

APPENDIX D

Enthalpy of Selected Substances

Table D.1 Enthalpy (Btu/lb-mole)

Table D.2 Enthalpy (Btu/lbm)

Table D.3 Enthalpy (kJ/kg)

Table D.4 Enthalpy (kJ/g-mole)

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The primary data in the JANAF Tables is presented on a gram-mole basis in SI units. Here the primary enthalpy data is presented in units of kJ/gram-mole. Tables in other sets of units are derived from this primary table. For instance enthalpy in kJ/kg is obtained by dividing the primary values by the appropriate molecular masses and multiplying by 1000. Mass-based values in the English system are obtained from the SI mass-based values by multiplying by the conversion factor 0.43021 Btu-kg/kJ-lbm. Mole-based values in the English system are obtained directly from the primary values by multiplying by (0.43021)(1000).

JANAF Table temperatures are given in degrees Kelvin. Rankine temperatures listed in the present tables are a factor of 1.8 times the Kelvin value.

Table D.1 Enthalpy (Btu/lb-mole)

TEMPERATURE		ENTHALPY (Btu/lb-mole)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
0	0	-3736	-3730	-452	-3730	-4028	-3643	-4261	-4540
180	100	-2486	-2481	-426	-2482	-2777	-2352	-2846	-3105
360	200	-1234	-1229	-286	-1230	-1469	-1193	-1412	-1607
536.7	298.15	0	0	0	0	0	0	0	0
540	300	23	23	7	23	30	23	27	32
720	400	1301	1278	447	1280	1722	1273	1485	1828
900	500	2617	2543	1017	2552	3573	2530	2979	3768
1080	600	3977	3826	1696	3847	5553	3791	4518	5827
1260	700	5377	5135	2459	5172	7638	5055	6106	7980
1440	800	6812	6473	3286	6529	9811	6325	7745	10205
1620	900	8278	7840	4161	7916	12059	7604	9438	12486
1800	1000	9767	9234	5074	9331	14368	8897	11185	14811
1980	1100	11277	10652	6018	10770	16728	10204	12988	17171
2160	1200	12803	12093	6987	12231	19133	11528	14845	19559
2340	1300	14345	13553	7976	13710	21574	12871	16753	21970
2520	1400	15899	15030	8982	15205	24047	14232	18711	24401
2700	1500	17466	16522	10004	16714	26546	15612	20715	26847
2880	1600	19044	18028	11038	18234	29069	17011	22762	29307
3060	1700	20632	19544	12085	19766	31612	18428	24848	31780
3240	1800	22230	21071	13142	21307	34172	19862	26971	34263
3420	1900	23839	22607	14208	22860	36748	21313	29128	36755
3600	2000	25458	24151	15283	24412	39338	22780	31315	39257
3780	2100	27086	25702	16367	25974	41940	24263	33531	41765
3960	2200	28725	27259	17458	27542	44553	25759	35773	44281
4140	2300	30373	28822	18557	29118	47177	27270	38040	46803
4320	2400	32030	30390	19662	30684	49809	28793	40328	49332
4500	2500	33698	31963	20774	32259	52450	30329	42637	51866
4680	2600	35374	33540	21893	33846	55098	31877	44966	54405
4860	2700	37059	35122	23018	35436	57754	33436	47312	56950
5040	2800	38753	36707	24148	37030	60416	35006	49674	59499
5220	2900	40455	38295	25285	38627	63084	36586	52051	62053
5400	3000	42166	39887	26427	40226	65759	38177	54443	64611

Table D.1 continued. Enthalpy (Btu/lb-mole)

TEMPERATURE		ENTHALPY (Btu/lb-mole)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
5580	3100	43885	41481	27574	41829	68438	39777	56848	67173
5760	3200	45612	43079	28727	43434	71123	41387	59264	69740
5940	3300	47346	44678	29885	45041	73812	43006	61693	72310
6120	3400	49088	46281	31049	46651	76507	44634	64133	74885
6300	3500	50836	47885	32218	48263	79206	46271	66583	77462
6480	3600	52591	49492	33392	49877	81909	47917	69042	80044
6660	3700	54352	51101	34570	51493	84616	49571	71510	82630
6840	3800	56120	52712	35754	53111	87328	51233	73988	85219
7020	3900	57893	54324	36943	54731	90043	52904	76473	87811
7200	4000	59672	55939	38136	56353	92763	54583	78966	90407
7380	4100	61457	57555	39335	57976	95486	56269	81466	93005
7560	4200	63247	59173	40538	59601	98213	57964	83973	95608
7740	4300	65043	60793	41746	61228	100943	59667	86487	98214
7920	4400	66843	62414	42959	62856	103677	61377	89007	100822
8100	4500	68650	64037	44165	64486	106414	63095	91533	103434
8280	4600	70461	65661	45398	66118	109155	64820	94065	106049
8460	4700	72277	67287	46625	67751	111899	66553	96603	108668
8640	4800	74099	68914	47857	69385	114646	68292	99145	111289
8820	4900	75927	70543	49093	71021	117397	70039	101693	113913
9000	5000	77760	72173	50333	72658	120150	71792	104246	116541
9180	5100	79599	73805	51579	74297	122907	73552	106803	119171
9360	5200	81444	75438	52829	75937	125668	75317	109366	121805
9540	5300	83295	77073	54083	77578	128433	77089	111934	124441
9720	5400	85153	78709	55342	79222	131202	78867	114507	127081
9900	5500	87017	80347	56606	80861	133974	80649	117085	129723
10080	5600	88889	81986	57874	82504	136751	82437	119668	132368
10260	5700	90769	83626	59146	84150	139532	84230	122256	135016
10440	5800	92657	85268	60423	85799	142316	86026	124849	137667
10620	5900	94552	86912	61705	87448	145105	87827	127447	140321
10800	6000	96457	88558	62991	89099	147897	89630	130050	142979

Table D.2. Enthalpy (Btu/lbm)

TEMPERATURE		ENTHALPY (Btu/lbm)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
0	0	-116.7	-133.2	-37.6	-133.2	-91.5	-1806.8	-236.5	-252.0
180	100	-77.7	-88.6	-35.5	-88.6	-63.1	-1166.9	-158.0	-172.3
360	200	-38.6	-43.9	-23.8	-43.9	-33.4	-592.0	-78.4	-89.2
536.7	298.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
540	300	0.7	0.8	0.6	0.8	0.7	11.3	1.5	1.8
720	400	40.7	45.6	37.2	45.7	39.1	631.4	82.4	101.5
900	500	81.8	90.8	84.7	91.1	81.2	1255.2	165.4	209.1
1080	600	124.3	136.6	141.2	137.3	126.2	1880.2	250.8	323.4
1260	700	168.0	183.3	204.7	184.7	173.6	2507.2	338.9	442.9
1440	800	212.9	231.1	273.5	233.1	222.9	3137.4	429.9	566.4
1620	900	258.7	279.9	346.4	282.6	274.0	3772.0	523.9	693.0
1800	1000	305.2	329.7	422.5	333.1	326.5	4413.1	620.9	822.1
1980	1100	352.4	380.3	501.1	384.5	380.1	5061.6	720.9	953.1
2160	1200	400.1	431.7	581.7	436.7	434.7	5718.4	824.0	1085.6
2340	1300	448.3	483.9	664.0	489.5	490.2	6384.4	929.9	1219.5
2520	1400	496.9	536.6	747.8	542.8	546.4	7059.6	1038.6	1354.4
2700	1500	545.8	589.9	832.9	596.7	603.2	7744.2	1149.8	1490.2
2880	1600	595.1	643.6	919.0	651.0	660.5	8438.0	1263.4	1626.7
3060	1700	644.8	697.8	1006.1	705.7	718.3	9140.9	1379.2	1764.0
3240	1800	694.7	752.3	1094.1	760.7	776.5	9852.4	1497.1	1901.8
3420	1900	745.0	807.1	1182.9	816.1	835.0	10571.9	1616.8	2040.2
3600	2000	795.6	862.2	1272.4	871.5	893.8	11299.6	1738.2	2179.0
3780	2100	846.5	917.6	1362.7	927.3	953.0	12035.0	1861.2	2318.2
3960	2200	897.6	973.2	1453.5	983.3	1012.3	12777.4	1985.6	2457.9
4140	2300	949.2	1029.0	1545.0	1039.5	1072.0	13526.6	2111.4	2597.9
4320	2400	1001.0	1085.0	1637.0	1095.5	1131.8	14282.3	2238.5	2738.2
4500	2500	1053.0	1141.1	1729.6	1151.7	1191.8	15044.1	2366.6	2878.9
4680	2600	1105.4	1197.4	1822.7	1208.3	1251.9	15811.9	2495.9	3019.8
4860	2700	1158.1	1253.9	1916.4	1265.1	1312.3	16585.3	2626.1	3161.1
5040	2800	1211.0	1310.5	2010.5	1322.0	1372.8	17364.0	2757.2	3302.6
5220	2900	1264.2	1367.2	2105.1	1379.0	1433.4	18148.0	2889.2	3444.3
5400	3000	1317.7	1424.0	2200.2	1436.1	1494.2	18936.9	3021.9	3586.3

Table D.2 continued. Enthalpy (Btu/lbm)

TEMPERATURE		ENTHALPY (Btu/lbm)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
5580	3100	1371.4	1480.9	2295.8	1493.3	1555.1	19730.8	3155.4	3728.5
5760	3200	1425.4	1538.0	2391.7	1550.6	1616.1	20529.3	3289.5	3871.0
5940	3300	1479.6	1595.1	2488.2	1608.0	1677.2	21332.5	3424.4	4013.7
6120	3400	1534.0	1652.3	2585.1	1665.5	1738.4	22140.0	3559.8	4156.6
6300	3500	1588.6	1709.6	2682.4	1723.0	1799.7	22952.0	3695.8	4299.6
6480	3600	1643.5	1766.9	2780.1	1780.7	1861.1	23768.2	3832.3	4442.9
6660	3700	1698.5	1824.4	2878.2	1838.4	1922.7	24588.6	3969.3	4586.5
6840	3800	1753.7	1881.9	2976.8	1896.1	1984.3	25413.3	4106.8	4730.2
7020	3900	1809.2	1939.5	3075.8	1953.9	2046.0	26242.0	4244.7	4874.0
7200	4000	1864.8	1997.1	3175.1	2011.9	2107.8	27074.6	4383.1	5018.1
7380	4100	1920.5	2054.8	3274.9	2069.8	2169.6	27911.4	4521.9	5162.4
7560	4200	1976.5	2112.6	3375.1	2127.8	2231.6	28751.9	4661.0	5306.8
7740	4300	2032.6	2170.4	3475.7	2185.9	2293.6	29596.6	4800.6	5451.5
7920	4400	2088.9	2228.3	3576.6	2244.0	2355.8	30444.8	4940.4	5596.3
8100	4500	2145.3	2286.2	3677.0	2302.2	2418.0	31296.9	5080.7	5741.2
8280	4600	2201.9	2344.2	3779.7	2360.5	2480.2	32152.6	5221.2	5886.4
8460	4700	2258.7	2402.2	3881.9	2418.8	2542.6	33012.2	5362.1	6031.7
8640	4800	2315.6	2460.3	3984.4	2477.1	2605.0	33875.0	5503.2	6177.2
8820	4900	2372.7	2518.5	4087.3	2535.5	2667.5	34741.4	5644.6	6322.9
9000	5000	2430.0	2576.7	4190.6	2594.0	2730.1	35611.0	5786.3	6468.7
9180	5100	2487.5	2635.0	4294.3	2652.5	2792.7	36484.0	5928.2	6614.7
9360	5200	2545.1	2693.3	4398.3	2711.0	2855.4	37359.8	6070.5	6760.9
9540	5300	2603.0	2751.6	4502.8	2769.6	2918.3	38238.8	6213.0	6907.3
9720	5400	2661.0	2810.0	4607.6	2828.3	2981.2	39120.5	6355.8	7053.8
9900	5500	2719.3	2868.5	4712.8	2886.8	3044.2	40004.6	6498.9	7200.4
10080	5600	2777.8	2927.0	4818.4	2945.5	3107.3	40891.5	6642.3	7347.3
10260	5700	2836.5	2985.6	4924.3	3004.3	3170.5	41780.5	6786.0	7494.2
10440	5800	2895.5	3044.2	5030.7	3063.1	3233.7	42671.7	6929.9	7641.4
10620	5900	2954.8	3102.9	5137.3	3122.0	3297.1	43564.7	7074.1	7788.7
10800	6000	3014.3	3161.7	5244.4	3180.9	3360.5	44459.5	7218.6	7936.2

Table D.3. Enthalpy (kJ/kg)

TEMPERATURE		ENTHALPY (kJ/kg)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
0	0	-271.3	-309.5	-87.5	-309.6	-212.8	-4199.9	-549.7	-585.7
180	100	-180.6	-205.9	-82.5	-206.0	-146.7	-2712.3	-367.2	-400.6
360	200	-89.6	-102.0	-55.4	-102.0	-77.6	-1376.0	-182.2	-207.4
536.7	298.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
540	300	1.7	1.9	1.3	1.9	1.6	26.3	3.4	4.1
720	400	94.5	106.1	86.5	106.2	91.0	1467.8	191.6	235.9
900	500	190.1	211.0	196.9	211.7	188.7	2917.7	384.4	486.1
1080	600	288.9	317.5	328.3	319.2	293.3	4370.5	582.9	751.8
1260	700	390.6	426.2	475.9	429.2	403.4	5827.9	787.7	1029.5
1440	800	494.8	537.2	635.8	541.8	518.2	7292.7	999.2	1316.7
1620	900	601.3	650.6	805.3	656.9	636.9	8767.9	1217.7	1611.0
1800	1000	709.5	766.3	982.0	774.4	758.9	10257.9	1443.2	1911.0
1980	1100	819.1	884.0	1164.7	893.8	883.5	11765.4	1675.8	2215.5
2160	1200	930.0	1003.5	1352.1	1015.0	1010.5	13292.2	1915.3	2523.5
2340	1300	1042.0	1124.7	1543.5	1137.7	1139.5	14840.3	2161.5	2834.6
2520	1400	1154.9	1247.3	1738.3	1261.8	1270.1	16409.7	2414.1	3148.2
2700	1500	1268.7	1371.1	1936.0	1387.0	1402.1	18001.0	2672.7	3463.8
2880	1600	1383.3	1496.0	2136.2	1513.2	1535.3	19613.6	2936.7	3781.3
3060	1700	1498.7	1621.9	2338.7	1640.3	1669.6	21247.5	3205.9	4100.2
3240	1800	1614.8	1748.6	2543.3	1768.1	1804.8	22901.3	3479.9	4420.6
3420	1900	1731.7	1876.0	2749.6	1897.0	1940.9	24573.9	3758.1	4742.2
3600	2000	1849.2	2004.2	2957.7	2025.8	2077.7	26265.4	4040.3	5064.9
3780	2100	1967.5	2132.9	3167.4	2155.5	2215.1	27974.7	4326.2	5388.6
3960	2200	2086.5	2262.1	3378.7	2285.6	2353.1	29700.4	4615.5	5713.2
4140	2300	2206.3	2391.8	3591.2	2416.4	2491.7	31442.0	4907.9	6038.6
4320	2400	2326.7	2522.0	3805.2	2546.3	2630.7	33198.4	5203.2	6364.8
4500	2500	2447.8	2652.5	4020.4	2677.0	2770.2	34969.2	5501.1	6691.8
4680	2600	2569.5	2783.4	4236.9	2808.7	2910.1	36754.0	5801.5	7019.4
4860	2700	2691.9	2914.6	4454.5	2940.7	3050.4	38551.6	6104.2	7347.7
5040	2800	2815.0	3046.2	4673.3	3072.9	3190.9	40361.6	6409.0	7676.6
5220	2900	2938.6	3178.0	4893.3	3205.5	3331.9	42184.0	6715.7	8006.1
5400	3000	3062.9	3310.1	5114.2	3338.2	3473.1	44017.9	7024.3	8336.1

Table D.3 continued. Enthalpy (kJ/kg)

TEMPERATURE		ENTHALPY (kJ/kg)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
5580	3100	3187.8	3442.4	5336.4	3471.2	3614.7	45863.1	7334.5	8666.7
5760	3200	3313.2	3574.9	5559.5	3604.4	3756.4	47719.2	7646.4	8997.9
5940	3300	3439.2	3707.7	5783.6	3737.8	3898.5	49586.3	7959.8	9329.5
6120	3400	3565.7	3840.7	6008.8	3871.3	4040.8	51463.3	8274.5	9661.7
6300	3500	3692.7	3973.8	6235.0	4005.1	4183.3	53350.7	8590.6	9994.3
6480	3600	3820.2	4107.1	6462.2	4139.1	4326.1	55248.0	8907.9	10327.4
6660	3700	3948.1	4240.7	6690.3	4273.2	4469.1	57154.8	9226.4	10661.0
6840	3800	4076.5	4374.3	6919.4	4407.4	4612.3	59071.9	9546.0	10995.0
7020	3900	4205.3	4508.2	7149.4	4541.8	4755.8	60998.0	9866.6	11329.4
7200	4000	4334.5	4642.2	7380.4	4676.4	4899.4	62933.5	10188.3	11664.4
7380	4100	4464.2	4776.3	7612.4	4811.1	5043.2	64878.5	10510.8	11999.7
7560	4200	4594.2	4910.6	7845.2	4946.0	5187.2	66832.3	10834.3	12335.4
7740	4300	4724.6	5044.9	8079.0	5081.0	5331.4	68795.6	11158.6	12671.6
7920	4400	4855.4	5179.5	8313.7	5216.1	5475.8	70767.4	11483.8	13008.2
8100	4500	4986.6	5314.2	8547.0	5351.4	5620.4	72748.0	11809.7	13345.2
8280	4600	5118.2	5448.9	8785.8	5486.8	5765.2	74737.1	12136.4	13682.6
8460	4700	5250.2	5583.9	9023.2	5622.3	5910.1	76735.1	12463.8	14020.4
8640	4800	5382.5	5718.9	9261.5	5757.9	6055.2	78740.6	12791.9	14358.6
8820	4900	5515.3	5854.1	9500.8	5893.7	6200.5	80754.5	13120.6	14697.2
9000	5000	5648.4	5989.4	9740.8	6029.5	6345.9	82775.8	13449.9	15036.2
9180	5100	5782.0	6124.8	9981.8	6165.5	6491.5	84805.1	13779.9	15375.6
9360	5200	5916.0	6260.3	10223.7	6301.6	6637.3	86840.8	14110.5	15715.4
9540	5300	6050.4	6396.0	10466.5	6437.8	6783.3	88883.9	14441.8	16055.6
9720	5400	6185.4	6531.8	10710.2	6574.2	6929.6	90933.5	14773.8	16396.1
9900	5500	6320.8	6667.7	10954.7	6710.3	7076.0	92988.6	15106.4	16737.0
10080	5600	6456.8	6803.7	11200.1	6846.6	7222.7	95050.1	15439.7	17078.3
10260	5700	6593.3	6939.8	11446.3	6983.2	7369.6	97116.6	15773.6	17420.0
10440	5800	6730.5	7076.1	11693.5	7120.0	7516.6	99188.0	16108.1	17762.0
10620	5900	6868.2	7212.5	11941.5	7256.9	7663.9	101264	16443.4	18104.4
10800	6000	7006.6	7349.1	12190.4	7393.9	7811.4	103344	16779.3	18447.3

Table D.4. Enthalpy (kJ/g-mole)

TEMPERATURE		ENTHALPY (kJ/g-mole)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
0	0	-8.683	-8.670	-1.051	-8.671	-9.364	-8.467	-9.904	-10.552
180	100	-5.779	-5.768	-0.991	-5.769	-6.456	-5.468	-6.615	-7.217
360	200	-2.868	-2.857	-0.665	-2.858	-3.414	-2.774	-3.282	-3.736
536.7	298.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
540	300	0.054	0.054	0.016	0.054	0.069	0.053	0.062	0.074
720	400	3.025	2.971	1.039	2.976	4.003	2.959	3.452	4.250
900	500	6.084	5.911	2.365	5.931	8.305	5.882	6.925	8.758
1080	600	9.244	8.894	3.943	8.942	12.907	8.811	10.501	13.544
1260	700	12.499	11.937	5.716	12.023	17.754	11.749	14.192	18.548
1440	800	15.835	15.046	7.637	15.177	22.806	14.702	18.002	23.721
1620	900	19.241	18.223	9.672	18.401	28.030	17.676	21.938	29.023
1800	1000	22.703	21.463	11.795	21.690	33.397	20.680	26.000	34.428
1980	1100	26.212	24.760	13.989	25.035	38.884	23.719	30.191	39.914
2160	1200	29.761	28.109	16.240	28.430	44.473	26.797	34.506	45.464
2340	1300	33.344	31.503	18.539	31.868	50.148	29.918	38.942	51.069
2520	1400	36.957	34.936	20.879	35.343	55.896	33.082	43.493	56.718
2700	1500	40.599	38.405	23.253	38.850	61.705	36.290	48.151	62.404
2880	1600	44.266	41.904	25.658	42.385	67.569	39.541	52.908	68.123
3060	1700	47.958	45.429	28.090	45.945	73.480	42.835	57.758	73.870
3240	1800	51.673	48.978	30.547	49.526	79.431	46.169	62.693	79.642
3420	1900	55.413	52.548	33.026	53.136	85.419	49.541	67.706	85.436
3600	2000	59.175	56.137	35.525	56.744	91.439	52.951	72.790	91.250
3780	2100	62.961	59.742	38.044	60.376	97.488	56.397	77.941	97.081
3960	2200	66.769	63.361	40.581	64.021	103.562	59.876	83.153	102.929
4140	2300	70.600	66.995	43.134	67.683	109.660	63.387	88.421	108.792
4320	2400	74.453	70.640	45.704	71.324	115.779	66.928	93.741	114.669
4500	2500	78.328	74.296	48.289	74.985	121.917	70.498	99.108	120.559
4680	2600	82.224	77.963	50.889	78.673	128.073	74.096	104.520	126.462
4860	2700	86.141	81.639	53.503	82.369	134.246	77.720	109.973	132.376
5040	2800	90.079	85.323	56.131	86.074	140.433	81.369	115.464	138.302
5220	2900	94.036	89.015	58.773	89.786	146.636	85.043	120.990	144.238
5400	3000	98.013	92.715	61.427	93.504	152.852	88.740	126.549	150.184

Table D.4 continued. Enthalpy (kJ/g-mole)

TEMPERATURE		ENTHALPY (kJ/g-mole)							
R	K	O2	N2	C	CO	CO2	H2	H2O	SO2
5580	3100	102.009	96.421	64.095	97.229	159.081	92.460	132.139	156.140
5760	3200	106.023	100.134	66.775	100.960	165.321	96.202	137.757	162.106
5940	3300	110.054	103.852	69.467	104.696	171.573	99.966	143.403	168.081
6120	3400	114.102	107.577	72.172	108.438	177.836	103.750	149.073	174.065
6300	3500	118.165	111.306	74.889	112.185	184.109	107.555	154.768	180.057
6480	3600	122.245	115.041	77.617	115.937	190.393	111.380	160.485	186.058
6660	3700	126.339	118.781	80.357	119.693	196.686	115.224	166.222	192.068
6840	3800	130.447	122.525	83.109	123.454	202.989	119.089	171.980	198.086
7020	3900	134.569	126.274	85.872	127.219	209.301	122.972	177.757	204.111
7200	4000	138.705	130.027	88.646	130.989	215.622	126.874	183.552	210.145
7380	4100	142.854	133.784	91.432	134.762	221.951	130.795	189.363	216.186
7560	4200	147.015	137.545	94.229	138.540	228.290	134.734	195.191	222.235
7740	4300	151.188	141.309	97.037	142.321	234.637	138.692	201.034	228.292
7920	4400	155.374	145.078	99.856	146.106	240.991	142.667	206.892	234.356
8100	4500	159.572	148.850	102.658	149.895	247.354	146.660	212.764	240.427
8280	4600	163.783	152.625	105.526	153.687	253.725	150.670	218.650	246.506
8460	4700	168.005	156.405	108.378	157.483	260.103	154.698	224.548	252.592
8640	4800	172.240	160.187	111.240	161.282	266.489	158.741	230.458	258.685
8820	4900	176.488	163.973	114.114	165.084	272.882	162.801	236.380	264.785
9000	5000	180.749	167.763	116.997	168.890	279.283	166.876	242.313	270.893
9180	5100	185.023	171.556	119.892	172.699	285.691	170.967	248.258	277.007
9360	5200	189.311	175.352	122.797	176.511	292.109	175.071	254.215	283.128
9540	5300	193.614	179.152	125.713	180.326	298.535	179.190	260.184	289.257
9720	5400	197.933	182.955	128.640	184.146	304.971	183.322	266.164	295.392
9900	5500	202.267	186.761	131.577	187.957	311.416	187.465	272.157	301.534
10080	5600	206.618	190.571	134.524	191.775	317.870	191.621	278.161	307.683
10260	5700	210.987	194.384	137.482	195.603	324.334	195.787	284.177	313.838
10440	5800	215.375	198.201	140.451	199.434	330.806	199.963	290.204	320.000
10620	5900	219.782	202.023	143.429	203.268	337.288	204.148	296.244	326.169
10800	6000	224.210	205.848	146.419	207.106	343.779	208.341	302.295	332.346