.54
44.570	655.000	151.731	273.12	0.019959	39.870	5.3298	50.103	0.025082	0.18762	0.5599	64.38
44.910	660.000	151.926	273.47	0.019806	39.564	5.2890	50.490	0.025275	0.18907	0.5556	63.88
45.000	661.320	151.977	273.56	0.019766	39.484	5.2782	50.593	0.025327	0.18946	0.5545	63.75
45.041	661.926	152.000	273.60	0.019747	39.446	5.2732	50.642	0.025351	0.18964	0.5539	63.69
45.250	665.000	152.119	273.81	0.019648	39.249	5.2469	50.896	0.025478	0.19059	0.5512	63.37
45.433	667.686	152.222	274.00	0.019562	39.077	5.2238	51.120	0.025590	0.19143	0.5488	63.10
45.591	670.000	152.312	274.16	0.019484	38.922	5.2032	51.323	0.025692	0.19219	0.5466	62.85
45.931	675.000	152.503	274.50	0.019315	38.583	5.1578	51.774	0.025918	0.19388	0.5418	62.30
46.000	676.016	152.541	274.57	0.019280	38.515	5.1487	51.866	0.025964	0.19423	0.5409	62.19
46.271	680.000	152.692	274.85	0.019138	38.229	5.1105	52.253	0.026158	0.19567	0.5369	61.73
46.426	682.271	152.778	275.00	0.019055	38.065	5.0885	52.480	0.026271	0.19652	0.5345	61.46
46.611	685.000	152.881	275.19	0.018951	37.857	5.0607	52.768	0.026415	0.19760	0.5316	61.13
46.828	688.180	153.000	275.40	0.018828	37.611	5.0279	53.112	0.026588	0.19889	0.5282	60.73
46.952	690.000	153.069	275.52	0.018754	37.463	5.0081	53.323	0.026693	0.19968	0.5261	60.49
47.000	690.712	153.095	275.57	0.018726	37.407	5.0006	53.403	0.026733	0.19998	0.5253	60.40
47.292	695.000	153.255	275.86	0.018543	37.041	4.9517	53.930	0.026997	0.20195	0.5202	59.81
47.436	697.126	153.333	276.00	0.018450	36.856	4.9269	54.201	0.027133	0.20297	0.5176	59.51
47.632	700.000	153.440	276.19	0.018315	36.587	4.8910	54.599	0.027332	0.20446	0.5138	59.08
47.972	705.000	153.624	276.52	0.018066	36.090	4.8245	55.351	0.027709	0.20727	0.5068	58.27
48.000	705.408	153.639	276.55	0.018047	36.050	4.8192	55.412	0.027739	0.20750	0.5063	58.21
48.312	710.000	153.807	276.85	0.017789	35.536	4.7505	56.214	0.028140	0.21050	0.4990	57.38
48.466	712.261	153.889	277.00	0.017654	35.266	4.7144	56.644	0.028356	0.21212	0.4952	56.94
48.653	715.000	153.989	277.18	0.017472	34.903	4.6659	57.233	0.028651	0.21432	0.4901	56.36
48.675	715.322	154.000	277.20	0.017454	34.866	4.6609	57.294	0.028681	0.21455	0.4896	56.30
48.993	720.000	154.170	277.51	0.017099	34.157	4.5661	58.484	0.029277	0.21901	0.4797	55.15
49.000	720.104	154.173	277.51	0.017096	34.151	4.5654	58.493	0.029281	0.21904	0.4796	55.14
49.333	725.000	154.349	277.83	0.016640	33.241	4.4437	60.095	0.030083	0.22504	0.4668	53.67
49.516	727.683	154.444	278.00	0.016337	32.634	4.3625	61.213	0.030643	0.22922	0.4583	52.69
49.673	730.000	154.527	278.15	0.016004	31.969	4.2737	62.485	0.031280	0.23399	0.4489	51.62
50.000	734.800	154.697	278.46	0.014931	29.826	3.9872	66.975	0.033528	0.25080	0.4189	48.16

TABLE 3 CONTINUED

SATURATED LIQUID OXYGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
50.014	735.000	154.705	278.47	0.014807	29.578	3.9540	67.537	0.033809	0.25291	0.4154	47.76
50.140	736.857	154.770	278.59	0.013333	26.635	3.5606	75.000	0.037545	0.28085	0.3740	43.01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.0160
.0156
.0152
.0148
.0144
.0140
.0136
.0132
.0128
.0124
.0120
SPECIFIC VOLUME, ft³/lb
0
125
150
210
15
145
140
135
130
125
120

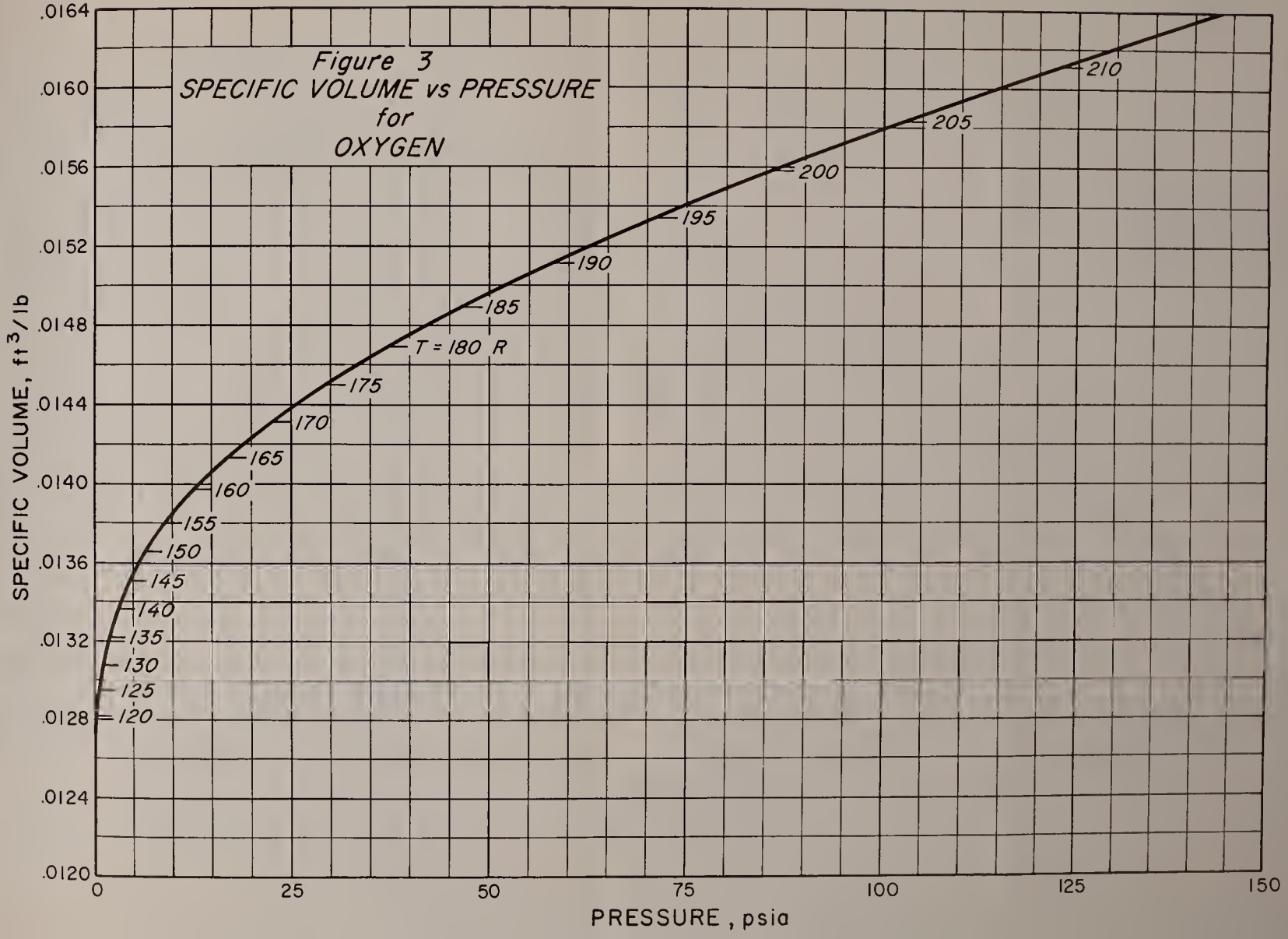
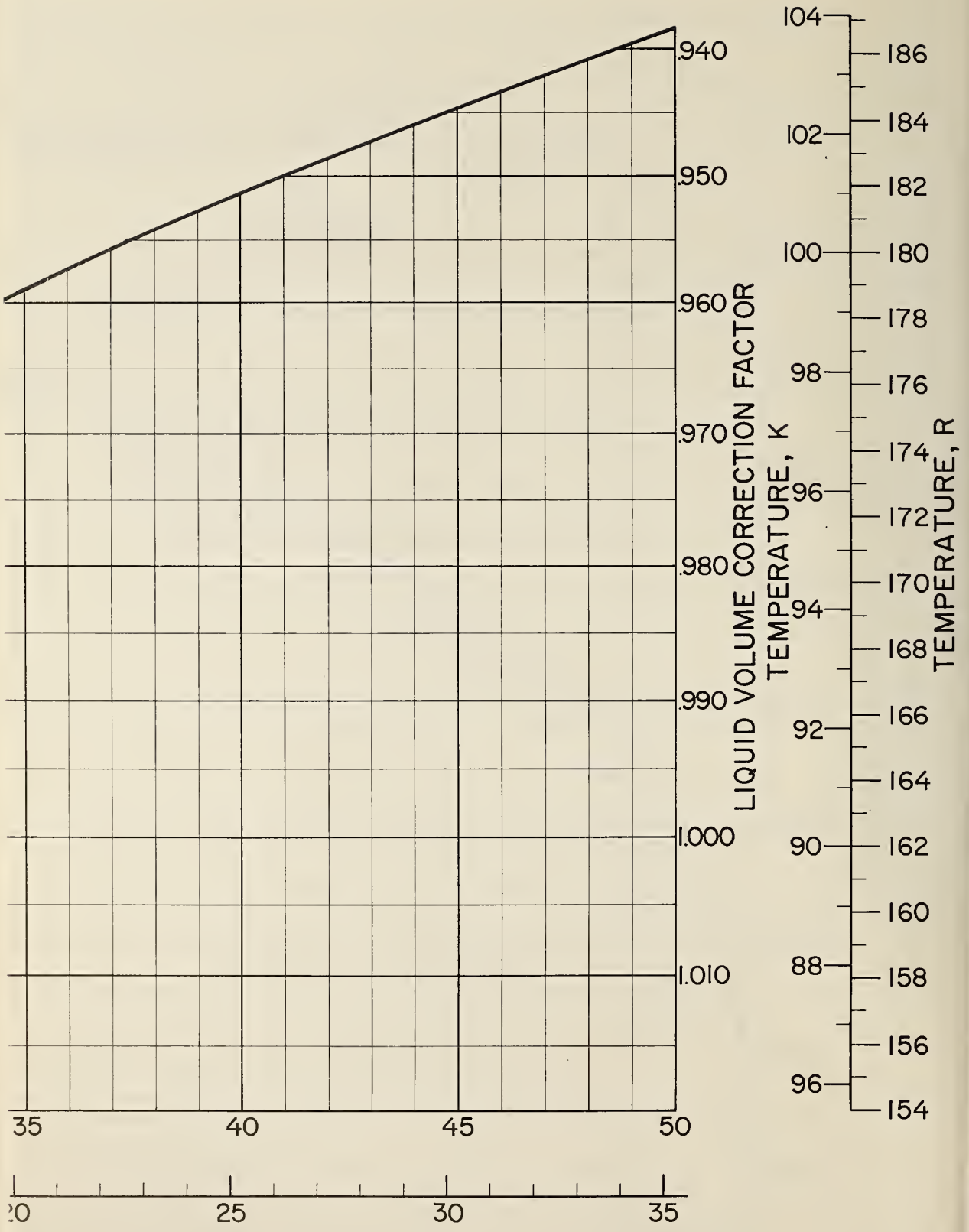


Figure 3
SPECIFIC VOLUME vs PRESSURE
for
OXYGEN
SPECIFIC VOLUME, ft³/lb
.0164
.0160
.0156
.0152
.0148
.0144
.0140
.0136
.0132
.0128
.0124
.0120
0
25
50
75
100
125
150
PRESSURE, psia
T = 180 R
120
125
130
135
140
145
150
155
160
165
170
175
185
190
195
200
205
210


.940
.950
.960
.970
.980
.990
1.000
1.010
LIQUID VOLUME CORRECTION FACTOR
35
40
45
50
:0
25
30
35
104
102
100
98
96
94
92
90
88
96
186
184
182
180
178
176
174
172
170
168
166
164
162
160
158
156
154
TEMPERATURE, K
TEMPERATURE, R

6. Nitrogen

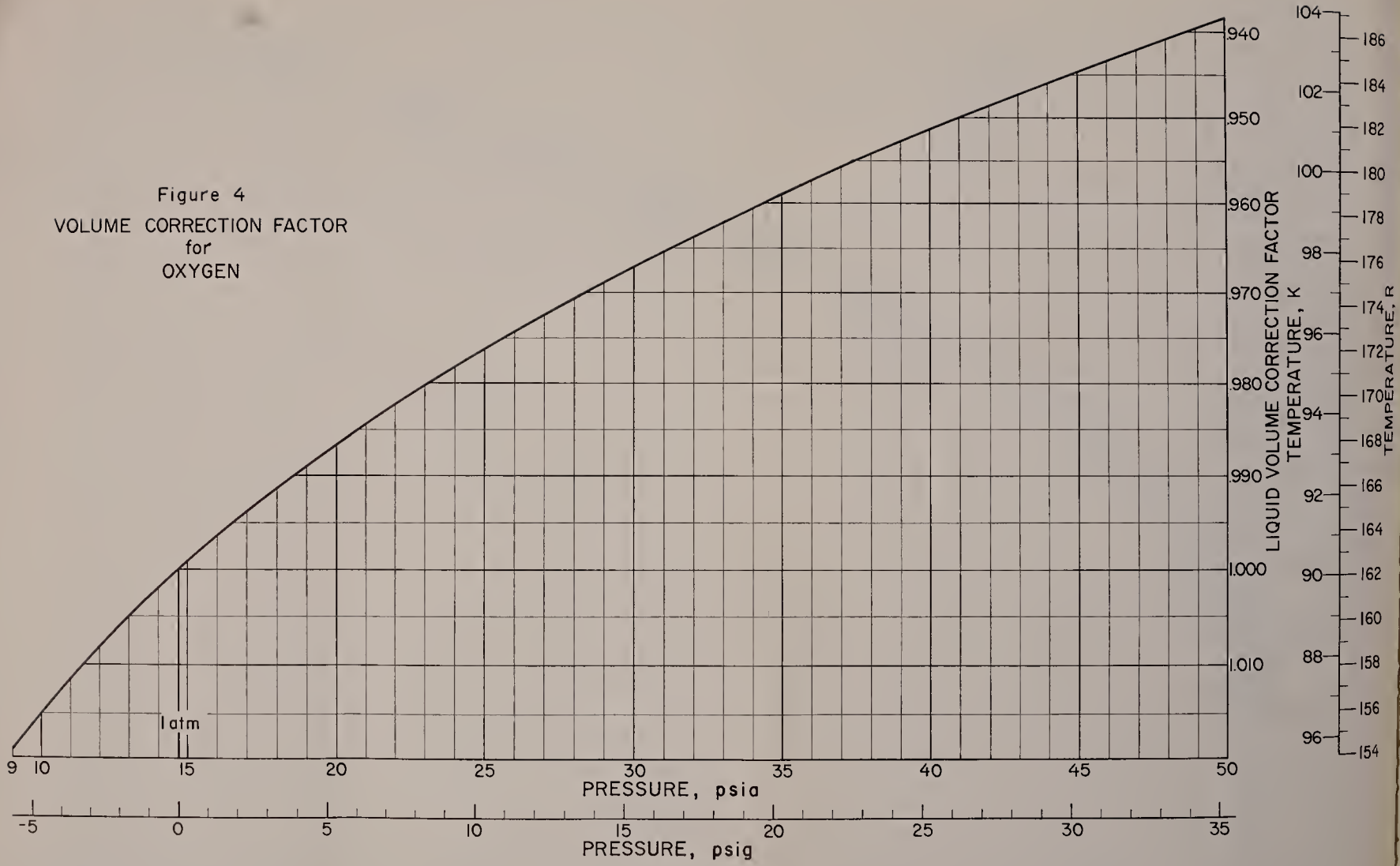
The data tabulated for nitrogen are based on the paper by Strobridge (1962). The saturated liquid values were calculated by solving simultaneously the vapor pressure equation and the equation of state. First the vapor pressure equation was solved for either pressure or temperature depending on the integral value desired, then using the resulting P and T, the equation of state was solved for the corresponding density. All of the tabulated values were obtained in this manner except the critical point. At the critical point the vapor pressure equation was used to calculate the pressure from an input temperature of 126.26 K but the density was calculated using the theory of

Table 4

Density of nitrogen at 1 atmosphere near room temperature

Temperature	Density		
	gram-mole/cm^3	lb/ft^3	lb/gal
0 C	0.000044635	0.078066	0.010436
68 F	0.000041582	0.072725	0.009722
70 F	0.000041424	0.072450	0.009685
Temperature	**Volume**		
	cm^3/gram-mole	ft^3/lb	gal/lb
0 C	22404	12.810	95.823
68 F	24049	13.750	102.860
70 F	24141	13.803	103.251
Temperature	**Density Ratios and Equivalent volumes** $\frac{\text{density at NBP}}{\text{density at the temperature indicated}}$		
	dimensionless	$\frac{lb/gal}{lb/ft^3} = ft^3/gal$	
0 C	645.67	86.31	
68 F	693.08	92.65	
70 F	695.71	93.00_6	

Figure 4
VOLUME CORRECTION FACTOR
for
OXYGEN



rectilinear diameters and the saturation densities tabulated by Strobridge.

Values near room temperature are given in table 4; as the source has not changed, the values remain the same. Uncertainties in the data are given in table 5. Near the critical point, the deviations between calculated and experimental data goes from 0.2% at 125 K to 5% at 126 K. The critical density given in table 6 is uncertain by 5% as well. The bulk of the values are found in table 6. The value of the density at the NBP in table 6 should be the same as in the CGA pamphlet, yet they differ by 0.2%. This is surprising as the source has not changed, and we can only suspect an error in the printing of the pamphlet.

Table 5

Uncertainties in the data for nitrogen

variable	uncertainty	range of temperature
temperature	0.5% 0.1% 0.015 K	64 to 72 K 72 to 125 K room temperature
volume	0.4% increases to 5% 0.01%	up to 125 K at 126 K room temperature
pressure	1% 0.1% 0.01%	64 to 72 K 72 to 126 K room temperature

TABLE 6

SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
0.123	1.813	63.150	113.67	0.030998	54.215	7.2475	32.260	0.018445	0.13798	1.0756	100.04
0.128	1.876	63.333	114.00	0.030972	54.169	7.2414	32.287	0.018461	0.13810	1.0747	99.95
0.136	2.000	63.687	114.64	0.030922	54.081	7.2296	32.340	0.018491	0.13832	1.0729	99.79
0.141	2.074	63.889	115.00	0.030893	54.031	7.2229	32.370	0.018508	0.13845	1.0719	99.70
0.144	2.116	64.000	115.20	0.030877	54.003	7.2192	32.387	0.018517	0.13852	1.0714	99.65
0.156	2.290	64.444	116.00	0.030813	53.892	7.2043	32.454	0.018556	0.13881	1.0692	99.44
0.172	2.522	65.000	117.00	0.030733	53.751	7.1855	32.538	0.018604	0.13917	1.0664	99.18
0.189	2.774	65.556	118.00	0.030652	53.610	7.1666	32.624	0.018653	0.13954	1.0636	98.92
0.203	2.989	66.000	118.80	0.030587	53.496	7.1514	32.694	0.018693	0.13983	1.0613	98.71
0.207	3.045	66.111	119.00	0.030571	53.468	7.1476	32.711	0.018703	0.13991	1.0608	98.66
0.227	3.337	66.667	120.00	0.030489	53.324	7.1284	32.799	0.018753	0.14028	1.0579	98.39
0.240	3.523	67.000	120.60	0.030439	53.238	7.1169	32.852	0.018784	0.14051	1.0562	98.23
0.248	3.651	67.222	121.00	0.030406	53.180	7.1092	32.888	0.018804	0.14066	1.0551	98.13
0.271	3.988	67.778	122.00	0.030323	53.035	7.0898	32.978	0.018855	0.14105	1.0522	97.86
0.272	4.000	67.797	122.03	0.030321	53.030	7.0891	32.981	0.018857	0.14106	1.0521	97.85
0.281	4.129	68.000	122.40	0.030290	52.977	7.0820	33.014	0.018876	0.14120	1.0510	97.75
0.296	4.349	68.333	123.00	0.030240	52.889	7.0703	33.069	0.018907	0.14144	1.0493	97.59
0.322	4.735	68.889	124.00	0.030156	52.743	7.0507	33.161	0.018960	0.14183	1.0464	97.32
0.328	4.816	69.000	124.20	0.030139	52.713	7.0467	33.179	0.018971	0.14191	1.0458	97.27
0.350	5.148	69.444	125.00	0.030072	52.595	7.0309	33.254	0.019013	0.14223	1.0435	97.05
0.380	5.589	70.000	126.00	0.029987	52.447	7.0111	33.348	0.019067	0.14263	1.0405	96.77
0.408	6.000	70.489	126.88	0.029912	52.315	6.9936	33.431	0.019115	0.14299	1.0379	96.53
0.412	6.058	70.556	127.00	0.029902	52.297	6.9911	33.443	0.019121	0.14304	1.0376	96.50
0.439	6.456	71.000	127.80	0.029833	52.177	6.9751	33.520	0.019165	0.14337	1.0352	96.28
0.446	6.558	71.111	128.00	0.029816	52.147	6.9711	33.539	0.019176	0.14345	1.0346	96.22
0.482	7.090	71.667	129.00	0.029730	51.997	6.9509	33.636	0.019232	0.14387	1.0316	95.94
0.505	7.425	72.000	129.60	0.029678	51.906	6.9388	33.695	0.019266	0.14412	1.0298	95.78
0.521	7.654	72.222	130.00	0.029643	51.845	6.9307	33.735	0.019288	0.14429	1.0286	95.66
0.544	8.000	72.547	130.58	0.029592	51.756	6.9188	33.793	0.019321	0.14453	1.0268	95.50
0.562	8.253	72.778	131.00	0.029556	51.693	6.9103	33.834	0.019345	0.14471	1.0256	95.38
0.579	8.503	73.000	131.40	0.029521	51.631	6.9021	33.874	0.019368	0.14488	1.0243	95.27
0.605	8.888	73.333	132.00	0.029468	51.539	6.8898	33.935	0.019403	0.14514	1.0225	95.10
0.651	9.560	73.889	133.00	0.029380	51.385	6.8692	34.037	0.019461	0.14558	1.0195	94.82
0.660	9.699	74.000	133.20	0.029363	51.354	6.8651	34.057	0.019472	0.14566	1.0188	94.76
0.680	10.000	74.237	133.63	0.029325	51.289	6.8563	34.101	0.019497	0.14585	1.0175	94.64
0.699	10.270	74.444	134.00	0.029292	51.231	6.8485	34.139	0.019520	0.14602	1.0164	94.53
0.750	11.021	75.000	135.00	0.029203	51.075	6.8277	34.243	0.019579	0.14646	1.0133	94.24
0.804	11.813	75.556	136.00	0.029113	50.919	6.8069	34.348	0.019639	0.14691	1.0102	93.95
0.817	12.000	75.683	136.23	0.029093	50.883	6.8020	34.373	0.019653	0.14701	1.0095	93.89
0.849	12.477	76.000	136.80	0.029042	50.793	6.7901	34.433	0.019688	0.14727	1.0077	93.72
0.861	12.648	76.111	137.00	0.029024	50.762	6.7859	34.455	0.019700	0.14737	1.0071	93.67
0.920	13.527	76.667	138.00	0.028933	50.604	6.7647	34.562	0.019761	0.14783	1.0040	93.37
0.953	14.000	76.955	138.52	0.028886	50.522	6.7538	34.618	0.019793	0.14807	1.0023	93.22
0.958	14.076	77.000	138.60	0.028879	50.509	6.7520	34.627	0.019799	0.14810	1.0021	93.20

TABLE 6 CONTINUED

SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
0.983	14.452	77.222	139.00	0.028843	50.445	6.7435	34.671	0.019824	0.14829	1.0008	93.08
1.000	14.696	77.364	139.26	0.028819	50.405	6.7381	34.699	0.019839	0.14841	1.0000	93.01
1.050	15.425	77.778	140.00	0.028751	50.286	6.7222	34.781	0.019886	0.14876	0.9976	92.79
1.077	15.828	78.000	140.40	0.028715	50.222	6.7137	34.825	0.019912	0.14895	0.9964	92.67
1.089	16.000	78.094	140.57	0.028699	50.195	6.7100	34.844	0.019922	0.14903	0.9958	92.62
1.119	16.447	78.333	141.00	0.028660	50.125	6.7008	34.892	0.019950	0.14924	0.9945	92.49
1.192	17.520	78.889	142.00	0.028568	49.964	6.6793	35.005	0.020014	0.14972	0.9913	92.19
1.207	17.740	79.000	142.20	0.028549	49.932	6.6749	35.027	0.020027	0.14981	0.9906	92.13
1.225	18.000	79.129	142.43	0.028528	49.894	6.6699	35.054	0.020042	0.14993	0.9899	92.06
1.269	18.644	79.444	143.00	0.028475	49.802	6.6576	35.118	0.020079	0.15020	0.9881	91.90
1.349	19.823	80.000	144.00	0.028382	49.640	6.6359	35.234	0.020145	0.15070	0.9848	91.59
1.361	20.000	80.081	144.15	0.028368	49.616	6.6327	35.250	0.020155	0.15077	0.9844	91.55
1.433	21.057	80.556	145.00	0.028289	49.476	6.6140	35.350	0.020212	0.15119	0.9816	91.29
1.497	22.000	80.963	145.73	0.028220	49.355	6.5979	35.436	0.020261	0.15156	0.9792	91.07
1.503	22.086	81.000	145.80	0.028213	49.345	6.5964	35.444	0.020266	0.15160	0.9790	91.05
1.521	22.349	81.111	146.00	0.028195	49.312	6.5920	35.468	0.020279	0.15170	0.9783	90.99
1.613	23.699	81.667	147.00	0.028100	49.146	6.5699	35.587	0.020347	0.15221	0.9750	90.68
1.633	24.000	81.787	147.22	0.028079	49.110	6.5651	35.613	0.020362	0.15232	0.9743	90.62
1.670	24.538	82.000	147.60	0.028043	49.047	6.5566	35.659	0.020389	0.15252	0.9731	90.50
1.709	25.110	82.222	148.00	0.028005	48.980	6.5477	35.708	0.020416	0.15273	0.9717	90.38
1.769	26.000	82.561	148.61	0.027947	48.879	6.5341	35.782	0.020459	0.15304	0.9697	90.19
1.809	26.583	82.778	149.00	0.027909	48.813	6.5254	35.830	0.020486	0.15325	0.9684	90.07
1.850	27.190	83.000	149.40	0.027871	48.746	6.5164	35.879	0.020514	0.15346	0.9671	89.95
1.905	28.000	83.291	149.92	0.027821	48.658	6.5046	35.944	0.020552	0.15374	0.9654	89.78
1.913	28.120	83.333	150.00	0.027813	48.645	6.5029	35.954	0.020557	0.15378	0.9651	89.76
2.000	29.392	83.777	150.80	0.027736	48.510	6.4849	36.054	0.020614	0.15420	0.9624	89.51
2.022	29.722	83.889	151.00	0.027717	48.476	6.4803	36.079	0.020629	0.15431	0.9617	89.45
2.041	30.000	83.983	151.17	0.027700	48.448	6.4765	36.101	0.020641	0.15440	0.9612	89.40
2.045	30.050	84.000	151.20	0.027697	48.442	6.4758	36.104	0.020643	0.15442	0.9611	89.39
2.136	31.392	84.444	152.00	0.027620	48.306	6.4576	36.206	0.020701	0.15486	0.9584	89.13
2.177	32.000	84.641	152.35	0.027585	48.246	6.4495	36.251	0.020727	0.15505	0.9572	89.02
2.254	33.130	85.000	153.00	0.027522	48.136	6.4348	36.334	0.020775	0.15541	0.9550	88.82
2.314	34.000	85.270	153.49	0.027474	48.052	6.4237	36.397	0.020811	0.15567	0.9533	88.67
2.378	34.940	85.556	154.00	0.027424	47.964	6.4118	36.465	0.020849	0.15596	0.9516	88.50
2.450	36.000	85.871	154.57	0.027368	47.866	6.3987	36.539	0.020892	0.15628	0.9496	88.32
2.480	36.440	86.000	154.80	0.027345	47.826	6.3934	36.570	0.020909	0.15641	0.9488	88.25
2.506	36.822	86.111	155.00	0.027325	47.791	6.3887	36.596	0.020924	0.15653	0.9481	88.18
2.586	38.000	86.448	155.61	0.027265	47.686	6.3746	36.677	0.020971	0.15687	0.9461	87.99
2.639	38.778	86.667	156.00	0.027226	47.617	6.3655	36.730	0.021001	0.15710	0.9447	87.86
2.721	39.989	87.000	156.60	0.027166	47.512	6.3515	36.811	0.021047	0.15744	0.9426	87.67
2.722	40.000	87.003	156.61	0.027165	47.511	6.3513	36.812	0.021048	0.15745	0.9426	87.67
2.777	40.811	87.222	157.00	0.027126	47.442	6.3421	36.866	0.021078	0.15768	0.9412	87.54
2.858	42.000	87.538	157.57	0.027069	47.342	6.3288	36.943	0.021123	0.15801	0.9392	87.36

TABLE 6 CONTINUED

SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
2.921	42.921	87.778	158.00	0.027025	47.266	6.3186	37.003	0.021157	0.15826	0.9377	87.22
2.980	43.788	88.000	158.40	0.026985	47.196	6.3091	37.058	0.021188	0.15850	0.9363	87.08
2.994	44.000	88.054	158.50	0.026975	47.178	6.3068	37.072	0.021196	0.15856	0.9360	87.05
3.000	44.088	88.076	158.54	0.026971	47.171	6.3059	37.077	0.021199	0.15858	0.9359	87.04
3.070	45.112	88.333	159.00	0.026924	47.089	6.2949	37.142	0.021236	0.15886	0.9342	86.89
3.130	46.000	88.553	159.40	0.026884	47.019	6.2855	37.197	0.021268	0.15910	0.9328	86.76
3.224	47.383	88.889	160.00	0.026822	46.911	6.2711	37.283	0.021317	0.15946	0.9307	86.56
3.256	47.848	89.000	160.20	0.026801	46.875	6.2663	37.311	0.021333	0.15958	0.9300	86.49
3.266	48.000	89.036	160.27	0.026795	46.863	6.2647	37.321	0.021339	0.15962	0.9297	86.47
3.384	49.738	89.444	161.00	0.026719	46.732	6.2471	37.426	0.021399	0.16007	0.9271	86.23
3.402	50.000	89.505	161.11	0.026708	46.712	6.2445	37.442	0.021408	0.16014	0.9267	86.19
3.538	52.000	89.960	161.93	0.026624	46.564	6.2247	37.561	0.021476	0.16065	0.9238	85.92
3.551	52.179	90.000	162.00	0.026616	46.551	6.2230	37.571	0.021482	0.16070	0.9235	85.90
3.674	54.000	90.402	162.72	0.026541	46.420	6.2054	37.678	0.021543	0.16115	0.9209	85.65
3.723	54.706	90.556	163.00	0.026512	46.369	6.1987	37.719	0.021566	0.16133	0.9199	85.56
3.811	56.000	90.833	163.50	0.026460	46.278	6.1865	37.793	0.021608	0.16164	0.9181	85.39
3.864	56.792	91.000	163.80	0.026428	46.223	6.1791	37.838	0.021634	0.16184	0.9170	85.29
3.901	57.322	91.111	164.00	0.026407	46.186	6.1742	37.868	0.021651	0.16196	0.9163	85.22
3.947	58.000	91.252	164.25	0.026381	46.140	6.1680	37.906	0.021673	0.16213	0.9154	85.14
4.000	58.784	91.413	164.54	0.026350	46.086	6.1608	37.950	0.021699	0.16232	0.9143	85.04
4.083	60.000	91.661	164.99	0.026303	46.004	6.1498	38.018	0.021737	0.16261	0.9127	84.89
4.085	60.029	91.667	165.00	0.026302	46.002	6.1496	38.020	0.021738	0.16261	0.9127	84.88
4.198	61.698	92.000	165.60	0.026238	45.891	6.1347	38.112	0.021791	0.16301	0.9104	84.68
4.219	62.000	92.060	165.71	0.026227	45.871	6.1320	38.129	0.021800	0.16308	0.9101	84.64
4.275	62.829	92.222	166.00	0.026196	45.816	6.1247	38.174	0.021826	0.16327	0.9090	84.54
4.355	64.000	92.449	166.41	0.026152	45.740	6.1145	38.238	0.021863	0.16354	0.9075	84.40
4.472	65.723	92.778	167.00	0.026089	45.629	6.0997	38.330	0.021916	0.16394	0.9053	84.19
4.491	66.000	92.830	167.09	0.026079	45.612	6.0974	38.345	0.021924	0.16400	0.9049	84.16
4.553	66.908	93.000	167.40	0.026046	45.554	6.0897	38.394	0.021952	0.16421	0.9038	84.06
4.627	68.000	93.202	167.76	0.026007	45.485	6.0805	38.452	0.021985	0.16446	0.9024	83.93
4.676	68.713	93.333	168.00	0.025981	45.441	6.0745	38.489	0.022007	0.16462	0.9015	83.85
4.763	70.000	93.567	168.42	0.025936	45.361	6.0639	38.557	0.022045	0.16491	0.8999	83.70
4.886	71.802	93.889	169.00	0.025873	45.251	6.0492	38.651	0.022099	0.16531	0.8978	83.50
4.899	72.000	93.924	169.06	0.025866	45.239	6.0476	38.661	0.022105	0.16536	0.8975	83.47
4.929	72.432	94.000	169.20	0.025851	45.213	6.0441	38.683	0.022118	0.16545	0.8970	83.43
5.000	73.480	94.183	169.53	0.025815	45.150	6.0356	38.737	0.022149	0.16568	0.8957	83.31
5.035	74.000	94.274	169.69	0.025797	45.119	6.0315	38.764	0.022164	0.16580	0.8951	83.25
5.103	74.991	94.444	170.00	0.025763	45.060	6.0236	38.815	0.022193	0.16601	0.8940	83.14
5.171	76.000	94.617	170.31	0.025729	45.000	6.0156	38.866	0.022222	0.16623	0.8928	83.03
5.308	78.000	94.953	170.92	0.025662	44.883	6.0000	38.968	0.022280	0.16667	0.8905	82.82
5.327	78.282	95.000	171.00	0.025653	44.867	5.9978	38.982	0.022288	0.16673	0.8901	82.79
5.444	80.000	95.283	171.51	0.025596	44.768	5.9846	39.068	0.022338	0.16710	0.8882	82.60
5.558	81.677	95.556	172.00	0.025542	44.672	5.9718	39.152	0.022385	0.16745	0.8863	82.43
5.580	82.000	95.608	172.09	0.025531	44.654	5.9694	39.168	0.022394	0.16752	0.8859	82.39
5.716	84.000	95.926	172.67	0.025467	44.542	5.9543	39.266	0.022451	0.16794	0.8837	82.19

TABLE 6 CONTINUED

SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
5.748	84.469	96.000	172.80	0.025452	44.515	5.9508	39.289	0.022464	0.16804	0.8832	82.14
5.796	85.177	96.111	173.00	0.025430	44.476	5.9456	39.324	0.022484	0.16819	0.8824	82.07
5.852	86.000	96.239	173.23	0.025404	44.431	5.9395	39.364	0.022507	0.16836	0.8815	81.98
5.988	88.000	96.547	173.78	0.025341	44.321	5.9248	39.462	0.022563	0.16878	0.8793	81.78
6.000	88.176	96.575	173.83	0.025335	44.311	5.9235	39.471	0.022568	0.16882	0.8791	81.76
6.042	88.786	96.667	174.00	0.025317	44.278	5.9191	39.500	0.022584	0.16894	0.8785	81.70
6.124	90.000	96.850	174.33	0.025279	44.213	5.9104	39.558	0.022618	0.16919	0.8772	81.58
6.192	91.004	97.000	174.60	0.025248	44.159	5.9032	39.607	0.022646	0.16940	0.8761	81.48
6.260	92.000	97.148	174.87	0.025218	44.105	5.8960	39.655	0.022673	0.16961	0.8750	81.38
6.295	92.504	97.222	175.00	0.025202	44.079	5.8925	39.679	0.022687	0.16971	0.8745	81.33
6.396	94.000	97.441	175.39	0.025157	44.000	5.8819	39.750	0.022728	0.17001	0.8729	81.19
6.532	96.000	97.730	175.91	0.025097	43.895	5.8679	39.845	0.022782	0.17042	0.8708	80.99
6.555	96.334	97.778	176.00	0.025087	43.877	5.8655	39.861	0.022791	0.17049	0.8705	80.96
6.662	97.898	98.000	176.40	0.025041	43.796	5.8547	39.935	0.022833	0.17080	0.8689	80.81
6.668	98.000	98.014	176.43	0.025038	43.791	5.8540	39.939	0.022836	0.17082	0.8688	80.80
6.805	100.000	98.295	176.93	0.024979	43.688	5.8403	40.033	0.022889	0.17122	0.8668	80.61
6.823	100.277	98.333	177.00	0.024971	43.674	5.8384	40.046	0.022897	0.17128	0.8665	80.59
6.941	102.000	98.571	177.43	0.024921	43.587	5.8267	40.127	0.022943	0.17162	0.8647	80.43
7.000	102.872	98.691	177.64	0.024896	43.542	5.8208	40.167	0.022966	0.17180	0.8639	80.34
7.077	104.000	98.843	177.92	0.024863	43.486	5.8132	40.220	0.022996	0.17202	0.8627	80.24
7.100	104.336	98.889	178.00	0.024854	43.469	5.8110	40.235	0.023005	0.17209	0.8624	80.21
7.156	105.162	99.000	178.20	0.024830	43.428	5.8054	40.273	0.023027	0.17225	0.8616	80.13
7.213	106.000	99.112	178.40	0.024806	43.386	5.7999	40.312	0.023049	0.17242	0.8608	80.06
7.349	108.000	99.377	178.88	0.024750	43.287	5.7866	40.404	0.023102	0.17281	0.8588	79.87
7.384	108.512	99.444	179.00	0.024735	43.262	5.7833	40.428	0.023115	0.17291	0.8583	79.83
7.485	110.000	99.639	179.35	0.024694	43.189	5.7735	40.496	0.023154	0.17320	0.8568	79.69
7.621	112.000	99.897	179.81	0.024638	43.092	5.7605	40.587	0.023206	0.17360	0.8549	79.51
7.676	112.808	100.000	180.00	0.024616	43.053	5.7553	40.624	0.023227	0.17375	0.8541	79.44
7.757	114.000	100.151	180.27	0.024583	42.995	5.7476	40.679	0.023258	0.17399	0.8530	79.33
7.893	116.000	100.403	180.73	0.024528	42.899	5.7348	40.769	0.023310	0.17437	0.8511	79.16
7.977	117.225	100.556	181.00	0.024495	42.841	5.7270	40.825	0.023342	0.17461	0.8499	79.05
8.000	117.568	100.598	181.08	0.024486	42.825	5.7248	40.840	0.023351	0.17468	0.8496	79.02
8.029	118.000	100.651	181.17	0.024474	42.804	5.7221	40.860	0.023362	0.17476	0.8492	78.98
8.165	120.000	100.897	181.61	0.024420	42.710	5.7095	40.950	0.023414	0.17515	0.8473	78.81
8.223	120.847	101.000	181.80	0.024397	42.671	5.7042	40.988	0.023435	0.17531	0.8466	78.74
8.286	121.765	101.111	182.00	0.024373	42.628	5.6985	41.029	0.023459	0.17549	0.8457	78.66
8.302	122.000	101.139	182.05	0.024367	42.617	5.6970	41.040	0.023465	0.17553	0.8455	78.64
8.438	124.000	101.379	182.48	0.024313	42.524	5.6846	41.130	0.023516	0.17591	0.8436	78.46
8.574	126.000	101.616	182.91	0.024261	42.431	5.6723	41.219	0.023567	0.17630	0.8418	78.29
8.603	126.430	101.667	183.00	0.024249	42.412	5.6696	41.238	0.023578	0.17638	0.8414	78.26
8.710	128.000	101.850	183.33	0.024208	42.340	5.6600	41.308	0.023618	0.17668	0.8400	78.13
8.798	129.291	102.000	183.60	0.024175	42.281	5.6522	41.366	0.023651	0.17692	0.8388	78.02
8.846	130.000	102.082	183.75	0.024156	42.249	5.6478	41.397	0.023669	0.17706	0.8382	77.96
8.929	131.223	102.222	184.00	0.024125	42.193	5.6404	41.452	0.023700	0.17729	0.8371	77.85
8.982	132.000	102.311	184.16	0.024104	42.158	5.6357	41.486	0.023720	0.17744	0.8364	77.79

TABLE 6 CONTINUED

SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
9.000	132.264	102.341	184.21	0.024098	42.146	5.6341	41.498	0.023727	0.17749	0.8362	77.77
9.118	134.000	102.537	184.57	0.024053	42.068	5.6237	41.575	0.023771	0.17782	0.8346	77.62
9.254	136.000	102.762	184.97	0.024002	41.979	5.6118	41.663	0.023821	0.17820	0.8328	77.46
9.264	136.145	102.778	185.00	0.023998	41.973	5.6109	41.670	0.023825	0.17822	0.8327	77.45
9.390	138.000	102.983	185.37	0.023951	41.890	5.5999	41.752	0.023872	0.17857	0.8311	77.30
9.401	138.150	103.000	185.40	0.023947	41.884	5.5990	41.758	0.023876	0.17860	0.8309	77.28
9.526	140.000	103.203	185.77	0.023901	41.802	5.5881	41.840	0.023922	0.17895	0.8293	77.13
9.608	141.198	103.333	186.00	0.023871	41.749	5.5811	41.893	0.023953	0.17918	0.8283	77.04
9.662	142.000	103.420	186.16	0.023850	41.714	5.5764	41.928	0.023973	0.17933	0.8276	76.97
9.799	144.000	103.635	186.54	0.023800	41.627	5.5647	42.016	0.024023	0.17971	0.8259	76.81
9.935	146.000	103.848	186.93	0.023751	41.540	5.5530	42.104	0.024073	0.18008	0.8241	76.65
9.961	146.384	103.889	187.00	0.023741	41.523	5.5508	42.121	0.024083	0.18015	0.8238	76.62
10.000	146.960	103.950	187.11	0.023727	41.498	5.5475	42.146	0.024097	0.18026	0.8233	76.57
10.032	147.437	104.000	187.20	0.023715	41.478	5.5447	42.167	0.024109	0.18035	0.8229	76.53
10.071	148.000	104.059	187.31	0.023701	41.453	5.5415	42.192	0.024124	0.18046	0.8224	76.49
10.207	150.000	104.268	187.68	0.023652	41.367	5.5300	42.279	0.024174	0.18083	0.8207	76.33
10.323	151.705	104.444	188.00	0.023610	41.294	5.5202	42.354	0.024217	0.18115	0.8193	76.20
10.343	152.000	104.476	188.06	0.023603	41.281	5.5185	42.368	0.024224	0.18121	0.8190	76.17
10.479	154.000	104.681	188.43	0.023554	41.196	5.5071	42.455	0.024274	0.18158	0.8173	76.01
10.615	156.000	104.884	188.79	0.023506	41.111	5.4957	42.543	0.024324	0.18196	0.8156	75.86
10.694	157.164	105.000	189.00	0.023478	41.062	5.4892	42.593	0.024353	0.18218	0.8147	75.77
10.751	158.000	105.085	189.15	0.023457	41.027	5.4844	42.631	0.024374	0.18233	0.8139	75.70
10.887	160.000	105.284	189.51	0.023409	40.942	5.4732	42.718	0.024425	0.18271	0.8123	75.55
11.000	161.656	105.447	189.80	0.023370	40.873	5.4640	42.790	0.024466	0.18302	0.8109	75.42
11.023	162.000	105.482	189.87	0.023361	40.859	5.4620	42.806	0.024475	0.18308	0.8106	75.39
11.075	162.761	105.556	190.00	0.023343	40.827	5.4578	42.839	0.024493	0.18322	0.8100	75.33
11.159	164.000	105.678	190.22	0.023314	40.775	5.4509	42.893	0.024525	0.18346	0.8090	75.24
11.296	166.000	105.872	190.57	0.023266	40.692	5.4397	42.981	0.024575	0.18383	0.8073	75.08
11.387	167.341	106.000	190.80	0.023235	40.637	5.4324	43.039	0.024608	0.18408	0.8062	74.98
11.432	168.000	106.064	190.92	0.023219	40.609	5.4287	43.068	0.024625	0.18421	0.8057	74.93
11.466	168.500	106.111	191.00	0.023207	40.589	5.4260	43.090	0.024637	0.18430	0.8053	74.89
11.568	170.000	106.255	191.26	0.023172	40.527	5.4177	43.156	0.024675	0.18458	0.8040	74.78
11.704	172.000	106.444	191.60	0.023125	40.445	5.4067	43.244	0.024725	0.18496	0.8024	74.63
11.840	174.000	106.632	191.94	0.023078	40.363	5.3957	43.332	0.024775	0.18533	0.8008	74.48
11.866	174.382	106.667	192.00	0.023069	40.347	5.3937	43.348	0.024785	0.18540	0.8005	74.45
11.976	176.000	106.818	192.27	0.023031	40.281	5.3848	43.419	0.024826	0.18571	0.7992	74.33
12.000	176.352	106.850	192.33	0.023023	40.267	5.3829	43.434	0.024834	0.18577	0.7989	74.30
12.111	177.981	107.000	192.60	0.022985	40.201	5.3741	43.506	0.024875	0.18608	0.7976	74.18
12.112	178.000	107.002	192.60	0.022985	40.200	5.3739	43.507	0.024876	0.18608	0.7975	74.18
12.248	180.000	107.186	192.93	0.022938	40.119	5.3631	43.595	0.024926	0.18646	0.7959	74.03
12.276	180.410	107.222	193.00	0.022929	40.102	5.3609	43.613	0.024936	0.18654	0.7956	74.00
12.384	182.000	107.367	193.26	0.022892	40.038	5.3523	43.683	0.024976	0.18684	0.7943	73.88
12.520	184.000	107.548	193.59	0.022846	39.957	5.3415	43.771	0.025027	0.18721	0.7927	73.73
12.657	186.000	107.726	193.91	0.022800	39.877	5.3307	43.860	0.025077	0.18759	0.7911	73.58
12.696	186.585	107.778	194.00	0.022787	39.854	5.3277	43.885	0.025092	0.18770	0.7907	73.54

TABLE 6 CONTINUED

SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
12.793	188.000	107.904	194.23	0.022754	39.797	5.3200	43.948	0.025128	0.18797	0.7895	73.43
12.867	189.097	108.000	194.40	0.022729	39.753	5.3142	43.996	0.025155	0.18817	0.7887	73.35
12.929	190.000	108.080	194.54	0.022708	39.717	5.3093	44.037	0.025178	0.18835	0.7880	73.28
13.000	191.048	108.171	194.71	0.022685	39.675	5.3038	44.083	0.025205	0.18854	0.7871	73.21
13.065	192.000	108.255	194.86	0.022663	39.637	5.2987	44.125	0.025229	0.18873	0.7864	73.14
13.127	192.910	108.333	195.00	0.022642	39.601	5.2939	44.165	0.025252	0.18890	0.7857	73.07
13.201	194.000	108.428	195.17	0.022617	39.557	5.2880	44.214	0.025280	0.18911	0.7848	72.99
13.337	196.000	108.601	195.48	0.022572	39.478	5.2774	44.303	0.025331	0.18949	0.7832	72.84
13.473	198.000	108.772	195.79	0.022527	39.399	5.2668	44.392	0.025382	0.18987	0.7816	72.70
13.567	199.386	108.889	196.00	0.022495	39.344	5.2595	44.453	0.025417	0.19013	0.7806	72.60
13.609	200.000	108.941	196.09	0.022481	39.320	5.2563	44.481	0.025433	0.19025	0.7801	72.55
13.657	200.700	109.000	196.20	0.022466	39.292	5.2526	44.512	0.025450	0.19038	0.7795	72.50
13.949	205.000	109.360	196.85	0.022369	39.123	5.2300	44.705	0.025560	0.19121	0.7762	72.19
14.000	205.744	109.422	196.96	0.022352	39.094	5.2261	44.738	0.025580	0.19135	0.7756	72.14
14.019	206.016	109.444	197.00	0.022346	39.083	5.2246	44.750	0.025587	0.19140	0.7754	72.12
14.290	210.000	109.772	197.59	0.022257	38.927	5.2038	44.930	0.025689	0.19217	0.7723	71.83
14.480	212.803	110.000	198.00	0.022194	38.817	5.1891	45.057	0.025762	0.19271	0.7701	71.63
14.630	215.000	110.177	198.32	0.022145	38.732	5.1777	45.156	0.025819	0.19314	0.7684	71.47
14.953	219.747	110.556	199.00	0.022040	38.547	5.1530	45.373	0.025942	0.19406	0.7648	71.13
14.970	220.000	110.576	199.04	0.022034	38.537	5.1517	45.384	0.025949	0.19411	0.7646	71.11
15.000	220.440	110.610	199.10	0.022024	38.520	5.1494	45.405	0.025961	0.19420	0.7642	71.08
15.310	225.000	110.967	199.74	0.021923	38.343	5.1257	45.614	0.026080	0.19509	0.7607	70.75
15.339	225.419	111.000	199.80	0.021914	38.327	5.1236	45.633	0.026091	0.19518	0.7604	70.72
15.436	226.853	111.111	200.00	0.021882	38.271	5.1161	45.699	0.026129	0.19546	0.7593	70.62
15.651	230.000	111.353	200.44	0.021812	38.150	5.0999	45.845	0.026213	0.19608	0.7569	70.39
15.931	234.121	111.667	201.00	0.021721	37.990	5.0786	46.037	0.026322	0.19691	0.7537	70.10
15.991	235.000	111.733	201.12	0.021702	37.957	5.0740	46.079	0.026346	0.19708	0.7530	70.04
16.000	235.136	111.743	201.14	0.021699	37.951	5.0733	46.085	0.026350	0.19711	0.7529	70.03
16.233	238.561	112.000	201.60	0.021624	37.819	5.0557	46.246	0.026442	0.19780	0.7503	69.78
16.331	240.000	112.107	201.79	0.021592	37.764	5.0483	46.314	0.026480	0.19809	0.7492	69.68
16.437	241.555	112.222	202.00	0.021558	37.704	5.0403	46.387	0.026523	0.19840	0.7480	69.57
16.671	245.000	112.476	202.46	0.021482	37.571	5.0225	46.551	0.026616	0.19910	0.7454	69.33
16.954	249.156	112.778	203.00	0.021390	37.411	5.0011	46.750	0.026730	0.19996	0.7422	69.03
17.000	249.832	112.827	203.09	0.021375	37.385	4.9976	46.783	0.026749	0.20009	0.7417	68.98
17.011	250.000	112.839	203.11	0.021372	37.379	4.9968	46.791	0.026753	0.20013	0.7416	68.97
17.164	252.244	113.000	203.40	0.021322	37.292	4.9852	46.900	0.026815	0.20059	0.7399	68.81
17.352	255.000	113.197	203.75	0.021261	37.186	4.9710	47.033	0.026892	0.20117	0.7378	68.62
17.483	256.927	113.333	204.00	0.021219	37.112	4.9611	47.127	0.026946	0.20157	0.7363	68.48
17.692	260.000	113.550	204.39	0.021151	36.993	4.9453	47.278	0.027032	0.20221	0.7339	68.26
18.000	264.528	113.865	204.96	0.021052	36.819	4.9219	47.503	0.027160	0.20317	0.7305	67.94
18.023	264.871	113.889	205.00	0.021044	36.805	4.9202	47.520	0.027170	0.20324	0.7302	67.91
18.032	265.000	113.898	205.02	0.021041	36.801	4.9195	47.526	0.027174	0.20327	0.7301	67.90
18.133	266.481	114.000	205.20	0.021008	36.743	4.9119	47.600	0.027216	0.20359	0.7290	67.80
18.372	270.000	114.241	205.63	0.020931	36.607	4.8937	47.777	0.027317	0.20434	0.7263	67.55
18.576	272.991	114.444	206.00	0.020865	36.492	4.8782	47.928	0.027403	0.20499	0.7240	67.33

TABLE 6 CONTINUED

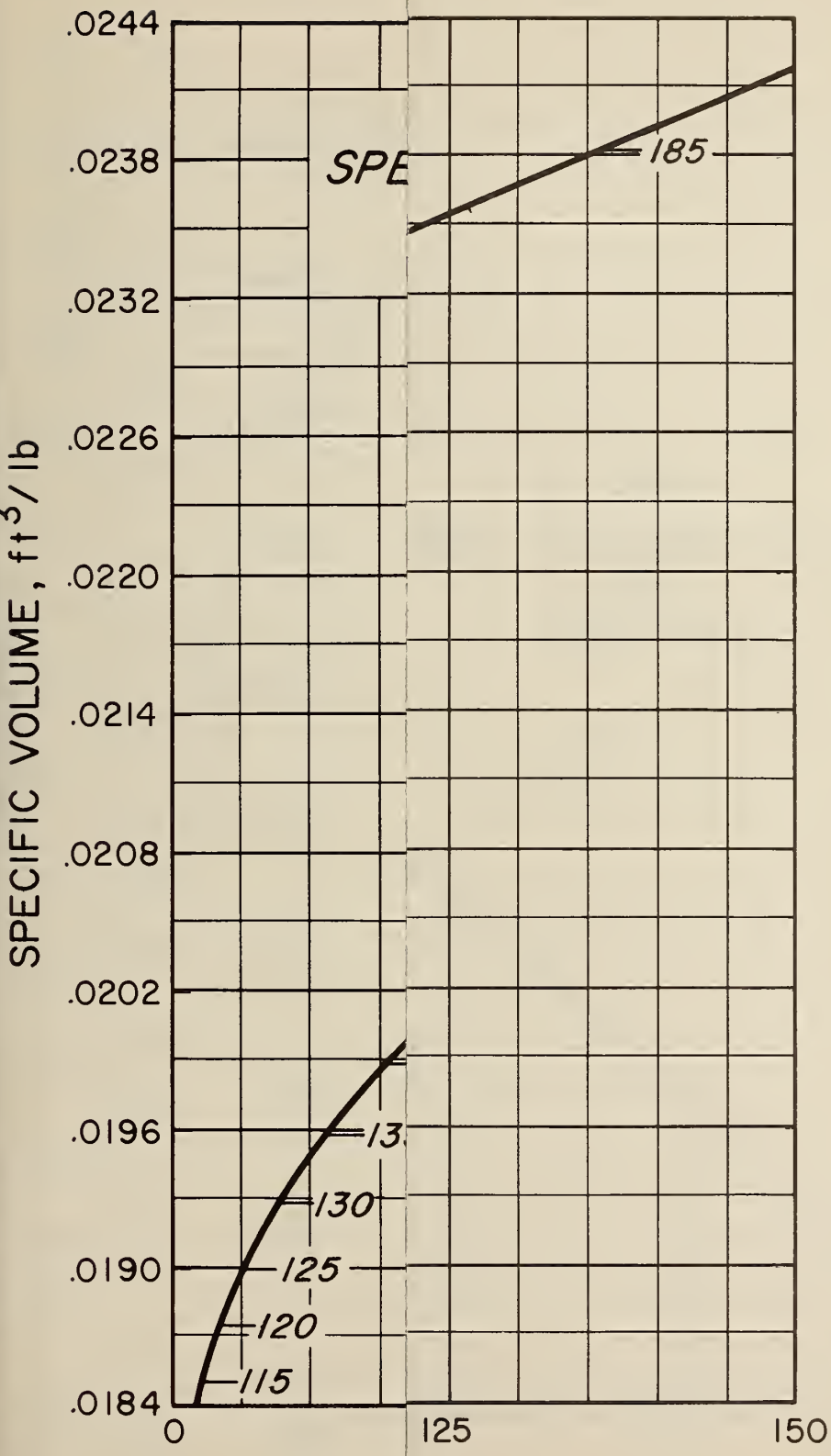
SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
18.713	275.000	114.580	206.24	0.020820	36.414	4.8678	48.030	0.027462	0.20543	0.7224	67.19
19.000	279.224	114.863	206.75	0.020726	36.250	4.8459	48.247	0.027586	0.20636	0.7192	66.89
19.053	280.000	114.915	206.85	0.020709	36.220	4.8419	48.288	0.027609	0.20653	0.7186	66.83
19.140	281.288	115.000	207.00	0.020681	36.170	4.8352	48.354	0.027647	0.20682	0.7176	66.74
19.393	285.000	115.245	207.44	0.020598	36.026	4.8159	48.548	0.027758	0.20764	0.7147	66.47
19.717	289.766	115.556	208.00	0.020492	35.840	4.7911	48.800	0.027902	0.20872	0.7110	66.13
19.733	290.000	115.571	208.03	0.020486	35.831	4.7898	48.813	0.027909	0.20878	0.7109	66.11
20.000	293.920	115.823	208.48	0.020399	35.677	4.7693	49.023	0.028029	0.20967	0.7078	65.83
20.073	295.000	115.893	208.61	0.020375	35.635	4.7637	49.081	0.028063	0.20992	0.7070	65.75
20.188	296.680	116.000	208.80	0.020337	35.569	4.7548	49.172	0.028115	0.21031	0.7057	65.63
20.307	298.427	116.111	209.00	0.020297	35.500	4.7456	49.267	0.028169	0.21072	0.7043	65.50
20.414	300.000	116.211	209.18	0.020262	35.438	4.7374	49.353	0.028218	0.21109	0.7031	65.39
20.754	305.000	116.525	209.74	0.020149	35.240	4.7109	49.630	0.028377	0.21227	0.6991	65.02
20.909	307.275	116.667	210.00	0.020097	35.150	4.6989	49.758	0.028450	0.21282	0.6974	64.86
21.000	308.616	116.750	210.15	0.020067	35.097	4.6917	49.833	0.028493	0.21314	0.6963	64.76
21.094	310.000	116.835	210.30	0.020035	35.041	4.6844	49.912	0.028538	0.21348	0.6952	64.66
21.276	312.675	117.000	210.60	0.019974	34.935	4.6701	50.064	0.028625	0.21413	0.6931	64.46
21.434	315.000	117.142	210.86	0.019921	34.842	4.6576	50.198	0.028701	0.21470	0.6912	64.29
21.524	316.313	117.222	211.00	0.019891	34.789	4.6506	50.274	0.028745	0.21503	0.6902	64.19
21.775	320.000	117.446	211.40	0.019806	34.640	4.6307	50.490	0.028868	0.21595	0.6872	63.92
22.000	323.312	117.645	211.76	0.019729	34.506	4.6128	50.686	0.028980	0.21679	0.6846	63.67
22.115	325.000	117.745	211.94	0.019690	34.438	4.6037	50.787	0.029038	0.21722	0.6832	63.54
22.152	325.543	117.778	212.00	0.019678	34.416	4.6007	50.819	0.029057	0.21736	0.6828	63.50
22.407	329.290	118.000	212.40	0.019590	34.263	4.5802	51.046	0.029186	0.21833	0.6798	63.22
22.455	330.000	118.042	212.48	0.019573	34.234	4.5764	51.090	0.029211	0.21851	0.6792	63.17
22.793	334.969	118.333	213.00	0.019456	34.029	4.5490	51.397	0.029387	0.21983	0.6751	62.79
22.795	335.000	118.335	213.00	0.019456	34.028	4.5488	51.399	0.029388	0.21984	0.6751	62.79
23.000	338.008	118.510	213.32	0.019384	33.903	4.5322	51.588	0.029496	0.22065	0.6726	62.56
23.136	340.000	118.625	213.53	0.019337	33.820	4.5211	51.714	0.029568	0.22119	0.6710	62.40
23.448	344.594	118.889	214.00	0.019227	33.627	4.4953	52.011	0.029738	0.22245	0.6672	62.05
23.476	345.000	118.912	214.04	0.019217	33.610	4.4931	52.037	0.029753	0.22257	0.6668	62.02
23.581	346.543	119.000	214.20	0.019180	33.545	4.4843	52.138	0.029810	0.22300	0.6655	61.90
23.816	350.000	119.196	214.55	0.019096	33.399	4.4647	52.367	0.029941	0.22398	0.6626	61.63
24.000	352.704	119.348	214.83	0.019030	33.283	4.4493	52.549	0.030045	0.22475	0.6603	61.41
24.117	354.422	119.444	215.00	0.018988	33.209	4.4395	52.665	0.030112	0.22525	0.6589	61.28
24.156	355.000	119.477	215.06	0.018974	33.185	4.4361	52.705	0.030135	0.22542	0.6584	61.23
24.496	360.000	119.755	215.56	0.018850	32.968	4.4072	53.051	0.030332	0.22690	0.6541	60.83
24.800	364.456	120.000	216.00	0.018738	32.773	4.3811	53.367	0.030513	0.22825	0.6502	60.47
24.837	365.000	120.030	216.05	0.018725	32.749	4.3779	53.406	0.030535	0.22842	0.6497	60.43
25.000	367.400	120.161	216.29	0.018664	32.643	4.3637	53.580	0.030635	0.22916	0.6476	60.23
25.177	370.000	120.302	216.54	0.018598	32.527	4.3482	53.771	0.030744	0.22998	0.6453	60.02
25.497	374.701	120.556	217.00	0.018477	32.315	4.3199	54.123	0.030945	0.23149	0.6411	59.63
25.517	375.000	120.572	217.03	0.018469	32.302	4.3181	54.145	0.030958	0.23158	0.6408	59.60
25.857	380.000	120.838	217.51	0.018338	32.073	4.2876	54.531	0.031179	0.23323	0.6363	59.18
26.000	382.096	120.950	217.71	0.018283	31.976	4.2746	54.696	0.031273	0.23394	0.6344	59.00

TABLE 6 CONTINUED

SATURATED LIQUID NITROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
26.065	383.051	121.000	217.80	0.018257	31.932	4.2687	54.772	0.031317	0.23426	0.6335	58.92
26.198	385.000	121.103	217.98	0.018205	31.841	4.2565	54.929	0.031406	0.23493	0.6317	58.75
26.209	385.160	121.111	218.00	0.018201	31.834	4.2555	54.941	0.031413	0.23499	0.6316	58.74
26.538	390.000	121.364	218.46	0.018071	31.605	4.2250	55.339	0.031640	0.23669	0.6270	58.32
26.878	395.000	121.623	218.92	0.017933	31.365	4.1929	55.762	0.031883	0.23850	0.6223	57.87
26.935	395.838	121.667	219.00	0.017910	31.324	4.1874	55.835	0.031924	0.23881	0.6215	57.80
27.000	396.792	121.716	219.09	0.017883	31.278	4.1812	55.918	0.031972	0.23916	0.6205	57.71
27.218	400.000	121.880	219.38	0.017793	31.120	4.1602	56.201	0.032134	0.24038	0.6174	57.42
27.378	402.351	122.000	219.60	0.017727	31.003	4.1445	56.413	0.032255	0.24128	0.6151	57.21
27.559	405.000	122.134	219.84	0.017651	30.870	4.1268	56.655	0.032393	0.24232	0.6125	56.96
27.677	406.739	122.222	220.00	0.017600	30.782	4.1150	56.818	0.032486	0.24301	0.6107	56.80
27.899	410.000	122.386	220.30	0.017505	30.615	4.0927	57.127	0.032663	0.24434	0.6074	56.49
28.000	411.488	122.461	220.43	0.017461	30.538	4.0824	57.272	0.032746	0.24495	0.6059	56.35
28.239	415.000	122.636	220.74	0.017356	30.355	4.0578	57.618	0.032944	0.24644	0.6022	56.01
28.434	417.867	122.778	221.00	0.017268	30.202	4.0374	57.909	0.033110	0.24768	0.5992	55.73
28.579	420.000	122.883	221.19	0.017203	30.087	4.0221	58.130	0.033237	0.24863	0.5969	55.52
28.741	422.383	123.000	221.40	0.017129	29.957	4.0047	58.382	0.033381	0.24970	0.5943	55.28
28.919	425.000	123.128	221.63	0.017046	29.813	3.9854	58.665	0.033542	0.25091	0.5915	55.01
29.000	426.184	123.186	221.73	0.017008	29.747	3.9766	58.795	0.033617	0.25147	0.5902	54.89
29.207	429.228	123.333	222.00	0.016910	29.575	3.9536	59.137	0.033812	0.25293	0.5868	54.57
29.260	430.000	123.371	222.07	0.016885	29.531	3.9477	59.225	0.033863	0.25331	0.5859	54.49
29.600	435.000	123.611	222.50	0.016719	29.241	3.9089	59.813	0.034199	0.25583	0.5801	53.95
29.940	440.000	123.850	222.93	0.016547	28.941	3.8688	60.433	0.034553	0.25848	0.5742	53.40
29.996	440.827	123.889	223.00	0.016518	28.890	3.8621	60.539	0.034614	0.25893	0.5732	53.31
30.000	440.880	123.891	223.00	0.016516	28.887	3.8616	60.546	0.034618	0.25896	0.5731	53.30
30.156	443.175	124.000	223.20	0.016435	28.745	3.8427	60.844	0.034789	0.26024	0.5703	53.04
30.280	445.000	124.086	223.35	0.016370	28.631	3.8274	61.088	0.034928	0.26128	0.5680	52.83
30.621	450.000	124.320	223.78	0.016186	28.309	3.7843	61.783	0.035325	0.26425	0.5616	52.23
30.802	452.668	124.444	224.00	0.016084	28.131	3.7606	62.172	0.035547	0.26591	0.5581	51.91
30.961	455.000	124.552	224.19	0.015994	27.973	3.7395	62.523	0.035748	0.26742	0.5550	51.62
31.000	455.576	124.579	224.24	0.015972	27.934	3.7342	62.612	0.035799	0.26779	0.5542	51.54
31.301	460.000	124.784	224.61	0.015792	27.620	3.6923	63.323	0.036205	0.27084	0.5480	50.96
31.625	464.759	125.000	225.00	0.015594	27.274	3.6460	64.126	0.036665	0.27427	0.5411	50.33
31.641	465.000	125.012	225.02	0.015582	27.253	3.6431	64.177	0.036694	0.27449	0.5407	50.29
31.981	470.000	125.238	225.43	0.015360	26.865	3.5913	65.103	0.037223	0.27845	0.5330	49.57
32.000	470.272	125.250	225.45	0.015350	26.847	3.5889	65.146	0.037248	0.27864	0.5326	49.54
32.322	475.000	125.463	225.83	0.015125	26.454	3.5364	66.114	0.037801	0.28277	0.5248	48.81
32.465	477.104	125.556	226.00	0.015024	26.277	3.5128	66.559	0.038056	0.28468	0.5213	48.49
32.662	480.000	125.685	226.23	0.014875	26.015	3.4777	67.229	0.038439	0.28754	0.5161	48.00
33.000	484.968	125.903	226.63	0.014609	25.551	3.4157	68.450	0.039137	0.29276	0.5069	47.15
33.002	485.000	125.906	226.63	0.014604	25.543	3.4146	68.472	0.039150	0.29286	0.5068	47.13
33.150	487.168	126.000	226.80	0.014483	25.331	3.3863	69.045	0.039477	0.29531	0.5026	46.74
33.556	493.134	126.260	227.27	0.011230	19.641	2.6257	89.046	0.050913	0.38085	0.3897	36.24


.0244
.0238
.0232
.0226
.0220
.0214
.0208
.0202
.0196
.0190
.0184
SPECIFIC VOLUME, ft³/lb
0
125
150
185
130
125
120
115

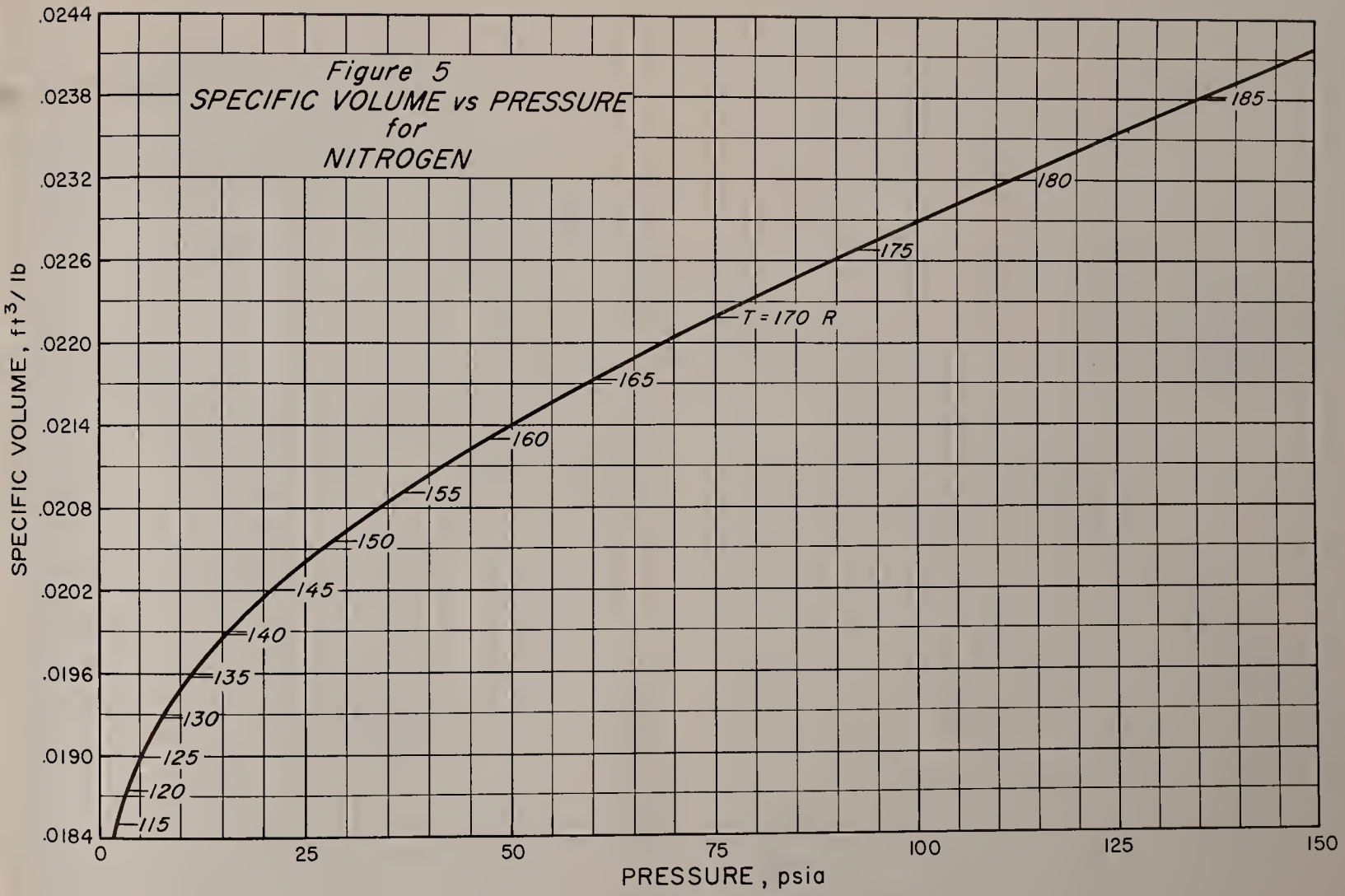
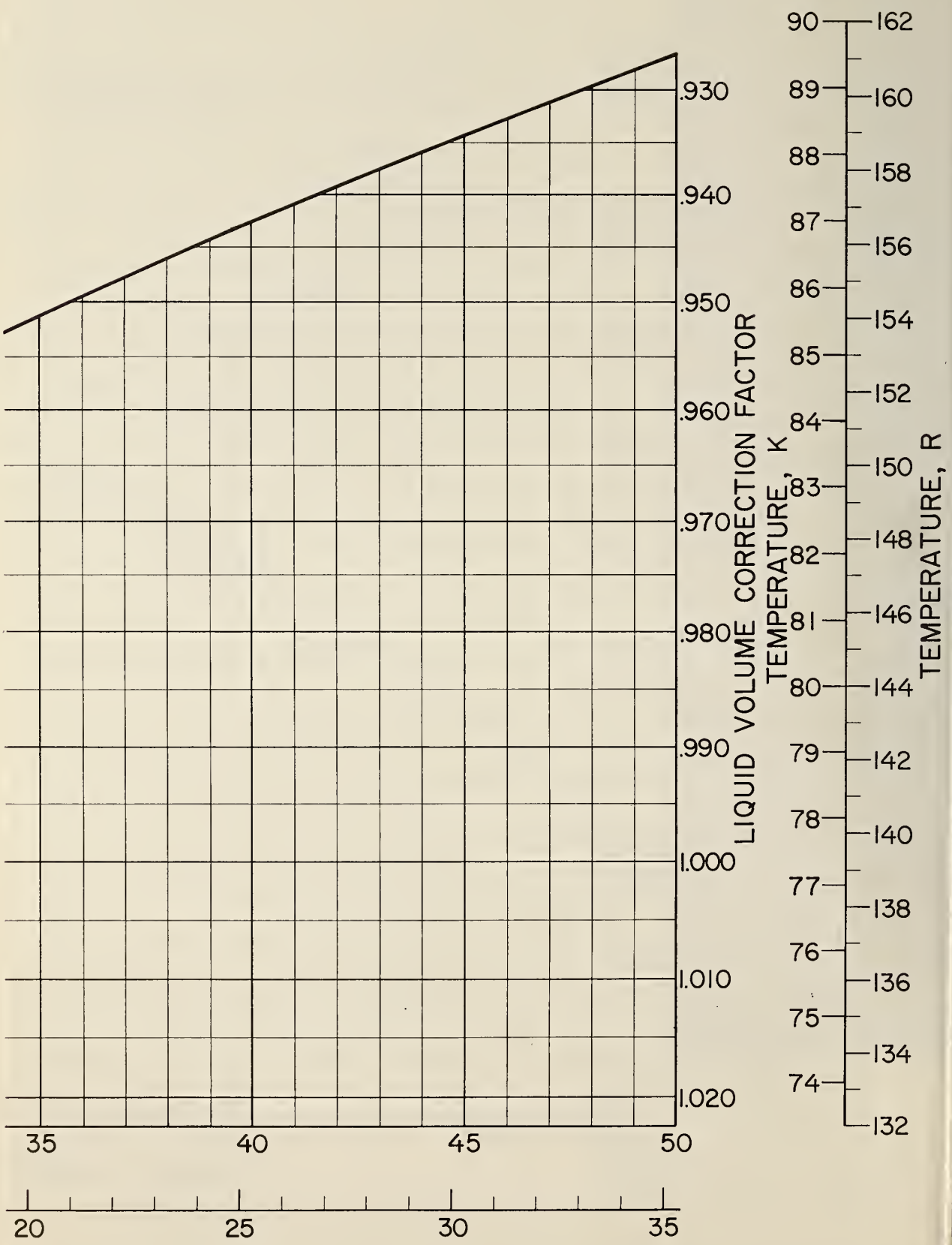


Figure 5
SPECIFIC VOLUME vs PRESSURE
for
NITROGEN
SPECIFIC VOLUME, ft³/lb
.0244
.0238
.0232
.0226
.0220
.0214
.0208
.0202
.0196
.0190
.0184
0
25
50
75
100
125
150
PRESSURE, psia
T = 170 R
115
120
125
130
135
140
145
150
155
160
165
175
180
185


.930
.940
.950
.960
.970
.980
.990
1.000
1.010
1.020
LIQUID VOLUME CORRECTION FACTOR
35
40
45
50
20
25
30
35
TEMPERATURE, K
90
89
88
87
86
85
84
83
82
81
80
79
78
77
76
75
74
TEMPERATURE, R
162
160
158
156
154
152
150
148
146
144
142
140
138
136
134
132

7. Argon

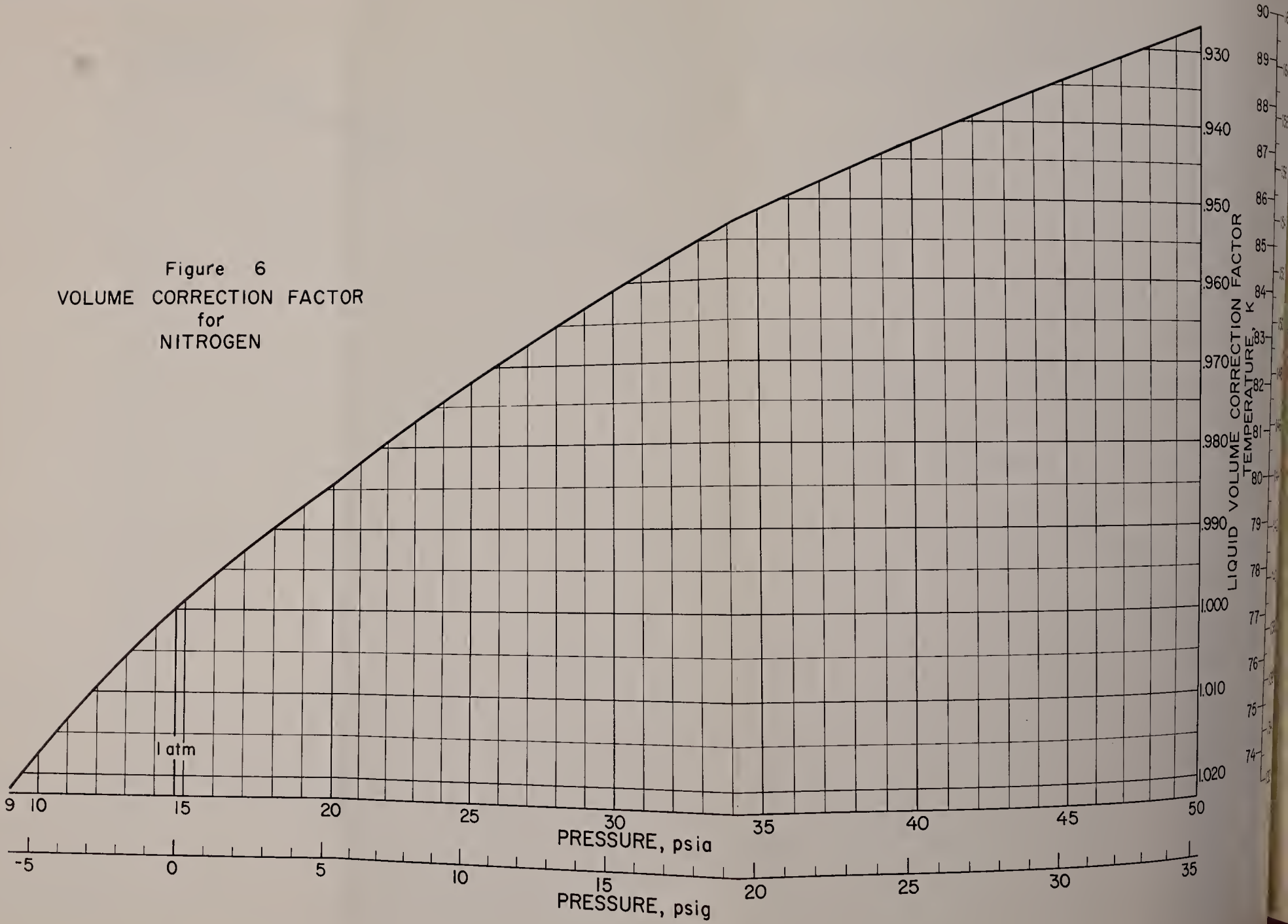
The data for argon given here are from Gosman, et al. (1968). The entire PVT tabulations were calculated by a simultaneous solution of the vapor pressure equation and the equation of state reported by these authors. The calculation of each point was performed by solving the vapor pressure equation for either P or T depending on which was the integral value input. Using the P and T so obtained a corresponding density was found from the equation of state.

Table 7

Density of argon at 1 atmosphere near room temperature

Temperature	Density		
	gram-mole/cm^3	lb/ft^3	lb/gal
0 C	0.000044659	0.111373	0.014888
68 F	0.000041601	0.103749	0.013869
70 F	0.000041444	0.103356	0.013817
Temperature	**Volume**		
	cm^3/gram-mole	ft^3/lb	gal/lb
0 C	22392	8.979	67.166
68 F	24038	9.639	72.102
70 F	24129	9.675	72.376
Temperature	**Density Ratios and Equivalent volumes** $\frac{\text{density at NBP}}{\text{density at the temperature indicated}}$		
	dimensionless	$\frac{lb/gal}{lb/ft^3} = ft^3/gal$	
0 C	781.34	104.45	
68 F	838.75	112.13	
70 F	841.94	112.55	

Figure 6
VOLUME CORRECTION FACTOR
for
NITROGEN



Values near room temperature are given in table 7. These values differ from those in the CGA pamphlet by about 0.02% primarily because a higher order interpolation is used here. Uncertainties in the data are shown in table 8. The tabulation for the saturated liquid line is found in table 9. The value of the density at the NBP differs from that in the CGA pamphlet by 0.04%. The new correlation includes quite recent data both on PVT and on the temperature scale corrections and should, therefore, be more accurate.

Table 8

Uncertainties in the data for argon

variable	uncertainty	range of temperature
temperature	0.08% 0.02% 0.015 K	84 to 87 K 82 to 154 K room temperature
volume	0.1% increase to 1% 0.01%	triple point to 145 K linearly from 145 K to critical room temperature
pressure	0.1% 0.02% 0.01%	84 to 87 K 87 to 154 K room temperature

TABLE 9

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
0.680	9.990	83.800	150.84	0.035413	88.315	11.8059	28.239	0.011323	0.08470	1.0149	114.22
0.680	10.000	83.808	150.86	0.035411	88.311	11.8055	28.240	0.011324	0.08471	1.0148	114.22
0.687	10.093	83.889	151.00	0.035400	88.282	11.8016	28.249	0.011327	0.08473	1.0145	114.18
0.696	10.224	84.000	151.20	0.035383	88.242	11.7962	28.262	0.011333	0.08477	1.0140	114.13
0.732	10.757	84.444	152.00	0.035318	88.079	11.7745	28.314	0.011353	0.08493	1.0122	113.92
0.779	11.455	85.000	153.00	0.035236	87.875	11.7472	28.380	0.011380	0.08513	1.0098	113.66
0.817	12.000	85.417	153.75	0.035174	87.720	11.7265	28.430	0.011400	0.08528	1.0081	113.46
0.829	12.187	85.556	154.00	0.035154	87.669	11.7196	28.446	0.011407	0.08533	1.0075	113.39
0.871	12.798	86.000	154.80	0.035087	87.503	11.6975	28.500	0.011428	0.08549	1.0056	113.18
0.881	12.954	86.111	155.00	0.035071	87.462	11.6919	28.514	0.011434	0.08553	1.0051	113.12
0.936	13.758	86.667	156.00	0.034987	87.253	11.6641	28.582	0.011461	0.08573	1.0027	112.85
0.953	14.000	86.829	156.29	0.034962	87.192	11.6559	28.602	0.011469	0.08579	1.0020	112.77
0.970	14.259	87.000	156.60	0.034937	87.127	11.6472	28.623	0.011477	0.08586	1.0012	112.69
0.993	14.600	87.222	157.00	0.034903	87.043	11.6360	28.651	0.011489	0.08594	1.0003	112.58
1.000	14.696	87.284	157.11	0.034893	87.020	11.6329	28.659	0.011492	0.08596	1.0000	112.55
1.053	15.481	87.778	158.00	0.034818	86.832	11.6077	28.721	0.011516	0.08615	0.9978	112.31
1.078	15.845	88.000	158.40	0.034784	86.747	11.5964	28.749	0.011528	0.08623	0.9969	112.20
1.089	16.000	88.094	158.57	0.034770	86.711	11.5916	28.761	0.011533	0.08627	0.9965	112.15
1.116	16.402	88.333	159.00	0.034733	86.619	11.5793	28.791	0.011545	0.08636	0.9954	112.03
1.182	17.365	88.889	160.00	0.034647	86.406	11.5508	28.862	0.011573	0.08657	0.9929	111.76
1.195	17.562	89.000	160.20	0.034630	86.363	11.5450	28.877	0.011579	0.08662	0.9924	111.70
1.225	18.000	89.243	160.64	0.034592	86.269	11.5324	28.908	0.011592	0.08671	0.9914	111.58
1.250	18.370	89.444	161.00	0.034561	86.191	11.5220	28.934	0.011602	0.08679	0.9905	111.48
1.321	19.418	90.000	162.00	0.034474	85.974	11.4931	29.007	0.011631	0.08701	0.9880	111.20
1.361	20.000	90.298	162.54	0.034427	85.858	11.4775	29.047	0.011647	0.08713	0.9866	111.05
1.396	20.512	90.556	163.00	0.034387	85.757	11.4640	29.081	0.011661	0.08723	0.9855	110.92
1.458	21.420	91.000	163.80	0.034317	85.582	11.4407	29.140	0.011685	0.08741	0.9835	110.69
1.473	21.652	91.111	164.00	0.034299	85.538	11.4348	29.155	0.011691	0.08745	0.9830	110.63
1.497	22.000	91.277	164.30	0.034273	85.473	11.4261	29.177	0.011700	0.08752	0.9822	110.55
1.554	22.839	91.667	165.00	0.034211	85.318	11.4054	29.230	0.011721	0.08768	0.9804	110.35
1.604	23.574	92.000	165.60	0.034158	85.186	11.3877	29.276	0.011739	0.08781	0.9789	110.18
1.633	24.000	92.189	165.94	0.034128	85.111	11.3776	29.302	0.011749	0.08789	0.9781	110.08
1.638	24.074	92.222	166.00	0.034123	85.097	11.3759	29.306	0.011751	0.08791	0.9779	110.06
1.726	25.360	92.778	167.00	0.034034	84.875	11.3462	29.383	0.011782	0.08814	0.9754	109.78
1.762	25.888	93.000	167.40	0.033998	84.786	11.3343	29.414	0.011794	0.08823	0.9743	109.66
1.769	26.000	93.047	167.48	0.033990	84.767	11.3318	29.420	0.011797	0.08825	0.9741	109.64
1.817	26.696	93.333	168.00	0.033944	84.652	11.3163	29.460	0.011813	0.08837	0.9728	109.49
1.905	28.000	93.856	168.94	0.033859	84.441	11.2881	29.534	0.011843	0.08859	0.9704	109.21
1.911	28.085	93.889	169.00	0.033854	84.428	11.2863	29.539	0.011844	0.08860	0.9702	109.20
1.930	28.369	94.000	169.20	0.033836	84.383	11.2803	29.554	0.011851	0.08865	0.9697	109.14
2.000	29.392	94.394	169.91	0.033772	84.223	11.2589	29.611	0.011873	0.08882	0.9679	108.93
2.009	29.527	94.444	170.00	0.033764	84.202	11.2562	29.618	0.011876	0.08884	0.9676	108.91

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
2.041	30.000	94.622	170.32	0.033735	84.130	11.2465	29.643	0.011886	0.08892	0.9668	108.81
2.111	31.024	95.000	171.00	0.033673	83.975	11.2259	29.698	0.011908	0.08908	0.9650	108.61
2.177	32.000	95.352	171.63	0.033615	83.831	11.2066	29.749	0.011929	0.08923	0.9634	108.43
2.217	32.577	95.556	172.00	0.033581	83.748	11.1954	29.778	0.011941	0.08932	0.9624	108.32
2.304	33.860	96.000	172.80	0.033508	83.565	11.1710	29.844	0.011967	0.08952	0.9603	108.08
2.314	34.000	96.048	172.89	0.033500	83.545	11.1683	29.851	0.011970	0.08954	0.9601	108.06
2.326	34.187	96.111	173.00	0.033490	83.519	11.1648	29.860	0.011973	0.08957	0.9598	108.02
2.440	35.856	96.667	174.00	0.033397	83.289	11.1341	29.943	0.012006	0.08981	0.9571	107.72
2.450	36.000	96.714	174.08	0.033389	83.269	11.1315	29.950	0.012009	0.08984	0.9569	107.70
2.510	36.886	97.000	174.60	0.033342	83.150	11.1156	29.992	0.012026	0.08996	0.9555	107.54
2.557	37.584	97.222	175.00	0.033305	83.057	11.1032	30.026	0.012040	0.09006	0.9545	107.43
2.586	38.000	97.353	175.24	0.033283	83.003	11.0959	30.046	0.012048	0.09012	0.9538	107.35
2.679	39.374	97.778	176.00	0.033211	82.825	11.0721	30.110	0.012074	0.09032	0.9518	107.12
2.722	40.000	97.968	176.34	0.033180	82.746	11.0615	30.139	0.012085	0.09040	0.9509	107.02
2.729	40.107	98.000	176.40	0.033174	82.732	11.0596	30.144	0.012087	0.09042	0.9507	107.00
2.805	41.226	98.333	177.00	0.033118	82.592	11.0409	30.195	0.012108	0.09057	0.9491	106.82
2.858	42.000	98.560	177.41	0.033080	82.496	11.0281	30.230	0.012122	0.09068	0.9480	106.70
2.936	43.142	98.889	178.00	0.033024	82.357	11.0095	30.281	0.012142	0.09083	0.9464	106.52
2.962	43.533	99.000	178.20	0.033005	82.310	11.0032	30.299	0.012149	0.09088	0.9459	106.46
2.994	44.000	99.132	178.44	0.032983	82.254	10.9958	30.319	0.012157	0.09094	0.9452	106.39
3.000	44.088	99.156	178.48	0.032978	82.244	10.9944	30.323	0.012159	0.09096	0.9451	106.37
3.070	45.123	99.444	179.00	0.032929	82.121	10.9780	30.368	0.012177	0.09109	0.9437	106.21
3.130	46.000	99.685	179.43	0.032888	82.019	10.9643	30.406	0.012192	0.09120	0.9425	106.08
3.210	47.170	100.000	180.00	0.032834	81.884	10.9463	30.456	0.012212	0.09135	0.9410	105.91
3.266	48.000	100.220	180.40	0.032796	81.790	10.9338	30.491	0.012226	0.09146	0.9399	105.79
3.354	49.285	100.556	181.00	0.032739	81.646	10.9145	30.545	0.012248	0.09162	0.9382	105.60
3.402	50.000	100.739	181.33	0.032707	81.567	10.9039	30.574	0.012260	0.09171	0.9373	105.50
3.472	51.026	101.000	181.80	0.032662	81.455	10.8889	30.617	0.012277	0.09184	0.9361	105.35
3.502	51.469	101.111	182.00	0.032643	81.407	10.8825	30.635	0.012284	0.09189	0.9355	105.29
3.538	52.000	101.244	182.24	0.032620	81.350	10.8749	30.656	0.012293	0.09196	0.9348	105.22
3.656	53.723	101.667	183.00	0.032546	81.166	10.8504	30.725	0.012320	0.09216	0.9327	104.98
3.674	54.000	101.734	183.12	0.032535	81.137	10.8465	30.736	0.012325	0.09220	0.9324	104.94
3.750	55.109	102.000	183.60	0.032488	81.022	10.8310	30.780	0.012342	0.09233	0.9311	104.79
3.811	56.000	102.211	183.98	0.032451	80.930	10.8187	30.815	0.012356	0.09243	0.9300	104.67
3.814	56.048	102.222	184.00	0.032449	80.925	10.8181	30.817	0.012357	0.09244	0.9300	104.67
3.947	58.000	102.676	184.82	0.032370	80.727	10.7916	30.893	0.012388	0.09266	0.9277	104.41
3.977	58.447	102.778	185.00	0.032352	80.682	10.7856	30.910	0.012394	0.09272	0.9272	104.35
4.000	58.784	102.855	185.14	0.032338	80.648	10.7811	30.923	0.012400	0.09276	0.9268	104.31
4.044	59.427	103.000	185.40	0.032313	80.584	10.7725	30.947	0.012409	0.09283	0.9260	104.23
4.083	60.000	103.129	185.63	0.032290	80.528	10.7650	30.969	0.012418	0.09289	0.9254	104.15
4.145	60.919	103.333	186.00	0.032254	80.438	10.7529	31.004	0.012432	0.09300	0.9244	104.04
4.219	62.000	103.571	186.43	0.032212	80.333	10.7389	31.044	0.012448	0.09312	0.9232	103.90
4.319	63.467	103.889	187.00	0.032156	80.192	10.7201	31.099	0.012470	0.09328	0.9215	103.72
4.354	63.986	104.000	187.20	0.032136	80.143	10.7135	31.118	0.012478	0.09334	0.9210	103.66
4.355	64.000	104.003	187.21	0.032135	80.142	10.7134	31.118	0.012478	0.09334	0.9210	103.65

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
4.491	66.000	104.425	187.97	0.032060	79.954	10.6883	31.191	0.012507	0.09356	0.9188	103.41
4.497	66.092	104.444	188.00	0.032057	79.945	10.6871	31.195	0.012509	0.09357	0.9187	103.40
4.627	68.000	104.838	188.71	0.031986	79.770	10.6636	31.263	0.012536	0.09378	0.9167	103.17
4.681	68.795	105.000	189.00	0.031957	79.697	10.6540	31.292	0.012547	0.09386	0.9159	103.08
4.763	70.000	105.243	189.44	0.031914	79.589	10.6394	31.335	0.012565	0.09399	0.9146	102.94
4.871	71.578	105.556	190.00	0.031857	79.448	10.6206	31.390	0.012587	0.09416	0.9130	102.76
4.899	72.000	105.639	190.15	0.031842	79.411	10.6156	31.405	0.012593	0.09420	0.9126	102.71
5.000	73.480	105.926	190.67	0.031790	79.281	10.5983	31.456	0.012613	0.09435	0.9111	102.54
5.026	73.862	106.000	190.80	0.031777	79.247	10.5938	31.469	0.012619	0.09439	0.9107	102.50
5.035	74.000	106.027	190.85	0.031772	79.235	10.5922	31.474	0.012621	0.09441	0.9105	102.48
5.065	74.441	106.111	191.00	0.031757	79.197	10.5871	31.489	0.012627	0.09445	0.9101	102.43
5.171	76.000	106.407	191.53	0.031703	79.063	10.5692	31.543	0.012648	0.09461	0.9086	102.26
5.266	77.387	106.667	192.00	0.031656	78.945	10.5534	31.590	0.012667	0.09476	0.9072	102.11
5.308	78.000	106.780	192.20	0.031635	78.893	10.5465	31.611	0.012675	0.09482	0.9066	102.04
5.389	79.194	107.000	192.60	0.031595	78.793	10.5331	31.651	0.012691	0.09494	0.9055	101.91
5.444	80.000	107.147	192.86	0.031568	78.726	10.5241	31.678	0.012702	0.09502	0.9047	101.82
5.472	80.416	107.222	193.00	0.031554	78.691	10.5195	31.692	0.012708	0.09506	0.9043	101.78
5.580	82.000	107.507	193.51	0.031502	78.561	10.5021	31.744	0.012729	0.09522	0.9028	101.61
5.684	83.530	107.778	194.00	0.031452	78.437	10.4854	31.795	0.012749	0.09537	0.9014	101.45
5.716	84.000	107.860	194.15	0.031436	78.399	10.4804	31.810	0.012755	0.09542	0.9009	101.40
5.770	84.799	108.000	194.40	0.031411	78.334	10.4718	31.836	0.012766	0.09549	0.9002	101.32
5.852	86.000	108.208	194.77	0.031372	78.238	10.4589	31.875	0.012781	0.09561	0.8991	101.19
5.902	86.730	108.333	195.00	0.031349	78.180	10.4512	31.899	0.012791	0.09568	0.8984	101.12
5.988	88.000	108.550	195.39	0.031309	78.080	10.4378	31.940	0.012807	0.09581	0.8973	100.99
6.000	88.176	108.580	195.44	0.031303	78.066	10.4359	31.946	0.012810	0.09582	0.8971	100.97
6.124	90.000	108.886	195.99	0.031246	77.924	10.4169	32.004	0.012833	0.09600	0.8955	100.79
6.125	90.018	108.889	196.00	0.031245	77.922	10.4167	32.005	0.012833	0.09600	0.8955	100.78
6.171	90.686	109.000	196.20	0.031225	77.870	10.4098	32.026	0.012842	0.09606	0.8949	100.72
6.260	92.000	109.217	196.59	0.031184	77.769	10.3962	32.068	0.012859	0.09619	0.8937	100.59
6.355	93.394	109.444	197.00	0.031141	77.663	10.3820	32.112	0.012876	0.09632	0.8925	100.45
6.396	94.000	109.543	197.18	0.031123	77.617	10.3759	32.131	0.012884	0.09638	0.8919	100.39
6.532	96.000	109.863	197.75	0.031063	77.466	10.3557	32.193	0.012909	0.09656	0.8902	100.19
6.591	96.862	110.000	198.00	0.031037	77.402	10.3471	32.220	0.012920	0.09665	0.8895	100.11
6.668	98.000	110.179	198.32	0.031003	77.317	10.3358	32.255	0.012934	0.09675	0.8885	100.00
6.805	100.000	110.491	198.88	0.030944	77.170	10.3161	32.317	0.012958	0.09694	0.8868	99.81
6.833	100.420	110.556	199.00	0.030932	77.139	10.3120	32.329	0.012964	0.09697	0.8865	99.77
6.941	102.000	110.798	199.44	0.030885	77.024	10.2967	32.378	0.012983	0.09712	0.8851	99.62
7.000	102.872	110.931	199.67	0.030860	76.961	10.2882	32.404	0.012994	0.09720	0.8844	99.54
7.031	103.334	111.000	199.80	0.030847	76.928	10.2838	32.418	0.012999	0.09724	0.8840	99.50
7.077	104.000	111.100	199.98	0.030828	76.880	10.2774	32.438	0.013007	0.09730	0.8835	99.44
7.082	104.072	111.111	200.00	0.030826	76.875	10.2767	32.441	0.013008	0.09731	0.8834	99.43
7.213	106.000	111.399	200.52	0.030771	76.738	10.2583	32.499	0.013031	0.09748	0.8818	99.25
7.337	107.819	111.667	201.00	0.030719	76.609	10.2412	32.553	0.013053	0.09765	0.8804	99.09
7.349	108.000	111.693	201.05	0.030714	76.597	10.2395	32.559	0.013055	0.09766	0.8802	99.07
7.485	110.000	111.984	201.57	0.030658	76.457	10.2208	32.618	0.013079	0.09784	0.8786	98.89

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
7.493	110.113	112.000	201.60	0.030655	76.449	10.2197	32.621	0.013081	0.09785	0.8785	98.88
7.598	111.661	112.222	202.00	0.030612	76.342	10.2054	32.667	0.013099	0.09799	0.8773	98.74
7.621	112.000	112.271	202.09	0.030602	76.318	10.2023	32.677	0.013103	0.09802	0.8770	98.71
7.757	114.000	112.554	202.60	0.030547	76.181	10.1840	32.736	0.013127	0.09819	0.8754	98.53
7.866	115.601	112.778	203.00	0.030504	76.073	10.1694	32.783	0.013145	0.09833	0.8742	98.39
7.893	116.000	112.833	203.10	0.030493	76.045	10.1658	32.794	0.013150	0.09837	0.8739	98.36
7.975	117.204	113.000	203.40	0.030460	75.964	10.1550	32.830	0.013164	0.09847	0.8730	98.25
8.000	117.568	113.050	203.49	0.030451	75.940	10.1517	32.840	0.013168	0.09851	0.8727	98.22
8.029	118.000	113.110	203.60	0.030439	75.911	10.1478	32.853	0.013173	0.09854	0.8723	98.18
8.141	119.639	113.333	204.00	0.030395	75.801	10.1332	32.900	0.013192	0.09869	0.8711	98.04
8.165	120.000	113.382	204.09	0.030385	75.777	10.1300	32.910	0.013197	0.09872	0.8708	98.01
8.302	122.000	113.652	204.57	0.030332	75.645	10.1123	32.968	0.013220	0.09889	0.8693	97.84
8.422	123.777	113.889	205.00	0.030286	75.529	10.0967	33.019	0.013240	0.09904	0.8679	97.69
8.438	124.000	113.918	205.05	0.030280	75.514	10.0948	33.025	0.013243	0.09906	0.8678	97.67
8.480	124.617	114.000	205.20	0.030264	75.474	10.0894	33.043	0.013250	0.09911	0.8673	97.62
8.574	126.000	114.182	205.53	0.030228	75.384	10.0774	33.082	0.013265	0.09923	0.8663	97.50
8.710	128.000	114.442	206.00	0.030176	75.255	10.0601	33.139	0.013288	0.09940	0.8648	97.33
8.711	128.017	114.444	206.00	0.030175	75.254	10.0600	33.139	0.013288	0.09940	0.8648	97.33
8.846	130.000	114.700	206.46	0.030125	75.127	10.0430	33.195	0.013311	0.09957	0.8633	97.17
8.982	132.000	114.955	206.92	0.030074	75.000	10.0260	33.252	0.013333	0.09974	0.8619	97.00
9.000	132.264	114.988	206.98	0.030067	74.983	10.0238	33.259	0.013336	0.09976	0.8617	96.98
9.006	132.359	115.000	207.00	0.030065	74.977	10.0230	33.262	0.013337	0.09977	0.8616	96.97
9.118	134.000	115.206	207.37	0.030023	74.874	10.0092	33.308	0.013356	0.09991	0.8604	96.84
9.254	136.000	115.456	207.82	0.029973	74.749	9.9924	33.363	0.013378	0.10008	0.8590	96.68
9.309	136.806	115.556	208.00	0.029953	74.698	9.9857	33.386	0.013387	0.10014	0.8584	96.61
9.390	138.000	115.702	208.26	0.029923	74.624	9.9758	33.419	0.013400	0.10024	0.8576	96.52
9.526	140.000	115.947	208.70	0.029874	74.501	9.9593	33.474	0.013423	0.10041	0.8561	96.36
9.556	140.440	116.000	208.80	0.029863	74.474	9.9557	33.486	0.013427	0.10044	0.8558	96.32
9.619	141.359	116.111	209.00	0.029840	74.418	9.9482	33.512	0.013438	0.10052	0.8552	96.25
9.662	142.000	116.188	209.14	0.029825	74.379	9.9430	33.529	0.013445	0.10057	0.8547	96.20
9.799	144.000	116.428	209.57	0.029776	74.257	9.9267	33.584	0.013467	0.10074	0.8533	96.04
9.935	146.000	116.664	210.00	0.029727	74.136	9.9106	33.639	0.013489	0.10090	0.8519	95.89
9.936	146.019	116.667	210.00	0.029727	74.135	9.9104	33.640	0.013489	0.10090	0.8519	95.88
10.000	146.960	116.777	210.20	0.029704	74.078	9.9028	33.665	0.013499	0.10098	0.8513	95.81
10.071	148.000	116.899	210.42	0.029679	74.016	9.8945	33.694	0.013511	0.10107	0.8506	95.73
10.130	148.867	117.000	210.60	0.029658	73.964	9.8876	33.717	0.013520	0.10114	0.8500	95.66
10.207	150.000	117.131	210.84	0.029631	73.897	9.8786	33.748	0.013532	0.10123	0.8492	95.58
10.260	150.788	117.222	211.00	0.029613	73.850	9.8723	33.769	0.013541	0.10129	0.8487	95.52
10.343	152.000	117.361	211.25	0.029584	73.778	9.8627	33.802	0.013554	0.10139	0.8478	95.42
10.479	154.000	117.589	211.66	0.029537	73.660	9.8470	33.856	0.013576	0.10155	0.8465	95.27
10.592	155.667	117.778	212.00	0.029497	73.563	9.8339	33.901	0.013594	0.10169	0.8454	95.14
10.615	156.000	117.815	212.07	0.029490	73.543	9.8313	33.910	0.013597	0.10172	0.8451	95.12
10.727	157.650	118.000	212.40	0.029451	73.447	9.8185	33.955	0.013615	0.10185	0.8440	95.00
10.751	158.000	118.039	212.47	0.029443	73.427	9.8158	33.964	0.013619	0.10188	0.8438	94.97
10.887	160.000	118.262	212.87	0.029396	73.311	9.8002	34.018	0.013641	0.10204	0.8425	94.82

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
10.932	160.657	118.333	213.00	0.029381	73.273	9.7952	34.035	0.013648	0.10209	0.8420	94.77
11.000	161.656	118.443	213.20	0.029358	73.216	9.7875	34.062	0.013658	0.10217	0.8414	94.70
11.023	162.000	118.482	213.27	0.029350	73.196	9.7848	34.071	0.013662	0.10220	0.8411	94.67
11.159	164.000	118.700	213.66	0.029304	73.081	9.7695	34.125	0.013683	0.10236	0.8398	94.52
11.279	165.761	118.889	214.00	0.029264	72.982	9.7562	34.171	0.013702	0.10250	0.8387	94.39
11.296	166.000	118.916	214.05	0.029259	72.968	9.7543	34.178	0.013705	0.10252	0.8385	94.38
11.350	166.796	119.000	214.20	0.029241	72.923	9.7484	34.199	0.013713	0.10258	0.8380	94.32
11.432	168.000	119.130	214.43	0.029213	72.854	9.7392	34.231	0.013726	0.10268	0.8372	94.23
11.568	170.000	119.342	214.82	0.029168	72.742	9.7242	34.284	0.013747	0.10284	0.8359	94.08
11.634	170.979	119.444	215.00	0.029146	72.687	9.7169	34.310	0.013758	0.10291	0.8353	94.01
11.704	172.000	119.553	215.19	0.029123	72.630	9.7092	34.337	0.013768	0.10300	0.8346	93.94
11.840	174.000	119.761	215.57	0.029079	72.518	9.6943	34.389	0.013790	0.10315	0.8334	93.79
11.976	176.000	119.968	215.94	0.029034	72.408	9.6795	34.442	0.013811	0.10331	0.8321	93.65
11.997	176.314	120.000	216.00	0.029027	72.391	9.6772	34.450	0.013814	0.10334	0.8319	93.63
12.000	176.352	120.004	216.01	0.029027	72.389	9.6769	34.451	0.013814	0.10334	0.8319	93.63
12.112	178.000	120.174	216.31	0.028990	72.297	9.6647	34.495	0.013832	0.10347	0.8308	93.51
12.248	180.000	120.378	216.68	0.028946	72.187	9.6501	34.547	0.013853	0.10363	0.8296	93.37
12.368	181.766	120.556	217.00	0.028907	72.091	9.6372	34.593	0.013871	0.10376	0.8284	93.24
12.384	182.000	120.580	217.04	0.028902	72.078	9.6355	34.600	0.013874	0.10378	0.8283	93.22
12.520	184.000	120.781	217.40	0.028859	71.969	9.6209	34.652	0.013895	0.10394	0.8270	93.08
12.657	186.000	120.980	217.76	0.028815	71.861	9.6064	34.704	0.013916	0.10410	0.8258	92.94
12.671	186.213	121.000	217.80	0.028811	71.850	9.6050	34.709	0.013918	0.10411	0.8257	92.93
12.747	187.337	121.111	218.00	0.028786	71.790	9.5969	34.739	0.013930	0.10420	0.8250	92.85
12.793	188.000	121.177	218.12	0.028772	71.753	9.5920	34.756	0.013937	0.10425	0.8246	92.80
12.929	190.000	121.373	218.47	0.028729	71.646	9.5777	34.808	0.013957	0.10441	0.8233	92.67
13.000	191.048	121.475	218.65	0.028707	71.590	9.5703	34.835	0.013968	0.10449	0.8227	92.59
13.065	192.000	121.568	218.82	0.028686	71.539	9.5634	34.860	0.013978	0.10457	0.8221	92.53
13.135	193.029	121.667	219.00	0.028664	71.485	9.5561	34.887	0.013989	0.10464	0.8215	92.46
13.201	194.000	121.761	219.17	0.028643	71.433	9.5492	34.912	0.013999	0.10472	0.8209	92.39
13.337	196.000	121.953	219.51	0.028601	71.327	9.5350	34.964	0.014020	0.10488	0.8197	92.25
13.371	196.503	122.000	219.60	0.028590	71.301	9.5315	34.977	0.014025	0.10492	0.8194	92.22
13.473	198.000	122.143	219.86	0.028559	71.221	9.5209	35.016	0.014041	0.10503	0.8184	92.12
13.530	198.844	122.222	220.00	0.028541	71.177	9.5150	35.037	0.014049	0.10510	0.8179	92.06
13.609	200.000	122.332	220.20	0.028516	71.116	9.5069	35.068	0.014061	0.10519	0.8172	91.98
13.935	204.782	122.778	221.00	0.028416	70.867	9.4735	35.191	0.014111	0.10556	0.8144	91.66
13.949	205.000	122.798	221.04	0.028412	70.856	9.4720	35.197	0.014113	0.10557	0.8142	91.64
14.000	205.744	122.867	221.16	0.028396	70.817	9.4668	35.216	0.014121	0.10563	0.8138	91.59
14.099	207.192	123.000	221.40	0.028366	70.742	9.4568	35.253	0.014136	0.10574	0.8129	91.50
14.290	210.000	123.257	221.86	0.028308	70.597	9.4374	35.325	0.014165	0.10596	0.8113	91.31
14.347	210.846	123.333	222.00	0.028291	70.553	9.4316	35.347	0.014174	0.10603	0.8108	91.25
14.630	215.000	123.707	222.67	0.028205	70.341	9.4032	35.454	0.014217	0.10635	0.8083	90.98
14.768	217.037	123.889	223.00	0.028164	70.237	9.3893	35.507	0.014238	0.10650	0.8071	90.84
14.854	218.290	124.000	223.20	0.028138	70.173	9.3808	35.539	0.014250	0.10660	0.8064	90.76
14.970	220.000	124.151	223.47	0.028103	70.086	9.3692	35.583	0.014268	0.10673	0.8054	90.65
15.000	220.440	124.190	223.54	0.028095	70.064	9.3662	35.594	0.014273	0.10677	0.8052	90.62

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
15.198	223.356	124.444	224.00	0.028036	69.917	9.3465	35.669	0.014303	0.10699	0.8035	90.43
15.310	225.000	124.587	224.26	0.028002	69.834	9.3355	35.711	0.014320	0.10712	0.8025	90.32
15.637	229.806	125.000	225.00	0.027906	69.594	9.3033	35.835	0.014369	0.10749	0.7997	90.01
15.651	230.000	125.017	225.03	0.027902	69.584	9.3020	35.840	0.014371	0.10750	0.7996	90.00
15.991	235.000	125.439	225.79	0.027802	69.336	9.2688	35.968	0.014423	0.10789	0.7968	89.68
16.000	235.136	125.451	225.81	0.027800	69.329	9.2679	35.972	0.014424	0.10790	0.7967	89.67
16.085	236.388	125.556	226.00	0.027775	69.267	9.2596	36.004	0.014437	0.10800	0.7960	89.59
16.331	240.000	125.856	226.54	0.027703	69.089	9.2358	36.097	0.014474	0.10827	0.7939	89.36
16.450	241.750	126.000	226.80	0.027669	69.003	9.2244	36.142	0.014492	0.10841	0.7930	89.25
16.542	243.104	126.111	227.00	0.027642	68.937	9.2155	36.176	0.014506	0.10851	0.7922	89.16
16.671	245.000	126.266	227.28	0.027605	68.844	9.2031	36.225	0.014526	0.10866	0.7911	89.04
17.000	249.832	126.657	227.98	0.027511	68.608	9.1716	36.349	0.014575	0.10903	0.7884	88.74
17.008	249.955	126.667	228.00	0.027508	68.602	9.1708	36.353	0.014577	0.10904	0.7884	88.73
17.011	250.000	126.670	228.01	0.027508	68.600	9.1705	36.354	0.014577	0.10905	0.7883	88.73
17.293	254.132	127.000	228.60	0.027427	68.400	9.1438	36.460	0.014620	0.10936	0.7860	88.47
17.352	255.000	127.069	228.72	0.027410	68.358	9.1382	36.482	0.014629	0.10943	0.7855	88.41
17.484	256.944	127.222	229.00	0.027373	68.264	9.1256	36.533	0.014649	0.10958	0.7845	88.29
17.692	260.000	127.462	229.43	0.027314	68.117	9.1060	36.611	0.014681	0.10982	0.7828	88.10
17.969	264.071	127.778	230.00	0.027236	67.922	9.0799	36.717	0.014723	0.11013	0.7805	87.85
18.000	264.528	127.813	230.06	0.027227	67.900	9.0770	36.728	0.014727	0.11017	0.7803	87.82
18.032	265.000	127.849	230.13	0.027218	67.878	9.0739	36.741	0.014732	0.11021	0.7800	87.79
18.166	266.962	128.000	230.40	0.027180	67.784	9.0614	36.791	0.014753	0.11036	0.7790	87.67
18.372	270.000	128.232	230.82	0.027122	67.639	9.0421	36.870	0.014784	0.11059	0.7773	87.48
18.463	271.339	128.333	231.00	0.027097	67.576	9.0336	36.905	0.014798	0.11070	0.7766	87.40
18.713	275.000	128.609	231.50	0.027027	67.402	9.0104	37.000	0.014836	0.11098	0.7746	87.18
18.968	278.750	128.889	232.00	0.026956	67.225	8.9867	37.097	0.014875	0.11128	0.7725	86.95
19.000	279.224	128.924	232.06	0.026947	67.202	8.9837	37.110	0.014880	0.11131	0.7723	86.92
19.053	280.000	128.982	232.17	0.026932	67.166	8.9788	37.130	0.014889	0.11137	0.7718	86.87
19.070	280.249	129.000	232.20	0.026928	67.154	8.9772	37.137	0.014891	0.11139	0.7717	86.86
19.393	285.000	129.349	232.83	0.026838	66.931	8.9473	37.261	0.014941	0.11177	0.7691	86.57
19.482	286.305	129.444	233.00	0.026813	66.869	8.9391	37.295	0.014955	0.11187	0.7684	86.49
19.733	290.000	129.712	233.48	0.026744	66.696	8.9160	37.392	0.014993	0.11216	0.7664	86.26
20.000	293.920	129.994	233.99	0.026671	66.513	8.8915	37.495	0.015035	0.11247	0.7643	86.03
20.006	294.006	130.000	234.00	0.026669	66.509	8.8909	37.497	0.015036	0.11247	0.7643	86.02
20.073	295.000	130.071	234.13	0.026650	66.463	8.8848	37.523	0.015046	0.11255	0.7638	85.96
20.414	300.000	130.425	234.77	0.026557	66.230	8.8536	37.655	0.015099	0.11295	0.7611	85.66
20.540	301.856	130.556	235.00	0.026522	66.143	8.8421	37.704	0.015119	0.11310	0.7601	85.55
20.754	305.000	130.775	235.40	0.026464	65.998	8.8226	37.787	0.015152	0.11335	0.7584	85.36
20.975	308.243	131.000	235.80	0.026404	65.847	8.8025	37.874	0.015187	0.11360	0.7567	85.17
21.000	308.616	131.026	235.85	0.026397	65.830	8.8002	37.884	0.015191	0.11363	0.7565	85.14
21.084	309.855	131.111	236.00	0.026374	65.773	8.7925	37.917	0.015204	0.11373	0.7558	85.07
21.094	310.000	131.121	236.02	0.026371	65.766	8.7916	37.920	0.015205	0.11374	0.7558	85.06
21.434	315.000	131.463	236.63	0.026278	65.535	8.7608	38.054	0.015259	0.11415	0.7531	84.76
21.639	318.006	131.667	237.00	0.026223	65.396	8.7422	38.135	0.015291	0.11439	0.7515	84.58
21.775	320.000	131.801	237.24	0.026186	65.304	8.7299	38.188	0.015313	0.11455	0.7505	84.46

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
21.977	322.971	132.000	237.60	0.026131	65.168	8.7117	38.268	0.015345	0.11479	0.7489	84.29
22.000	323.312	132.023	237.64	0.026125	65.152	8.7096	38.278	0.015349	0.11482	0.7487	84.27
22.115	325.000	132.135	237.84	0.026094	65.074	8.6992	38.323	0.015367	0.11495	0.7478	84.17
22.204	326.311	132.222	238.00	0.026070	65.014	8.6911	38.359	0.015381	0.11506	0.7471	84.09
22.455	330.000	132.466	238.44	0.026002	64.845	8.6685	38.459	0.015421	0.11536	0.7452	83.87
22.780	334.772	132.778	239.00	0.025914	64.626	8.6392	38.589	0.015474	0.11575	0.7427	83.59
22.795	335.000	132.793	239.03	0.025910	64.615	8.6378	38.596	0.015476	0.11577	0.7425	83.57
23.000	338.008	132.988	239.38	0.025854	64.478	8.6194	38.678	0.015509	0.11602	0.7410	83.39
23.013	338.201	133.000	239.40	0.025851	64.469	8.6182	38.683	0.015511	0.11603	0.7409	83.38
23.136	340.000	133.116	239.61	0.025818	64.386	8.6072	38.733	0.015531	0.11618	0.7399	83.28
23.366	343.391	133.333	240.00	0.025756	64.231	8.5864	38.827	0.015569	0.11646	0.7381	83.08
23.476	345.000	133.436	240.18	0.025726	64.157	8.5766	38.871	0.015587	0.11660	0.7373	82.98
23.816	350.000	133.752	240.75	0.025634	63.929	8.5460	39.010	0.015642	0.11701	0.7346	82.68
23.964	352.170	133.889	241.00	0.025594	63.829	8.5327	39.071	0.015667	0.11720	0.7335	82.56
24.000	352.704	133.922	241.06	0.025585	63.805	8.5295	39.086	0.015673	0.11724	0.7332	82.52
24.084	353.945	134.000	241.20	0.025562	63.748	8.5219	39.121	0.015687	0.11734	0.7326	82.45
24.156	355.000	134.066	241.32	0.025543	63.700	8.5154	39.150	0.015699	0.11743	0.7320	82.39
24.496	360.000	134.376	241.88	0.025451	63.471	8.4849	39.291	0.015755	0.11786	0.7294	82.09
24.572	361.111	134.444	242.00	0.025431	63.420	8.4781	39.323	0.015768	0.11795	0.7288	82.03
24.837	365.000	134.683	242.43	0.025359	63.243	8.4543	39.433	0.015812	0.11828	0.7268	81.80
25.000	367.400	134.829	242.69	0.025315	63.133	8.4396	39.502	0.015840	0.11849	0.7255	81.66
25.177	370.000	134.987	242.98	0.025267	63.014	8.4237	39.577	0.015870	0.11871	0.7241	81.50
25.192	370.217	135.000	243.00	0.025264	63.004	8.4224	39.583	0.015872	0.11873	0.7240	81.49
25.517	375.000	135.288	243.52	0.025176	62.785	8.3931	39.721	0.015927	0.11914	0.7215	81.21
25.823	379.489	135.556	244.00	0.025093	62.579	8.3656	39.851	0.015980	0.11954	0.7191	80.94
25.857	380.000	135.586	244.05	0.025084	62.556	8.3625	39.866	0.015986	0.11958	0.7189	80.91
26.000	382.096	135.710	244.28	0.025045	62.460	8.3497	39.928	0.016010	0.11977	0.7178	80.78
26.198	385.000	135.881	244.59	0.024992	62.327	8.3319	40.013	0.016045	0.12002	0.7162	80.61
26.336	387.028	136.000	244.80	0.024955	62.234	8.3194	40.073	0.016069	0.12020	0.7152	80.49
26.465	388.929	136.111	245.00	0.024920	62.146	8.3077	40.129	0.016091	0.12037	0.7142	80.38
26.538	390.000	136.173	245.11	0.024900	62.097	8.3012	40.161	0.016104	0.12047	0.7136	80.32
26.878	395.000	136.463	245.63	0.024808	61.867	8.2704	40.310	0.016164	0.12091	0.7110	80.02
27.000	396.792	136.566	245.82	0.024775	61.784	8.2594	40.364	0.016185	0.12107	0.7100	79.91
27.119	398.541	136.667	246.00	0.024742	61.704	8.2486	40.417	0.016206	0.12123	0.7091	79.81
27.218	400.000	136.750	246.15	0.024715	61.637	8.2396	40.461	0.016224	0.12137	0.7083	79.72
27.517	404.391	137.000	246.60	0.024634	61.434	8.2125	40.594	0.016278	0.12177	0.7060	79.46
27.559	405.000	137.034	246.66	0.024623	61.406	8.2087	40.613	0.016285	0.12182	0.7057	79.42
27.785	408.326	137.222	247.00	0.024561	61.252	8.1882	40.715	0.016326	0.12213	0.7039	79.22
27.899	410.000	137.316	247.17	0.024530	61.174	8.1778	40.767	0.016347	0.12228	0.7030	79.12
28.000	411.488	137.400	247.32	0.024502	61.105	8.1686	40.813	0.016365	0.12242	0.7022	79.03
28.239	415.000	137.596	247.67	0.024437	60.942	8.1468	40.922	0.016409	0.12275	0.7003	78.82
28.463	418.287	137.778	248.00	0.024375	60.789	8.1263	41.025	0.016450	0.12306	0.6986	78.62
28.579	420.000	137.872	248.17	0.024343	60.709	8.1157	41.079	0.016472	0.12322	0.6976	78.52
28.737	422.321	138.000	248.40	0.024300	60.601	8.1012	41.152	0.016501	0.12344	0.6964	78.38
28.919	425.000	138.147	248.66	0.024250	60.476	8.0844	41.238	0.016536	0.12369	0.6950	78.22

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
29.000	426.184	138.211	248.78	0.024228	60.420	8.0770	41.275	0.016551	0.12381	0.6943	78.15
29.153	428.425	138.333	249.00	0.024185	60.315	8.0630	41.347	0.016580	0.12402	0.6931	78.01
29.260	430.000	138.419	249.15	0.024156	60.241	8.0531	41.398	0.016600	0.12418	0.6923	77.92
29.600	435.000	138.688	249.64	0.024061	60.006	8.0217	41.560	0.016665	0.12466	0.6896	77.61
29.855	438.745	138.889	250.00	0.023991	59.829	7.9980	41.683	0.016714	0.12503	0.6875	77.38
29.940	440.000	138.956	250.12	0.023967	59.770	7.9901	41.724	0.016731	0.12515	0.6869	77.31
29.997	440.831	139.000	250.20	0.023951	59.731	7.9848	41.752	0.016742	0.12524	0.6864	77.25
30.000	440.880	139.003	250.20	0.023950	59.728	7.9845	41.754	0.016742	0.12524	0.6864	77.25
30.280	445.000	139.221	250.60	0.023872	59.533	7.9584	41.891	0.016797	0.12565	0.6841	77.00
30.569	449.247	139.444	251.00	0.023791	59.331	7.9313	42.034	0.016855	0.12608	0.6818	76.74
30.621	450.000	139.484	251.07	0.023776	59.295	7.9265	42.059	0.016865	0.12616	0.6814	76.69
30.961	455.000	139.745	251.54	0.023680	59.055	7.8945	42.230	0.016933	0.12667	0.6786	76.38
31.000	455.576	139.775	251.59	0.023669	59.028	7.8908	42.249	0.016941	0.12673	0.6783	76.35
31.297	459.935	140.000	252.00	0.023585	58.818	7.8628	42.400	0.017002	0.12718	0.6759	76.07
31.301	460.000	140.003	252.01	0.023584	58.814	7.8623	42.402	0.017003	0.12719	0.6759	76.07
31.641	465.000	140.260	252.47	0.023487	58.572	7.8300	42.578	0.017073	0.12771	0.6731	75.76
31.981	470.000	140.514	252.93	0.023389	58.329	7.7974	42.755	0.017144	0.12825	0.6703	75.44
32.000	470.272	140.528	252.95	0.023384	58.316	7.7957	42.765	0.017148	0.12828	0.6701	75.42
32.037	470.812	140.556	253.00	0.023373	58.289	7.7921	42.784	0.017156	0.12833	0.6698	75.39
32.322	475.000	140.767	253.38	0.023291	58.084	7.7647	42.936	0.017216	0.12879	0.6675	75.12
32.638	479.650	141.000	253.80	0.023199	57.855	7.7340	43.106	0.017285	0.12930	0.6648	74.83
32.662	480.000	141.018	253.83	0.023191	57.836	7.7315	43.120	0.017290	0.12934	0.6646	74.80
32.790	481.879	141.111	254.00	0.023154	57.744	7.7193	43.188	0.017318	0.12955	0.6636	74.69
33.000	484.968	141.264	254.28	0.023093	57.590	7.6987	43.304	0.017364	0.12989	0.6618	74.49
33.002	485.000	141.267	254.28	0.023092	57.588	7.6983	43.306	0.017365	0.12990	0.6618	74.48
33.342	490.000	141.514	254.72	0.022991	57.337	7.6649	43.495	0.017441	0.13047	0.6589	74.16
33.556	493.140	141.667	255.00	0.022928	57.181	7.6439	43.614	0.017488	0.13082	0.6571	73.96
33.683	495.000	141.758	255.17	0.022890	57.085	7.6312	43.687	0.017518	0.13104	0.6560	73.83
34.000	499.664	141.984	255.57	0.022796	56.850	7.5997	43.868	0.017590	0.13158	0.6533	73.53
34.022	499.991	142.000	255.60	0.022789	56.833	7.5974	43.881	0.017595	0.13162	0.6531	73.51
34.023	500.000	142.001	255.60	0.022788	56.831	7.5972	43.882	0.017596	0.13163	0.6531	73.50
34.336	504.597	142.222	256.00	0.022694	56.597	7.5659	44.064	0.017669	0.13217	0.6504	73.20
34.363	505.000	142.242	256.04	0.022685	56.575	7.5629	44.081	0.017676	0.13222	0.6501	73.17
34.703	510.000	142.482	256.47	0.022582	56.316	7.5284	44.284	0.017757	0.13283	0.6472	72.84
35.000	514.360	142.688	256.84	0.022491	56.090	7.4981	44.462	0.017829	0.13337	0.6446	72.55
35.044	515.000	142.719	256.89	0.022477	56.055	7.4934	44.490	0.017840	0.13345	0.6442	72.50
35.129	516.254	142.778	257.00	0.022451	55.990	7.4848	44.541	0.017860	0.13360	0.6434	72.42
35.384	520.000	142.955	257.32	0.022371	55.791	7.4582	44.700	0.017924	0.13408	0.6411	72.16
35.450	520.974	143.000	257.40	0.022351	55.741	7.4515	44.740	0.017940	0.13420	0.6406	72.09
35.724	525.000	143.189	257.74	0.022264	55.525	7.4226	44.915	0.018010	0.13472	0.6381	71.81
35.936	528.114	143.333	258.00	0.022198	55.359	7.4004	45.049	0.018064	0.13513	0.6362	71.60
36.000	529.056	143.377	258.08	0.022177	55.308	7.3936	45.091	0.018081	0.13525	0.6356	71.53
36.064	530.000	143.422	258.16	0.022156	55.255	7.3866	45.134	0.018098	0.13538	0.6350	71.47
36.404	535.000	143.652	258.57	0.022047	54.983	7.3501	45.357	0.018188	0.13605	0.6318	71.11
36.745	540.000	143.882	258.99	0.021937	54.707	7.3133	45.586	0.018279	0.13674	0.6287	70.76

TABLE 9 CONTINUED

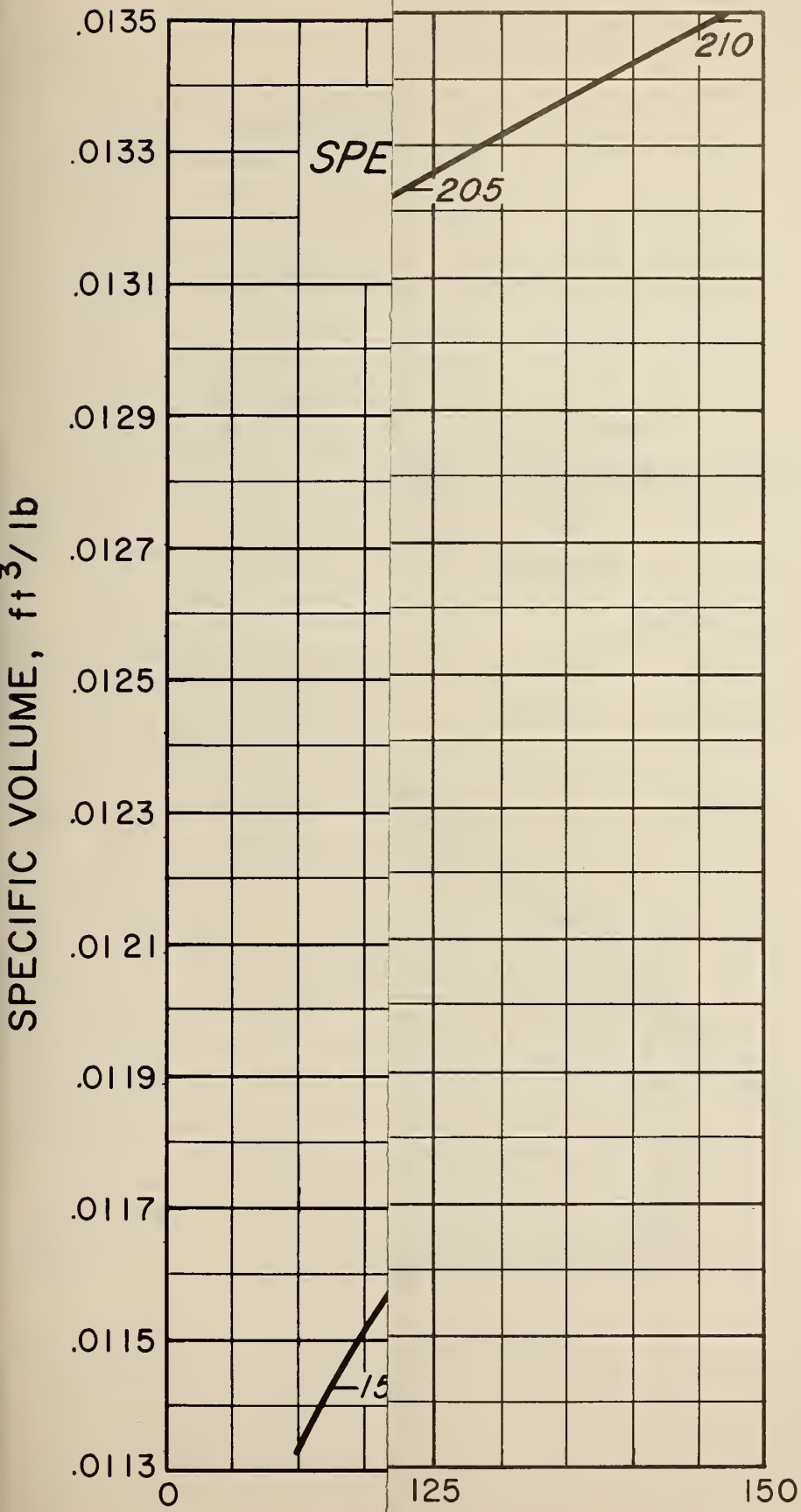
SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
36.757	540.179	143.889	259.00	0.021933	54.699	7.3121	45.593	0.018282	0.13676	0.6286	70.75
36.923	542.616	144.000	259.20	0.021879	54.563	7.2940	45.706	0.018328	0.13710	0.6270	70.57
37.000	543.752	144.052	259.29	0.021853	54.499	7.2855	45.760	0.018349	0.13726	0.6263	70.49
37.085	545.000	144.109	259.40	0.021825	54.428	7.2759	45.820	0.018373	0.13744	0.6255	70.40
37.425	550.000	144.335	259.80	0.021711	54.145	7.2381	46.059	0.018469	0.13816	0.6222	70.03
37.592	552.452	144.444	260.00	0.021656	54.006	7.2196	46.178	0.018516	0.13851	0.6206	69.85
37.765	555.000	144.559	260.21	0.021596	53.858	7.1997	46.305	0.018567	0.13889	0.6189	69.66
38.000	558.448	144.712	260.48	0.021516	53.659	7.1732	46.476	0.018636	0.13941	0.6166	69.40
38.106	560.000	144.782	260.61	0.021479	53.567	7.1608	46.556	0.018668	0.13965	0.6156	69.28
38.442	564.937	145.000	261.00	0.021363	53.276	7.1220	46.810	0.018770	0.14041	0.6122	68.91
38.446	565.000	145.004	261.01	0.021361	53.271	7.1213	46.815	0.018772	0.14042	0.6122	68.90
38.786	570.000	145.223	261.40	0.021240	52.971	7.0812	47.080	0.018878	0.14122	0.6087	68.51
39.000	573.144	145.360	261.65	0.021164	52.781	7.0558	47.250	0.018946	0.14173	0.6065	68.27
39.126	575.000	145.442	261.80	0.021118	52.665	7.0403	47.353	0.018988	0.14204	0.6052	68.12
39.306	577.637	145.556	262.00	0.021053	52.503	7.0187	47.499	0.019046	0.14248	0.6034	67.91
39.467	580.000	145.659	262.19	0.020993	52.354	6.9987	47.635	0.019101	0.14288	0.6016	67.71
39.807	585.000	145.874	262.57	0.020866	52.037	6.9564	47.925	0.019217	0.14375	0.5980	67.30
40.000	587.840	145.995	262.79	0.020793	51.856	6.9322	48.092	0.019284	0.14426	0.5959	67.07
40.008	587.954	146.000	262.80	0.020790	51.849	6.9312	48.099	0.019287	0.14428	0.5958	67.06
40.147	590.000	146.088	262.96	0.020736	51.714	6.9131	48.224	0.019337	0.14465	0.5943	66.89
40.185	590.555	146.111	263.00	0.020723	51.679	6.9085	48.257	0.019350	0.14475	0.5939	66.84
40.487	595.000	146.301	263.34	0.020604	51.384	6.8690	48.534	0.019461	0.14558	0.5905	66.46
40.827	600.000	146.512	263.72	0.020469	51.046	6.8239	48.855	0.019590	0.14654	0.5866	66.02
41.000	602.536	146.618	263.91	0.020400	50.874	6.8009	49.021	0.019656	0.14704	0.5846	65.80
41.079	603.695	146.667	264.00	0.020367	50.794	6.7901	49.098	0.019688	0.14727	0.5837	65.70
41.168	605.000	146.722	264.10	0.020330	50.701	6.7777	49.188	0.019724	0.14754	0.5826	65.58
41.508	610.000	146.931	264.48	0.020188	50.347	6.7303	49.534	0.019862	0.14858	0.5786	65.12
41.623	611.686	147.000	264.60	0.020140	50.227	6.7144	49.652	0.019910	0.14893	0.5772	64.96
41.848	615.000	147.138	264.85	0.020042	49.983	6.6817	49.895	0.020007	0.14966	0.5744	64.65
41.988	617.060	147.222	265.00	0.019982	49.832	6.6616	50.046	0.020067	0.15011	0.5727	64.45
42.000	617.232	147.229	265.01	0.019977	49.819	6.6599	50.058	0.020073	0.15015	0.5725	64.44
42.188	620.000	147.344	265.22	0.019892	49.609	6.6317	50.271	0.020158	0.15079	0.5701	64.16
42.529	625.000	147.549	265.59	0.019738	49.223	6.5802	50.665	0.020316	0.15197	0.5657	63.66
42.869	630.000	147.752	265.95	0.019578	48.825	6.5269	51.078	0.020481	0.15321	0.5611	63.15
42.913	630.654	147.778	266.00	0.019558	48.774	6.5202	51.131	0.020503	0.15337	0.5605	63.08
43.000	631.928	147.829	266.09	0.019516	48.670	6.5063	51.240	0.020546	0.15370	0.5593	62.95
43.209	635.000	147.954	266.32	0.019413	48.413	6.4719	51.513	0.020656	0.15452	0.5563	62.62
43.288	636.156	148.000	266.40	0.019375	48.318	6.4592	51.614	0.020696	0.15482	0.5553	62.49
43.549	640.000	148.155	266.68	0.019241	47.985	6.4147	51.972	0.020840	0.15589	0.5514	62.06
43.854	644.480	148.333	267.00	0.019083	47.590	6.3618	52.404	0.021013	0.15719	0.5469	61.55
43.889	645.000	148.355	267.04	0.019063	47.540	6.3551	52.459	0.021035	0.15735	0.5463	61.49
44.000	646.624	148.419	267.15	0.019004	47.394	6.3356	52.620	0.021100	0.15784	0.5446	61.30
44.230	650.000	148.553	267.40	0.018876	47.074	6.2929	52.977	0.021243	0.15891	0.5410	60.89
44.570	655.000	148.750	267.75	0.018680	46.586	6.2277	53.533	0.021466	0.16057	0.5354	60.25
44.811	658.543	148.889	268.00	0.018537	46.228	6.1798	53.947	0.021632	0.16182	0.5312	59.79

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
44.910	660.000	148.946	268.10	0.018474	46.072	6.1589	54.130	0.021705	0.16237	0.5294	59.59
45.000	661.320	148.997	268.20	0.018419	45.934	6.1405	54.292	0.021770	0.16285	0.5279	59.41
45.004	661.384	149.000	268.20	0.018416	45.928	6.1396	54.300	0.021773	0.16288	0.5278	59.40
45.250	665.000	149.141	268.45	0.018255	45.526	6.0860	54.779	0.021965	0.16431	0.5232	58.88
45.591	670.000	149.335	268.80	0.018022	44.944	6.0082	55.488	0.022250	0.16644	0.5165	58.13
45.784	672.846	149.444	269.00	0.017883	44.598	5.9619	55.919	0.022422	0.16773	0.5125	57.68
45.931	675.000	149.528	269.15	0.017771	44.318	5.9244	56.272	0.022564	0.16879	0.5093	57.32
46.000	676.016	149.566	269.22	0.017719	44.189	5.9072	56.436	0.022630	0.16928	0.5078	57.15
46.271	680.000	149.719	269.49	0.017497	43.636	5.8333	57.151	0.022917	0.17143	0.5015	56.44
46.611	685.000	149.910	269.84	0.017196	42.884	5.7328	58.154	0.023319	0.17444	0.4928	55.47
46.774	687.394	150.000	270.00	0.017042	42.500	5.6814	58.680	0.023530	0.17601	0.4884	54.97
46.952	690.000	150.099	270.18	0.016856	42.037	5.6196	59.325	0.023788	0.17795	0.4831	54.37
47.000	690.712	150.125	270.23	0.016807	41.915	5.6033	59.498	0.023858	0.17847	0.4817	54.21
47.292	695.000	150.287	270.52	0.016463	41.056	5.4884	60.743	0.024357	0.18220	0.4718	53.10
47.632	700.000	150.474	270.85	0.015984	39.863	5.3289	62.561	0.025086	0.18766	0.4581	51.56
47.781	702.190	150.556	271.00	0.015739	39.251	5.2471	63.536	0.025477	0.19058	0.4511	50.77
47.972	705.000	150.661	271.19	0.015342	38.261	5.1148	65.180	0.026136	0.19551	0.4397	49.49
48.000	705.408	150.675	271.22	0.015287	38.124	5.0964	65.415	0.026230	0.19622	0.4381	49.31
48.312	710.000	150.846	271.52	0.013957	34.807	4.6530	71.649	0.028730	0.21492	0.4000	45.02
48.340	710.405	150.860	271.55	0.013412	33.449	4.4714	74.558	0.029897	0.22364	0.3844	43.26


SPECIFIC VOLUME, ft³/lb
.0135
.0133
.0131
.0129
.0127
.0125
.0123
.0121
.0119
.0117
.0115
.0113
0
125
150
SPE
205
210
15

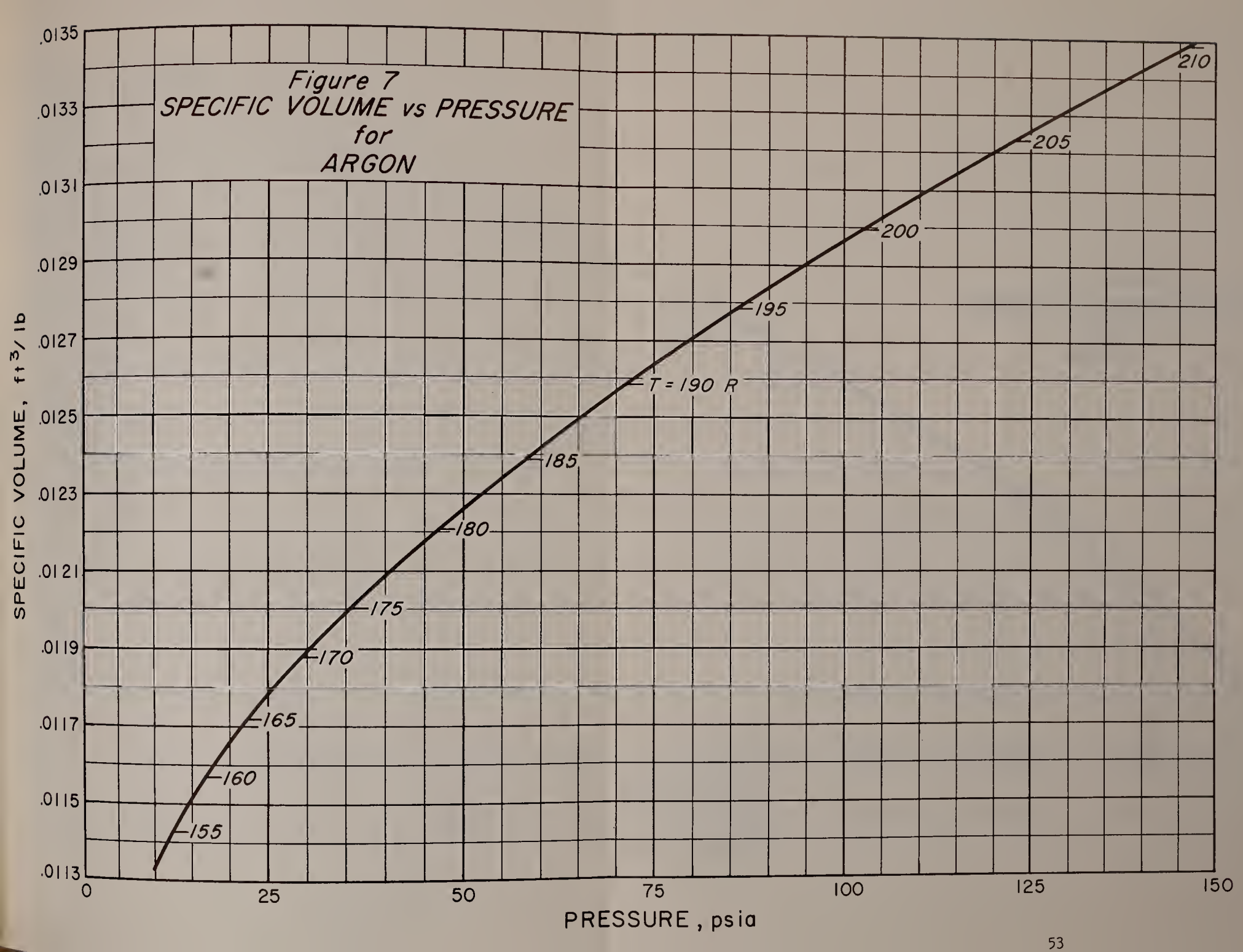


Figure 7
SPECIFIC VOLUME vs PRESSURE
for
ARGON
SPECIFIC VOLUME, ft³/lb
.0135
.0133
.0131
.0129
.0127
.0125
.0123
.0121
.0119
.0117
.0115
.0113
0
25
50
75
100
125
150
PRESSURE, psia
T = 190 R
155
160
165
170
175
180
185
195
200
205
210

TABLE 9 CONTINUED

SATURATED LIQUID ARGON

8. Parahydrogen

While the document or source for parahydrogen has changed, the numerical values remain the same. The tables for the saturated liquid were calculated using the explicit equations for vapor pressure (Weber, et al. 1962) and saturated liquid density (Roder, et al. 1963) which were incorporated unchanged into the final compilation (Roder, et al. 1965). The values for temperatures near room temperature were taken from Hilsenrath, et al. (1955), using a high order interpolation. This is the source used by the experimenters in their determination of the liquid densities. The CGA pamphlet cites Dean (1961), who also presents a high order interpolation of Hilsenrath's values.

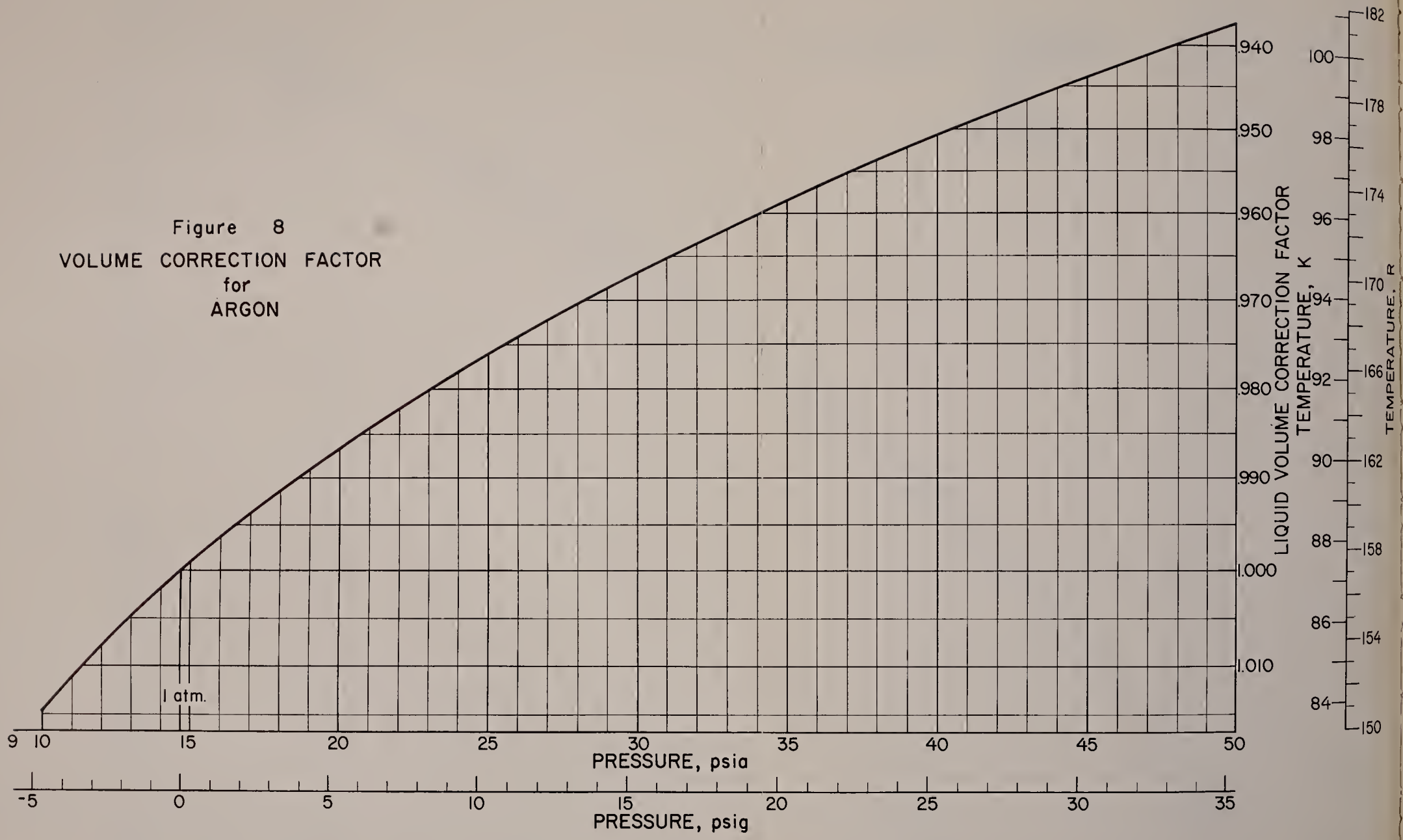
Table 10

Density of parahydrogen at 1 atmosphere near room temperature

Temperature	Density		
	gram-mole/cm^3	lb/ft^3	lb/gal
0 C	0.000044588	0.005611	0.000750
68 F	0.000041547	0.005229	0.000699
70 F	0.000041390	0.005209	0.000696
Temperature	**Volume**		
	cm^3/gram-mole	ft^3/lb	gal/lb
0 C	22428	178.21	1333.1
68 F	24069	191.25	1430.6
70 F	24160	191.97	1436.1
Temperature	**Density Ratios and Equivalent volumes** $\frac{\text{density at NBP}}{\text{density at the temperature indicated}}$		
	dimensionless	$\frac{lb/gal}{lb/ft^3} = ft^3/gal$	
0 C	787.50	105.273	
68 F	845.13	112.98	
70 F	848.34	113.41	

Figure 8

VOLUME CORRECTION FACTOR
for
ARGON



Values near room temperature are given in table 10. As stated before, these values do not differ from those presented in the CGA pamphlet P-6. Uncertainties in the data are shown in table 11. The main table of values pertaining to the saturated liquid are found in table 12. An astute observer may detect a difference of one part in 4000 in the density at the NBP between this table and pamphlet P-6, but that difference is caused only by accumulative rounding errors.

The properties presented here pertain to parahydrogen. Specifications for delivery of parahydrogen are usually stated as 95% parahydrogen with the remainder being orthohydrogen. As a matter of fact, producers do not send less than 97% parahydrogen to storage tanks, and the liquid when shipped is, or is very close to being, equilibrium hydrogen. Equilibrium parahydrogen is 99.79% para at the NBP, and the difference between it and 95% parahydrogen amounts to about 0.008 K or about 2 mm in pressure. It is easy to see that sophisticated equipment is required to detect ortho-para composition. The matter of composition is mentioned because the amount of orthohydrogen present has a very pronounced effect on the length of storage.

Table 11

Uncertainties in the data for parahydrogen

variable	uncertainty	range of temperature
temperature	0.02 K 0.015 K	triple point to critical point room temperature
volume	0.1% increases to 0.3% 0.01%	triple point to 32 K near critical room temperature
pressure	0.05% 0.01%	triple point to critical point room temperature

TABLE 12

SATURATED LIQUID PARAHYDROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
0.0695	1.021	13.803	24.85	0.038206	4.8083	0.64277	26.174	0.20798	1.5558	1.0881	123.40
0.0730	1.073	13.889	25.00	0.038170	4.8038	0.64217	26.198	0.20817	1.5572	1.0871	123.28
0.0778	1.143	14.000	25.20	0.038124	4.7979	0.64139	26.230	0.20842	1.5591	1.0857	123.13
0.0995	1.462	14.444	26.00	0.037936	4.7743	0.63824	26.360	0.20945	1.5668	1.0804	122.53
0.133	1.950	15.000	27.00	0.037698	4.7443	0.63422	26.527	0.21078	1.5767	1.0736	121.76
0.136	2.000	15.051	27.09	0.037676	4.7415	0.63385	26.542	0.21090	1.5777	1.0730	121.69
0.174	2.553	15.556	28.00	0.037454	4.7136	0.63012	26.700	0.21215	1.5870	1.0667	120.97
0.204	3.000	15.906	28.63	0.037297	4.6939	0.62748	26.812	0.21304	1.5937	1.0622	120.46
0.213	3.129	16.000	28.80	0.037255	4.6885	0.62677	26.842	0.21329	1.5955	1.0610	120.33
0.224	3.298	16.111	29.00	0.037204	4.6822	0.62592	26.879	0.21358	1.5977	1.0595	120.16
0.272	4.000	16.567	29.82	0.036995	4.6558	0.62240	27.031	0.21478	1.6067	1.0536	119.49
0.284	4.170	16.667	30.00	0.036949	4.6500	0.62162	27.065	0.21505	1.6087	1.0523	119.34
0.325	4.777	17.000	30.60	0.036792	4.6303	0.61899	27.180	0.21597	1.6155	1.0478	118.83
0.340	5.000	17.115	30.81	0.036738	4.6235	0.61807	27.220	0.21629	1.6179	1.0463	118.66
0.355	5.217	17.222	31.00	0.036687	4.6171	0.61721	27.258	0.21659	1.6202	1.0448	118.49
0.408	6.000	17.586	31.65	0.036511	4.5950	0.61426	27.389	0.21763	1.6280	1.0398	117.93
0.439	6.446	17.778	32.00	0.036418	4.5832	0.61269	27.459	0.21819	1.6322	1.0371	117.62
0.476	6.994	18.000	32.40	0.036308	4.5694	0.61084	27.542	0.21885	1.6371	1.0340	117.27
0.476	7.000	18.002	32.40	0.036307	4.5693	0.61082	27.543	0.21885	1.6371	1.0340	117.27
0.536	7.877	18.333	33.00	0.036141	4.5484	0.60804	27.669	0.21986	1.6446	1.0293	116.73
0.544	8.000	18.377	33.08	0.036119	4.5456	0.60766	27.686	0.21999	1.6457	1.0286	116.66
0.612	9.000	18.720	33.70	0.035945	4.5237	0.60473	27.821	0.22106	1.6536	1.0237	116.10
0.648	9.527	18.889	34.00	0.035857	4.5127	0.60326	27.888	0.22160	1.6577	1.0212	115.81
0.673	9.885	19.000	34.20	0.035799	4.5054	0.60228	27.933	0.22196	1.6604	1.0195	115.63
0.680	10.000	19.035	34.26	0.035781	4.5031	0.60197	27.948	0.22207	1.6612	1.0190	115.57
0.748	11.000	19.328	34.79	0.035626	4.4836	0.59937	28.069	0.22303	1.6684	1.0146	115.07
0.777	11.415	19.444	35.00	0.035564	4.4758	0.59833	28.118	0.22342	1.6713	1.0128	114.87
0.817	12.000	19.603	35.29	0.035479	4.4651	0.59690	28.185	0.22396	1.6753	1.0104	114.59
0.885	13.000	19.861	35.75	0.035339	4.4474	0.59453	28.298	0.22485	1.6820	1.0064	114.14
0.923	13.561	20.000	36.00	0.035262	4.4378	0.59325	28.359	0.22534	1.6856	1.0042	113.89
0.953	14.000	20.106	36.19	0.035204	4.4305	0.59227	28.406	0.22571	1.6884	1.0026	113.70
1.000	14.696	20.268	36.48	0.035113	4.4190	0.59074	28.479	0.22629	1.6928	1.0000	113.41
1.021	15.000	20.338	36.61	0.035074	4.4141	0.59008	28.511	0.22655	1.6947	0.9989	113.28
1.088	15.984	20.556	37.00	0.034951	4.3986	0.58800	28.612	0.22735	1.7007	0.9954	112.88
1.089	16.000	20.559	37.01	0.034949	4.3983	0.58797	28.613	0.22736	1.7008	0.9953	112.88
1.157	17.000	20.771	37.39	0.034827	4.3830	0.58593	28.713	0.22815	1.7067	0.9919	112.49
1.225	18.000	20.973	37.75	0.034709	4.3682	0.58394	28.811	0.22893	1.7125	0.9885	112.10
1.233	18.127	21.000	37.80	0.034694	4.3662	0.58368	28.824	0.22903	1.7133	0.9880	112.05
1.272	18.694	21.111	38.00	0.034628	4.3580	0.58258	28.878	0.22946	1.7165	0.9862	111.84
1.293	19.000	21.170	38.11	0.034593	4.3536	0.58199	28.907	0.22969	1.7182	0.9852	111.73
1.361	20.000	21.358	38.44	0.034481	4.3395	0.58011	29.001	0.23044	1.7238	0.9820	111.37

TABLE 12 CONTINUED

SATURATED LIQUID PARAHYDROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
1.429	21.000	21.539	38.77	0.034372	4.3258	0.57827	29.093	0.23117	1.7293	0.9789	111.02
1.478	21.723	21.667	39.00	0.034294	4.3160	0.57696	29.159	0.23170	1.7332	0.9767	110.77
1.497	22.000	21.715	39.09	0.034265	4.3123	0.57647	29.184	0.23189	1.7347	0.9758	110.67
1.565	23.000	21.884	39.39	0.034160	4.2991	0.57471	29.274	0.23261	1.7400	0.9729	110.33
1.613	23.701	22.000	39.60	0.034088	4.2901	0.57350	29.336	0.23310	1.7437	0.9708	110.10
1.633	24.000	22.049	39.69	0.034058	4.2862	0.57298	29.362	0.23331	1.7452	0.9699	110.00
1.701	25.000	22.208	39.97	0.033957	4.2735	0.57129	29.449	0.23400	1.7504	0.9671	109.68
1.707	25.089	22.222	40.00	0.033948	4.2724	0.57114	29.457	0.23406	1.7509	0.9668	109.65
1.769	26.000	22.363	40.25	0.033858	4.2611	0.56963	29.535	0.23468	1.7555	0.9643	109.36
1.837	27.000	22.514	40.53	0.033761	4.2489	0.56799	29.620	0.23536	1.7606	0.9615	109.04
1.905	28.000	22.661	40.79	0.033665	4.2368	0.56638	29.704	0.23603	1.7656	0.9588	108.73
1.961	28.813	22.778	41.00	0.033589	4.2272	0.56509	29.772	0.23656	1.7696	0.9566	108.49
1.973	29.000	22.804	41.05	0.033571	4.2250	0.56480	29.787	0.23669	1.7705	0.9561	108.43
2.000	29.392	22.859	41.15	0.033535	4.2204	0.56418	29.820	0.23695	1.7725	0.9550	108.31
2.041	30.000	22.944	41.30	0.033478	4.2133	0.56324	29.870	0.23734	1.7755	0.9534	108.13
2.069	30.407	23.000	41.40	0.033441	4.2086	0.56260	29.903	0.23761	1.7774	0.9524	108.01
2.109	31.000	23.081	41.54	0.033387	4.2018	0.56169	29.952	0.23800	1.7803	0.9508	107.83
2.177	32.000	23.214	41.79	0.033296	4.1904	0.56017	30.033	0.23864	1.7852	0.9483	107.54
2.240	32.914	23.333	42.00	0.033215	4.1801	0.55880	30.107	0.23923	1.7896	0.9459	107.28
2.246	33.000	23.344	42.02	0.033207	4.1791	0.55867	30.114	0.23928	1.7900	0.9457	107.25
2.314	34.000	23.472	42.25	0.033119	4.1680	0.55719	30.194	0.23992	1.7947	0.9432	106.97
2.382	35.000	23.597	42.47	0.033032	4.1571	0.55572	30.274	0.24055	1.7995	0.9407	106.69
2.450	36.000	23.720	42.70	0.032945	4.1462	0.55427	30.353	0.24119	1.8042	0.9383	106.41
2.518	37.000	23.840	42.91	0.032860	4.1354	0.55283	30.432	0.24181	1.8089	0.9358	106.13
2.546	37.415	23.889	43.00	0.032825	4.1310	0.55224	30.465	0.24207	1.8108	0.9348	106.02
2.586	38.000	23.958	43.12	0.032775	4.1248	0.55141	30.511	0.24244	1.8135	0.9334	105.86
2.611	38.364	24.000	43.20	0.032745	4.1209	0.55089	30.539	0.24266	1.8152	0.9325	105.76
2.654	39.000	24.073	43.33	0.032691	4.1143	0.55000	30.589	0.24306	1.8182	0.9310	105.59
2.722	40.000	24.187	43.54	0.032608	4.1038	0.54860	30.667	0.24368	1.8228	0.9287	105.32
2.790	41.000	24.299	43.74	0.032526	4.0934	0.54721	30.745	0.24429	1.8274	0.9263	105.05
2.858	42.000	24.408	43.93	0.032444	4.0832	0.54584	30.822	0.24491	1.8320	0.9240	104.79
2.881	42.334	24.444	44.00	0.032417	4.0798	0.54538	30.848	0.24511	1.8336	0.9232	104.70
2.926	43.000	24.516	44.13	0.032363	4.0730	0.54448	30.899	0.24552	1.8366	0.9217	104.53
2.994	44.000	24.622	44.32	0.032283	4.0629	0.54312	30.976	0.24613	1.8412	0.9194	104.27
3.000	44.088	24.632	44.34	0.032276	4.0620	0.54301	30.983	0.24619	1.8416	0.9192	104.25
3.062	45.000	24.727	44.51	0.032203	4.0528	0.54178	31.053	0.24674	1.8458	0.9171	104.01
3.130	46.000	24.829	44.69	0.032124	4.0428	0.54045	31.129	0.24735	1.8503	0.9149	103.75
3.198	47.000	24.931	44.88	0.032045	4.0329	0.53912	31.206	0.24796	1.8549	0.9126	103.50
3.245	47.693	25.000	45.00	0.031991	4.0261	0.53821	31.259	0.24838	1.8580	0.9111	103.33
3.266	48.000	25.030	45.05	0.031967	4.0231	0.53781	31.282	0.24857	1.8594	0.9104	103.25
3.334	49.000	25.129	45.23	0.031889	4.0133	0.53650	31.359	0.24917	1.8639	0.9082	103.00
3.402	50.000	25.226	45.41	0.031812	4.0035	0.53520	31.435	0.24978	1.8685	0.9060	102.75
3.470	51.000	25.321	45.58	0.031735	3.9939	0.53390	31.511	0.25038	1.8730	0.9038	102.50
3.538	52.000	25.415	45.75	0.031658	3.9842	0.53262	31.587	0.25099	1.8775	0.9016	102.25
3.606	53.001	25.508	45.91	0.031582	3.9747	0.53133	31.663	0.25159	1.8821	0.8994	102.01

TABLE 12 CONTINUED

SATURATED LIQUID PARAHYDROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
3.641	53.515	25.556	46.00	0.031543	3.9698	0.53068	31.703	0.25191	1.8844	0.8983	101.88
3.674	54.000	25.600	46.08	0.031506	3.9651	0.53006	31.739	0.25220	1.8866	0.8973	101.76
3.743	55.000	25.691	46.24	0.031431	3.9556	0.52879	31.816	0.25280	1.8911	0.8951	101.52
3.811	56.000	25.780	46.40	0.031356	3.9462	0.52753	31.892	0.25341	1.8956	0.8930	101.27
3.879	56.999	25.868	46.56	0.031281	3.9368	0.52627	31.968	0.25401	1.9002	0.8909	101.03
3.947	58.000	25.955	46.72	0.031207	3.9274	0.52502	32.044	0.25462	1.9047	0.8887	100.79
3.982	58.517	26.000	46.80	0.031168	3.9226	0.52437	32.084	0.25493	1.9070	0.8877	100.67
4.000	58.783	26.023	46.84	0.031149	3.9201	0.52404	32.104	0.25510	1.9083	0.8871	100.60
4.015	59.000	26.041	46.87	0.031133	3.9181	0.52377	32.121	0.25523	1.9092	0.8866	100.55
4.070	59.817	26.111	47.00	0.031072	3.9105	0.52275	32.183	0.25572	1.9129	0.8849	100.36
4.083	60.000	26.127	47.03	0.031059	3.9088	0.52253	32.197	0.25584	1.9138	0.8845	100.31
4.151	61.000	26.211	47.18	0.030985	3.8995	0.52129	32.274	0.25644	1.9183	0.8824	100.08
4.219	62.000	26.294	47.33	0.030912	3.8903	0.52005	32.350	0.25705	1.9229	0.8803	99.84
4.287	63.000	26.376	47.48	0.030838	3.8810	0.51882	32.427	0.25766	1.9275	0.8783	99.60
4.355	64.000	26.457	47.62	0.030765	3.8719	0.51759	32.504	0.25827	1.9320	0.8762	99.37
4.423	65.000	26.538	47.77	0.030693	3.8627	0.51637	32.581	0.25889	1.9366	0.8741	99.13
4.491	66.000	26.617	47.91	0.030620	3.8536	0.51515	32.658	0.25950	1.9412	0.8720	98.90
4.534	66.625	26.667	48.00	0.030575	3.8479	0.51438	32.707	0.25989	1.9441	0.8707	98.75
4.559	67.000	26.696	48.05	0.030548	3.8444	0.51393	32.736	0.26012	1.9458	0.8700	98.66
4.627	68.000	26.774	48.19	0.030475	3.8353	0.51271	32.814	0.26073	1.9504	0.8679	98.43
4.695	69.000	26.851	48.33	0.030403	3.8263	0.51150	32.891	0.26135	1.9550	0.8659	98.20
4.763	70.001	26.928	48.47	0.030331	3.8172	0.51028	32.970	0.26197	1.9597	0.8638	97.96
4.829	70.960	27.000	48.60	0.030262	3.8085	0.50912	33.045	0.26257	1.9642	0.8618	97.74
4.831	71.000	27.003	48.61	0.030259	3.8082	0.50908	33.048	0.26259	1.9643	0.8618	97.73
4.899	71.999	27.078	48.74	0.030187	3.7991	0.50787	33.126	0.26322	1.9690	0.8597	97.50
4.967	72.999	27.152	48.87	0.030116	3.7901	0.50666	33.205	0.26384	1.9737	0.8577	97.27
5.000	73.481	27.187	48.94	0.030081	3.7858	0.50608	33.243	0.26415	1.9760	0.8567	97.16
5.032	73.957	27.222	49.00	0.030047	3.7815	0.50551	33.281	0.26445	1.9782	0.8557	97.05
5.035	74.000	27.225	49.01	0.030044	3.7811	0.50546	33.284	0.26447	1.9784	0.8556	97.04
5.103	75.000	27.298	49.14	0.029973	3.7721	0.50426	33.364	0.26510	1.9831	0.8536	96.81
5.172	76.001	27.370	49.27	0.029901	3.7631	0.50305	33.443	0.26574	1.9879	0.8516	96.58
5.240	77.000	27.441	49.39	0.029830	3.7541	0.50186	33.523	0.26637	1.9926	0.8495	96.35
5.308	77.999	27.512	49.52	0.029759	3.7452	0.50066	33.604	0.26701	1.9974	0.8475	96.12
5.376	79.000	27.582	49.65	0.029688	3.7362	0.49946	33.684	0.26765	2.0022	0.8455	95.89
5.444	80.000	27.652	49.77	0.029616	3.7272	0.49826	33.765	0.26829	2.0070	0.8435	95.66
5.512	81.001	27.721	49.90	0.029545	3.7183	0.49706	33.847	0.26894	2.0118	0.8414	95.43
5.569	81.838	27.778	50.00	0.029486	3.7108	0.49606	33.915	0.26948	2.0159	0.8397	95.23
5.580	82.000	27.789	50.02	0.029474	3.7093	0.49587	33.928	0.26959	2.0167	0.8394	95.20
5.648	83.000	27.857	50.14	0.029403	3.7004	0.49467	34.010	0.27024	2.0216	0.8374	94.97
5.716	84.000	27.924	50.26	0.029332	3.6914	0.49347	34.093	0.27090	2.0265	0.8353	94.74
5.784	85.000	27.990	50.38	0.029261	3.6825	0.49228	34.176	0.27156	2.0314	0.8333	94.51
5.794	85.148	28.000	50.40	0.029250	3.6812	0.49210	34.188	0.27165	2.0321	0.8330	94.47
5.852	86.000	28.056	50.50	0.029190	3.6735	0.49108	34.259	0.27222	2.0363	0.8313	94.28
5.920	87.000	28.122	50.62	0.029118	3.6646	0.48988	34.343	0.27288	2.0413	0.8293	94.05
5.988	88.001	28.187	50.74	0.029047	3.6556	0.48868	34.427	0.27355	2.0463	0.8272	93.82

TABLE 12 CONTINUED

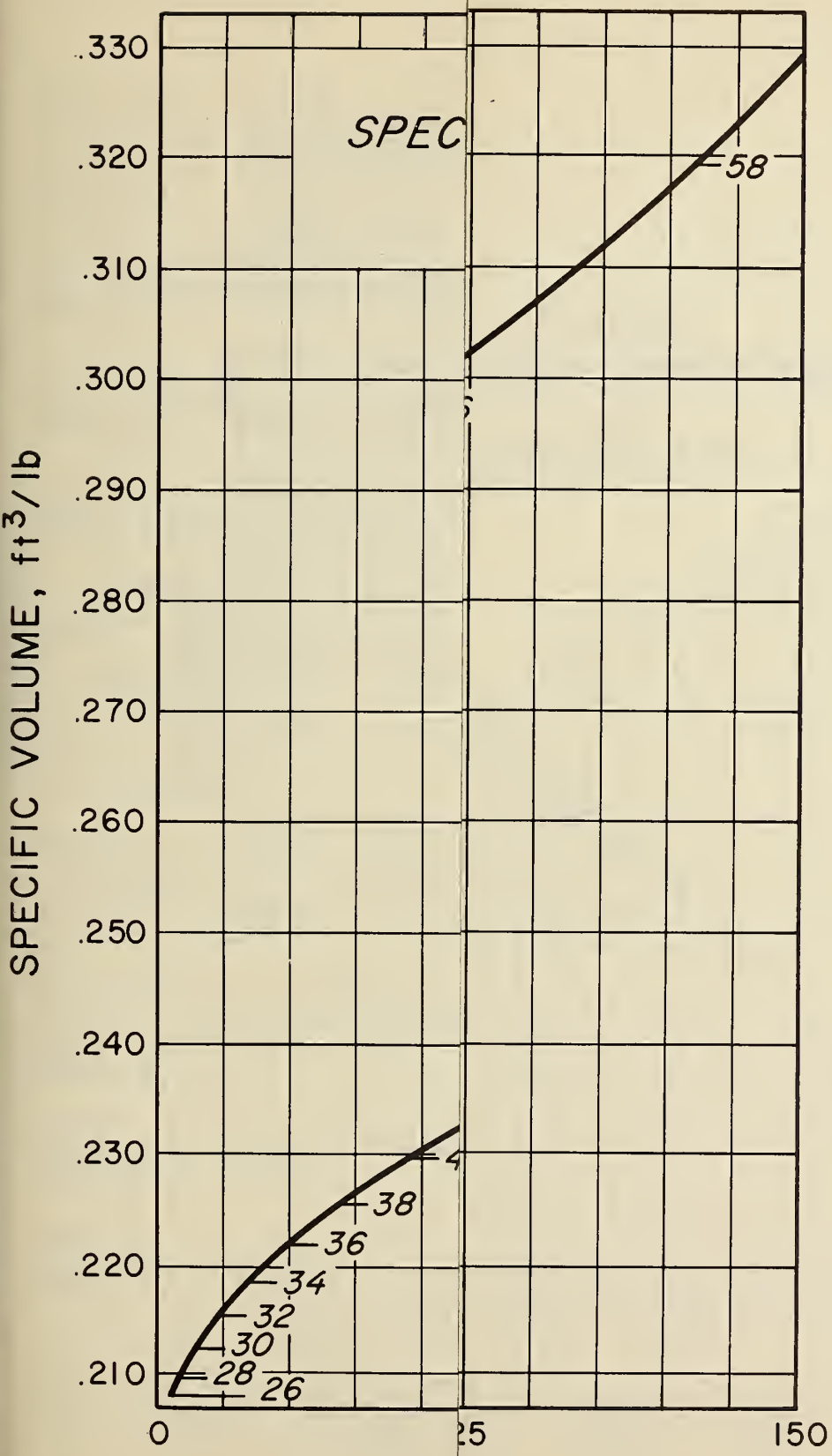
SATURATED LIQUID PARAHYDROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
6.000	88.175	28.198	50.76	0.029035	3.6540	0.48847	34.442	0.27367	2.0472	0.8269	93.78
6.056	89.000	28.251	50.85	0.028976	3.6466	0.48748	34.511	0.27423	2.0513	0.8252	93.59
6.124	89.999	28.315	50.97	0.028905	3.6377	0.48629	34.597	0.27490	2.0564	0.8232	93.36
6.144	90.287	28.333	51.00	0.028884	3.6351	0.48594	34.621	0.27510	2.0579	0.8226	93.29
6.192	91.000	28.379	51.08	0.028833	3.6287	0.48508	34.682	0.27558	2.0615	0.8211	93.13
6.260	92.001	28.442	51.19	0.028762	3.6197	0.48388	34.768	0.27627	2.0666	0.8191	92.90
6.328	92.999	28.504	51.31	0.028690	3.6107	0.48268	34.855	0.27695	2.0718	0.8171	92.66
6.396	94.001	28.566	51.42	0.028619	3.6017	0.48147	34.942	0.27765	2.0770	0.8150	92.43
6.464	95.000	28.627	51.53	0.028547	3.5927	0.48027	35.030	0.27835	2.0822	0.8130	92.20
6.532	96.000	28.689	51.64	0.028475	3.5836	0.47906	35.118	0.27905	2.0874	0.8110	91.97
6.600	97.000	28.749	51.75	0.028403	3.5746	0.47785	35.207	0.27975	2.0927	0.8089	91.74
6.668	98.000	28.809	51.86	0.028331	3.5655	0.47664	35.297	0.28046	2.0980	0.8069	91.51
6.737	99.000	28.869	51.96	0.028259	3.5564	0.47543	35.387	0.28118	2.1034	0.8048	91.27
6.759	99.329	28.889	52.00	0.028235	3.5534	0.47503	35.417	0.28142	2.1052	0.8041	91.20
6.805	100.000	28.929	52.07	0.028187	3.5473	0.47421	35.478	0.28190	2.1088	0.8027	91.04
6.873	100.999	28.988	52.18	0.028114	3.5382	0.47299	35.569	0.28263	2.1142	0.8007	90.80
6.887	101.210	29.000	52.20	0.028099	3.5363	0.47273	35.588	0.28278	2.1154	0.8002	90.76
6.941	102.000	29.046	52.28	0.028042	3.5291	0.47177	35.661	0.28336	2.1197	0.7986	90.57
7.000	102.871	29.097	52.37	0.027978	3.5211	0.47070	35.742	0.28400	2.1245	0.7968	90.37
7.009	103.001	29.104	52.39	0.027969	3.5199	0.47054	35.754	0.28410	2.1252	0.7965	90.33
7.077	104.000	29.162	52.49	0.027896	3.5107	0.46932	35.847	0.28484	2.1308	0.7945	90.10
7.145	105.000	29.220	52.60	0.027823	3.5015	0.46809	35.942	0.28559	2.1364	0.7924	89.86
7.213	106.000	29.277	52.70	0.027750	3.4923	0.46685	36.037	0.28634	2.1420	0.7903	89.63
7.281	107.000	29.333	52.80	0.027676	3.4831	0.46562	36.132	0.28710	2.1477	0.7882	89.39
7.349	108.000	29.389	52.90	0.027602	3.4738	0.46438	36.229	0.28787	2.1534	0.7861	89.15
7.416	108.986	29.444	53.00	0.027529	3.4646	0.46315	36.325	0.28863	2.1591	0.7840	88.92
7.417	109.000	29.445	53.00	0.027528	3.4645	0.46313	36.326	0.28864	2.1592	0.7840	88.91
7.485	110.000	29.501	53.10	0.027454	3.4551	0.46188	36.424	0.28942	2.1650	0.7819	88.67
7.553	111.000	29.556	53.20	0.027380	3.4458	0.46063	36.523	0.29021	2.1709	0.7798	88.43
7.621	112.000	29.611	53.30	0.027305	3.4364	0.45938	36.623	0.29100	2.1769	0.7776	88.19
7.689	113.000	29.665	53.40	0.027230	3.4270	0.45812	36.724	0.29180	2.1828	0.7755	87.95
7.757	114.000	29.719	53.49	0.027155	3.4175	0.45685	36.826	0.29261	2.1889	0.7734	87.71
7.825	114.999	29.773	53.59	0.027080	3.4080	0.45558	36.928	0.29343	2.1950	0.7712	87.46
7.893	116.001	29.826	53.69	0.027004	3.3985	0.45431	37.032	0.29425	2.2012	0.7690	87.22
7.961	117.000	29.879	53.78	0.026928	3.3889	0.45303	37.136	0.29508	2.2074	0.7669	86.97
8.000	117.568	29.909	53.84	0.026885	3.3834	0.45230	37.196	0.29556	2.2109	0.7657	86.83
8.029	118.001	29.932	53.88	0.026851	3.3793	0.45174	37.242	0.29592	2.2136	0.7647	86.73
8.097	119.000	29.984	53.97	0.026775	3.3696	0.45045	37.349	0.29677	2.2200	0.7625	86.48
8.118	119.297	30.000	54.00	0.026752	3.3668	0.45007	37.380	0.29702	2.2219	0.7619	86.40
8.165	120.000	30.037	54.07	0.026698	3.3599	0.44916	37.456	0.29762	2.2264	0.7603	86.23
8.234	121.000	30.088	54.16	0.026620	3.3502	0.44786	37.565	0.29849	2.2329	0.7581	85.98
8.302	122.001	30.140	54.25	0.026543	3.3404	0.44655	37.675	0.29936	2.2394	0.7559	85.73
8.370	123.000	30.191	54.34	0.026465	3.3306	0.44524	37.786	0.30025	2.2460	0.7537	85.48
8.438	124.000	30.242	54.44	0.026386	3.3207	0.44391	37.899	0.30114	2.2527	0.7515	85.22
8.506	125.001	30.292	54.53	0.026307	3.3108	0.44259	38.013	0.30204	2.2595	0.7492	84.97

TABLE 12 CONTINUED

SATURATED LIQUID PARAHYDROGEN

PRESSURE		TEMPERATURE		DENSITY			VOLUME			DENSITY RATIO	
ATM	PSIA	KELVIN	RANKINE	GRAM-MOLE/ CM^3	LB/FT^3	LB/GAL	CM^3/ GRAM-MOLE	FT^3/LB	GAL/LB	LIQ VOLUME CORRECTION FACTOR	NTP (70F) VOLUME CORRECTION FACTOR
8.574	126.000	30.343	54.62	0.026228	3.3008	0.44125	38.127	0.30296	2.2663	0.7469	84.71
8.642	127.000	30.393	54.71	0.026148	3.2908	0.43991	38.244	0.30388	2.2732	0.7447	84.45
8.710	128.000	30.442	54.80	0.026068	3.2806	0.43856	38.362	0.30482	2.2802	0.7424	84.19
8.778	129.000	30.492	54.89	0.025987	3.2705	0.43726	38.481	0.30576	2.2873	0.7401	83.93
8.846	129.999	30.541	54.97	0.025906	3.2603	0.43584	38.601	0.30672	2.2944	0.7378	83.67
8.866	130.300	30.556	55.00	0.025881	3.2572	0.43542	38.638	0.30701	2.2966	0.7371	83.59
8.914	131.000	30.590	55.06	0.025824	3.2500	0.43446	38.724	0.30769	2.3017	0.7354	83.41
8.982	132.001	30.638	55.15	0.025742	3.2396	0.43307	38.847	0.30868	2.3091	0.7331	83.14
9.000	132.263	30.651	55.17	0.025720	3.2369	0.43271	38.880	0.30894	2.3110	0.7325	83.07
9.050	133.000	30.687	55.24	0.025659	3.2292	0.43168	38.973	0.30967	2.3165	0.7307	82.87
9.118	134.000	30.735	55.32	0.025576	3.2187	0.43028	39.100	0.31068	2.3241	0.7284	82.60
9.186	135.000	30.783	55.41	0.025491	3.2081	0.42886	39.229	0.31171	2.3317	0.7260	82.33
9.254	135.999	30.830	55.49	0.025407	3.1975	0.42744	39.359	0.31275	2.3395	0.7236	82.06
9.322	137.000	30.877	55.58	0.025322	3.1867	0.42600	39.492	0.31380	2.3474	0.7211	81.78
9.390	138.000	30.924	55.66	0.025236	3.1759	0.42456	39.627	0.31487	2.3554	0.7187	81.51
9.458	139.001	30.971	55.75	0.025149	3.1650	0.42310	39.763	0.31596	2.3635	0.7162	81.23
9.501	139.621	31.000	55.80	0.025095	3.1582	0.42219	39.849	0.31664	2.3686	0.7147	81.05
9.526	140.000	31.018	55.83	0.025061	3.1540	0.42163	39.902	0.31706	2.3718	0.7137	80.94
9.594	140.999	31.064	55.91	0.024973	3.1429	0.42015	40.043	0.31818	2.3801	0.7112	80.66
9.663	142.001	31.110	56.00	0.024884	3.1317	0.41865	40.186	0.31932	2.3886	0.7087	80.37
9.664	142.027	31.111	56.00	0.024882	3.1314	0.41861	40.190	0.31935	2.3889	0.7086	80.36
9.731	143.001	31.156	56.08	0.024794	3.1204	0.41714	40.332	0.32047	2.3973	0.7061	80.08
9.799	144.000	31.201	56.16	0.024704	3.1090	0.41561	40.480	0.32165	2.4061	0.7035	79.79
9.867	144.999	31.246	56.24	0.024612	3.0975	0.41407	40.630	0.32284	2.4150	0.7009	79.49
9.935	146.000	31.292	56.32	0.024520	3.0858	0.41251	40.784	0.32406	2.4242	0.6983	79.19
10.000	146.961	31.335	56.40	0.024430	3.0745	0.41100	40.934	0.32526	2.4331	0.6957	78.90
10.003	147.001	31.337	56.41	0.024426	3.0740	0.41094	40.940	0.32531	2.4335	0.6956	78.89
10.071	148.000	31.381	56.49	0.024331	3.0621	0.40935	41.099	0.32657	2.4429	0.6929	78.59
10.139	149.000	31.425	56.57	0.024236	3.0501	0.40774	41.261	0.32786	2.4526	0.6902	78.28
10.207	150.001	31.470	56.65	0.024139	3.0379	0.40611	41.427	0.32918	2.4624	0.6875	77.96
10.515	154.522	31.667	57.00	0.023685	2.9808	0.39848	42.220	0.33548	2.5096	0.6745	76.50
11.000	161.657	31.969	57.54	0.022903	2.8824	0.38532	43.662	0.34694	2.5953	0.6523	73.97
11.051	162.411	32.000	57.60	0.022814	2.8712	0.38383	43.832	0.34828	2.6053	0.6497	73.69
11.421	167.847	32.222	58.00	0.022130	2.7851	0.37231	45.188	0.35906	2.6859	0.6302	71.48
12.000	176.353	32.558	58.60	0.020809	2.6189	0.35009	48.056	0.38185	2.8564	0.5926	67.21
12.394	182.137	32.778	59.00	0.019520	2.4567	0.32841	51.229	0.40706	3.0450	0.5559	63.05
12.759	187.516	32.976	59.36	0.015590	1.9620	0.26228	64.144	0.50968	3.8127	0.4440	50.35


SPECIFIC VOLUME, ft³/lb
.330
.320
.310
.300
.290
.280
.270
.260
.250
.240
.230
.220
.210
SPEC
58
38
36
34
32
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26
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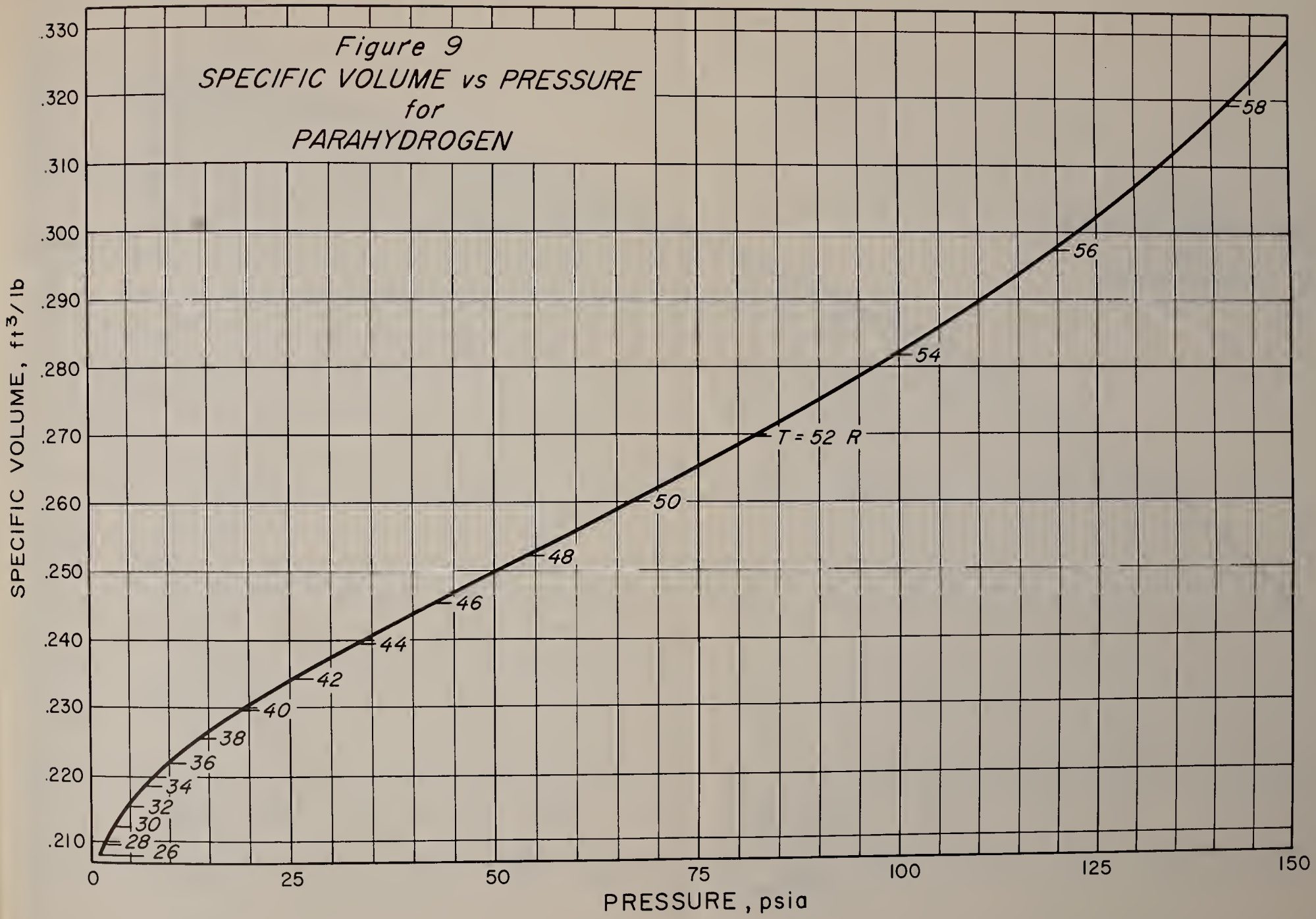
Figure 9
SPECIFIC VOLUME vs PRESSURE
for
PARAHYDROGEN
SPECIFIC VOLUME, ft³/lb
.330
.320
.310
.300
.290
.280
.270
.260
.250
.240
.230
.220
.210
0
25
50
75
100
125
150
PRESSURE, psia
T = 52 R
26
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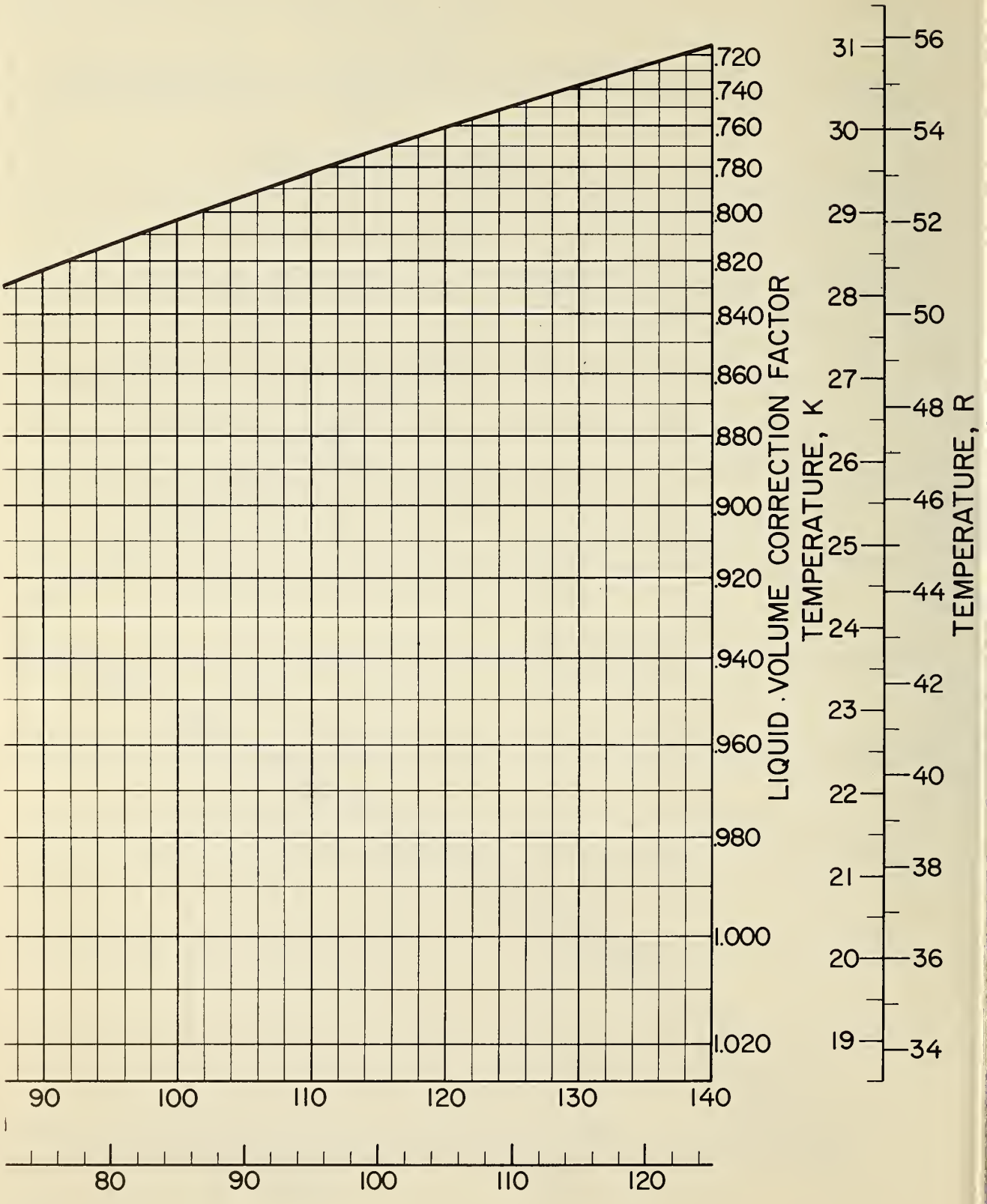
.720
.740
.760
.780
.800
.820
.840
.860
.880
.900
.920
.940
.960
.980
1.000
1.020
LIQUID VOLUME CORRECTION FACTOR
90
100
110
120
130
140
80
90
100
110
120
31
30
29
28
27
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24
23
22
21
20
19
TEMPERATURE, K
56
54
52
50
48
46
44
42
40
38
36
34
TEMPERATURE, R

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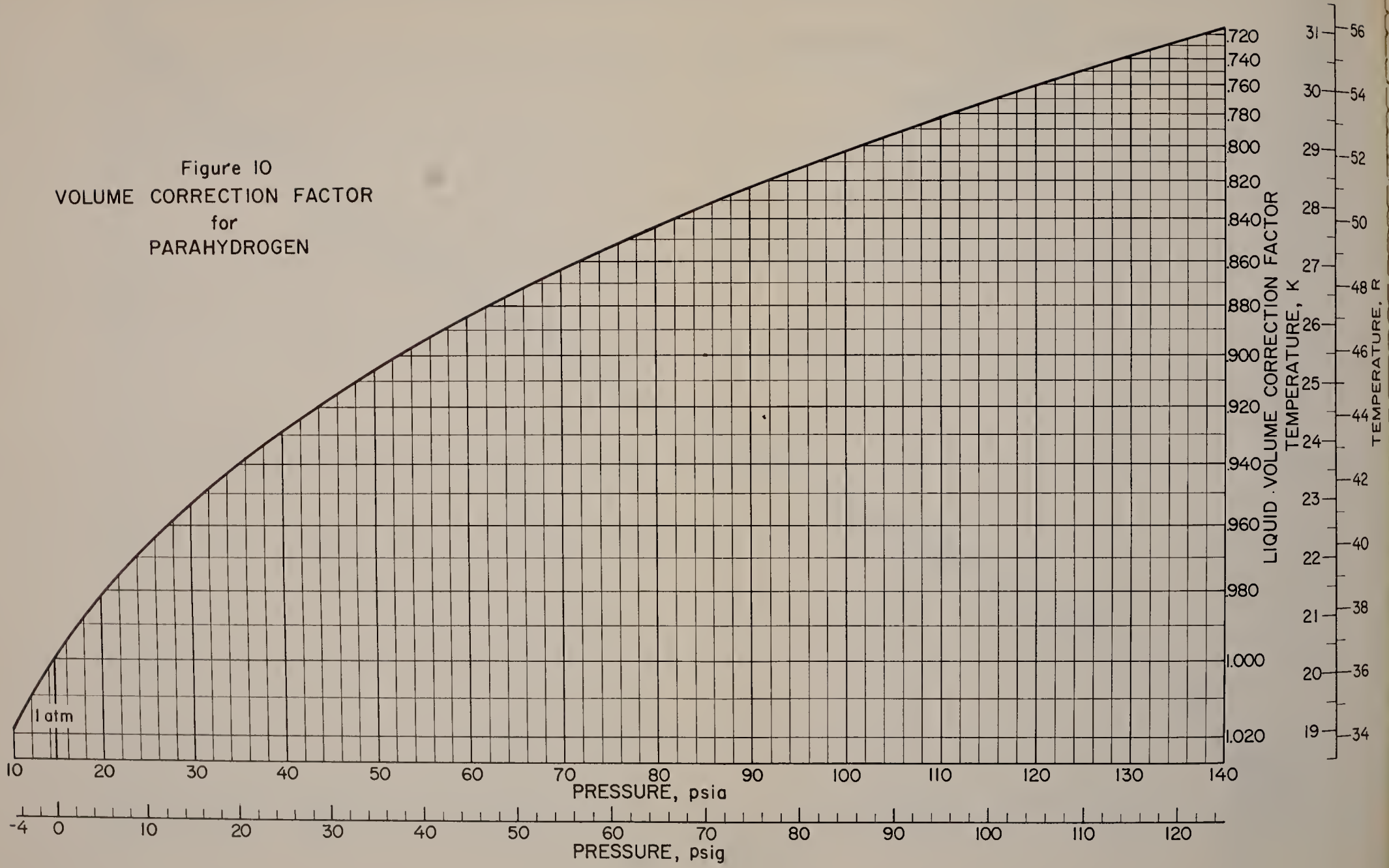
Figure 10
VOLUME CORRECTION FACTOR
for
PARAHYDROGEN



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10. Appendix

Units and Conversions

The calculations for all fluids were performed with equations whose units were atmospheres, degrees Kelvin, and molar volumes. The various units presented in the tables involved the following conversion factors (IUPAC 1961 and Mechtly 1964):

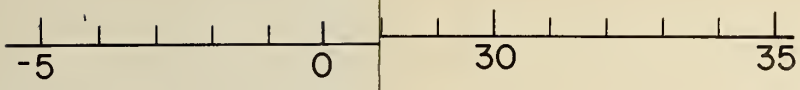
Molecular Weight

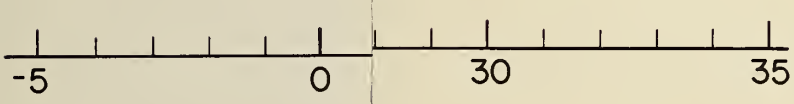
Parahydrogen	2.01594
Oxygen	31.9988
Nitrogen	28.016
Argon	39.948

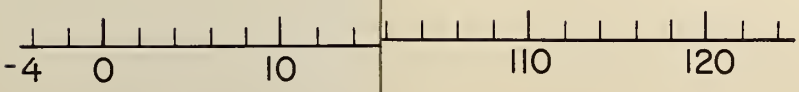
14.696 PSIA	= 1 atmosphere
1.8 degrees R	= 1 degree K
1000.0 cm^3	= 1 liter
28.316847 liters	= 1 ft^3
3.7854118 liters	= 1 gal
453.59237 gm	= 1 lb

Acknowledgement

This work although financed primarily with NBS funds is a "spin-off" from the Cryogenics Data Center's data compilation program largely supported by NASA-SNPO (Contract R-45) and OART (Contract R-46).







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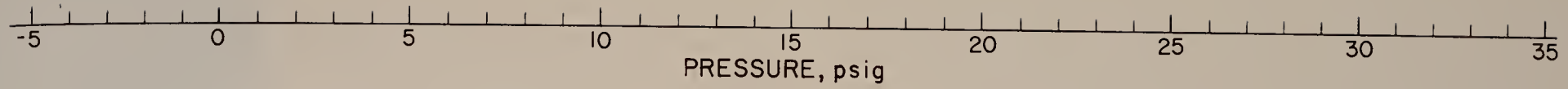
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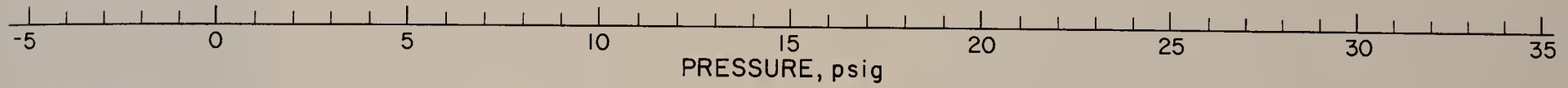
PRESSURE, psig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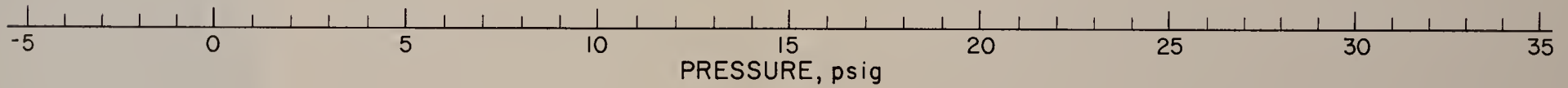
PRESSURE, psig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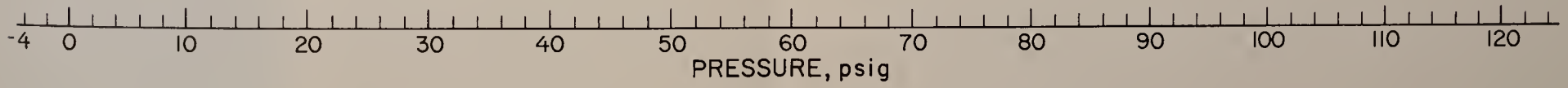
PRESSURE, psig


-4
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80
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100
110
120
PRESSURE, psig

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