TO: Lieut. Comdr. L. M. A. L.

TECHNICAL NOTES

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 276

H E L I U M T A B L E S

By Lieut. Comdr. Clinton H. Havill, U.S.N.

Washington
January, 1928

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

TECHNICAL NOTE NO. 276.

H E L I U M T A B L E S.

By Lieut. Comdr. Clinton H. Havill, U.S.N.

PART I.

These tables were prepared at the request of the U.S. Naval Air Station, Lakehurst, New Jersey, and the naval representative at the U. S. Helium Production Plant at Fort Worth, Texas.

These tables are intended to provide a standard method and to facilitate the calculation of the quantity of "Standard Helium" in high pressure containers (See example at end of Table IV). The research data and the formulas used in the preparation of the tables were furnished by the Research Laboratory of Physical Chemistry, of the Massachusetts Institute of Technology.

It is to be noted that the nitrogen impurity referred to in the tables (Part I) is not atmospheric nitrogen, which usually means a mixture of nitrogen, argon, and the other inert gases of the atmosphere, but pure nitrogen, containing no argon or other inert gases, as is produced in the separation of helium from the natural gas. This nitrogen impurity is more compressible than the helium for pressures higher than atmospheric and expands more than helium for partial pressures below atmospheric.

If it is desired to find the free volume (1 atmosphere pressure and 70° F.) of a mixture of helium and nitrogen, the following formula gives a very close approximation.

$$\frac{\text{Standard Helium in mixture calculated for Tables III and IV}}{\text{Value in Table IV for (0) gauge and purity}} =$$

Number of cubic feet of mixture at 70° F., 0 (gauge).

The author is responsible for the numerical calculations and he will appreciate information as to any errors which may be found so that they may be corrected.

HELIUM TABLES

COMPUTED BY CLINTON H. HAVILL

FROM

EQUATION FURNISHED BY DR. FREDERICK G. KEYES, PROF. J.A. BEATTIE AND DR. O.C. BRIDGEMAN

RESEARCH LABORATORY OF PHYSICAL CHEMISTRY

OF

MASS. INSTITUTE OF TECHNOLOGY

EQUATION OF STATE AS FURNISHED FOR PURE, DRY HELIUM

$$P = \frac{20.515\ T\left(1-\frac{10{,}000}{vT^3}\right)(v+3.5)}{v^2} - \frac{1350\left(1-\frac{14.96}{v}\right)}{v^2}$$

WHERE,— P = PRESSURE, ATMOSPHERES ABSOLUTE
T = TEMPERATURE, DEGREES CENTIGRADE ABSOLUTE
v = VOLUME PER WEIGHT IN $^{CC}/_{GR}$

CONVERSION FACTORS USED;-

1 ATMOSPHERE = 14.7 $^{LB}/_{SQ.IN.}$
$^{CC}/_{GR}$ x .016017 = $^{CU.FT.}/_{LB.}$
T° C ABS. x 1.8 = T° F ABS.

ABSOLUTE ZERO C = −273.13°
" " F = −459.63°

TABLE I

VALUES IN TABLE = $\left(\frac{Pv}{T}\right)$

WHERE,— P = $^{LB.}/_{SQ.FT.}$ ABSOLUTE
v = $^{CU.FT.}/_{LB.}$
T = TEMPERATURE DEGREES FAHRENHEIT ABSOLUTE

PRESSURE—LB/SQ. IN. ABSOLUTE	PRESSURE LB/SQ. IN. GAUGE	TEMPERATURE DEGREES F ABSOLUTE											
		479.63	489.63	499.63	509.63	519.63	529.63	539.63	549.63	559.63	569.63	579.63	589.63
		TEMPERATURE DEGREES F											
		20° F	30° F	40° F	50° F	60° F	70° F	80° F	90° F	100° F	110° F	120° F	130° F
14.7	0	386.360	386.356	386.353	386.349	386.345	386.342	386.338	386.335	386.331	386.327	386.324	386.320
114.7	100	387.725	387.721	387.718	387.714	387.710	387.707	387.703	387.700	387.696	387.692	387.689	387.685
214.7	200	389.250	389.219	389.189	389.157	389.126	389.096	389.064	389.034	389.003	388.971	388.941	388.910
314.7	300	390.775	390.717	390.659	390.601	390.542	390.484	390.426	390.368	390.309	390.251	390.193	390.135
414.7	400	392.301	392.215	392.130	392.044	391.958	391.873	391.787	391.702	391.616	391.530	391.445	391.359
514.7	500	393.826	393.713	393.600	393.487	393.374	393.262	393.148	393.036	392.923	392.810	392.697	392.584
614.7	600	395.351	395.210	395.071	394.930	394.790	394.650	394.510	394.370	394.230	394.089	393.950	393.809
714.7	700	396.876	396.708	396.541	396.374	396.206	396.039	395.871	395.704	395.536	395.369	395.202	395.034
814.7	800	398.401	398.206	398.012	397.817	397.622	397.428	397.232	397.038	396.843	396.648	396.454	396.259
914.7	900	399.926	399.704	399.482	399.260	399.038	398.816	398.594	398.372	398.150	397.928	397.706	397.484
1014.7	1000	401.452	401.202	400.953	400.703	400.454	400.205	399.955	399.706	399.457	399.207	398.958	398.708
1114.7	1100	402.977	402.700	402.424	402.147	401.870	401.594	401.316	401.040	400.763	400.486	400.210	399.933
1214.7	1200	404.502	404.198	403.894	403.590	403.286	402.982	402.678	402.374	402.070	401.766	401.462	401.158
1314.7	1300	406.027	405.696	405.365	405.033	404.702	404.371	404.039	403.708	403.377	403.045	402.714	402.383
1414.7	1400	407.552	407.194	406.835	406.477	406.118	405.760	405.400	405.042	404.683	404.325	403.966	403.608
1514.7	1500	409.077	408.691	408.306	407.920	407.534	407.148	406.762	406.376	405.990	405.604	405.218	404.833
1614.7	1600	410.603	410.189	409.776	409.363	408.949	408.537	408.123	407.711	407.297	406.884	406.471	406.057
1714.7	1700	412.128	411.687	411.247	410.806	410.365	409.925	409.485	409.045	408.604	408.163	407.723	407.282
1814.7	1800	413.653	413.185	412.717	412.250	411.781	411.314	410.846	410.379	409.910	409.443	408.975	408.507
1914.7	1900	415.178	414.683	414.188	413.693	413.197	412.703	412.207	411.713	411.217	410.722	410.227	409.732
2014.7	2000	416.703	416.181	415.658	415.136	414.613	414.091	413.569	413.047	412.524	412.002	411.479	410.957
2114.7	2100	418.228	417.679	417.129	416.580	416.029	415.480	414.930	414.381	413.830	413.281	412.731	412.182
2214.7	2200	419.754	419.177	418.600	418.023	417.445	416.869	416.291	415.715	415.137	414.560	413.983	413.406
2314.7	2300	421.279	420.675	420.070	419.466	418.861	418.257	417.653	417.049	416.444	415.840	415.235	414.631
2414.7	2400	422.804	422.173	421.541	420.909	420.277	419.646	419.014	418.383	417.751	417.119	416.487	415.856
2514.7	2500	424.329	423.671	423.011	422.353	421.693	421.035	420.375	419.717	419.057	418.399	417.739	417.081
2614.7	2600	425.854	425.168	424.482	423.796	423.109	422.423	421.737	421.051	420.364	419.678	418.992	418.306
2714.7	2700	427.379	426.666	425.952	425.239	424.525	423.812	423.098	422.385	421.671	420.958	420.244	419.531
2814.7	2800	428.905	428.164	427.423	426.682	425.941	425.201	424.459	423.719	422.978	422.237	421.496	420.755
2914.7	2900	430.430	429.662	428.893	428.126	427.357	426.589	425.821	425.053	424.284	423.516	422.748	421.980
3014.7	3000	431.955	431.160	430.364	429.569	428.773	427.978	427.182	426.387	425.591	424.796	424.000	423.205

U. S. GOVERNMENT PRINTING OFFICE: 1926

NITROGEN TABLES

COMPUTED BY CLINTON H. HAVILL

FROM

EQUATION FURNISHED BY DR. FREDERICK G. KEYES, PROF. J.A. BEATTIE AND DR. O. C. BRIDGEMAN

RESEARCH LABORATORY OF PHYSICAL CHEMISTRY

MASS. INSTITUTE OF TECHNOLOGY

EQUATION OF STATE AS FURNISHED FOR PURE, DRY NITROGEN,—

$$P = \frac{2.92904\,T\left(1-\frac{1{,}500{,}000}{vT^3}\right)\left[v+1.8011\left(1+\frac{.24652}{v}\right)\right]}{v^2} - \frac{1713\left(1-\frac{.93403}{v}\right)}{v^2}$$

WHERE,— P = PRESSURE, ATMOSPHERES ABSOLUTE
T = TEMPERATURE, DEGREES CENTIGRADE ABSOLUTE
v = VOLUME PER WEIGHT IN $^{CC}/_{GR}$

CONVERSION FACTORS USED:—

1 ATMOSPHERE = 14.7 $^{LB}/_{SQ.\,IN.}$
$^{CC}/_{GR.}$ x .016017 = $^{CU.\,FT}/_{LB.}$
T° C ABS. x 1.8 = T° F ABS.

ABSOLUTE ZERO C = −273.13°
" " F = −459.63°

TABLE I (a)

PRELIMINARY TABLE COMPILED TO COMPUTE NITROGEN AS IMPURITY IN COMMERCIAL HELIUM, USING PARTIAL PRESSURES

VALUES IN TABLE = $\left(\frac{Pv}{T}\right)$

WHERE,— P = $^{LB}/_{SQ.\,FT.}$ ABSOLUTE
v = $^{CU.\,FT.}/_{LB.}$
T = TEMPERATURE DEGREES FAHRENHEIT ABSOLUTE

PRESSURE LB/SQ. IN. ABSOLUTE	PRESSURE LB/SQ. IN. GAUGE	TEMPERATURE DEGREES F ABSOLUTE											
		479.63	489.63	499.63	509.63	519.63	529.63	539.63	549.63	559.63	569.63	579.63	589.63
		TEMPERATURE DEGREES F											
		20° F	30° F	40° F	50° F	60° F	70° F	80° F	90° F	100° F	110° F	120° F	130° F
14.7	0	55.150	55.129	55.108	55.087	55.066	55.045	55.023	55.002	54.981	54.960	54.939	54.918
24.7	10	55.129	55.109	55.090	55.071	55.052	55.032	55.012	54.993	54.974	54.954	54.935	54.916
34.7	20	55.107	55.090	55.072	55.055	55.037	55.020	55.001	54.984	54.966	54.949	54.931	54.914
44.7	30	55.086	55.070	55.054	55.038	55.023	55.007	54.990	54.975	54.959	54.943	54.927	54.912
54.7	40	55.064	55.050	55.036	55.022	55.008	54.994	54.980	54.966	54.952	54.938	54.924	54.910
64.7	50	55.043	55.031	55.018	55.006	54.994	54.982	54.969	54.957	54.944	54.932	54.920	54.908
74.7	60	55.021	55.011	55.001	54.990	54.979	54.969	54.958	54.947	54.937	54.926	54.916	54.905
84.7	70	55.000	54.991	54.983	54.974	54.965	54.956	54.947	54.938	54.930	54.921	54.912	54.903
94.7	80	54.979	54.972	54.965	54.957	54.951	54.944	54.936	54.929	54.922	54.915	54.908	54.901
104.7	90	54.957	54.952	54.947	54.941	54.936	54.931	54.925	54.920	54.915	54.909	54.904	54.899
114.7	100	54.936	54.932	54.929	54.925	54.922	54.918	54.914	54.911	54.908	54.904	54.900	54.897
124.7	110	54.914	54.913	54.911	54.909	54.907	54.906	54.904	54.902	54.900	54.898	54.897	54.895
134.7	120	54.893	54.893	54.893	54.893	54.893	54.893	54.893	54.893	54.893	54.893	54.893	54.893
144.7	130	54.871	54.873	54.875	54.877	54.878	54.880	54.882	54.884	54.886	54.887	54.889	54.891
154.7	140	54.850	54.854	54.857	54.860	54.864	54.868	54.871	54.875	54.878	54.881	54.885	54.889
164.7	150	54.829	54.834	54.839	54.844	54.850	54.855	54.860	54.866	54.871	54.876	54.881	54.887
174.7	160	54.807	54.814	54.822	54.828	54.835	54.842	54.849	54.856	54.864	54.870	54.877	54.884
184.7	170	54.786	54.795	54.804	54.812	54.821	54.830	54.838	54.847	54.856	54.864	54.873	54.882
194.7	180	54.764	54.775	54.786	54.796	54.806	54.817	54.828	54.838	54.849	54.859	54.870	54.880
204.7	190	54.743	54.755	54.768	54.779	54.792	54.804	54.817	54.829	54.842	54.853	54.866	54.878
214.7	200	54.721	54.736	54.750	54.763	54.777	54.792	54.806	54.820	54.834	54.848	54.862	54.876
224.7	210	54.700	54.716	54.732	54.747	54.763	54.779	54.795	54.811	54.827	54.842	54.858	54.874

U. S. GOVERNMENT PRINTING OFFICE: 1923

HELIUM TABLE II

SPECIFIC VOLUME CU. FT./LB.

VALUES IN THIS TABLE = VOLUME IN CU. FT. OF ONE (1) LB OF PURE, DRY HELIUM

PRESSURE LB/SQ. IN. ABS.	PRESSURE LB/SQ. IN. GAUGE	TEMPERATURE DEGREES F											
		20° F	30° F	40° F	50° F	60° F	70° F	80° F	90° F	100° F	110° F	120° F	130° F
14.7	0	87.543	89.366	91.191	93.015	94.839	96.664	98.488	100.312	102.136	103.960	105.785	107.609
114.7	100	11.259	11.494	11.728	11.963	12.198	12.432	12.667	12.902	13.137	13.371	13.605	13.840
214.7	200	6.0387	6.1640	6.2895	6.4148	6.5402	6.6655	6.7908	6.9161	7.0414	7.1666	7.2919	7.4171
314.7	300	4.1359	4.2215	4.3071	4.3927	4.4782	4.5637	4.6491	4.7346	4.8200	4.9054	4.9908	5.0761
414.7	400	3.1509	3.2158	3.2808	3.3458	3.4106	3.4755	3.5404	3.6052	3.6700	3.7347	3.7995	3.8642
514.7	500	2.5486	2.6009	2.6533	2.7056	2.7579	2.8102	2.8624	2.9147	2.9668	3.0190	3.0711	3.1232
614.7	600	2.1422	2.1861	2.2300	2.2738	2.3176	2.3613	2.4050	2.4488	2.4924	2.5361	2.5797	2.6232
714.7	700	1.8496	1.8874	1.9251	1.9628	2.0005	2.0381	2.0757	2.1133	2.1508	2.1883	2.2258	2.2632
814.7	800	1.6288	1.6619	1.6951	1.7281	1.7612	1.7942	1.8272	1.8601	1.8930	1.9259	1.9588	1.9916
914.7	900	1.4563	1.4858	1.5153	1.5448	1.5742	1.6036	1.6330	1.6623	1.6916	1.7209	1.7501	1.7793
1014.7	1000	1.3178	1.3444	1.3710	1.3976	1.4241	1.4506	1.4771	1.5035	1.5299	1.5563	1.5826	1.6089
1114.7	1100	1.2041	1.2284	1.2526	1.2768	1.3010	1.3251	1.3492	1.3732	1.3972	1.4212	1.4452	1.4691
1214.7	1200	1.1092	1.1314	1.1537	1.1759	1.1980	1.2202	1.2423	1.2644	1.2864	1.3084	1.3303	1.3523
1314.7	1300	1.0287	1.0493	1.0698	1.0903	1.1108	1.1313	1.1518	1.1721	1.1924	1.2127	1.2330	1.2532
1414.7	1400	.95930	.97868	.99779	1.0169	1.0359	1.0549	1.0739	1.0928	1.1117	1.1306	1.1494	1.1682
1514.7	1500	.89955	.91744	.93529	.95310	.97089	.98864	1.0063	1.0240	1.0417	1.0593	1.0768	1.0944
1614.7	1600	.84698	.86377	.88052	.89724	.91392	.93057	.94718	.96376	.98029	.99680	1.0133	1.0297
1714.7	1700	.80055	.81637	.83215	.84789	.86360	.87928	.89492	.91052	.92609	.94162	.95712	.97258
1814.7	1800	.75923	.77419	.78910	.80397	.81883	.83364	.84841	.86315	.87785	.89252	.90715	.92175
1914.7	1900	.72223	.73641	.75056	.76466	.77873	.79277	.80677	.82073	.83466	.84855	.86241	.87623
2014.7	2000	.68891	.70239	.71584	.72924	.74262	.75595	.76926	.78252	.79575	.80895	.82210	83522
2114.7	2100	.65873	.67158	.68440	.69717	.70991	.72262	.73529	.74793	.76052	.77309	.78561	.79810
2214.7	2200	.63128	.64356	.65579	.66800	.68016	.69230	.70439	.71645	.72847	.74046	.75241	76432
2314.7	2300	.60620	.61796	.62967	.64135	.65299	.66460	.67617	.68770	.69920	.71066	.72209	.73347
2414.7	2400	.58321	.59448	.60571	.61691	.62806	.63919	.65028	.66133	.67235	.68333	.69427	.70518
2514.7	2500	.56203	.57286	.58365	.59440	.60512	.61580	.62645	.63706	.64763	.65817	.66866	.67913
2614.7	2600	.54248	.55290	.56328	.57362	.58393	.59420	.60444	.61464	.62480	.63493	.64502	.65507
2714.7	2700	.52437	.53441	.54441	.55437	.56430	.57420	.58405	.59387	.60366	.61341	.62311	.63279
2814.7	2800	.50754	.51723	.52688	.53649	.54607	.55561	.56512	.57459	.58401	.59341	.60277	.61209
2914.7	2900	.49187	.50123	.51055	.51984	.52909	.53830	.54748	.55662	.56572	.57479	.58382	.59281
3014.7	3000	.47724	.48630	.49531	.50429	.51323	.52214	.53101	.53984	.54864	.55740	.56612	.57481

NITROGEN TABLE II a

SPECIFIC VOLUME CU. FT./LB.

VALUES IN THIS TABLE = VOLUME IN CU. FT. OF ONE (1) LB OF PURE, DRY NITROGEN

PRESSURE LB/SQ. IN. ABS.	PRESSURE LB/SQ. IN. GAUGE	TEMPERATURE DEGREES F											
		20° F	30° F	40° F	50° F	60° F	70° F	80° F	90° F	100° F	110° F	120° F	130° F
14.7	0	12.496	12.752	13.007	13.262	13.518	13.772	14.027	14.281	14.536	14.790	15.044	15.297
24.7	10	7.4340	7.5864	7.7386	7.8907	8.0427	8.1947	8.3463	8.4980	8.6496	8.8011	8.9525	9.1037
34.7	20	5.2896	5.3982	5.5067	5.6151	5.7234	5.8317	5.9399	6.0480	6.1561	6.2641	6.3720	6.4799
44.7	30	4.1047	4.1890	4.2734	4.3576	4.4419	4.5261	4.6101	4.6942	4.7783	4.8623	4.9462	5.0301
54.7	40	3.3529	3.4220	3.4910	3.5599	3.6289	3.6978	3.7666	3.8354	3.9042	3.9729	4.0417	4.1103
64.7	50	2.8336	2.8921	2.9505	3.0088	3.0672	3.1255	3.1838	3.2421	3.3003	3.3585	3.4167	3.4749
74.7	60	2.4533	2.5040	2.5547	2.6053	2.6559	2.7065	2.7570	2.8076	2.8581	2.9086	2.9591	3.0096
84.7	70	2.1628	2.2076	2.2523	2.2970	2.3417	2.3864	2.4311	2.4757	2.5204	2.5650	2.6096	2.6542
94.7	80	1.9337	1.9738	2.0138	2.0539	2.0939	2.1339	2.1739	2.2139	2.2539	2.2939	2.3339	2.3738
104.7	90	1.7483	1.7846	1.8209	1.8571	1.8934	1.9297	1.9659	2.0021	2.0384	2.0746	2.1108	2.1470
114.7	100	1.5953	1.6284	1.6616	1.6947	1.7279	1.7610	1.7941	1.8273	1.8604	1.8935	1.9266	1.9598
124.7	110	1.4668	1.4973	1.5278	1.5584	1.5889	1.6194	1.6499	1.6805	1.7110	1.7415	1.7720	1.8025
134.7	120	1.3574	1.3857	1.4140	1.4422	1.4706	1.4989	1.5271	1.5555	1.5838	1.6120	1.6403	1.6687
144.7	130	1.2631	1.2894	1.3158	1.3422	1.3686	1.3949	1.4213	1.4477	1.4741	1.5005	1.5269	1.5533
154.7	140	1.1811	1.2058	1.2305	1.2552	1.2799	1.3046	1.3293	1.3540	1.3788	1.4035	1.4282	1.4530
164.7	150	1.1088	1.1320	1.1553	1.1785	1.2017	1.2250	1.2482	1.2715	1.2948	1.3180	1.3413	1.3646
174.7	160	1.0449	1.0669	1.0888	1.1107	1.1327	1.1546	1.1766	1.1985	1.2205	1.2424	1.2644	1.2864
184.7	170	.98797	1.0087	1.0295	1.0503	1.0710	1.0918	1.1126	1.1334	1.1542	1.1750	1.1959	1.2167
194.7	180	.93686	.95658	.97631	.99603	1.0158	1.0355	1.0553	1.0750	1.0948	1.1146	1.1344	1.1542
204.7	190	.89075	.90953	.92831	.94709	.96590	.98471	1.0035	1.0224	1.0412	1.0600	1.0789	1.0977
214.7	200	.84893	.86685	.88478	.90271	.92067	.93863	.95660	.97458	.99256	1.0105	1.0286	1.0466
224.7	210	.81085	.82816	.84515	.86230	.87948	.89667	.91386	.93107	.94829	.96549	.98273	.99998

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HELIUM TABLE III

VALUES IN THIS TABLE = NUMBER CU. FT. STANDARD HELIUM CONTAINED IN EACH CU. FT. (DEAD VOL) OF CONTAINER

$$= \frac{\text{SPECIFIC VOLUME OF STANDARD HELIUM}}{\text{SPECIFIC VOLUME}} = \frac{96.684}{v}$$

v = SPECIFIC VOLUME; SEE TABLE II

STANDARD HELIUM IS MEASURED AT 70° F, 30" Hg AND 100% PURITY

NOTE:- THIS TABLE FOR 100% PURITY

FOR PURITY OTHER THAN 100% MULTIPLY BY FACTORS IN TABLE IV

PRESSURE LB/SQ. IN. ABSOLUTE	PRESSURE LB/SQ. IN. GAUGE	TEMPERATURE DEGREES F										
		20° F	30° F	40° F	50° F	60° F	70° F	80° F	90° F	100° F	110° F	120° F	130° F
14.7	0	1.1042	1.0817	1.0600	1.0392	1.0192	1.0000	.98148	.96363	.94642	.92982	.91378	.89829
	20	2.6047	2.5515	2.5004	2.4514	2.4043	2.3591	2.3152	2.2731	2.2325	2.1933	2.1555	2.1190
	40	4.1030	4.0193	3.9388	3.8616	3.7873	3.7158	3.6470	3.5807	3.5167	3.4550	3.3955	3.3379
	60	5.5993	5.4850	5.3752	5.2698	5.1685	5.0709	4.9770	4.8865	4.7992	4.7150	4.6337	4.5552
	80	7.0934	6.9486	6.8096	6.6760	6.5476	6.4241	6.3050	6.1904	6.0798	5.9732	5.8702	5.7707
114.7	100	8.5855	8.4100	8.2422	8.0802	7.9246	7.7754	7.6312	7.4922	7.3581	7.2294	7.1050	6.9844
	20	10.075	9.8689	9.6716	9.4821	9.2998	9.1245	8.9556	8.7928	8.6360	8.4845	8.3384	8.1971
	40	11.561	11.326	11.099	10.882	10.673	10.472	10.278	10.091	9.9115	9.7379	9.5702	9.4082
	60	13.046	12.780	12.525	12.280	12.044	11.817	11.599	11.388	11.185	10.990	10.801	10.618
	80	14.528	14.232	13.948	13.675	13.413	13.160	12.918	12.683	12.458	12.240	12.029	11.826
214.7	200	16.008	15.682	15.369	15.069	14.780	14.502	14.235	13.890	13.728	13.488	13.256	13.033
	20	17.484	17.129	16.788	16.460	16.145	15.842	15.550	15.268	14.997	14.735	14.482	14.238
	40	18.960	18.575	18.205	17.850	17.508	17.179	16.863	16.558	16.264	15.980	15.706	15.441
	60	20.433	20.018	19.620	19.237	18.869	18.515	18.174	17.846	17.529	17.223	16.928	16.643
	80	21.903	21.459	21.032	20.622	20.228	19.849	19.484	19.132	18.793	18.465	18.149	17.844
314.7	300	23.372	22.898	22.443	22.006	21.585	21.181	20.792	20.417	20.055	19.706	19.368	19.043
	20	24.838	24.334	23.851	23.387	22.941	22.511	22.098	21.699	21.315	20.944	20.586	20.240
	40	26.301	25.769	25.257	24.766	24.293	23.839	23.402	22.980	22.573	22.181	21.802	21.436
	60	27.763	27.201	26.661	26.143	25.645	25.166	24.704	24.259	23.830	23.416	23.017	22.631
	80	29.222	28.482	28.063	27.519	26.994	26.490	26.005	25.537	25.085	24.650	24.230	23.824
414.7	400	30.678	30.059	29.464	28.891	28.342	27.813	27.303	26.812	26.339	25.883	25.441	25.015
	20	32.133	31.484	30.861	30.263	29.687	29.133	28.600	28.086	27.591	27.113	26.651	26.205
	40	33.585	32.907	32.256	31.631	31.030	30.452	29.895	29.358	28.842	28.341	27.859	27.393
	60	35.036	34.329	33.650	32.999	32.372	31.769	31.189	30.629	30.090	29.569	29.066	28.581
	80	36.482	35.748	35.041	34.363	33.711	33.084	32.480	31.897	31.336	30.800	30.271	29.766
514.7	500	37.928	37.166	36.432	35.727	35.050	34.398	33.770	33.164	32.582	32.019	31.475	30.950
	20	39.372	38.580	37.819	37.088	36.385	35.709	35.058	34.430	33.825	33.241	32.678	32.133
	40	40.812	39.992	39.154	38.446	37.719	37.019	36.343	35.694	35.066	34.462	33.878	33.264
	60	42.252	41.403	40.488	39.804	39.051	38.326	37.628	36.956	36.307	35.682	35.078	34.494
	80	43.688	42.811	41.918	41.158	39.999	39.632	38.911	38.215	37.546	36.899	36.276	35.672
614.7	600	45.124	44.218	43.347	42.512	40.937	40.937	40.193	39.474	38.784	38.115	37.471	36.850
	20	46.555	45.622	44.725	43.863	43.035	42.238	41.471	40.731	40.018	39.330	38.666	38.024
	40	47.984	47.023	46.099	45.212	44.359	43.538	42.748	41.986	41.251	40.503	39.858	39.198
	60	49.413	48.423	47.473	46.560	45.682	44.837	44.024	43.240	42.484	41.755	41.050	40.371
	80	50.838	49.819	48.843	47.904	47.001	46.134	45.297	44.491	43.714	42.964	42.240	41.541
714.7	700	52.262	51.215	50.212	49.248	48.320	47.428	46.569	45.741	44.943	44.173	43.429	42.711
	20	53.679	52.605	51.575	50.586	49.633	48.718	47.836	46.986	46.167	45.377	44.613	43.876
	40	55.096	53.995	52.938	51.924	50.946	50.007	49.103	48.231	47.391	46.581	45.797	45.041
	60	56.513	55.385	54.300	53.261	52.259	51.297	50.369	49.477	48.616	47.784	46.981	46.206
	80	57.930	56.775	55.663	54.599	53.572	52.586	51.636	50.722	49.840	48.988	48.165	47.371
814.7	800	59.347	58.165	57.026	55.937	54.885	53.876	52.903	51.967	51.064	50.192	49.349	48.536
	20	60.753	59.544	58.379	57.264	56.184	55.157	54.161	53.204	52.280	51.388	50.526	49.694
	40	62.159	60.923	59.732	58.592	57.493	56.437	55.419	54.441	53.496	52.584	51.703	50.852
	60	63.564	62.301	61.086	59.919	58.797	57.718	56.678	55.677	54.712	53.779	52.879	52.011
	80	64.970	63.680	62.439	61.247	60.101	58.998	57.936	56.914	55.928	54.975	54.056	53.169
914.7	900	66.376	65.059	63.792	62.574	61.405	60.279	59.194	58.151	57.144	56.171	55.233	54.327
	20	67.771	66.427	65.135	63.892	62.699	61.551	60.444	59.379	58.352	57.359	56.402	55.478
	40	69.167	67.796	66.478	65.210	63.994	62.822	61.693	60.608	59.560	58.547	57.571	56.629
	60	70.562	69.164	67.820	66.528	65.288	64.094	62.943	61.836	60.767	59.735	58.741	57.779
	80	71.958	70.533	69.163	67.846	66.583	65.365	64.192	63.065	61.975	60.923	59.910	58.930
1014.7	1000	73.353	71.901	70.506	69.164	67.877	66.637	65.442	64.293	63.183	62.111	61.079	60.081
	20	74.738	73.259	71.839	70.473	69.162	67.899	66.683	65.513	64.383	63.292	62.240	61.224
	40	76.123	74.617	73.172	71.782	70.446	69.161	67.923	66.733	65.583	64.413	63.402	62.368
	60	77.509	75.975	74.505	73.090	71.731	70.424	69.164	67.953	66.784	65.654	64.563	63.511
	80	78.894	77.333	75.838	74.399	73.015	71.686	70.404	69.173	67.984	66.835	65.725	64.655
1114.7	1100	80.279	78.691	77.171	75.708	74.300	72.948	71.645	70.393	69.184	68.016	66.886	65.798
	20	81.653	80.040	78.494	77.007	75.578	74.202	72.878	71.604	70.376	69.189	68.041	66.935
	40	83.026	81.390	79.817	78.306	76.855	75.457	74.111	72.816	71.568	70.362	69.197	68.071
	60	84.400	82.739	81.140	79.606	78.133	76.711	75.345	74.027	72.759	71.534	70.352	69.208
	80	85.773	84.089	82.463	80.905	79.410	77.966	76.578	75.239	73.951	72.707	71.508	70.344
1214.7	1200	87.147	85.438	83.786	82.204	80.688	79.220	77.811	76.450	75.143	73.880	72.663	71.481
	20	88.511	86.775	85.260	83.495	81.955	80.465	79.034	77.654	76.328	75.046	73.810	72.612
	40	89.875	88.112	86.534	84.786	83.222	81.710	80.256	78.858	77.513	76.212	74.957	73.742
	60	91.239	89.448	87.809	86.076	84.488	82.955	81.479	80.063	78.697	77.378	76.103	74.873
	80	92.603	90.785	89.083	87.367	85.755	84.200	82.701	81.267	79.882	78.544	77.250	76.003
1314.7	1300	93.967	92.122	90.357	88.658	87.022	85.445	83.924	82.471	81.067	79.710	78.397	77.134
	20	95.327	93.452	91.661	89.938	88.280	86.683	85.142	83.668	82.244	80.868	79.538	78.256
	40	96.686	94.781	92.965	91.218	89.539	87.920	86.359	84.865	83.421	82.025	80.678	79.379
	60	98.046	96.111	94.270	92.498	90.797	89.158	87.577	86.061	84.597	83.183	81.819	80.501
	80	99.405	97.440	95.574	93.778	92.056	90.395	88.794	87.258	85.774	84.340	82.959	81.624
1414.7	1400	100.765	98.770	96.878	95.058	93.314	91.633	90.012	88.455	86.951	85.498	84.100	82.746
	20	102.104	100.089	98.173	96.331	94.564	92.861	91.221	89.644	88.120	86.649	85.234	83.862
	40	103.442	101.407	99.468	97.603	95.813	94.090	92.431	90.832	89.288	87.800	86.368	84.978
	60	104.781	102.726	100.762	98.876	97.063	95.318	93.640	92.021	90.457	88.951	87.502	86.044
	80	106.119	104.044	102.057	100.148	98.312	96.547	94.850	93.209	91.625	90.102	88.636	87.210
1514.7	1500	107.458	105.363	103.352	101.421	99.562	97.775	96.059	94.398	92.794	91.253	89.770	88.326

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PAGE 2 (1500 TO 3000 LB/SQ IN GAUGE)

HELIUM TABLE III CONTINUED

VALUES IN THIS TABLE = NUMBER CU. FT. STANDARD HELIUM CONTAINED IN EACH CU. FT. (DEAD VOL) OF CONTAINER

$$= \frac{\text{SPECIFIC VOLUME OF STANDARD HELIUM}}{\text{SPECIFIC VOLUME}} = \frac{96.664}{v}$$

v = SPECIFIC VOLUME; SEE TABLE II

STANDARD HELIUM IS MEASURED AT 70° F, 30" Hg AND 100% PURITY

NOTE:- THIS TABLE FOR 100% PURITY

FOR PURITY OTHER THAN 100% MULTIPLY BY FACTORS IN TABLE IV

PRESSURE LB/SQ. IN. ABSOLUTE	PRESSURE LB/SQ. IN. GAUGE	TEMPERATURE DEGREES F										
		20° F	30° F	40° F	50° F	60° F	70° F	80° F	90° F	100° F	110° F	120° F	130° F
1514.7	1500	107.458	105.363	103.352	101.421	99.562	97.775	96.059	94.398	92.794	91.253	89.770	88.326
	20	108.792	106.672	104.638	102.684	100.803	98.995	97.258	95.578	93.957	92.379	90.895	89.436
	40	110.126	107.981	105.924	103.947	102.045	100.215	98.457	96.758	95.120	93.541	92.020	90.546
	60	111.460	109.291	107.209	105.209	103.286	101.436	99.657	97.939	96.282	94.686	93.145	91.656
	80	112.794	110.600	108.495	106.472	104.528	102.656	100.856	99.119	97.445	95.830	94.270	92.766
1614.7	1600	114.128	111.909	109.781	107.735	105.769	103.876	102.055	100.299	98.608	96.974	95.395	93.876
	20	115.452	113.209	111.057	108.989	107.001	105.088	103.247	101.472	99.762	98.111	96.515	94.979
	40	116.776	114.508	112.333	110.243	108.234	106.300	104.439	102.645	100.916	99.247	97.635	96.081
	60	118.099	115.808	113.610	111.497	109.466	107.511	105.630	103.818	102.071	100.384	98.755	97.184
	80	119.423	117.107	114.886	112.751	110.699	108.723	106.822	104.991	103.225	101.520	99.875	98.286
1714.7	1700	120.747	118.407	116.162	114.005	111.931	109.935	108.014	106.164	104.379	102.657	100.995	99.389
	20	122.061	119.697	117.429	115.250	113.155	111.139	109.198	107.329	105.526	103.787	102.108	100.485
	40	123.375	120.987	118.697	116.495	114.379	112.343	110.382	108.494	106.673	104.916	103.220	101.581
	60	124.690	122.278	119.964	117.740	115.603	113.546	111.567	109.660	107.820	106.046	104.333	102.678
	80	126.004	123.567	121.232	118.985	116.827	114.750	112.751	110.825	108.967	107.175	105.445	103.774
1814.7	1800	127.318	124.858	122.499	120.230	118.051	115.954	113.935	111.990	110.114	108.305	106.558	104.870
	20	128.623	126.149	123.757	121.467	119.267	117.150	115.111	113.148	111.254	109.427	107.664	105.960
	40	129.927	127.440	125.015	122.704	120.483	118.345	116.287	114.305	112.393	110.550	108.769	107.049
	60	131.232	128.730	126.273	123.940	121.698	119.541	117.464	115.463	113.533	111.672	109.875	108.139
	80	132.536	130.021	127.531	125.177	122.914	120.736	118.640	116.620	114.672	112.795	110.980	109.228
1914.7	1900	133.841	131.312	128.789	126.414	124.130	121.932	119.816	117.778	115.812	113.917	112.086	110.318
	20	135.136	132.574	130.038	127.642	125.337	123.120	120.984	118.928	116.945	115.032	113.185	111.401
	40	136.430	133.836	131.088	128.870	126.544	124.308	122.153	120.078	118.077	116.147	114.284	112.485
	60	137.725	135.098	132.537	130.098	127.752	125.495	123.321	121.229	119.210	117.263	115.384	113.568
	80	139.019	136.360	133.787	131.326	128.959	126.683	124.490	122.379	120.342	118.378	116.483	114.652
2014.7	2000	140.314	137.622	135.036	132.554	130.166	127.871	125.658	123.529	121.475	119.493	117.582	115.735
	20	141.600	138.885	136.277	133.774	131.366	129.051	126.819	124.671	122.601	120.602	118.674	116.812
	40	142.886	140.147	137.517	134.993	132.565	130.230	127.980	125.814	123.726	121.710	119.766	117.888
	60	144.171	141.410	138.758	136.213	133.765	131.410	129.142	126.957	124.852	122.819	120.859	118.965
	80	145.457	142.672	139.998	137.432	134.964	132.589	130.303	128.099	125.977	123.927	121.951	120.041
2114.7	2100	146.743	143.935	141.239	138.652	136.164	133.769	131.464	129.242	127.103	125.036	123.043	121.118
	20	148.019	145.188	142.471	139.863	137.355	134.941	132.617	130.378	128.221	126.138	124.129	122.189
	40	149.295	146.442	143.704	141.074	138.546	136.112	133.771	131.514	129.340	127.240	125.215	123.259
	60	150.572	147.695	144.936	142.285	139.738	137.284	134.924	132.649	130.458	128.342	126.301	124.330
	80	151.848	148.949	146.169	143.496	140.929	138.455	136.078	133.785	131.577	129.444	127.387	125.400
2214.7	2200	153.124	150.202	147.401	144.707	142.120	139.627	137.231	134.921	132.695	130.546	128.473	126.471
	20	154.391	151.446	148.624	145.910	143.303	140.791	138.376	136.049	133.806	131.641	129.552	127.535
	40	155.658	152.691	149.847	147.112	144.485	141.955	139.522	137.177	134.917	132.736	130.631	128.599
	60	156.925	153.935	151.069	148.315	145.667	143.119	140.667	138.305	136.027	133.830	131.709	129.662
	80	158.192	155.180	152.292	149.517	146.850	144.283	141.813	139.433	137.138	134.925	132.788	130.726
2314.7	2300	159.459	156.424	153.515	150.720	148.033	145.447	142.958	140.561	138.249	136.020	133.867	131.790
	20	160.716	157.660	154.730	151.914	149.208	146.603	144.096	141.682	139.353	137.108	134.940	132.847
	40	161.973	158.896	155.944	153.108	150.383	147.760	145.235	142.803	140.457	138.196	136.013	133.905
	60	163.231	160 131	157.159	154.303	151.559	148.916	146.373	143.924	141.562	139.284	137.085	134.962
	80	164.488	161.367	158.373	155.497	152.734	150.073	147.512	145.045	142.666	140.372	138.158	136.020
2414.7	2400	165.745	162.603	159.588	156.691	153.909	151.229	148.650	146.166	143.770	141.460	139.231	137.077
	20	166.994	163.830	160.794	157.878	155.076	152.378	149.781	147.280	144.868	142.542	140.298	138.129
	40	178.243	165.057	162.001	159.064	156.243	153.527	150.912	148.394	145.965	143.623	141.364	139.180
	60	169.493	166.285	163.207	160.251	157.410	154.675	152.042	149.507	147.063	144.705	142.431	140.232
	80	170.742	167.512	164.414	161.437	158.577	155.824	153.173	150.621	148.160	145.786	143.497	141.283
2514.7	2500	171.991	168.739	165.620	162.624	159.744	156.973	154.304	151.735	149.258	146.868	144.564	142.335
	20	173.231	169.957	166.818	163.802	160.903	158.114	155.428	152.842	150.349	147.943	145.624	143.381
	40	174.470	171.176	168.016	164.981	162.062	159.255	156.552	153.949	151.440	149.018	146.683	144.426
	60	175.710	172.394	169.213	166.159	163.222	160.397	157.675	155.055	152.530	150.094	147.743	145.470
	80	176.949	173.613	170.411	167.338	164.381	161.538	158.799	156.162	153.621	151.169	148.802	146.517
2614.7	2600	178.189	174.831	171.609	168.516	165.540	162.679	159.923	157.269	154.712	152.244	149.862	147.563
	20	179.420	176.041	172.799	169.686	166.692	163.812	161.040	158.369	155.796	153.312	150.916	148.602
	40	180.651	177.251	173.988	170.856	167.844	164.946	162.156	159.469	156.879	154.380	151.970	149.641
	60	181.881	178.460	175.178	172.027	168.995	166.079	163.273	160.570	157.963	155.449	153.024	150.680
	80	183.112	179.670	176.367	173.197	170.147	167.213	164.389	161.670	159.046	156.517	154.078	151.719
2714.7	2700	184.343	180.880	177.557	174.367	171.299	168.346	165.506	162.770	160.130	157.585	155.132	152.758
	20	185.566	182.082	178.739	175.529	172.443	169.472	166.615	163.862	161.208	158.647	156.179	153.791
	40	186.788	183.283	179.920	176.692	173.587	170.599	167.724	164.954	162.285	159.709	157.226	154.824
	60	188.011	184.485	181.102	177.854	174.730	171.725	168.832	166.047	163.363	160.772	158.272	155.858
	80	189.233	185.686	182.283	179.017	175.874	172.852	169.941	167.139	164.440	161.834	159.319	156.891
2814.7	2800	190.456	186.888	183.465	180.179	177.018	173.978	171.050	168.231	165.518	162.896	160.366	157.924
	20	191.668	188.081	184.638	181.333	178.154	175.097	172.152	169.317	166.588	163.951	161.407	158.951
	40	192.880	189.274	185.811	182.487	179.290	176.216	173.255	170.403	167.658	165.007	162.448	159.979
	60	194.093	190.468	186.984	183.642	180.427	177.335	174.357	171.490	168.729	166.062	163.490	161.006
	80	195.306	191.661	188.157	184.796	181.563	178.454	175.460	172.576	169.799	167.118	164.531	162.034
2914.7	2900	196.523	192.854	189.333	185.950	182.699	179.573	176.562	173.662	170.869	168.173	165.572	163.061
	20	197.728	194.038	190.496	187.097	183.828	180.684	177.657	174.742	171.933	169.222	166.607	164.082
	40	198.933	195.222	191.662	188.243	184.957	181.796	178.752	175.821	172.997	170.271	167.642	165.103
	60	200.138	196.406	192.827	189.390	186.086	182.907	179.848	176.901	174.060	171.321	168.678	166.125
	80	201.343	197.590	193.993	190.536	187.215	184.019	180.943	177.980	175.124	172.370	169.713	167.146
3014.7	3000	202.548	198.774	195.159	191.683	188.344	185.130	182.038	179.060	176.188	173.419	170.748	168.167

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HELIUM TABLE IV

FACTORS TO MULTIPLY VALUES IN TABLE III FOR PURITY OTHER THAN 100 %

PURITY DEFINED AS,- $\frac{\text{VOLUME OF HELIUM}}{\text{TOTAL VOLUME OF MIXTURE}}$ } MEASURED AFTER SEPARATION AT A PRESSURE OF ONE ATMOSPHERE AND AT NORMAL ROOM TEMPERATURE

TOTAL PRESSURE OF MIXTURE LBS/SQ.IN. ABSOLUTE	GAUGE	HELIUM PURITY OF MIXTURE 88 %	89 %	90 %	91 %	92 %	93 %	94 %	95 %	96 %	97 %	98 %	99 %	100 %
14.7	0	.87262	.88267	.89285	.90326	.91468	.92592	.93700	.94792	.95867	.96925	.97967	.98992	1.0000
	100	.87357	.88357	.89371	.90405	.91530	.92640	.93735	.94816	.95883	.96934	.97971	.98993	"
	200	.87452	.88448	.89456	.90484	.91572	.92687	.93770	.94841	.95898	.96943	.97975	.98994	"
	300	.87547	.88538	.89542	.90562	.91655	.92735	.93805	.94865	.95914	.96951	.97979	.98995	"
	400	.87642	.88628	.89627	.90641	.91767	.92783	.93840	.94889	.95929	.96960	.97983	.98996	"
	500	.87737	.88719	.89713	.90720	.91779	.92831	.93875	.94914	.95945	.96969	.97987	.98997	"
	600	.87832	.88809	.89798	.90799	.91841	.92878	.93910	.94938	.95960	.96978	.97990	.98997	"
	700	.87927	.88899	.89884	.90878	.91903	.92926	.93945	.94962	.95976	.96987	.97994	.98998	"
	800	.88022	.88989	.89969	.90956	.91966	.92974	.93980	.94986	.95991	.96995	.97998	.98999	"
	900	.88117	.89080	.90055	.91035	.92028	.93021	.94015	.95011	.96007	.97004	.98002	.99000	"
1014.7	1000	.88212	.89170	.90140	.91114	.92090	.93069	.94050	.95035	.96022	.97013	.98006	.99001	"
	1100	.88305	.89249	.90205	.91167	.92132	.93101	.94074	.95051	.96033	.97019	.98009	.99002	"
	1200	.88398	.89328	.90270	.91220	.92173	.93133	.94097	.95068	.96043	.97025	.98011	.99002	"
	1300	.88491	.89407	.90336	.91272	.92215	.93165	.94121	.95084	.96054	.97030	.98014	.99003	"
	1400	.88584	.89486	.90401	.91325	.92257	.93197	.94144	.95100	.96064	.97036	.98016	.99004	"
	1500	.88677	.89565	.90466	.91378	.92299	.93229	.94168	.95117	.96075	.97042	.98019	.99005	"
	1600	.88769	.89643	.90531	.91431	.92340	.93260	.94191	.95133	.96085	.97048	.98022	.99005	"
	1700	.88862	.89722	.90596	.91484	.92382	.93292	.94215	.95149	.96096	.97054	.98024	.99006	"
	1800	.88955	.89801	.90662	.91536	.92424	.93324	.94238	.95165	.96106	.97059	.98027	.99007	"
	1900	.89048	.89880	.90727	.91589	.92465	.93356	.94262	.95182	.96117	.97065	.98029	.99007	"
2014.7	2000	.89141	.89959	.90792	.91642	.92507	.93388	.94285	.95198	.96127	.97071	.98032	.99008	"
	2100	.89214	.90021	.90843	.91683	.92540	.93413	.94303	.95211	.96135	.97076	.98034	.99009	"
	2200	.89288	.90082	.90894	.91724	.92572	.93438	.94322	.95223	.96143	.97080	.98036	.99009	"
	2300	.89361	.90144	.90945	.91766	.92605	.93463	.94340	.95236	.96151	.97085	.98038	.99010	"
	2400	.89435	.90205	.90996	.91807	.92637	.93488	.94359	.95249	.96159	.97089	.98040	.99010	"
	2500	.89508	.90267	.91047	.91848	.92670	.93513	.94377	.95262	.96168	.97094	.98042	.98011	"
	2600	.89581	.90329	.91098	.91889	.92703	.93538	.94395	.95274	.96176	.97099	.98044	.99011	"
	2700	.89655	.90390	.91149	.91930	.92735	.93563	.94414	.95287	.96184	.97103	.98046	.99012	"
	2800	.89728	.90452	.91200	.91972	.92768	.93588	.94432	.95300	.96192	.97108	.98048	.99012	"
	2900	.89802	.90513	.91251	.92013	.92800	.93613	.94451	.95312	.96200	.97112	.98050	.99013	"
3014.7	3000	.89875	.90575	.91302	.92054	.92833	.93638	.94469	.95325	.96208	.97117	.98052	.99013	"

ABRIDGED TABLE OF PARTIAL PRESSURE OF NITROGEN IMPURITY AT 70° F.

VALUES ARE IN LBS/SQ. IN. ABSOLUTE

14.7	0	1.7773	1.6282	1.4792	1.3305	1.1819	1.0335	.8853	.7373	.5894	.4418	.2943	.1470	0
1014.7	1000	118.6518	106.9779	95.6289	84.6045	73.9050	63.5302	53.4802	43.7549	34.3544	25.2787	16.5277	8.1015	0
2014.7	2000	226.3689	207.4370	185.6218	164.3980	143.8656	123.7248	104.2739	85.4175	67.1510	49.4761	32.3926	15.7527	0
3014.7	3000	230.0301	299.1025	268.7976	239.1154	210.0560	181.6194	153.8055	126.6144	100.0460	74.1004	48.7775	24.0774	0

EXAMPLE OF METHOD FOR USE OF TABLE III & IV

PROBLEM: HIGH PRESSURE CONTAINER HAS DEAD VOLUME OF 1200 CU. FT.
: INITIAL CONDITIONS,- 2100 LBS (GAUGE) PRESSURE, TEMPERATURE 80° F., PURITY 93 %
: FINAL CONDITIONS,- CONTAINER DRAINED TO ATMOSPHERIC PRESSURE, TEMPERATURE 40°, PURITY AFTER DRAINING 92.5 %
: REQUIRED,- NUMBER CU. FT. STANDARD HELIUM OBTAINED FROM CONTAINER.

NO. CU. FT. HELIUM (STANDARD) IN CONTAINER AT INITIAL CONDITIONS =

1200 (DEAD VOL. OF CONTAINER) × 131.464 (TABLE III, 2100 LB (GAUGE) 80° F.) × .93413 (TABLE IV, 2100 LB (GAUGE) 93 % PURITY) = 147,365.4 CU. FT. STANDARD HELIUM AT INITIAL CONDITIONS

NO. CU. FT. HELIUM (STANDARD) LEFT IN CONTAINER AFTER DRAINING =

1200 × 1.0600 (TABLE III, 0 (GAUGE) 40° F.) × .92030 (TABLE IV, 0 (GAUGE) 92.5 % PURITY) = 1170.6 CU. FT. STANDARD HELIUM LEFT IN CONTAINER

HELIUM REMOVED FROM CONTAINER = 147,365.4 - 1170.6 = 146,194.8 CU. FT. STANDARD HELIUM.

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PART II.

Lift Factors of Helium

Explanation - Tabulated Values are:

$$\frac{\text{Lift per 100 cu.ft.}}{\text{Barometric pressure in inches Hg}}$$

To determine lift of any given volume - V - under pressure - P

$$L = \frac{PV \times (\text{tabulated values})}{100};$$ for dry helium and dry air,

where L = lift in lb.

V = volume in cu.ft.

P = pressure in inches of Hg.

Humidity correction:

To correct for air and gas humidity, apply the following correction to any tabulated value: This is a mean value

$-.0034\ (e - c)$ If the helium is dry $c = 0$
" " air " " $e = 0$

in which e is the partial pressure of water vapor in the atmosphere in inches of Hg, and c is the partial pressure of water vapor in the lifting gas in inches of Hg.

In these tables (Part II) the impurity is supposed to be air.

80% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No° superheat	10° superheat	20° superheat	30° superheat
-20	.208050	.210133	.212126	.214033	11	.194350	.196161	.197916	.199594
-19	.207587	.209661	.211646	.213545	12	.193943	.195749	.197496	.199166
-18	.207124	.209189	.211165	.213056	13	.193537	.195336	.197075	.198739
-17	.206661	.208717	.212568	.212568	14	.193131	.194924	.196655	.198312
-16	.206198	.208245	.210204	.212080	15	.192725	.194511	.196234	.197885
-15	.205735	.207774	.209724	.211592	16	.192318	.194098	.195813	.197457
-14	.205272	.207302	.209244	.211103	17	.191912	.193686	.195393	.197030
-13	.204809	.206830	.208763	.210615	18	.191506	.193273	.194972	.196603
-12	.204346	.206358	.208283	.210127	19	.191099	.192861	.194552	.196175
-11	.203883	.205886	.207802	.209638	20	.190693	.192448	.194131	.195748
-10	.203420	.205414	.207322	.209150	21	.190304	.192051	.193728	.195339
- 9	.202977	.204963	.206863	.208683	22	.189914	.191654	.193325	.194929
- 8	.202535	.204512	.206404	.208217	23	.189525	.191258	.192921	.194520
- 7	.202092	.204060	.205944	.207750	24	.189135	.190861	.192518	.194110
- 6	.201650	.203609	.205485	.207284	25	.188746	.190464	.192115	.193701
- 5	.201207	.203158	.205026	.206817	26	.188356	.190067	.191712	.193292
- 4	.200764	.202707	.204567	.206350	27	.187967	.189670	.191309	.192882
- 3	.200322	.202256	.204108	.205884	28	.187577	.189274	.190905	.192473
- 2	.199879	.201804	.203648	.205417	29	.187188	.188877	.190502	.192063
- 1	.199437	.201353	.203189	.204951	30	.186798	.188480	.190099	.191654
0	.198994	.200902	.202730	.204484	31	.186424	.188100	.189712	.191261
1	.198570	.200469	.202291	.204038	32	.186050	.187719	.189325	.190869
2	.198146	.200036	.201851	.203591	33	.185676	.187339	.188939	.190476
3	.197723	.199604	.201412	.203145	34	.185302	.186958	.188552	.190083
4	.197299	.199171	.200973	.202699	35	.184929	.186578	.188165	.189691
5	.196875	.196738	.200534	.202253	36	.184555	.186198	.187778	.189298
6	.196451	.198305	.200094	.201806	37	.184181	.185817	.187391	.188905
7	.196827	.197872	.199655	.201360	38	.183807	.185437	.187005	.188512
8	.195604	.197440	.199216	.200914	39	.183433	.185056	.186618	.188120
9	.195180	.197007	.198776	.200467	40	.183059	.184676	.186231	.187727
10	.194756	.196574	.198337	.200021					

80% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
41	.182700	.184311	.185861	.187350	71	.172367	.173803	.175186	.176520
42	.182340	.183945	.185488	.186973	72	.172047	.173477	.174855	.176185
43	.181981	.183580	.185117	.186596	73	.171727	.173152	.174525	.175850
44	.181621	.183214	.184745	.186219	74	.171407	.172826	.174195	.175515
45	.181262	.182849	.184374	.185843	75	.171087	.172501	.173865	.175180
46	.180903	.182483	.184003	.185466	76	.170766	.172176	.173534	.174845
47	.180543	.182118	.183631	.185089	77	.170446	.171850	.173204	.174510
48	.180184	.181752	.183260	.184712	78	.170126	.171525	.172874	.174175
49	.179824	.181387	.182888	.184335	79	.169806	.171199	.172543	.173840
50	.179465	.181021	.182517	.183958	80	.169486	.170874	.172213	.173505
51	.179120	.180670	.182160	.183596	81	.169178	.170561	.171895	.173182
52	.178774	.180318	.182803	.183234	82	.168869	.170247	.171577	.172860
53	.178429	.179967	.181446	.182871	83	.168561	.169934	.171259	.172537
54	.178083	.179615	.181089	.182509	84	.168252	.169621	.170941	.172215
55	.177738	.179264	.180733	.182147	85	.167944	.169308	.170623	.171892
56	.177393	.178913	.180376	.181785	86	.167635	.168994	.170304	.171569
57	.177047	.178561	.180019	.181423	87	.167327	.168681	.169986	.171247
58	.176702	.178210	.179662	.181060	88	.167018	.168368	.169668	.170924
59	.176356	.177858	.179305	.180698	89	.166710	.168054	.169350	.170602
60	.176011	.177507	.178948	.180336	90	.166401	.167741	.169032	.170279
61	.175679	.177169	.178605	.179988	91	.166104	.167439	.168725	.169968
62	.175346	.176831	.178262	.179640	92	.165806	.167137	.168419	.169657
63	.175014	.176493	.177918	.179292	93	.165509	.166834	.168112	.169347
64	.174681	.176155	.177575	.178944	94	.165212	.166532	.167806	.169036
65	.174349	.175818	.177232	.178596	95	.164915	.166230	.167499	.168725
66	.174017	.175480	.176889	.178247	96	.164617	.165928	.167192	.168414
67	.173684	.175142	.176546	.177899	97	.164320	.165626	.166886	.168103
68	.173352	.174804	.176202	.177551	98	.164023	.165323	.166579	.167793
69	.173019	.174466	.175859	.177203	99	.163725	.165021	.166273	.167482
70	.172687	.174128	.175516	.176855	100	.163428	.164719	.165966	.167171

85% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No° superheat	10° superheat	20° superheat	30° superheat
-20	.221053	.222847	.224563	.226205	11	.206496	.208058	.209568	.211012
-19	.220561	.222347	.224056	.225691	12	.206065	.207621	.209124	.210563
-18	.220069	.221848	.223549	.225177	13	.205633	.207183	.208680	.210113
-17	.219577	.221348	.223042	.224664	14	.205202	.206746	.208236	.209663
-16	.219085	.220849	.222535	.224150	15	.204770	.206309	.207792	.209214
-15	.218594	.220349	.222029	.223637	16	.204338	.205872	.207348	.208764
-14	.218102	.219849	.221512	.223123	17	.203907	.205435	.206904	.208314
-13	.217610	.219350	.221015	.222609	18	.203475	.204997	.206460	.207864
-12	.217118	.218850	.220508	.222095	19	.203044	.204560	.206016	.207415
-11	.216626	.218351	.220001	.221582	20	.202612	.204123	.205572	.206965
-10	.216134	.217851	.219494	.221060	21	.202198	.203703	.205146	.206534
- 9	.215664	.217373	.219010	.220577	22	.201784	.203283	.204721	.206103
- 8	.215193	.216896	.218525	.220086	23	.201370	.202863	.204295	.205672
- 7	.214723	.216418	.218041	.219595	24	.200956	.202443	.203870	.205241
- 6	.214253	.215940	.217556	.219104	25	.200542	.202023	.203444	.204810
- 5	.213783	.215463	.217072	.218614	26	.300127	.201603	.203018	.204379
- 4	.213312	.214985	.216587	.218123	27	.199713	.201182	.202593	.203948
- 3	.212842	.214507	.216103	.217632	28	.199299	.200762	.202167	.203517
- 2	.212372	.214029	.215618	.217141	29	.198885	.200342	.201742	.203086
- 1	.211901	.213552	.215134	.216650	30	.198471	.199922	.201316	.202655
0	.211431	.213074	.214649	.216159	31	.198074	.199519	.200908	.202242
1	.210981	.212616	.214185	.215689	32	.197677	.199116	.200499	.201828
2	.210530	.212158	.213722	.215220	33	.197280	.198713	.200091	.201415
3	.210080	.211700	.213258	.214750	34	.196883	.198310	.199682	.201001
4	.209630	.211242	.212794	.214280	35	.196486	.197908	.199274	.200588
5	.209180	.210785	.212331	.213811	36	.196088	.197505	.198866	.200174
6	.208729	.210327	.211867	.213341	37	.195691	.197102	.198457	.199761
7	.208279	.209869	.211402	.212871	38	.195294	.196699	.198049	.199347
8	.207829	.209411	.210939	.212401	39	.194897	.196296	.197640	.198934
9	.207378	.208953	.210476	.211932	40	.194500	.195893	.197232	.198520
10	.206928	.208495	.210012	.211462					

85% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
41	.194118	.195506	.196840	.198123	71	.183140	.184376	.185567	.186716
42	.193736	.195119	.196448	.197726	72	.182800	.184032	.185218	.186363
43	.193355	.194732	.196055	.197329	73	.182460	.183687	.184869	.186010
44	.192973	.194345	.195663	.196932	74	.182120	.183342	.184520	.185657
45	.192591	.193958	.195271	.196536	75	.181780	.182998	.184172	.185305
46	.192209	.193570	.194879	.196139	76	.181439	.182653	.183823	.184952
47	.191827	.193183	.194487	.195742	77	.181099	.182308	.183474	.184599
48	.191446	.192796	.194094	.195345	78	.180759	.181963	.183125	.184246
49	.191064	.192409	.193702	.194948	79	.180419	.181619	.182776	.183893
50	.190682	.192022	.193310	.194551	80	.180079	.181274	.182427	.183540
51	.190315	.191650	.192933	.194170	81	.179751	.180942	.182091	.183200
52	.189948	.191278	.192556	.193788	82	.179423	.180610	.181755	.182860
53	.189581	.190905	.192179	.193407	83	.179096	.180278	.181419	.182520
54	.189214	.190533	.191802	.193025	84	.178768	.179946	.181083	.182180
55	.188847	.190161	.191426	.192644	85	.178440	.179615	.180747	.181841
56	.188480	.189789	.191049	.192262	86	.178112	.179283	.180411	.181501
57	.188113	.189417	.190672	.191881	87	.177784	.178951	.180075	.181161
58	.187746	.189044	.190295	.191499	88	.177457	.178619	.179739	.180821
59	.187379	.188672	.189918	.191118	89	.177129	.178287	.179403	.180481
60	.187012	.188300	.189541	.190736	90	.176801	.177955	.179067	.180141
61	.186659	.187942	.189179	.190369	91	.176485	.177635	.178743	.179814
62	.186306	.187584	.188816	.190003	92	.176169	.177315	.178419	.179486
63	.185952	.187226	.188454	.189636	93	.175853	.176995	.178095	.179159
64	.185599	.186868	.188091	.189269	94	.175537	.176675	.177771	.178831
65	.185246	.186511	.187729	.188903	95	.175222	.176355	.177448	.178504
66	.184893	.186153	.187366	.188536	96	.174906	.176034	.177124	.178176
67	.184540	.185795	.187004	.188169	97	.174590	.175714	.176800	.177849
68	.184186	.185437	.186641	.187802	98	.174274	.175394	.176476	.177521
69	.183833	.185079	.186279	.187436	99	.173958	.175074	.176152	.177194
70	.183480	.184721	.185916	.187069	100	.173642	.174754	.175828	.176866

90% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
-20	.234056	.235561	.237000	.238378	11	.218644	.219954	.221220	.222431
-19	.233535	.235034	.236467	.237839	12	.218187	.219492	.220752	.221959
-18	.233015	.234507	.235933	.237300	13	.217730	.219031	.220385	.221486
-17	.232494	.233979	.235400	.236761	14	.217273	.218569	.219817	.221014
-16	.231973	.233452	.234866	.236222	15	.216816	.218107	.219350	.220542
-15	.231453	.232925	.234333	.235683	16	.216359	.217645	.218883	.220070
-14	.230932	.232398	.233800	.235143	17	.215902	.217183	.218415	.219598
-13	.230411	.231871	.233266	.234604	18	.215445	.216722	.217948	.219125
-12	.229890	.231343	.232733	.234065	19	.214988	.216260	.217480	.218653
-11	.229370	.230816	.232200	.233526	20	.214531	.215798	.217013	.218181
-10	.228849	.230289	.231666	.232987	21	.214092	.215355	.216565	.217729
- 9	.228351	.229785	.231156	.232472	22	.213654	.214911	.216117	.217276
- 8	.227853	.229281	.230646	.231956	23	.213215	.214468	.215669	.216824
- 7	.227355	.228776	.230136	.231441	24	.212776	.214024	.215221	.216371
- 6	.226851	.228272	.229626	.230926	25	.212338	.213581	.214773	.215919
- 5	.226359	.227768	.229117	.230411	26	.211899	.213137	.214324	.215466
- 4	.225860	.227264	.228607	.229895	27	.211460	.212694	.213876	.215014
- 3	.225362	.226760	.228097	.229380	28	.211021	.212250	.213428	.214561
- 2	.224864	.226255	.227587	.228865	29	.210583	.211807	.212980	.214109
- 1	.224366	.225751	.227077	.228349	30	.210144	.211363	.212532	.213656
0	.223868	.225247	.226567	.227834	31	.209724	.210938	.212102	.213222
1	.223391	.224764	.226079	.227341	32	.209304	.210512	.211672	.212787
2	.222915	.224281	.225591	.226848	33	.208883	.210087	.211242	.212353
3	.222438	.223798	.225103	.226355	34	.208463	.209662	.210812	.211919
4	.221961	.223315	.224615	.225862	35	.208043	.209737	.210383	.211485
5	.221485	.222832	.224127	.225369	36	.207623	.208811	.209953	.211050
6	.221008	.222348	.223639	.224875	37	.207203	.208386	.209523	.210617
7	.220531	.221865	.223151	.224382	38	.206782	.207961	.209093	.210182
8	.220054	.221382	.222663	.223889	39	.206362	.207535	.208663	.209747
9	.219578	.220899	.222175	.223396	40	.205942	.207110	.208233	.209313
10	.219101	.220416	.221687	.222903					

90% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
41	.205538	.206701	.207820	.208896	71	.193913	.194950	.195950	.196913
42	.205133	.206293	.207407	.208479	72	.193553	.194586	.195582	.196542
43	.204729	.205884	.206994	.208062	73	.193193	.194222	.195215	.196171
44	.204325	.205475	.206581	.207645	74	.192833	.193858	.194847	.195800
45	.203921	.205067	.206168	.207229	75	.192473	.193495	.194480	.195430
46	.203516	.204658	.205755	.206812	76	.192113	.193131	.194112	.195059
47	.203112	.204249	.205342	.206395	77	.191752	.192767	.193745	.194688
48	.202708	.203840	.204929	.205978	78	.191392	.192403	.193377	.194317
49	.202303	.203432	.204516	.205561	79	.191032	.192039	.193010	.193946
50	.201899	.203023	.204103	.205144	80	.190672	.191675	.192642	.193575
51	.201510	.202630	.203706	.204743	81	.190325	.191325	.192288	.193218
52	.201122	.202237	.203309	.204342	82	.189978	.190974	.191934	.192861
53	.200733	.201844	.202912	.203942	83	.189631	.190624	.191580	.192503
54	.200345	.201451	.202515	.203541	84	.189284	.190273	.191226	.192146
55	.199956	.201058	.202119	.203141	85	.188937	.189923	.190872	.191789
56	.199567	.200655	.201722	.202740	86	.188590	.189572	.190518	.191432
57	.199179	.200272	.201325	.202339	87	.188243	.189222	.190164	.191075
58	.198790	.199879	.200928	.201938	88	.187896	.188871	.189810	.190717
59	.198402	.199486	.200531	.201538	89	.187549	.188521	.189456	.190360
60	.198013	.199093	.200134	.201137	90	.187202	.188170	.189102	.190003
61	.197639	.198715	.199752	.200752	91	.186867	.187832	.188761	.189659
62	.197265	.198337	.199370	.200366	92	.186533	.187494	.188420	.189314
63	.196891	.197959	.198989	.199981	93	.186198	.187156	.188078	.188970
64	.196517	.197581	.198607	.199596	94	.185864	.186818	.187737	.188626
65	.196143	.197204	.198226	.199211	95	.185529	.186480	.187396	.188282
66	.195769	.196826	.197844	.198826	96	.185194	.186141	.187055	.187937
67	.195395	.196448	.197462	.198440	97	.184864	.185803	.186714	.187593
68	.195021	.196070	.197080	.198055	98	.184525	.185465	.186372	.187249
69	.194647	.195692	.196699	.197669	99	.184191	.185127	.186031	.186904
70	.194273	.195314	.196317	.197284	100	.183856	.184789	.185690	.186560

95% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
-20	.247059	.248275	.249437	.250550	11	.230791	.231850	.232871	.233849
-19	.246509	.247720	.248877	.249986	12	.230308	.231363	.232380	.233355
-18	.245960	.247165	.248317	.249421	13	.229826	.230877	.231890	.232860
-17	.245410	.246610	.247757	.248857	14	.229343	.230391	.231399	.232366
-16	.244861	.246055	.247197	.248292	15	.228861	.229905	.230908	.231871
-15	.244311	.245501	.246638	.247728	16	.228379	.229418	.230417	.231376
-14	.243761	.244946	.246074	.247163	17	.227896	.228932	.229926	.230882
-13	.243212	.244391	.245518	.246599	18	.227414	.228446	.229436	.230387
-12	.242662	.243836	.244958	.246034	19	.226931	.227959	.228945	.229893
-11	.242113	.243281	.244398	.245470	20	.226449	.227473	.228454	.229398
-10	.241563	.242726	.243838	.244905	21	.225986	.227006	.227984	.228924
- 9	.241037	.242195	.243303	.244365	22	.225522	.226539	.227513	.228450
- 8	.240511	.241665	.242768	.243826	23	.225059	.226073	.227043	.227975
- 7	.239986	.241134	.242232	.243286	24	.224596	.225606	.226572	.227501
- 6	.239460	.240603	.241697	.242746	25	.224133	.225139	.226102	.227027
- 5	.238934	.240073	.241162	.242207	26	.223669	.224672	.225631	.226553
- 4	.238408	.239542	.240627	.241667	27	.223206	.224205	.225161	.226079
- 3	.237882	.239011	.240092	.241127	28	.222743	.223739	.224690	.225604
- 2	.237357	.238480	.239556	.240587	29	.222279	.223272	.224220	.225130
- 1	.236831	.237950	.239021	.240048	30	.221816	.222805	.223749	.234656
0	.236305	.237419	.238486	.239508	31	.221373	.222357	.223297	.224201
1	.235807	.236911	.237974	.238992	32	.220929	.221909	.222846	.223746
2	.235299	.236402	.237461	.238475	33	.220486	.221461	.222394	.223291
3	.234795	.235894	.236949	.237959	34	.220043	.221013	.221943	.222836
4	.234292	.235386	.236436	.237442	35	.219600	.220566	.221491	.222381
5	.233789	.234878	.235924	.236926	36	.219156	.220118	.221039	.221926
6	.233286	.234369	.235417	.236410	37	.218713	.219670	.220588	.221471
7	.232783	.233861	.234899	.235893	38	.218270	.219222	.220136	.221016
8	.232279	.233353	.234387	.235377	39	.217826	.218774	.219685	.220561
9	.231776	.232844	.233874	.234860	40	.217383	.218326	.219233	.220106
10	.231273	.232336	.233362	.234344					

95% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
41	.216956	.217896	.218799	.219669	71	.204686	.205523	.206331	.207109
42	.216529	.217465	.218366	.219232	72	.204306	.205140	.205945	.206620
43	.216103	.217035	.217932	.218795	73	.203926	.204757	.205559	.206331
44	.215676	.216605	.217498	.218358	74	.203546	.204374	.205173	.205942
45	.215249	.216175	.217065	.217921	75	.203166	.203991	.204787	.205554
46	.214822	.215744	.216631	.217484	76	.202785	.203607	.204400	.205165
47	.214395	.215314	.216197	.217047	77	.202405	.203224	.204014	.204776
48	.213969	.214884	.215763	.216610	78	.202025	.202841	.203628	.204387
49	.213542	.214453	.215330	.216173	79	.201645	.202458	.203242	.203998
50	.213115	.214023	.214896	.215736	80	.201265	.202075	.202856	.203609
51	.212705	.213609	.214479	.215316	81	.200899	.201706	.202484	.203235
52	.212295	.213196	.214062	.214896	82	.200532	.201337	.202112	.202860
53	.211884	.212782	.213645	.214476	83	.200166	.200968	.201740	.202486
54	.211474	.212368	.213228	.214056	84	.199800	.200599	.201368	.202111
55	.211064	.211955	.212812	.213637	85	.199434	.200230	.200997	.201737
56	.210654	.211541	.212395	.213217	86	.199067	.199860	.200625	.201362
57	.210244	.211127	.211978	.212797	87	.198701	.199491	.200253	.200988
58	.209833	.210713	.211561	.212377	88	.198335	.199122	.199881	.200613
59	.209423	.210300	.211144	.211957	89	.197968	.198753	.199509	.200239
60	.209013	.209886	.210727	.211537	90	.197602	.198384	.199137	.199864
61	.208618	.209488	.210326	.211133	91	.197249	.198028	.198778	.199503
62	.208224	.209090	.209925	.210729	92	.196896	.197672	.198420	.199142
63	.207829	.208692	.209524	.210325	93	.196542	.197316	.198061	.198781
64	.207434	.208294	.209123	.209921	94	.196189	.196960	.197703	.198420
65	.207040	.207896	.208722	.209518	95	.195836	.196604	.197344	.198060
66	.206645	.207498	.208321	.209114	96	.195483	.196248	.196985	.197699
67	.206250	.207100	.207920	.208710	97	.195130	.195892	.196627	.197338
68	.205855	.206702	.207519	.208306	98	.194776	.195536	.196268	.196977
69	.205461	.206304	.207118	.207902	99	.194423	.195180	.195910	.196616
70	.205066	.205906	.206717	.207498	100	.194070	.194824	.195551	.196255

100% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
-20	.260062	.260989	.261874	.262722	11	.242937	.243746	.244523	.245268
-19	.259484	.260406	.261288	.262132	12	.242430	.243235	.244009	.244751
-18	.258905	.259824	.260701	.261542	13	.241922	.242724	.243494	.244234
-17	.258327	.259241	.260115	.260952	14	.241414	.242213	.242980	.243717
-16	.257748	.258659	.259528	.260362	15	.240907	.241703	.242466	.243200
-15	.257170	.258076	.258942	.259773	16	.240399	.241192	.241952	.242682
-14	.256591	.257493	.258356	.259183	17	.239891	.240681	.241438	.242165
-13	.256013	.256911	.257770	.258593	18	.239383	.240170	.240923	.241648
-12	.255434	.256328	.257183	.258003	19	.238876	.239659	.240409	.241131
-11	.254856	.255746	.256596	.257413	20	.238368	.239148	.239895	.240614
-10	.254277	.255163	.256010	.256823	21	.237880	.238658	.239402	.240118
- 9	.253724	.254606	.255449	.256259	22	.237392	.238168	.238909	.239623
- 8	.253170	.254049	.254889	.255695	23	.236904	.237677	.238416	.239127
- 7	.252617	.253491	.254328	.255131	24	.236416	.237187	.237923	.238631
- 6	.252063	.252934	.253768	.254567	25	.235929	.236697	.237430	.238136
- 5	.251510	.252377	.253207	.254003	26	.235441	.236207	.236937	.237640
- 4	.250956	.251820	.252646	.253439	27	.234953	.235717	.236444	.237144
- 3	.250403	.251263	.252086	.252875	28	.234465	.235226	.235951	.236648
- 2	.249849	.250706	.251525	.252311	29	.233977	.234736	.235458	.236153
- 1	.249296	.250148	.250965	.251747	30	.233489	.234246	.234965	.235657
0	.248742	.249591	.250404	.251183	31	.233023	.233776	.234492	.235181
1	.248212	.249058	.249867	.250643	32	.232556	.233305	.234019	.234705
2	.247683	.248524	.249331	.250103	33	.232090	.232835	.233546	.234230
3	.247153	.247991	.248794	.249564	34	.231623	.232365	.233073	.233754
4	.246623	.247457	.248257	.249024	35	.231157	.231894	.232600	.233278
5	.246094	.246924	.247721	.248484	36	.230609	.231424	.232126	.232802
6	.245564	.246390	.247184	.247944	37	.230224	.230954	.231653	.232326
7	.245034	.245857	.246647	.247404	38	.229757	.230484	.231180	.231851
8	.244504	.245324	.246110	.246865	39	.229291	.230013	.230707	.231375
9	.243975	.244790	.245574	.246325	40	.228824	.229543	.230234	.230899
10	.243445	.244257	.245037	.245785					

100% Purity

Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat	Air temp. °F.	No superheat	10° superheat	20° superheat	30° superheat
41	.228375	.229091	.229780	.230442	71	.215459	.216097	.216712	.217305
42	.227926	.228639	.229325	.229985	72	.215059	.215694	.216307	.216898
43	.227476	.228187	.228871	.229528	73	.214659	.215292	.215903	.216492
44	.227027	.227735	.228416	.229071	74	.214259	.214890	.215498	.216085
45	.226578	.227284	.227962	.228614	75	.213859	.214487	.215094	.215678
46	.226129	.226832	.227507	.228157	76	.213458	.214085	.214689	.215271
47	.225680	.226380	.227053	.227700	77	.213058	.213682	.214284	.214864
48	.225230	.225928	.226598	.227243	78	.212658	.213280	.213879	.214458
49	.224781	.225476	.226144	.226786	79	.212258	.212877	.213475	.214051
50	.224232	.225024	.225689	.226329	80	.211858	.212475	.213070	.213644
51	.223900	.224590	.225252	.225890	81	.211472	.212087	.212680	.213252
52	.223468	.224155	.224815	.225451	82	.211087	.211700	.212290	.212860
53	.223037	.223721	.224378	.225011	83	.210701	.211312	.211901	.212469
54	.222605	.223286	.223941	.224572	84	.210316	.210924	.211511	.212077
55	.222173	.222852	.223505	.224133	85	.209930	.210537	.211121	.211685
56	.221741	.222417	.223068	.223694	86	.209544	.210149	.210731	.211293
57	.221309	.221983	.222631	.223255	87	.209159	.209761	.210341	.210901
58	.220878	.221548	.222194	.222815	88	.208773	.209373	.209952	.210510
59	.220446	.221114	.221757	.222376	89	.208388	.208986	.209562	.210118
60	.220014	.220679	.221320	.221937	90	.208002	.208598	.209172	.209726
61	.219599	.220261	.220900	.221515	91	.207630	.208224	.208796	.209348
62	.219183	.219843	.220479	.221092	92	.207258	.207850	.208420	.208971
63	.218768	.219425	.220059	.220670	93	.206887	.207476	.208044	.208593
64	.218352	.219007	.219639	.220247	94	.206515	.207102	.207668	.208215
65	.217937	.218589	.219219	.219825	95	.206143	.206729	.207293	.207838
66	.217521	.218171	.218798	.219402	96	.205771	.206355	.206917	.207460
67	.217106	.217753	.218378	.218980	97	.205399	.205981	.206541	.207082
68	.216690	.217335	.217958	.218557	98	.205028	.205607	.206165	.206704
69	.216275	.216917	.217537	.218135	99	.204656	.205238	.205789	.206327
70	.215859	.216499	.217117	.217712	100	.204284	.204869	.205413	.205949