

**SÜLEYMAN DEMİREL ÜNİVERSİTESİ
MÜHENDİSLİK FAKÜLTESİ
MAKİNA MÜHENDİSLİĞİ BÖLÜMÜ
HAVA-SU KAYNAKLI ISI POMPASI LABORATUARI**



DENEY FÖYÜ

DENEY ADI

HAVA-SU KAYNAKLI ISI POMPASI

DERSİN ÖĞRETİM ÜYESİ

PROF. DR. ALİ BOLATTÜRK

DENEY GRUBU:

DENEY TARİHİ:

TESLİM TARİHİ:

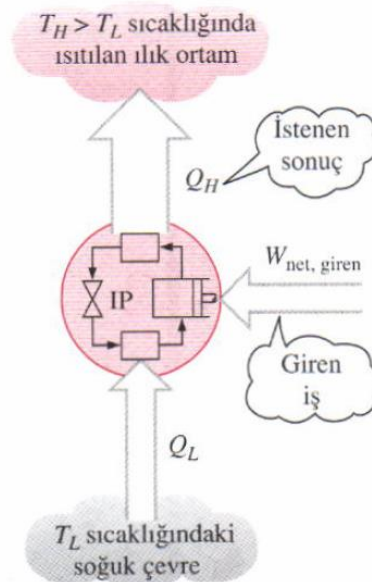
DENEYİN AMACI:

Deneyde, ısı kaynağı olarak su veya hava kullanan ısı pompasının termodinamik açıdan incelemesi yapılacaktır. Soğutucu akışkan ve ikincil akışkanlara ait (hava veya su) sıcaklık (C), basınç (kPa) ve kütsel debi (kg/s) değerleri saptanarak, sistemin harcadığı enerji, net ısı transferi miktarları ayrı ayrı hesaplanarak performans katsayıları (COP) elde edilecektir.

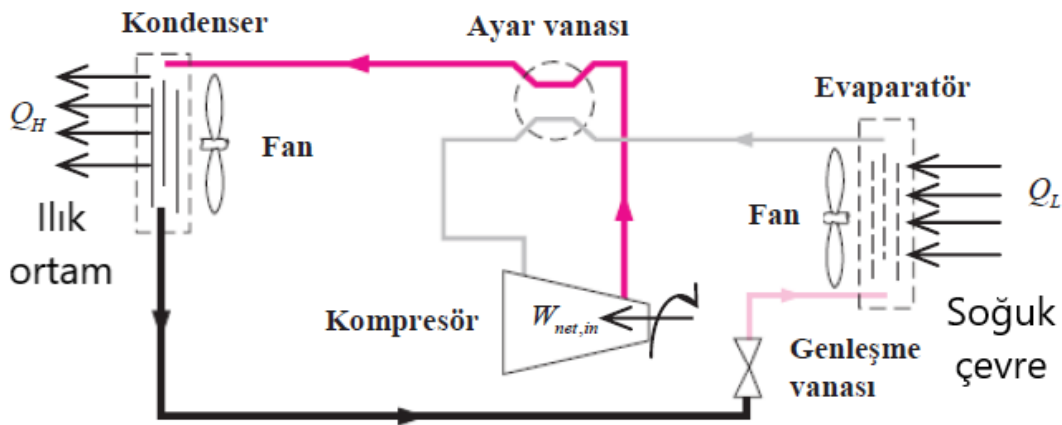
TEORİK BİLGİ:

Isı pompası hem ısıtma ve hem de soğutma işlevini yapabilecek şekilde tasarlanmış termodinamik bir çevrimdir. Isı pompası; toprak, su veya hava kaynaklı olmak üzere ısıtma, soğutma, kurutma gibi birçok uygulamada kullanılmaktadır. İlk yatırım maliyetlerinin yüksek olmasına rağmen işletme maliyetlerinin uygunluğu nedeniyle özellikle su ve toprak kaynaklı ısı pompaları yüksek ısıtma ve soğutma yüklerine ihtiyaç duyan iş merkezlerinin ve yerleşkelerin iklimlendirilmesinde kullanılmaktadır.

Soğutma makinaları ve ısı pompaları aynı çevrime göre çalışırlar fakat kullanım amaçları farklıdır. Bir ısı pompasının kullanım amacı, ısıtılan ortamı yüksek sıcaklıkta tutulmasını sağlamaktır. Bu amaç, kuyu suyu veya kışın dışarıdaki soğuk hava gibi düşük sıcaklıktaki bir ortamdan ısı çekilerek, evin içi gibi yüksek sıcaklıktaki ısıtılmak istenen ortama aktarılmasıyla gerçekleştirilir (Şekil 1). Isı pompası temelde tersine çalışan bir soğutma çevrimidir. Isı pompası temelde *kondenser (yoğuşturucu)*, *genleşme vanası*, *evaporatör (buharlaştırıcı)* ve *kompresör* elemanlarından oluşmaktadır (Şekil 2).



Şekil 1. Isı pompasının çalışma prensibi



Şekil 2. Bir ısı pompası sisteminin ana elemanları

Bir ısı pompasının verimi etkinlik katsayısı COP ile,

veya

$$COP_{IP} = \frac{\dot{Q}_H}{\dot{Q}_H - \dot{Q}_L} = \frac{1}{1 - \dot{Q}_L / \dot{Q}_H}$$

DENEY DÜZENİĞİ:

Şekil 3. Hava-su kaynaklı ısı pompası deney düzeneği şematik gösterimi

DENEYİN YAPILIŞI:

Hava-su kaynaklı ısı pompası deneyi iki aşamalı olarak yapılacaktır. Sudan suya ve havadan suya ısı pompası tek düzeneğe incelenecektir. Deney düzeneğinden elde edilen sıcaklık, basınç ve debi değerleri kullanılarak evaporatör ve kondenserde meydana gelen ısı geçiş miktarları, soğutucu akışkan tarafından ve ikincil akışkan tarafından ayrı ayrı hesaplanarak karşılaştırılacaktır. Çalışma, ısı pompasının havadan suya ve sudan suya çalışma durumları için tekrarlanarak performans katsayısının ikincil akışkana göre değişimi gözlemlenecektir. Bu amaçla gerçekleştirilmesi gereken deney adımları aşağıda listelenmiştir (Su kaynaklı çevrim için deney adımları listelenmiştir, hava kaynaklı evaporatörün kullanımı durumunda da benzer işlemler tekrarlanacaktır).

1. İlk olarak deney düzeneğinin üzerindeki üç yollu vana yardımıyla su kaynaklı evaporatör seçilir,
2. Kondenser suyunun debisi ve giriş sıcaklığıyla, evaporatör tarafındaki suyun debisi ayarlanır,
3. Sistem çalıştırılıp dengeye gelmesi beklenir (Termometrelerden ve debi ölçerlerden okunan değerlerin sabitlendiği duruma kadar beklenir),
4. Sistem denge durumuna ulaştığında, ilgili sıcaklık, debi ve basınç değerleri not edilir (Tablo 1).
5. Su kaynaklı çalışma tamamlandıktan sonra, sistem hava kaynaklı ölçüm için tekrarlanarak denge durumuna gelmesi beklenir ve Tablo 1 tekrar oluşturulur.

Tablo 1. Deney verileri

Eleman	Açıklama	Birim	Değer (Su kaynaklı)	Değer (Hava kaynaklı)
R-12 (Freon)	Kütleli debi	$\dot{m}_r, (kg/s)$		
	Kompresör giriş basıncı (Alçak basınç)	$P_1, (kPa)$		
	Kompresör çıkış basıncı (Yüksek basınç)	$P_2, (kPa)$		
	Kompresör giriş sıcaklığı	$T_1, (^\circ C)$		
	Kompresör çıkış sıcaklığı	$T_2, (^\circ C)$		
	Kondenser çıkış sıcaklığı	$T_3, (^\circ C)$		
	Evaporatör giriş sıcaklığı	$T_4, (^\circ C)$		
Hava Kaynağı (Evaporatör)	Hava giriş sıcaklığı	$T_a, (^\circ C)$		
	Hava çıkış sıcaklığı	$T_{10}, (^\circ C)$		
Su Kaynağı (Evaporatör)	Kütleli debi	$\dot{m}_{cold}, (kg/s)$		
	Evaporatör giriş sıcaklığı	$T_5, (^\circ C)$		
	Evaporatör çıkış sıcaklığı	$T_6, (^\circ C)$		
Kondenserde ısınan su (Soğutma suyu)	Kütleli debi	$\dot{m}_{hot}, (kg/s)$		
	Kompresör soğutma suyu giriş sıcaklığı	$T_7, (^\circ C)$		
	Kompresör soğutma suyu çıkış sıcaklığı	$T_8, (^\circ C)$		
	Kondenser çıkış sıcaklığı	$T_9, (^\circ C)$		

DENEY RAPORUNUN HAZIRLANMASI:

Tablo 1'deki verileri kullanarak soğutucu akışkanın kompresör giriş, çıkış, kondenser çıkış ve genişleme vanası çıkışındaki termodinamik özellikleri belirlenecektir. Elde edilen veriler kullanılarak aşağıdaki hesaplamalar yapılacaktır.

Kompresöre verilen işin bir kısmı soğutucu akışkanın entalpisindeki artışa eşittir. Diğer kısmı ise kompresör karterindeki yağı soğutan soğutma suyuna ısı olarak aktarılmaktadır.

$$W_c = \dot{m}_r(h_2 - h_1) + \dot{Q}_{su,7-8}$$

Evaporatörde soğutucu akışkan tarafından aktarılan ısı çevre akışkana (su veya hava) aktarılan ısıya eşittir.

$$\dot{Q}_L = \dot{m}_r(h_1 - h_4) = \dot{m}_{cold}c_{p,su}(T_5 - T_6) = (\dot{Q}_{hava,a-10})$$

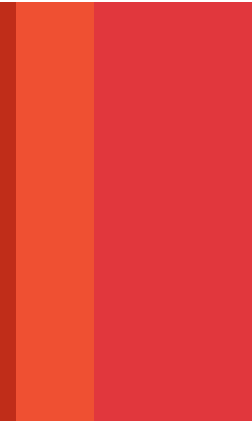
Isı pompasında soğutma suyuna aktarılan toplam ısı kondenserde ve kompresör karterinde çevre akışkana aktarılan ısıların toplamıdır.

$$\dot{Q}_H = \dot{m}_r(h_2 - h_3) + \dot{m}_{hot}c_{p,su}(T_8 - T_7) = \dot{m}_{hot}c_{p,su}(T_9 - T_7)$$

Hesaplanan bu değerler kullanılarak ısı pompasının performans katsayısı her iki durum için de (hava soğutmalı veya su soğutmalı işletme) elde edilecek ve Tablo 2 doldurulacaktır.

Tablo 2. Deney sonuçları

Hesaplanan Değerler (kW)	İkinci Akışkan	
	Su Kaynaklı	Hava Kaynaklı
$\dot{Q}_H$		
$\dot{Q}_L$		
$\dot{W}_{net}$		
COP_{IP}		



DuPont™ Freon®

REFRIGERANTS

Technical Information

T-12 SI

**Thermodynamic
Properties of
DuPont™ Freon® 12
(R-12)
Refrigerant**



The miracles of science™

Thermodynamic Properties of DuPont™ Freon® 12 (R12)

SI Units

Tables of the thermodynamic properties of DuPont™ Freon® 12 (R-12) have been developed and are presented here. This information is based on values calculated using the NIST REFPROP Database (McLinden, M.O., Klein, S.A., Lemmon, E.W., and Peskin, A.P., NIST Standard Reference Database 23, NIST thermodynamic and transport properties of refrigerants and refrigerant mixtures – REFPROP version 6.01, Standard Reference Data Program, National Institute of Standards and Technology, 1998).

Physical Properties

Chemical Formula	CCl_2F_2
Molecular mass	120.91
Boiling Point At one atmosphere	-29.75°C
Critical Temperature	111.97°C
Critical Pressure	4136 kPa
Critical Density	565.0 kg/m^3
Critical Volume	$0.0018\text{ m}^3/\text{kg}$

Units

P = Pressure in kPa. Absolute

T = Temperature in Celcius

V_f = Fluid (liquid) specific volume in cubic meters per kilogram

V_g = Vapor (gas) specific volume in cubic meters per kilogram

d_f and d_g = Fluid and Vapor (respectively) densities in kilograms per cubic meter

H = Enthalpy (kJ/kg)

S = Entropy (kJ/kg·K)

Table 1
DuPont™ Freon® 12 Saturation Properties — Temperature Table

Temp °C	Pressure [kPa]	Volume [m ³ /kg]		Density [kg/m ³]		Enthalpy [kJ/kg]			Entropy [kJ/K-kg]		Temp °C
		Liquid v _f	Vapour v _g	Liquid d _f	Vapour d _g	Liquid H _f	Latent H _{fg}	Vapour H _g	Liquid S _f	Vapour S _g	
-100	1.2	0.0006	10.0000	1679.0	0.100	113.3	192.8	306.1	0.6077	1.7210	-100
-99	1.3	0.0006	9.1670	1677.0	0.109	114.1	192.4	306.5	0.6124	1.7170	-99
-98	1.4	0.0006	8.4100	1674.0	0.119	115.0	192.0	307.0	0.6171	1.7130	-98
-97	1.6	0.0006	7.7250	1671.0	0.129	115.8	191.6	307.4	0.6218	1.7100	-97
-96	1.7	0.0006	7.1040	1669.0	0.141	116.6	191.3	307.9	0.6264	1.7060	-96
-95	1.9	0.0006	6.5400	1666.0	0.153	117.4	190.9	308.3	0.6310	1.7030	-95
-94	2.0	0.0006	6.0270	1663.0	0.166	118.2	190.6	308.8	0.6356	1.6990	-94
-93	2.2	0.0006	5.5610	1661.0	0.180	119.1	190.1	309.2	0.6402	1.6960	-93
-92	2.4	0.0006	5.1360	1658.0	0.195	119.9	189.8	309.7	0.6448	1.6920	-92
-91	2.6	0.0006	4.7480	1655.0	0.211	120.7	189.4	310.1	0.6493	1.6890	-91
-90	2.9	0.0006	4.3950	1653.0	0.228	121.5	189.1	310.6	0.6538	1.6860	-90
-89	3.1	0.0006	4.0720	1650.0	0.246	122.4	188.6	311.0	0.6583	1.6830	-89
-88	3.4	0.0006	3.7760	1648.0	0.265	123.2	188.3	311.5	0.6628	1.6800	-88
-87	3.6	0.0006	3.5050	1645.0	0.285	124.0	188.0	312.0	0.6672	1.6770	-87
-86	3.9	0.0006	3.2570	1642.0	0.307	124.8	187.6	312.4	0.6716	1.6740	-86
-85	4.3	0.0006	3.0290	1640.0	0.330	125.7	187.2	312.9	0.6761	1.6710	-85
-84	4.6	0.0006	2.8190	1637.0	0.355	126.5	186.8	313.3	0.6804	1.6680	-84
-83	5.0	0.0006	2.6270	1634.0	0.381	127.3	186.5	313.8	0.6848	1.6660	-83
-82	5.3	0.0006	2.4490	1632.0	0.408	128.1	186.2	314.3	0.6892	1.6630	-82
-81	5.8	0.0006	2.2860	1629.0	0.437	129.0	185.7	314.7	0.6935	1.6600	-81
-80	6.2	0.0006	2.1360	1626.0	0.468	129.8	185.4	315.2	0.6978	1.6580	-80
-79	6.7	0.0006	1.9970	1624.0	0.501	130.6	185.1	315.7	0.7021	1.6550	-79
-78	7.1	0.0006	1.8680	1621.0	0.535	131.5	184.6	316.1	0.7064	1.6530	-78
-77	7.7	0.0006	1.7490	1618.0	0.572	132.3	184.3	316.6	0.7106	1.6500	-77
-76	8.2	0.0006	1.6390	1616.0	0.610	133.1	184.0	317.1	0.7149	1.6480	-76
-75	8.8	0.0006	1.5380	1613.0	0.650	134.0	183.5	317.5	0.7191	1.6450	-75
-74	9.4	0.0006	1.4430	1610.0	0.693	134.8	183.2	318.0	0.7233	1.6430	-74
-73	10.1	0.0006	1.3560	1608.0	0.738	135.6	182.9	318.5	0.7275	1.6410	-73
-72	10.8	0.0006	1.2740	1605.0	0.785	136.5	182.4	318.9	0.7317	1.6390	-72
-71	11.5	0.0006	1.1990	1602.0	0.834	137.3	182.1	319.4	0.7358	1.6370	-71
-70	12.3	0.0006	1.1290	1600.0	0.886	138.2	181.7	319.9	0.7400	1.6340	-70
-69	13.1	0.0006	1.0630	1597.0	0.941	139.0	181.3	320.3	0.7441	1.6320	-69
-68	14.0	0.0006	1.0020	1594.0	0.998	139.8	181.0	320.8	0.7482	1.6300	-68
-67	14.9	0.0006	0.9455	1591.0	1.058	140.7	180.6	321.3	0.7523	1.6280	-67
-66	15.8	0.0006	0.8925	1589.0	1.120	141.5	180.3	321.8	0.7564	1.6260	-66
-65	16.8	0.0006	0.8430	1586.0	1.186	142.4	179.8	322.2	0.7604	1.6250	-65
-64	17.9	0.0006	0.7968	1583.0	1.255	143.2	179.5	322.7	0.7645	1.6230	-64
-63	19.0	0.0006	0.7536	1581.0	1.327	144.1	179.1	323.2	0.7685	1.6210	-63
-62	20.1	0.0006	0.7132	1578.0	1.402	144.9	178.8	323.7	0.7726	1.6190	-62
-61	21.3	0.0006	0.6754	1575.0	1.481	145.8	178.3	324.1	0.7766	1.6170	-61
-60	22.6	0.0006	0.6399	1572.0	1.563	146.6	178.0	324.6	0.7806	1.6160	-60
-59	24.0	0.0006	0.6067	1570.0	1.648	147.5	177.6	325.1	0.7845	1.6140	-59
-58	25.4	0.0006	0.5755	1567.0	1.738	148.3	177.3	325.6	0.7885	1.6120	-58
-57	26.8	0.0006	0.5463	1564.0	1.831	149.2	176.8	326.0	0.7924	1.6110	-57
-56	28.4	0.0006	0.5188	1561.0	1.928	150.0	176.5	326.5	0.7964	1.6090	-56
-55	30.0	0.0006	0.4930	1559.0	2.029	150.9	176.1	327.0	0.8003	1.6080	-55
-54	31.6	0.0006	0.4687	1556.0	2.134	151.7	175.8	327.5	0.8042	1.6060	-54
-53	33.4	0.0006	0.4458	1553.0	2.243	152.6	175.4	328.0	0.8081	1.6050	-53
-52	35.2	0.0007	0.4243	1550.0	2.357	153.5	174.9	328.4	0.8120	1.6030	-52
-51	37.1	0.0007	0.4040	1548.0	2.475	154.3	174.6	328.9	0.8159	1.6020	-51
-50	39.1	0.0007	0.3849	1545.0	2.598	155.2	174.2	329.4	0.8197	1.6000	-50
-49	41.2	0.0007	0.3669	1542.0	2.725	156.0	173.9	329.9	0.8236	1.5990	-49
-48	43.4	0.0007	0.3499	1539.0	2.858	156.9	173.4	330.3	0.8274	1.5980	-48
-47	45.6	0.0007	0.3339	1536.0	2.995	157.8	173.0	330.8	0.8313	1.5960	-47

Table 1 (continued)
DuPont™ Freon® 12 Saturation Properties — Temperature Table

Temp °C	Pressure [kPa]	Volume [m ³ /kg]		Density [kg/m ³]		Enthalpy [kJ/kg]			Entropy [kJ/K-kg]		Temp °C
		Liquid v _f	Vapour v _g	Liquid d _f	Vapour d _g	Liquid H _f	Latent H _{fg}	Vapour H _g	Liquid S _f	Vapour S _g	
-46	47.9	0.0007	0.3187	1534.0	3.138	158.6	172.7	331.3	0.8351	1.5950	-46
-45	50.4	0.0007	0.3044	1531.0	3.286	159.5	172.3	331.8	0.8389	1.5940	-45
-44	52.9	0.0007	0.2908	1528.0	3.439	160.4	171.9	332.3	0.8427	1.5930	-44
-43	55.6	0.0007	0.2780	1525.0	3.598	161.2	171.5	332.7	0.8464	1.5920	-43
-42	58.3	0.0007	0.2658	1522.0	3.762	162.1	171.1	333.2	0.8502	1.5900	-42
-41	61.1	0.0007	0.2543	1519.0	3.932	163.0	170.7	333.7	0.8540	1.5890	-41
-40	64.1	0.0007	0.2434	1517.0	4.108	163.9	170.3	334.2	0.8577	1.5880	-40
-39	67.2	0.0007	0.2331	1514.0	4.290	164.7	170.0	334.7	0.8615	1.5870	-39
-38	70.3	0.0007	0.2233	1511.0	4.479	165.6	169.5	335.1	0.8652	1.5860	-38
-37	73.6	0.0007	0.2140	1508.0	4.674	166.5	169.1	335.6	0.8689	1.5850	-37
-36	77.1	0.0007	0.2051	1505.0	4.875	167.4	168.7	336.1	0.8726	1.5840	-36
-35	80.6	0.0007	0.1967	1502.0	5.083	168.2	168.4	336.6	0.8763	1.5830	-35
-34	84.3	0.0007	0.1888	1499.0	5.298	169.1	167.9	337.0	0.8800	1.5820	-34
-33	88.1	0.0007	0.1812	1496.0	5.519	170.0	167.5	337.5	0.8836	1.5810	-33
-32	92.0	0.0007	0.1740	1494.0	5.748	170.9	167.1	338.0	0.8873	1.5800	-32
-31	96.1	0.0007	0.1671	1491.0	5.984	171.8	166.7	338.5	0.8910	1.5790	-31
-30	100.3	0.0007	0.1606	1488.0	6.228	172.7	166.2	338.9	0.8946	1.5780	-30
-29	104.6	0.0007	0.1543	1485.0	6.479	173.6	165.8	339.4	0.8982	1.5780	-29
-28	109.1	0.0007	0.1484	1482.0	6.738	174.4	165.5	339.9	0.9019	1.5770	-28
-27	113.7	0.0007	0.1428	1479.0	7.005	175.3	165.1	340.4	0.9055	1.5760	-27
-26	118.5	0.0007	0.1374	1476.0	7.280	176.2	164.6	340.8	0.9091	1.5750	-26
-25	123.5	0.0007	0.1322	1473.0	7.563	177.1	164.2	341.3	0.9127	1.5740	-25
-24	128.6	0.0007	0.1273	1470.0	7.855	178.0	163.8	341.8	0.9163	1.5740	-24
-23	133.9	0.0007	0.1226	1467.0	8.155	178.9	163.3	342.2	0.9199	1.5730	-23
-22	139.3	0.0007	0.1181	1464.0	8.464	179.8	162.9	342.7	0.9234	1.5720	-22
-21	144.9	0.0007	0.1139	1461.0	8.782	180.7	162.5	343.2	0.9270	1.5710	-21
-20	150.7	0.0007	0.1098	1458.0	9.109	181.6	162.1	343.7	0.9305	1.5710	-20
-19	156.7	0.0007	0.1059	1455.0	9.446	182.5	161.6	344.1	0.9341	1.5700	-19
-18	162.8	0.0007	0.1021	1452.0	9.792	183.4	161.2	344.6	0.9376	1.5690	-18
-17	169.1	0.0007	0.0986	1449.0	10.150	184.3	160.8	345.1	0.9412	1.5690	-17
-16	175.6	0.0007	0.0951	1446.0	10.510	185.2	160.3	345.5	0.9447	1.5680	-16
-15	182.3	0.0007	0.0918	1443.0	10.890	186.1	159.9	346.0	0.9482	1.5670	-15
-14	189.2	0.0007	0.0887	1440.0	11.270	187.1	159.3	346.4	0.9517	1.5670	-14
-13	196.3	0.0007	0.0857	1437.0	11.670	188.0	158.9	346.9	0.9552	1.5660	-13
-12	203.6	0.0007	0.0828	1434.0	12.080	188.9	158.5	347.4	0.9587	1.5660	-12
-11	211.1	0.0007	0.0800	1431.0	12.500	189.8	158.0	347.8	0.9622	1.5650	-11
-10	218.8	0.0007	0.0774	1428.0	12.920	190.7	157.6	348.3	0.9656	1.5640	-10
-9	226.7	0.0007	0.0748	1425.0	13.370	191.6	157.1	348.7	0.9691	1.5640	-9
-8	234.8	0.0007	0.0724	1421.0	13.820	192.6	156.6	349.2	0.9726	1.5630	-8
-7	243.2	0.0007	0.0700	1418.0	14.280	193.5	156.2	349.7	0.9760	1.5630	-7
-6	251.8	0.0007	0.0678	1415.0	14.760	194.4	155.7	350.1	0.9795	1.5620	-6
-5	260.6	0.0007	0.0656	1412.0	15.240	195.3	155.3	350.6	0.9829	1.5620	-5
-4	269.6	0.0007	0.0635	1409.0	15.740	196.3	154.7	351.0	0.9863	1.5610	-4
-3	278.9	0.0007	0.0615	1406.0	16.260	197.2	154.3	351.5	0.9898	1.5610	-3
-2	288.4	0.0007	0.0596	1402.0	16.780	198.1	153.8	351.9	0.9932	1.5600	-2
-1	298.1	0.0007	0.0577	1399.0	17.320	199.1	153.3	352.4	0.9966	1.5600	-1
0	308.1	0.0007	0.0560	1396.0	17.870	200.0	152.8	352.8	1.0000	1.5590	0
1	318.4	0.0007	0.0542	1393.0	18.440	200.9	152.4	353.3	1.0030	1.5590	1
2	328.9	0.0007	0.0526	1390.0	19.020	201.9	151.8	353.7	1.0070	1.5590	2
3	339.7	0.0007	0.0510	1386.0	19.610	202.8	151.3	354.1	1.0100	1.5580	3
4	350.7	0.0007	0.0495	1383.0	20.220	203.8	150.8	354.6	1.0140	1.5580	4
5	362.0	0.0007	0.0480	1380.0	20.840	204.7	150.3	355.0	1.0170	1.5570	5
6	373.6	0.0007	0.0466	1377.0	21.480	205.7	149.7	355.4	1.0200	1.5570	6
7	385.4	0.0007	0.0452	1373.0	22.130	206.6	149.3	355.9	1.0240	1.5570	7

Table 1 (continued)
DuPont™ Freon® 12 Saturation Properties — Temperature Table

Temp °C	Pressure [kPa]	Volume [m ³ /kg]		Density [kg/m ³]		Enthalpy [kJ/kg]			Entropy [kJ/K-kg]		Temp °C
		Liquid v _f	Vapour v _g	Liquid d _f	Vapour d _g	Liquid H _f	Latent H _{fg}	Vapour H _g	Liquid S _f	Vapour S _g	
8	397.6	0.0007	0.0439	1370.0	22.800	207.6	148.7	356.3	1.0270	1.5560	8
9	410.0	0.0007	0.0426	1367.0	23.480	208.5	148.2	356.7	1.0300	1.5560	9
10	422.7	0.0007	0.0414	1363.0	24.180	209.5	147.7	357.2	1.0340	1.5550	10
11	435.7	0.0007	0.0402	1360.0	24.900	210.4	147.2	357.6	1.0370	1.5550	11
12	448.9	0.0007	0.0390	1356.0	25.630	211.4	146.6	358.0	1.0400	1.5550	12
13	462.5	0.0007	0.0379	1353.0	26.380	212.3	146.2	358.5	1.0440	1.5540	13
14	476.4	0.0007	0.0368	1350.0	27.150	213.3	145.6	358.9	1.0470	1.5540	14
15	490.6	0.0007	0.0358	1346.0	27.930	214.3	145.0	359.3	1.0500	1.5540	15
16	505.1	0.0007	0.0348	1343.0	28.740	215.2	144.5	359.7	1.0540	1.5530	16
17	520.0	0.0008	0.0338	1339.0	29.560	216.2	143.9	360.1	1.0570	1.5530	17
18	535.1	0.0008	0.0329	1336.0	30.400	217.2	143.3	360.5	1.0600	1.5530	18
19	550.6	0.0008	0.0320	1332.0	31.260	218.2	142.8	361.0	1.0640	1.5520	19
20	566.4	0.0008	0.0311	1329.0	32.130	219.1	142.3	361.4	1.0670	1.5520	20
21	582.6	0.0008	0.0303	1325.0	33.030	220.1	141.7	361.8	1.0700	1.5520	21
22	599.0	0.0008	0.0295	1322.0	33.950	221.1	141.1	362.2	1.0740	1.5510	22
23	615.9	0.0008	0.0287	1318.0	34.890	222.1	140.5	362.6	1.0770	1.5510	23
24	633.0	0.0008	0.0279	1315.0	35.850	223.1	139.9	363.0	1.0800	1.5510	24
25	650.6	0.0008	0.0272	1311.0	36.830	224.1	139.3	363.4	1.0830	1.5510	25
26	668.5	0.0008	0.0264	1307.0	37.830	225.1	138.7	363.8	1.0870	1.5500	26
27	686.7	0.0008	0.0257	1304.0	38.850	226.0	138.2	364.2	1.0900	1.5500	27
28	705.3	0.0008	0.0251	1300.0	39.900	227.0	137.5	364.5	1.0930	1.5500	28
29	724.3	0.0008	0.0244	1296.0	40.970	228.0	136.9	364.9	1.0960	1.5490	29
30	743.7	0.0008	0.0238	1293.0	42.070	229.0	136.3	365.3	1.1000	1.5490	30
31	763.4	0.0008	0.0232	1289.0	43.180	230.0	135.7	365.7	1.1030	1.5490	31
32	783.5	0.0008	0.0226	1285.0	44.330	231.1	135.0	366.1	1.1060	1.5490	32
33	804.0	0.0008	0.0220	1281.0	45.490	232.1	134.3	366.4	1.1090	1.5480	33
34	824.9	0.0008	0.0214	1278.0	46.690	233.1	133.7	366.8	1.1130	1.5480	34
35	846.2	0.0008	0.0209	1274.0	47.910	234.1	133.1	367.2	1.1160	1.5480	35
36	867.9	0.0008	0.0203	1270.0	49.150	235.1	132.4	367.5	1.1190	1.5480	36
37	890.0	0.0008	0.0198	1266.0	50.430	236.1	131.8	367.9	1.1220	1.5470	37
38	912.5	0.0008	0.0193	1262.0	51.730	237.2	131.1	368.3	1.1260	1.5470	38
39	935.5	0.0008	0.0189	1258.0	53.060	238.2	130.4	368.6	1.1290	1.5470	39
40	958.8	0.0008	0.0184	1254.0	54.420	239.2	129.8	369.0	1.1320	1.5460	40
41	982.6	0.0008	0.0179	1250.0	55.800	240.3	129.0	369.3	1.1350	1.5460	41
42	1007.0	0.0008	0.0175	1246.0	57.220	241.3	128.4	369.7	1.1390	1.5460	42
43	1031.0	0.0008	0.0170	1242.0	58.670	242.3	127.7	370.0	1.1420	1.5460	43
44	1057.0	0.0008	0.0166	1238.0	60.160	243.4	126.9	370.3	1.1450	1.5450	44
45	1082.0	0.0008	0.0162	1234.0	61.670	244.4	126.3	370.7	1.1480	1.5450	45
46	1108.0	0.0008	0.0158	1230.0	63.220	245.5	125.5	371.0	1.1520	1.5450	46
47	1135.0	0.0008	0.0154	1226.0	64.810	246.5	124.8	371.3	1.1550	1.5450	47
48	1161.0	0.0008	0.0151	1222.0	66.420	247.6	124.0	371.6	1.1580	1.5440	48
49	1189.0	0.0008	0.0147	1217.0	68.080	248.6	123.3	371.9	1.1610	1.5440	49
50	1217.0	0.0008	0.0143	1213.0	69.770	249.7	122.5	372.2	1.1650	1.5440	50
51	1245.0	0.0008	0.0140	1209.0	71.500	250.8	121.7	372.5	1.1680	1.5430	51
52	1274.0	0.0008	0.0137	1204.0	73.270	251.9	120.9	372.8	1.1710	1.5430	52
53	1303.0	0.0008	0.0133	1200.0	75.080	252.9	120.2	373.1	1.1740	1.5430	53
54	1333.0	0.0008	0.0130	1196.0	76.930	254.0	119.4	373.4	1.1770	1.5420	54
55	1363.0	0.0008	0.0127	1191.0	78.820	255.1	118.6	373.7	1.1810	1.5420	55
56	1394.0	0.0008	0.0124	1187.0	80.760	256.2	117.8	374.0	1.1840	1.5420	56
57	1425.0	0.0009	0.0121	1182.0	82.740	257.3	117.0	374.3	1.1870	1.5410	57
58	1457.0	0.0009	0.0118	1177.0	84.770	258.4	116.1	374.5	1.1900	1.5410	58
59	1489.0	0.0009	0.0115	1173.0	86.840	259.5	115.3	374.8	1.1940	1.5410	59
60	1522.0	0.0009	0.0112	1168.0	88.970	260.6	114.4	375.0	1.1970	1.5400	60
61	1555.0	0.0009	0.0110	1163.0	91.140	261.7	113.6	375.3	1.2000	1.5400	61

Table 1 (continued)
DuPont™ Freon® 12 Saturation Properties — Temperature Table

Temp °C	Pressure [kPa]	Volume [m ³ /kg]		Density [kg/m ³]		Enthalpy [kJ/kg]			Entropy [kJ/K·kg]		Temp °C
		Liquid v _f	Vapour v _g	Liquid d _f	Vapour d _g	Liquid H _f	Latent H _{fg}	Vapour H _g	Liquid S _f	Vapour S _g	
62	1589.0	0.0009	0.0107	1159.0	93.370	262.8	112.7	375.5	1.2030	1.5400	62
63	1624.0	0.0009	0.0105	1154.0	95.650	263.9	111.9	375.8	1.2070	1.5390	63
64	1659.0	0.0009	0.0102	1149.0	97.980	265.1	110.9	376.0	1.2100	1.5390	64
65	1694.0	0.0009	0.0100	1144.0	100.400	266.2	110.0	376.2	1.2130	1.5390	65
66	1730.0	0.0009	0.0097	1139.0	102.800	267.3	109.1	376.4	1.2160	1.5380	66
67	1767.0	0.0009	0.0095	1134.0	105.300	268.5	108.1	376.6	1.2200	1.5380	67
68	1804.0	0.0009	0.0093	1129.0	107.900	269.6	107.2	376.8	1.2230	1.5370	68
69	1842.0	0.0009	0.0090	1124.0	110.600	270.8	106.2	377.0	1.2260	1.5370	69
70	1880.0	0.0009	0.0088	1118.0	113.300	271.9	105.3	377.2	1.2290	1.5360	70
71	1919.0	0.0009	0.0086	1113.0	116.100	273.1	104.3	377.4	1.2330	1.5360	71
72	1959.0	0.0009	0.0084	1108.0	118.900	274.3	103.3	377.6	1.2360	1.5350	72
73	1999.0	0.0009	0.0082	1102.0	121.800	275.5	102.2	377.7	1.2390	1.5350	73
74	2040.0	0.0009	0.0080	1097.0	124.900	276.6	101.3	377.9	1.2430	1.5340	74
75	2081.0	0.0009	0.0078	1091.0	128.000	277.8	100.2	378.0	1.2460	1.5340	75
76	2123.0	0.0009	0.0076	1085.0	131.100	279.0	99.1	378.1	1.2490	1.5330	76
77	2166.0	0.0009	0.0074	1079.0	134.400	280.3	97.9	378.2	1.2530	1.5330	77
78	2209.0	0.0009	0.0073	1074.0	137.800	281.5	96.8	378.3	1.2560	1.5320	78
79	2253.0	0.0009	0.0071	1068.0	141.200	282.7	95.7	378.4	1.2590	1.5310	79
80	2297.0	0.0009	0.0069	1061.0	144.800	283.9	94.6	378.5	1.2630	1.5310	80
81	2343.0	0.0010	0.0067	1055.0	148.500	285.2	93.3	378.5	1.2660	1.5300	81
82	2389.0	0.0010	0.0066	1049.0	152.300	286.4	92.2	378.6	1.2700	1.5290	82
83	2435.0	0.0010	0.0064	1042.0	156.200	287.7	90.9	378.6	1.2730	1.5280	83
84	2482.0	0.0010	0.0062	1036.0	160.300	289.0	89.6	378.6	1.2770	1.5280	84
85	2530.0	0.0010	0.0061	1029.0	164.500	290.3	88.3	378.6	1.2800	1.5270	85
86	2579.0	0.0010	0.0059	1022.0	168.800	291.6	87.0	378.6	1.2840	1.5260	86
87	2628.0	0.0010	0.0058	1015.0	173.300	292.9	85.7	378.6	1.2870	1.5250	87
88	2678.0	0.0010	0.0056	1008.0	177.900	294.2	84.3	378.5	1.2910	1.5240	88
89	2729.0	0.0010	0.0055	1001.0	182.800	295.6	82.9	378.5	1.2940	1.5230	89
90	2781.0	0.0010	0.0053	993.2	187.800	296.9	81.5	378.4	1.2980	1.5220	90
91	2833.0	0.0010	0.0052	985.4	193.000	298.3	79.9	378.2	1.3010	1.5210	91
92	2886.0	0.0010	0.0050	977.5	198.400	299.7	78.4	378.1	1.3050	1.5200	92
93	2940.0	0.0010	0.0049	969.3	204.100	301.1	76.8	377.9	1.3090	1.5190	93
94	2995.0	0.0010	0.0048	960.9	210.000	302.5	75.2	377.7	1.3120	1.5170	94
95	3050.0	0.0011	0.0046	952.2	216.200	304.0	73.4	377.4	1.3160	1.5160	95
96	3106.0	0.0011	0.0045	943.2	222.700	305.4	71.8	377.2	1.3200	1.5140	96
97	3163.0	0.0011	0.0044	933.9	229.600	306.9	69.9	376.8	1.3240	1.5130	97
98	3221.0	0.0011	0.0042	924.3	236.800	308.4	68.1	376.5	1.3280	1.5110	98
99	3280.0	0.0011	0.0041	914.3	244.400	310.0	66.1	376.1	1.3320	1.5090	99
100	3340.0	0.0011	0.0040	903.8	252.600	311.6	64.0	375.6	1.3360	1.5080	100
101	3400.0	0.0011	0.0038	892.8	261.200	313.2	61.9	375.1	1.3400	1.5060	101
102	3462.0	0.0011	0.0037	881.3	270.600	314.9	59.6	374.5	1.3440	1.5030	102
103	3524.0	0.0012	0.0036	869.1	280.600	316.6	57.2	373.8	1.3490	1.5010	103
104	3588.0	0.0012	0.0034	856.1	291.500	318.4	54.6	373.0	1.3530	1.4980	104
105	3653.0	0.0012	0.0033	842.2	303.500	320.2	51.9	372.1	1.3580	1.4950	105
106	3718.0	0.0012	0.0032	827.1	316.800	322.2	48.8	371.0	1.3630	1.4920	106
107	3785.0	0.0012	0.0030	810.5	331.800	324.2	45.6	369.8	1.3680	1.4880	107
108	3853.0	0.0013	0.0029	791.8	349.200	326.5	41.8	368.3	1.3740	1.4840	108
109	3922.0	0.0013	0.0027	769.9	369.900	328.9	37.5	366.4	1.3800	1.4780	109
110	3992.0	0.0014	0.0025	742.7	396.300	331.8	32.1	363.9	1.3870	1.4710	110

Table 2
DuPont™ Freon® 12 Superheated Vapor — Constant Pressure Tables

V = Volume in m³/kg H = Enthalpy in kJ/kg S = Entropy in kJ/kg·K Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	10			20			30			40			Temp °C
	(-73.12°C)			(-62.10°C)			(-54.97°C)			(-49.57°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(1.366)	(318.4)	(1.641)	(0.7172)	(323.6)	(1.619)	(0.4923)	(327.0)	(1.608)	(0.3770)	(329.6)	(1.600)	
-70	1.3880	319.9	1.6490	-	-	-	-	-	-	-	-	-	-70
-65	1.4230	322.4	1.6610	-	-	-	-	-	-	-	-	-	-65
-60	1.4580	325.0	1.6730	0.7247	324.7	1.6240	-	-	-	-	-	-	-60
-55	1.4920	327.5	1.6850	0.7423	327.3	1.6360	-	-	-	-	-	-	-55
-50	1.5270	330.1	1.6970	0.7599	329.9	1.6480	0.5041	329.6	1.6190	-	-	-	-50
-45	1.5620	332.7	1.7080	0.7775	332.5	1.6600	0.5160	332.3	1.6310	0.3852	332.0	1.6110	-45
-40	1.5970	335.4	1.7200	0.7950	335.2	1.6710	0.5278	334.9	1.6430	0.3941	334.7	1.6220	-40
-35	1.6310	338.1	1.7310	0.8125	337.9	1.6830	0.5396	337.7	1.6540	0.4031	337.4	1.6340	-35
-30	1.6660	340.8	1.7420	0.8300	340.6	1.6940	0.5513	340.4	1.6660	0.4120	340.2	1.6450	-30
-25	1.7010	343.5	1.7530	0.8475	343.3	1.7050	0.5630	343.1	1.6770	0.4208	343.0	1.6570	-25
-20	1.7350	346.3	1.7640	0.8649	346.1	1.7160	0.5748	345.9	1.6880	0.4297	345.8	1.6680	-20
-15	1.7700	349.1	1.7750	0.8823	348.9	1.7270	0.5865	348.7	1.6990	0.4385	348.6	1.6790	-15
-10	1.8050	351.9	1.7860	0.8997	351.7	1.7380	0.5981	351.6	1.7100	0.4473	351.4	1.6900	-10
-5	1.8390	354.8	1.7970	0.9171	354.6	1.7490	0.6098	354.5	1.7210	0.4561	354.3	1.7000	-5
0	1.8740	357.6	1.8080	0.9345	357.5	1.7600	0.6215	357.3	1.7310	0.4649	357.2	1.7110	0
5	1.9080	360.5	1.8180	0.9519	360.4	1.7700	0.6331	360.3	1.7420	0.4737	360.1	1.7220	5
10	1.9430	363.5	1.8290	0.9693	363.3	1.7810	0.6447	363.2	1.7520	0.4825	363.1	1.7320	10
15	1.9770	366.4	1.8390	0.9866	366.3	1.7910	0.6564	366.2	1.7630	0.4912	366.0	1.7430	15
20	2.0120	369.4	1.8490	1.0040	369.3	1.8010	0.6680	369.2	1.7730	0.5000	369.0	1.7530	20
25	2.0460	372.4	1.8590	1.0210	372.3	1.8110	0.6796	372.2	1.7830	0.5087	372.1	1.7630	25
30	2.0810	375.4	1.8690	1.0390	375.3	1.8220	0.6912	375.2	1.7930	0.5175	375.1	1.7730	30
35	2.1150	378.5	1.8790	1.0560	378.4	1.8320	0.7028	378.3	1.8030	0.5262	378.2	1.7830	35
40	2.1500	381.6	1.8890	1.0730	381.5	1.8410	0.7143	381.4	1.8130	0.5349	381.3	1.7930	40
45	2.1840	384.7	1.8990	1.0910	384.6	1.8510	0.7259	384.5	1.8230	0.5436	384.4	1.8030	45
50	2.2190	387.8	1.9090	1.1080	387.7	1.8610	0.7375	387.6	1.8330	0.5523	387.5	1.8130	50
55	2.2530	390.9	1.9190	1.1250	390.8	1.8710	0.7491	390.7	1.8430	0.5610	390.7	1.8230	55
60	2.2880	394.1	1.9280	1.1420	394.0	1.8800	0.7606	393.9	1.8520	0.5697	393.8	1.8320	60
65	2.3220	397.3	1.9380	1.1600	397.2	1.8900	0.7722	397.1	1.8620	0.5784	397.0	1.8420	65
70	2.3570	400.5	1.9470	1.1770	400.4	1.8990	0.7837	400.3	1.8710	0.5871	400.2	1.8510	70
75	2.3910	403.7	1.9560	1.1940	403.7	1.9090	0.7953	403.6	1.8810	0.5958	403.5	1.8610	75
80	2.4260	407.0	1.9660	1.2120	406.9	1.9180	0.8068	406.8	1.8900	0.6045	406.7	1.8700	80

Absolute Pressure kPa													
Temp °C	50			60			70			80			Temp °C
	(-45.15°C)			(-41.39°C)			(-38.10°C)			(-35.16°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.3065)	(331.7)	(1.594)	(0.2588)	(333.5)	(1.590)	(0.2243)	(335.1)	(1.586)	(0.1981)	(336.5)	(1.583)	
-40	0.3139	319.9	1.6490	0.2605	334.3	1.5930	-	-	-	0.1982	336.6	1.5840	-40
-35	0.3212	322.4	1.6610	0.2665	337.0	1.6050	0.2275	336.8	1.5930	0.2029	339.4	1.5950	-35
-30	0.3283	325.0	1.6730	0.2726	339.8	1.6160	0.2327	339.6	1.6050	0.2074	342.2	1.6070	-30
-25	0.3355	327.5	1.6850	0.2786	342.6	1.6280	0.2379	342.4	1.6160	0.2120	345.0	1.6180	-25
-20	0.3426	330.1	1.6970	0.2846	345.4	1.6390	0.2431	345.2	1.6280	0.2166	347.9	1.6290	-20
-15	0.3497	332.7	1.7080	0.2906	348.2	1.6500	0.2483	348.1	1.6390	0.2211	350.8	1.6400	-15
-10	0.3568	335.4	1.7200	0.2965	351.1	1.6610	0.2534	350.9	1.6500	0.2256	353.7	1.6510	-10
-5	0.3639	338.1	1.7310	0.3025	354.0	1.6720	0.2585	353.8	1.6610	0.2301	356.6	1.6620	-5
0	0.3710	340.8	1.7420	0.3084	356.9	1.6830	0.2637	356.7	1.6720	0.2346	359.5	1.6730	0
5	0.3781	343.5	1.7530	0.3143	359.8	1.6930	0.2688	359.7	1.6820	0.2391	362.5	1.6830	5
10	0.3851	346.3	1.7640	0.3202	362.8	1.7040	0.2738	362.6	1.6930	0.2435	365.5	1.6940	10
15	0.3922	349.1	1.7750	0.3261	365.8	1.7140	0.2789	365.6	1.7030	0.2480	368.5	1.7040	15
20	0.3992	351.9	1.7860	0.3320	368.8	1.7250	0.2840	368.7	1.7140	0.2524	371.6	1.7140	20
25	0.4062	354.8	1.7970	0.3379	371.8	1.7350	0.2890	371.7	1.7240	0.2569	374.6	1.7250	25
30	0.4132	357.6	1.8080	0.3437	374.9	1.7450	0.2941	374.7	1.7340	0.2613	377.7	1.7350	30
35	0.4202	360.5	1.8180	0.3496	377.9	1.7550	0.2991	377.8	1.7440	0.2657	380.8	1.7450	35
40	0.4272	363.5	1.8290	0.3554	381.0	1.7650	0.3042	380.9	1.7540	0.2701	383.9	1.7550	40
45	0.4342	366.4	1.8390	0.3613	384.2	1.7750	0.3092	384.0	1.7640	0.2745	387.1	1.7640	45
50	0.4412	369.4	1.8490	0.3671	387.3	1.7850	0.3142	387.2	1.7740	0.2789	390.3	1.7740	50
55	0.4482	372.4	1.8590	0.3730	390.5	1.7940	0.3192	390.4	1.7840	0.2833	393.4	1.7840	55
60	0.4552	375.4	1.8690	0.3788	393.6	1.8040	0.3243	393.5	1.7930	0.2877	396.7	1.7930	60
65	0.4621	378.5	1.8790	0.3846	396.8	1.8130	0.3293	396.7	1.8030	0.2921	399.9	1.8030	65
70	0.4691	381.6	1.8890	0.3905	400.1	1.8230	0.3343	400.0	1.8120	0.2965	403.1	1.8120	70
75	0.4761	384.7	1.8990	0.3963	403.3	1.8320	0.3393	403.2	1.8220	0.3009	406.4	1.8220	75
80	0.4830	387.8	1.9090	0.4021	406.6	1.8420	0.3443	406.5	1.8310	0.3053	409.7	1.8310	80
85	0.4900	390.9	1.9190	0.4079	409.8	1.8510	0.3493	409.8	1.8400	0.3097	413.0	1.8400	85
90	0.4969	394.1	1.9280	0.4137	413.2	1.8600	0.3542	413.1	1.8490	0.3140	416.3	1.8490	90
95	0.5039	397.3	1.9380	0.4195	416.5	1.8690	0.3592	416.4	1.8580	0.3184	419.7	1.8580	95
100	0.5108	400.5	1.9470	0.4253	419.8	1.8780	0.3642	419.7	1.8670	0.3228	423.0	1.8670	100
105	0.5178	403.7	1.9560	0.4311	423.2	1.8870	0.3692	423.1	1.8760	0.3271	426.4	1.8760	105
110	0.5247	407.0	1.9660	0.4369	426.5	1.8960	0.3742	426.5	1.8850				110

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure Tables

V = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													Temp °C
Temp °C	90			100			101.325			110			
	(-32.50°C)			(-30.06°C)			(-29.75°C)			(-27.8°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.1775)	(337.8)	(1.581)	(0.161)	(338.9)	(1.578)	(0.1610)	(339.1)	(1.578)	(0.1473)	(340.0)	(1.5780)	
-30	0.1796	339.2	1.5870	0.1610	338.9	1.5790	-	-	-	-	-	-	-30
-25	0.1837	342.0	1.5980	0.1647	341.8	1.5900	0.1625	341.8	1.5890	0.1492	341.6	1.5830	-25
-20	0.1878	344.8	1.6090	0.1685	344.6	1.6020	0.1662	344.6	1.6010	0.1526	344.5	1.5950	-20
-15	0.1919	347.7	1.6210	0.1721	347.5	1.6130	0.1698	347.5	1.6120	0.1560	347.3	1.6060	-15
-10	0.1959	350.6	1.6320	0.1758	350.4	1.6240	0.1735	350.4	1.6230	0.1594	350.2	1.6170	-10
-5	0.2000	353.5	1.6430	0.1795	353.3	1.6350	0.1771	353.3	1.6340	0.1627	353.2	1.6280	-5
0	0.2040	356.4	1.6530	0.1831	356.3	1.6460	0.1807	356.3	1.6450	0.1660	356.1	1.6390	0
5	0.2080	359.4	1.6640	0.1867	359.2	1.6570	0.1842	359.2	1.6560	0.1694	359.1	1.6500	5
10	0.2120	362.4	1.6750	0.1904	362.2	1.6670	0.1878	362.2	1.6660	0.1727	362.1	1.6600	10
15	0.2160	365.4	1.6850	0.1940	365.2	1.6780	0.1914	365.2	1.6770	0.1760	365.1	1.6710	15
20	0.2200	368.4	1.6960	0.1976	368.3	1.6880	0.1949	368.2	1.6870	0.1792	368.1	1.6810	20
25	0.2239	371.4	1.7060	0.2012	371.3	1.6980	0.1985	371.3	1.6980	0.1825	371.2	1.6920	25
30	0.2279	374.5	1.7160	0.2047	374.4	1.7090	0.2020	374.4	1.7080	0.1858	374.3	1.7020	30
35	0.2319	377.6	1.7260	0.2083	377.5	1.7190	0.2055	377.5	1.7180	0.1890	377.4	1.7120	35
40	0.2358	380.7	1.7360	0.2119	380.6	1.7290	0.2091	380.6	1.7280	0.1923	380.5	1.7220	40
45	0.2397	383.8	1.7460	0.2154	383.7	1.7390	0.2126	383.7	1.7380	0.1955	383.6	1.7320	45
50	0.2437	387.0	1.7560	0.2190	386.9	1.7490	0.2161	386.9	1.7480	0.1988	386.8	1.7420	50
55	0.2476	390.2	1.7660	0.2225	390.1	1.7580	0.2196	390.0	1.7570	0.2020	390.0	1.7520	55
60	0.2515	393.3	1.7750	0.2261	393.2	1.7680	0.2231	393.2	1.7670	0.2052	393.2	1.7610	60
65	0.2554	396.6	1.7850	0.2296	396.5	1.7780	0.2266	396.5	1.7770	0.2085	396.4	1.7710	65
70	0.2594	399.8	1.7950	0.2331	399.7	1.7870	0.2300	399.7	1.7860	0.2117	399.6	1.7800	70
75	0.2633	403.0	1.8040	0.2367	403.0	1.7970	0.2335	402.9	1.7960	0.2149	402.9	1.7900	75
80	0.2672	406.3	1.8130	0.2402	406.2	1.8060	0.2370	406.2	1.8050	0.2181	406.1	1.7990	80
85	0.2711	409.6	1.8230	0.2437	409.5	1.8150	0.2405	409.5	1.8140	0.2213	409.4	1.8080	85
90	0.2750	412.9	1.8320	0.2472	412.8	1.8240	0.2440	412.8	1.8230	0.2245	412.7	1.8180	90
95	0.2789	416.2	1.8410	0.2507	416.2	1.8330	0.2474	416.1	1.8320	0.2277	416.1	1.8270	95
100	0.2828	419.6	1.8500	0.2542	419.5	1.8420	0.2509	419.5	1.8410	0.2309	419.4	1.8360	100
105	0.2866	422.9	1.8590	0.2578	422.9	1.8510	0.2544	422.9	1.8500	0.2341	422.8	1.8450	105
110	0.2905	426.3	1.8680	0.2613	426.3	1.8600	0.2578	426.2	1.8590	0.2373	426.2	1.8540	110
115	0.2944	429.7	1.8760	0.2648	429.6	1.8690	0.2613	429.6	1.8680	0.2405	429.6	1.8620	115
120	0.2983	433.1	1.8850	0.2683	433.1	1.8780	0.2647	433.1	1.8770	0.2437	433.0	1.8710	120

Absolute Pressure kPa													
Temp °C	120			130			140			150			Temp °C
	(-25.7°C)			(-23.73°C)			(-21.88°C)			(-20.12°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.1358)	(341.0)	(1.5750)	(0.1260)	(341.9)	(1.5730)	(0.1176)	(343.2)	(1.5720)	(0.1103)	(343.6)	(1.5710)	
-25	0.1363	341.4	1.5760	-	-	-	-	-	-	-	-	-	-25
-20	0.1394	344.3	1.5880	0.1282	344.1	1.5820	0.1186	343.9	1.5760	0.1103	343.7	1.5710	-20
-15	0.1425	347.2	1.5990	0.1311	347.0	1.5930	0.1214	346.8	1.5880	0.1129	346.6	1.5820	-15
-10	0.1456	350.1	1.6110	0.1340	349.9	1.6050	0.1241	349.7	1.5990	0.1154	349.5	1.5940	-10
-5	0.1487	353.0	1.6220	0.1369	352.8	1.6160	0.1267	352.7	1.6100	0.1179	352.5	1.6050	-5
0	0.1518	356.0	1.6330	0.1397	355.8	1.6270	0.1294	355.7	1.6210	0.1204	355.5	1.6160	0
5	0.1549	358.9	1.6430	0.1426	358.8	1.6370	0.1321	358.6	1.6320	0.1229	358.5	1.6270	5
10	0.1579	361.9	1.6540	0.1454	361.8	1.6480	0.1347	361.7	1.6430	0.1254	361.5	1.6380	10
15	0.1609	365.0	1.6650	0.1482	364.8	1.6590	0.1373	364.7	1.6530	0.1279	364.5	1.6480	15
20	0.1640	368.0	1.6750	0.1510	367.9	1.6690	0.1399	367.7	1.6640	0.1303	367.6	1.6590	20
25	0.1670	371.1	1.6850	0.1538	370.9	1.6800	0.1426	370.8	1.6740	0.1328	370.7	1.6690	25
30	0.1700	374.1	1.6960	0.1566	374.0	1.6900	0.1452	373.9	1.6840	0.1352	373.8	1.6790	30
35	0.1730	377.2	1.7060	0.1594	377.1	1.7000	0.1477	377.0	1.6950	0.1376	376.9	1.6900	35
40	0.1760	380.4	1.7160	0.1622	380.3	1.7100	0.1503	380.1	1.7050	0.1401	380.0	1.7000	40
45	0.1790	383.5	1.7260	0.1649	383.4	1.7200	0.1529	383.3	1.7150	0.1425	383.2	1.7100	45
50	0.1819	386.7	1.7360	0.1677	386.6	1.7300	0.1555	386.5	1.7250	0.1449	386.4	1.7200	50
55	0.1849	389.9	1.7450	0.1704	389.8	1.7400	0.1580	389.6	1.7340	0.1473	389.5	1.7290	55
60	0.1879	393.1	1.7550	0.1732	393.0	1.7490	0.1606	392.9	1.7440	0.1497	392.8	1.7390	60
65	0.1908	396.3	1.7650	0.1759	396.2	1.7590	0.1632	396.1	1.7540	0.1521	396.0	1.7490	65
70	0.1938	399.5	1.7740	0.1787	399.4	1.7680	0.1657	399.3	1.7630	0.1545	399.2	1.7580	70
75	0.1968	402.8	1.7840	0.1814	402.7	1.7780	0.1683	402.6	1.7730	0.1568	402.5	1.7680	75
80	0.1997	406.1	1.7930	0.1841	406.0	1.7870	0.1708	405.9	1.7820	0.1592	405.8	1.7770	80
85	0.2027	409.4	1.8020	0.1869	409.3	1.7970	0.1733	409.2	1.7910	0.1616	409.1	1.7860	85
90	0.2056	412.7	1.8110	0.1896	412.6	1.8060	0.1759	412.5	1.8010	0.1640	412.4	1.7960	90
95	0.2085	416.0	1.8210	0.1923	415.9	1.8150	0.1784	415.8	1.8100	0.1663	415.8	1.8050	95
100	0.2115	419.4	1.8300	0.1950	419.3	1.8240	0.1809	419.2	1.8190	0.1687	419.1	1.8140	100
105	0.2144	422.7	1.8390	0.1977	422.6	1.8330	0.1835	422.6	1.8280	0.1711	422.5	1.8230	105
110	0.2173	426.1	1.8470	0.2005	426.0	1.8420	0.1860	426.0	1.8370	0.1734	425.9	1.8320	110
115	0.2203	429.5	1.8560	0.2032	429.4	1.8510	0.1885	429.4	1.8450	0.1758	429.3	1.8410	115
120	0.2232	432.9	1.8650	0.2059	432.9	1.8590	0.1910	432.8	1.8540	0.1781	432.7	1.8490	120
125	0.2261	436.4	1.8740	0.2086	436.3	1.8680	0.1935	436.2	1.8630	0.1805	436.2	1.8580	125

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure Tables

V = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	160			170			180			190			Temp °C
	(-18.45°C)			(-16.86°C)			(-15.34°C)			(-13.89°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	-0.1038	(344.4)	(1.5700)	(0.0981)	(345.1)	(1.569)	(0.0939)	(345.8)	(1.568)	(0.0884)	(346.5)	(1.567)	
-15	0.1055	346.4	1.5780	0.0989	346.2	1.5730	0.0931	346.0	1.5680	-	-	-	-15
-10	0.1079	349.4	1.5890	0.1012	349.2	1.5840	0.0953	349.0	1.5800	0.0900	348.8	1.5760	-10
-5	0.1102	352.3	1.6000	0.1035	352.2	1.5950	0.0974	352.0	1.5910	0.0920	351.8	1.5870	-5
0	0.1126	355.3	1.6110	0.1057	355.2	1.6070	0.0995	355.0	1.6020	0.0940	354.8	1.5980	0
5	0.1150	358.3	1.6220	0.1079	358.2	1.6170	0.1017	358.0	1.6130	0.0961	357.9	1.6090	5
10	0.1173	361.4	1.6330	0.1101	361.2	1.6280	0.1038	361.1	1.6240	0.0981	360.9	1.6200	10
15	0.1196	364.4	1.6430	0.1123	364.3	1.6390	0.1058	364.1	1.6350	0.1000	364.0	1.6310	15
20	0.1219	367.5	1.6540	0.1145	367.3	1.6490	0.1079	367.2	1.6450	0.1020	367.1	1.6410	20
25	0.1242	370.6	1.6640	0.1167	370.4	1.6600	0.1100	370.3	1.6560	0.1040	370.2	1.6520	25
30	0.1265	373.7	1.6750	0.1189	373.5	1.6700	0.1120	373.4	1.6660	0.1059	373.3	1.6620	30
35	0.1288	376.8	1.6850	0.1210	376.7	1.6800	0.1141	376.5	1.6760	0.1079	376.4	1.6720	35
40	0.1311	379.9	1.6950	0.1232	379.8	1.6910	0.1161	379.7	1.6860	0.1098	379.6	1.6820	40
45	0.1334	383.1	1.7050	0.1253	383.0	1.7010	0.1182	382.9	1.6960	0.1118	382.7	1.6920	45
50	0.1356	386.2	1.7150	0.1275	386.1	1.7110	0.1202	386.0	1.7060	0.1137	385.9	1.7020	50
55	0.1379	389.4	1.7250	0.1296	389.3	1.7200	0.1222	389.2	1.7160	0.1156	389.1	1.7120	55
60	0.1401	392.7	1.7340	0.1317	392.6	1.7300	0.1242	392.5	1.7260	0.1175	392.4	1.7220	60
65	0.1424	395.9	1.7440	0.1338	395.8	1.7400	0.1262	395.7	1.7360	0.1194	395.6	1.7320	65
70	0.1446	399.1	1.7540	0.1360	399.1	1.7490	0.1282	399.0	1.7450	0.1213	398.9	1.7410	70
75	0.1469	402.4	1.7630	0.1381	402.3	1.7590	0.1302	402.2	1.7550	0.1232	402.2	1.7510	75
80	0.1491	405.7	1.7730	0.1402	405.6	1.7680	0.1322	405.5	1.7640	0.1251	405.4	1.7600	80
85	0.1513	409.0	1.7820	0.1423	408.9	1.7770	0.1342	408.8	1.7730	0.1270	408.8	1.7700	85
90	0.1536	412.3	1.7910	0.1444	412.3	1.7870	0.1362	412.2	1.7830	0.1289	412.1	1.7790	90
95	0.1558	415.7	1.8000	0.1465	415.6	1.7960	0.1382	415.5	1.7920	0.1308	415.4	1.7880	95
100	0.1580	419.0	1.8090	0.1486	419.0	1.8050	0.1402	418.9	1.8010	0.1327	418.8	1.7970	100
105	0.1602	422.4	1.8180	0.1507	422.3	1.8140	0.1422	422.3	1.8100	0.1346	422.2	1.8060	105
110	0.1625	425.8	1.8270	0.1528	425.7	1.8230	0.1442	425.7	1.8190	0.1364	425.6	1.8150	110
115	0.1647	429.2	1.8360	0.1549	429.2	1.8320	0.1461	429.1	1.8280	0.1383	429.0	1.8240	115
120	0.1669	432.7	1.8450	0.1569	432.6	1.8400	0.1481	432.5	1.8360	0.1402	432.4	1.8330	120
125	0.1691	436.1	1.8530	0.1590	436.0	1.8490	0.1501	436.0	1.8450	0.1421	435.9	1.8410	125
130	0.1713	439.6	1.8620	0.1611	439.5	1.8580	0.1520	439.4	1.8540	0.1439	439.4	1.8500	130
135	0.1735	443.0	1.8710	0.1632	443.0	1.8660	0.1540	442.9	1.8620	0.1458	442.8	1.8590	135

Absolute Pressure kPa													
Temp °C	200			210			220			230			Temp °C
	(-12.49°C)			(-11.14°C)			(-9.84°C)			(-8.59°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0842)	(347.1)	(1.566)	(0.0804)	(347.8)	(1.565)	(0.0770)	(348.4)	(1.564)	(0.0738)	(348.9)	(1.564)	
-10	0.0852	348.6	1.5720	0.0809	348.5	1.5680	-	-	-	-	-	-	-10
-5	0.0871	351.7	1.5830	0.0827	351.5	1.5790	0.0787	351.3	1.5750	0.0751	351.1	1.5720	-5
0	0.0891	354.7	1.5940	0.0846	354.5	1.5900	0.0805	354.3	1.5870	0.0768	354.2	1.5830	0
5	0.0910	357.7	1.6050	0.0864	357.6	1.6010	0.0823	357.4	1.5980	0.0785	357.2	1.5940	5
10	0.0929	360.8	1.6160	0.0883	360.6	1.6120	0.0840	360.5	1.6090	0.0802	360.3	1.6050	10
15	0.0948	363.8	1.6270	0.0901	363.7	1.6230	0.0858	363.6	1.6190	0.0819	363.4	1.6160	15
20	0.0967	366.9	1.6370	0.0919	366.8	1.6340	0.0875	366.7	1.6300	0.0835	366.5	1.6270	20
25	0.0986	370.0	1.6480	0.0937	369.9	1.6440	0.0892	369.8	1.6410	0.0852	369.6	1.6370	25
30	0.1004	373.2	1.6580	0.0955	373.0	1.6550	0.0910	372.9	1.6510	0.0868	372.8	1.6480	30
35	0.1023	376.3	1.6690	0.0973	376.2	1.6650	0.0927	376.1	1.6610	0.0885	375.9	1.6580	35
40	0.1042	379.5	1.6790	0.0990	379.3	1.6750	0.0944	379.2	1.6720	0.0901	379.1	1.6680	40
45	0.1060	382.6	1.6890	0.1008	382.5	1.6850	0.0960	382.4	1.6820	0.0917	382.3	1.6780	45
50	0.1078	385.8	1.6990	0.1025	385.7	1.6950	0.0977	385.6	1.6920	0.0933	385.5	1.6880	50
55	0.1097	389.0	1.7090	0.1043	388.9	1.7050	0.0994	388.8	1.7020	0.0949	388.7	1.6980	55
60	0.1115	392.3	1.7180	0.1060	392.2	1.7150	0.1011	392.1	1.7110	0.0965	392.0	1.7080	60
65	0.1133	395.5	1.7280	0.1078	395.4	1.7240	0.1027	395.3	1.7210	0.0981	395.2	1.7180	65
70	0.1151	398.8	1.7380	0.1095	398.7	1.7340	0.1044	398.6	1.7310	0.0997	398.5	1.7270	70
75	0.1169	402.1	1.7470	0.1112	402.0	1.7440	0.1060	401.9	1.7400	0.1013	401.8	1.7370	75
80	0.1187	405.4	1.7560	0.1130	405.3	1.7530	0.1077	405.2	1.7500	0.1029	405.1	1.7460	80
85	0.1205	408.7	1.7660	0.1147	408.6	1.7620	0.1093	408.5	1.7590	0.1045	408.4	1.7560	85
90	0.1223	412.0	1.7750	0.1164	411.9	1.7720	0.1110	411.8	1.7680	0.1061	411.8	1.7650	90
95	0.1241	415.4	1.7840	0.1181	415.3	1.7810	0.1126	415.2	1.7770	0.1076	415.1	1.7740	95
100	0.1259	418.7	1.7930	0.1198	418.7	1.7900	0.1143	418.6	1.7860	0.1092	418.5	1.7830	100
105	0.1277	422.1	1.8020	0.1215	422.0	1.7990	0.1159	422.0	1.7950	0.1108	421.9	1.7920	105
110	0.1295	425.5	1.8110	0.1232	425.4	1.8080	0.1175	425.4	1.8040	0.1123	425.3	1.8010	110
115	0.1313	428.9	1.8200	0.1249	428.9	1.8170	0.1192	428.8	1.8130	0.1139	428.7	1.8100	115
120	0.1331	432.4	1.8290	0.1266	432.3	1.8250	0.1208	432.2	1.8220	0.1154	432.2	1.8190	120
125	0.1349	435.8	1.8380	0.1283	435.8	1.8340	0.1224	435.7	1.8310	0.1170	435.6	1.8280	125
130	0.1366	439.3	1.8460	0.1300	439.2	1.8430	0.1240	439.2	1.8400	0.1186	439.1	1.8360	130
135	0.1384	442.8	1.8550	0.1317	442.7	1.8510	0.1257	442.6	1.8480	0.1201	442.6	1.8450	135
140	0.1402	446.3	1.8630	0.1334	446.2	1.8600	0.1273	446.1	1.8570	0.1217	446.1	1.8530	140

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure TablesV = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	240			250			260			270			Temp °C
	(-7.38°C)			(-6.20°C)			(-5.06°C)			(-3.96°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0709)	(349.5)	(1.563)	(0.0682)	(350.0)	(1.562)	(0.0657)	(350.5)	(1.5620)	(0.0634)	(351.0)	(1.561)	
-5	0.0717	350.9	1.5680	0.0686	350.8	1.5650	0.0658	350.6	1.5620	-	-	-	-5
0	0.0734	354.0	1.5800	0.0702	353.8	1.5770	0.0673	353.7	1.5730	0.0646	353.5	1.5700	0
5	0.0750	357.1	1.5910	0.0718	356.9	1.5880	0.0689	356.8	1.5850	0.0661	356.6	1.5820	5
10	0.0767	360.2	1.6020	0.0734	360.0	1.5990	0.0704	359.9	1.5960	0.0676	359.7	1.5930	10
15	0.0783	363.3	1.6130	0.0750	363.1	1.6100	0.0719	363.0	1.6070	0.0691	362.8	1.6040	15
20	0.0799	366.4	1.6230	0.0765	366.2	1.6200	0.0734	366.1	1.6170	0.0705	366.0	1.6140	20
25	0.0815	369.5	1.6340	0.0780	369.4	1.6310	0.0749	369.2	1.6280	0.0720	369.1	1.6250	25
30	0.0831	372.7	1.6450	0.0796	372.5	1.6410	0.0764	372.4	1.6380	0.0734	372.3	1.6360	30
35	0.0846	375.8	1.6550	0.0811	375.7	1.6520	0.0778	375.6	1.6490	0.0748	375.4	1.6460	35
40	0.0862	379.0	1.6650	0.0826	378.9	1.6620	0.0793	378.8	1.6590	0.0762	378.6	1.6560	40
45	0.0878	382.2	1.6750	0.0841	382.1	1.6720	0.0807	382.0	1.6690	0.0776	381.8	1.6660	45
50	0.0893	385.4	1.6850	0.0856	385.3	1.6820	0.0822	385.2	1.6790	0.0790	385.1	1.6760	50
55	0.0908	388.6	1.6950	0.0871	388.5	1.6920	0.0836	388.4	1.6890	0.0804	388.3	1.6860	55
60	0.0924	391.9	1.7050	0.0886	391.8	1.7020	0.0850	391.7	1.6990	0.0818	391.6	1.6960	60
65	0.0939	395.1	1.7150	0.0900	395.0	1.7120	0.0865	394.9	1.7090	0.0831	394.8	1.7060	65
70	0.0955	398.4	1.7240	0.0915	398.3	1.7210	0.0879	398.2	1.7180	0.0845	398.1	1.7160	70
75	0.0970	401.7	1.7340	0.0930	401.6	1.7310	0.0893	401.5	1.7280	0.0859	401.4	1.7250	75
80	0.0985	405.0	1.7430	0.0945	404.9	1.7400	0.0907	404.8	1.7370	0.0873	404.7	1.7350	80
85	0.1000	408.3	1.7530	0.0959	408.3	1.7500	0.0921	408.2	1.7470	0.0886	408.1	1.7440	85
90	0.1015	411.7	1.7620	0.0974	411.6	1.7590	0.0935	411.5	1.7560	0.0900	411.4	1.7530	90
95	0.1030	415.0	1.7710	0.0988	415.0	1.7680	0.0949	414.9	1.7650	0.0913	414.8	1.7630	95
100	0.1045	418.4	1.7800	0.1003	418.3	1.7770	0.0963	418.3	1.7740	0.0927	418.2	1.7720	100
105	0.1060	421.8	1.7890	0.1017	421.7	1.7860	0.0977	421.7	1.7830	0.0940	421.6	1.7810	105
110	0.1076	425.2	1.7980	0.1032	425.2	1.7950	0.0991	425.1	1.7920	0.0954	425.0	1.7900	110
115	0.1090	428.7	1.8070	0.1046	428.6	1.8040	0.1005	428.5	1.8010	0.0967	428.4	1.7990	115
120	0.1105	432.1	1.8160	0.1060	432.0	1.8130	0.1019	432.0	1.8100	0.0980	431.9	1.8070	120
125	0.1120	435.6	1.8250	0.1075	435.5	1.8220	0.1033	435.4	1.8190	0.0994	435.3	1.8160	125
130	0.1135	439.0	1.8330	0.1089	439.0	1.8300	0.1046	438.9	1.8280	0.1007	438.8	1.8250	130
135	0.1150	442.5	1.8420	0.1103	442.4	1.8390	0.1060	442.4	1.8360	0.1020	442.3	1.8330	135
140	0.1165	446.0	1.8500	0.1118	446.0	1.8480	0.1074	445.9	1.8450	0.1034	445.8	1.8420	140
145	0.1180	449.5	1.8590	0.1132	449.5	1.8560	0.1088	449.4	1.8530	0.1047	449.3	1.8500	145

Absolute Pressure kPa													
Temp °C	280			290			300			310			Temp °C
	(-2.88°C)			(-1.83)			(-0.81°C)			(+0.18°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0613)	(351.5)	(1.561)	(0.0593)	(352.0)	(1.560)	(0.0574)	(352.4)	(1.560)	(0.0556)	(352.9)	(1.559)	
0	0.0621	353.3	1.5670	0.0598	353.1	1.5640	0.0576	353.0	1.5620	-	-	-	0
5	0.0636	356.4	1.5790	0.0612	356.3	1.5760	0.0590	356.1	1.5730	0.0569	355.9	1.5700	5
10	0.0650	359.6	1.5900	0.0626	359.4	1.5870	0.0604	359.2	1.5840	0.0583	359.1	1.5820	10
15	0.0664	362.7	1.6010	0.0640	362.5	1.5980	0.0617	362.4	1.5950	0.0596	362.2	1.5930	15
20	0.0678	365.8	1.6120	0.0653	365.7	1.6090	0.0630	365.5	1.6060	0.0608	365.4	1.6040	20
25	0.0692	369.0	1.6220	0.0667	368.8	1.6190	0.0643	368.7	1.6170	0.0621	368.6	1.6140	25
30	0.0706	372.1	1.6330	0.0680	372.0	1.6300	0.0656	371.9	1.6270	0.0634	371.8	1.6250	30
35	0.0720	375.3	1.6430	0.0694	375.2	1.6400	0.0669	375.1	1.6380	0.0646	375.0	1.6350	35
40	0.0734	378.5	1.6530	0.0707	378.4	1.6510	0.0682	378.3	1.6480	0.0659	378.2	1.6460	40
45	0.0747	381.7	1.6640	0.0720	381.6	1.6610	0.0695	381.5	1.6580	0.0671	381.4	1.6560	45
50	0.0761	385.0	1.6740	0.0733	384.8	1.6710	0.0708	384.7	1.6680	0.0684	384.6	1.6660	50
55	0.0774	388.2	1.6840	0.0746	388.1	1.6810	0.0720	388.0	1.6780	0.0696	387.9	1.6760	55
60	0.0787	391.5	1.6930	0.0759	391.4	1.6910	0.0733	391.3	1.6880	0.0708	391.2	1.6860	60
65	0.0801	394.7	1.7030	0.0772	394.6	1.7010	0.0745	394.5	1.6980	0.0720	394.4	1.6960	65
70	0.0814	398.0	1.7130	0.0785	397.9	1.7100	0.0758	397.8	1.7080	0.0732	397.7	1.7050	70
75	0.0827	401.3	1.7220	0.0798	401.2	1.7200	0.0770	401.1	1.7170	0.0744	401.1	1.7150	75
80	0.0840	404.7	1.7320	0.0810	404.6	1.7290	0.0783	404.5	1.7270	0.0756	404.4	1.7240	80
85	0.0854	408.0	1.7410	0.0823	407.9	1.7390	0.0795	407.8	1.7360	0.0768	407.7	1.7340	85
90	0.0867	411.4	1.7510	0.0836	411.3	1.7480	0.0807	411.2	1.7460	0.0780	411.1	1.7430	90
95	0.0880	414.7	1.7600	0.0848	414.6	1.7570	0.0819	414.6	1.7550	0.0792	414.5	1.7520	95
100	0.0893	418.1	1.7690	0.0861	418.0	1.7660	0.0832	418.0	1.7640	0.0804	417.9	1.7620	100
105	0.0906	421.5	1.7780	0.0874	421.4	1.7760	0.0844	421.4	1.7730	0.0816	421.3	1.7710	105
110	0.0919	424.9	1.7870	0.0886	424.9	1.7850	0.0856	424.8	1.7820	0.0828	424.7	1.7800	110
115	0.0932	428.4	1.7960	0.0899	428.3	1.7930	0.0868	428.2	1.7910	0.0839	428.1	1.7890	115
120	0.0945	431.8	1.8050	0.0911	431.7	1.8020	0.0880	431.7	1.8000	0.0851	431.6	1.7970	120
125	0.0957	435.3	1.8140	0.0924	435.2	1.8110	0.0892	435.1	1.8090	0.0863	435.1	1.8060	125
130	0.0970	438.8	1.8220	0.0936	438.7	1.8200	0.0904	438.6	1.8170	0.0874	438.6	1.8150	130
135	0.0983	442.3	1.8310	0.0949	442.2	1.8280	0.0916	442.1	1.8260	0.0886	442.1	1.8240	135
140	0.0996	445.8	1.8390	0.0961	445.7	1.8370	0.0928	445.6	1.8340	0.0898	445.6	1.8320	140
145	0.1009	449.3	1.8480	0.0973	449.2	1.8450	0.0940	449.2	1.8430	0.0909	449.1	1.8410	145
150	0.1022	452.8	1.8560	0.0986	452.8	1.8540	0.0952	452.7	1.8510	0.0921	452.6	1.8490	150

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure Tables

V = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													Temp °C
Temp °C	320			330			340			350			
	(1.15°C)			(2.10°C)			(3.03°C)			(3.94°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.054)	(353.3)	(1.559)	(0.0524)	-353.7	-1.559	(0.0509)	(354.1)	(1.558)	(0.0496)	(354.5)	(1.558)	
5	0.0550	355.8	1.5680	0.0532	355.6	1.5650	0.0514	355.4	1.5630	0.0498	355.2	1.5600	5
10	0.0563	358.9	1.5790	0.0544	358.8	1.5760	0.0527	358.6	1.5740	0.0510	358.4	1.5720	10
15	0.0575	362.1	1.5900	0.0557	361.9	1.5880	0.0539	361.8	1.5850	0.0522	361.6	1.5830	15
20	0.0588	365.3	1.6010	0.0569	365.1	1.5990	0.0551	365.0	1.5960	0.0534	364.8	1.5940	20
25	0.0600	368.4	1.6120	0.0581	368.3	1.6090	0.0563	368.2	1.6070	0.0545	368.0	1.6050	25
30	0.0613	371.6	1.6220	0.0593	371.5	1.6200	0.0574	371.4	1.6180	0.0557	371.2	1.6150	30
35	0.0625	374.8	1.6330	0.0605	374.7	1.6300	0.0586	374.6	1.6280	0.0568	374.4	1.6260	35
40	0.0637	378.0	1.6430	0.0617	377.9	1.6410	0.0597	377.8	1.6380	0.0579	377.7	1.6360	40
45	0.0649	381.3	1.6530	0.0628	381.2	1.6510	0.0609	381.0	1.6490	0.0590	380.9	1.6460	45
50	0.0661	384.5	1.6640	0.0640	384.4	1.6610	0.0620	384.3	1.6590	0.0602	384.2	1.6570	50
55	0.0673	387.8	1.6740	0.0652	387.7	1.6710	0.0632	387.6	1.6690	0.0613	387.5	1.6670	55
60	0.0685	391.0	1.6830	0.0663	390.9	1.6810	0.0643	390.8	1.6790	0.0624	390.7	1.6770	60
65	0.0697	394.3	1.6930	0.0675	394.2	1.6910	0.0654	394.1	1.6890	0.0634	394.0	1.6860	65
70	0.0709	397.6	1.7030	0.0686	397.5	1.7010	0.0665	397.5	1.6980	0.0645	397.4	1.6960	70
75	0.0720	401.0	1.7130	0.0698	400.9	1.7100	0.0676	400.8	1.7080	0.0656	400.7	1.7060	75
80	0.0732	404.3	1.7220	0.0709	404.2	1.7200	0.0687	404.1	1.7180	0.0667	404.0	1.7150	80
85	0.0743	407.6	1.7310	0.0720	407.6	1.7290	0.0698	407.5	1.7270	0.0677	407.4	1.7250	85
90	0.0755	411.0	1.7410	0.0731	410.9	1.7390	0.0709	410.8	1.7360	0.0688	410.8	1.7340	90
95	0.0767	414.4	1.7500	0.0743	414.3	1.7480	0.0720	414.2	1.7460	0.0699	414.2	1.7430	95
100	0.0778	417.8	1.7590	0.0754	417.7	1.7570	0.0731	417.6	1.7550	0.0709	417.6	1.7530	100
105	0.0790	421.2	1.7680	0.0765	421.1	1.7660	0.0742	421.1	1.7640	0.0720	421.0	1.7620	105
110	0.0801	424.6	1.7770	0.0776	424.6	1.7750	0.0753	424.5	1.7730	0.0730	424.4	1.7710	110
115	0.0812	428.1	1.7860	0.0787	428.0	1.7840	0.0763	427.9	1.7820	0.0741	427.9	1.7800	115
120	0.0824	431.5	1.7950	0.0798	431.5	1.7930	0.0774	431.4	1.7910	0.0751	431.3	1.7890	120
125	0.0835	435.0	1.8040	0.0809	434.9	1.8020	0.0785	434.9	1.7990	0.0762	434.8	1.7970	125
130	0.0847	438.5	1.8130	0.0820	438.4	1.8100	0.0796	438.4	1.8080	0.0772	438.3	1.8060	130
135	0.0858	442.0	1.8210	0.0831	441.9	1.8190	0.0806	441.9	1.8170	0.0783	441.8	1.8150	135
140	0.0869	445.5	1.8300	0.0842	445.4	1.8280	0.0817	445.4	1.8250	0.0793	445.3	1.8230	140
145	0.0880	449.0	1.8380	0.0853	449.0	1.8360	0.0828	448.9	1.8340	0.0803	448.9	1.8320	145
150	0.0892	452.6	1.8470	0.0864	452.5	1.8440	0.0838	452.5	1.8420	0.0814	452.4	1.8400	150
155	0.0903	456.1	1.8550	0.0875	456.1	1.8530	0.0849	456.0	1.8510	0.0824	456.0	1.8490	155

Absolute Pressure kPa													
Temp °C	360			370			380			390			Temp °C
	(4.82°C)			(5.69°C)			(6.54°C)			(7.38°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0482)	(354.9)	(1.557)	(0.0470)	(355.3)	(1.557)	(0.0548)	(355.7)	(1.557)	(0.0447)	(356.0)	(1.556)	
5	0.0483	355.0	1.5580	-	-	-	-	-	-	-	-	-	5
10	0.0495	358.3	1.5690	0.0480	358.1	1.5670	0.0466	357.9	1.5650	0.0453	357.7	1.5620	10
15	0.0506	361.5	1.5800	0.0491	361.3	1.5780	0.0477	361.1	1.5760	0.0464	361.0	1.5740	15
20	0.0518	364.7	1.5910	0.0502	364.5	1.5890	0.0488	364.4	1.5870	0.0474	364.2	1.5850	20
25	0.0529	367.9	1.6020	0.0513	367.7	1.6000	0.0499	367.6	1.5980	0.0485	367.4	1.5960	25
30	0.0540	371.1	1.6130	0.0524	371.0	1.6110	0.0510	370.8	1.6090	0.0495	370.7	1.6070	30
35	0.0551	374.3	1.6240	0.0535	374.2	1.6210	0.0520	374.1	1.6190	0.0506	373.9	1.6170	35
40	0.0562	377.6	1.6340	0.0546	377.4	1.6320	0.0531	377.3	1.6300	0.0516	377.2	1.6280	40
45	0.0573	380.8	1.6440	0.0557	380.7	1.6420	0.0541	380.6	1.6400	0.0526	380.5	1.6380	45
50	0.0584	384.1	1.6540	0.0567	384.0	1.6520	0.0551	383.8	1.6500	0.0536	383.7	1.6480	50
55	0.0595	387.3	1.6650	0.0578	387.2	1.6620	0.0562	387.1	1.6600	0.0546	387.0	1.6580	55
60	0.0605	390.6	1.6740	0.0588	390.5	1.6720	0.0572	390.4	1.6700	0.0556	390.3	1.6680	60
65	0.0616	393.9	1.6840	0.0598	393.8	1.6820	0.0582	393.7	1.6800	0.0566	393.6	1.6780	65
70	0.0626	397.3	1.6940	0.0609	397.2	1.6920	0.0592	397.1	1.6900	0.0576	397.0	1.6880	70
75	0.0637	400.6	1.7040	0.0619	400.5	1.7020	0.0602	400.4	1.7000	0.0586	400.3	1.6980	75
80	0.0647	403.9	1.7130	0.0629	403.8	1.7110	0.0612	403.8	1.7090	0.0595	403.7	1.7070	80
85	0.0658	407.3	1.7230	0.0639	407.2	1.7210	0.0622	407.1	1.7190	0.0605	407.0	1.7170	85
90	0.0668	410.7	1.7320	0.0649	410.6	1.7300	0.0632	410.5	1.7280	0.0615	410.4	1.7260	90
95	0.0679	414.1	1.7410	0.0660	414.0	1.7390	0.0642	413.9	1.7370	0.0624	413.8	1.7350	95
100	0.0689	417.5	1.7510	0.0670	417.4	1.7490	0.0651	417.3	1.7470	0.0634	417.2	1.7450	100
105	0.0699	420.9	1.7600	0.0680	420.8	1.7580	0.0661	420.7	1.7560	0.0644	420.7	1.7540	105
110	0.0709	424.3	1.7690	0.0690	424.3	1.7670	0.0671	424.2	1.7650	0.0653	424.1	1.7630	110
115	0.0720	427.8	1.7780	0.0700	427.7	1.7760	0.0681	427.6	1.7740	0.0663	427.6	1.7720	115
120	0.0730	431.2	1.7860	0.0710	431.2	1.7840	0.0690	431.1	1.7830	0.0672	431.0	1.7810	120
125	0.0740	434.7	1.7950	0.0719	434.7	1.7930	0.0700	434.6	1.7910	0.0682	434.5	1.7890	125
130	0.0750	438.2	1.8040	0.0729	438.2	1.8020	0.0710	438.1	1.8000	0.0691	438.0	1.7980	130
135	0.0760	441.7	1.8130	0.0739	441.7	1.8110	0.0719	441.6	1.8090	0.0700	441.5	1.8070	135
140	0.0770	445.3	1.8210	0.0749	445.2	1.8190	0.0729	445.1	1.8170	0.0710	445.1	1.8150	140
145	0.0781	448.8	1.8300	0.0759	448.7	1.8280	0.0738	448.7	1.8260	0.0719	448.6	1.8240	145
150	0.0791	452.3	1.8380	0.0769	452.3	1.8360	0.0748	452.2	1.8340	0.0728	452.2	1.8320	150
155	0.0801	455.9	1.8470	0.0779	455.8	1.8450	0.0758	455.8	1.8430	0.0738	455.7	1.8410	155

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure Tables

V = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	400			425			450			475			Temp °C
	(8.20°C)			(10.18°C)			(12.08°C)			(13.90°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0436)	(356.4)	(1.556)	(0.0411)	(357.3)	(1.555)	(0.0389)	(358.1)	(1.555)	(0.0369)	(358.8)	(1.554)	
10	0.0440	357.6	1.5600	-	-	-	-	-	-	-	-	-	10
15	0.0451	360.8	1.5720	0.0421	360.4	1.5660	0.0395	360.0	1.5610	0.0372	359.6	1.5570	15
20	0.0461	364.1	1.5830	0.0431	363.7	1.5780	0.0405	363.3	1.5730	0.0381	362.9	1.5680	20
25	0.0472	367.3	1.5940	0.0441	366.9	1.5890	0.0414	366.6	1.5840	0.0390	366.2	1.5790	25
30	0.0482	370.6	1.6050	0.0451	370.2	1.6000	0.0424	369.9	1.5950	0.0399	369.5	1.5900	30
35	0.0492	373.8	1.6150	0.0461	373.5	1.6100	0.0433	373.1	1.6060	0.0408	372.8	1.6010	35
40	0.0502	377.1	1.6260	0.0470	376.8	1.6210	0.0442	376.4	1.6160	0.0417	376.1	1.6120	40
45	0.0512	380.3	1.6360	0.0480	380.0	1.6310	0.0451	379.7	1.6270	0.0425	379.4	1.6220	45
50	0.0522	383.6	1.6460	0.0489	383.3	1.6410	0.0460	383.0	1.6370	0.0434	382.7	1.6330	50
55	0.0532	386.9	1.6560	0.0498	386.6	1.6520	0.0469	386.4	1.6470	0.0442	386.1	1.6430	55
60	0.0541	390.2	1.6660	0.0508	390.0	1.6620	0.0478	389.7	1.6570	0.0451	389.4	1.6530	60
65	0.0551	393.5	1.6760	0.0517	393.3	1.6720	0.0486	393.0	1.6670	0.0459	392.8	1.6630	65
70	0.0561	396.9	1.6860	0.0526	396.6	1.6810	0.0495	396.4	1.6770	0.0467	396.1	1.6730	70
75	0.0570	400.2	1.6960	0.0535	400.0	1.6910	0.0504	399.7	1.6870	0.0476	399.5	1.6820	75
80	0.0580	403.6	1.7050	0.0544	403.3	1.7010	0.0512	403.1	1.6960	0.0484	402.9	1.6920	80
85	0.0589	406.9	1.7150	0.0553	406.7	1.7100	0.0521	406.5	1.7060	0.0492	406.3	1.7020	85
90	0.0599	410.3	1.7240	0.0562	410.1	1.7200	0.0529	409.9	1.7150	0.0500	409.7	1.7110	90
95	0.0608	413.7	1.7330	0.0571	413.5	1.7290	0.0538	413.3	1.7250	0.0508	413.1	1.7200	95
100	0.0618	417.2	1.7430	0.0580	417.0	1.7380	0.0546	416.8	1.7340	0.0516	416.5	1.7300	100
105	0.0627	420.6	1.7520	0.0589	420.4	1.7470	0.0555	420.2	1.7430	0.0524	420.0	1.7390	105
110	0.0636	424.0	1.7610	0.0597	423.8	1.7560	0.0563	423.7	1.7520	0.0532	423.5	1.7480	110
115	0.0645	427.5	1.7700	0.0606	427.3	1.7650	0.0571	427.1	1.7610	0.0540	426.9	1.7570	115
120	0.0655	431.0	1.7790	0.0615	430.8	1.7740	0.0580	430.6	1.7700	0.0548	430.4	1.7660	120
125	0.0664	434.5	1.7880	0.0624	434.3	1.7830	0.0588	434.1	1.7790	0.0556	433.9	1.7750	125
130	0.0673	438.0	1.7960	0.0632	437.8	1.7920	0.0596	437.6	1.7880	0.0564	437.4	1.7840	130
135	0.0682	441.5	1.8050	0.0641	441.3	1.8010	0.0604	441.1	1.7960	0.0571	441.0	1.7920	135
140	0.0691	445.0	1.8140	0.0650	444.8	1.8090	0.0613	444.7	1.8050	0.0579	444.5	1.8010	140
145	0.0701	448.5	1.8220	0.0658	448.4	1.8180	0.0621	448.2	1.8130	0.0587	448.1	1.8090	145
150	0.0710	452.1	1.8310	0.0667	451.9	1.8260	0.0629	451.8	1.8220	0.0595	451.6	1.8180	150
155	0.0719	455.7	1.8390	0.0676	455.5	1.8340	0.0637	455.4	1.8300	0.0603	455.2	1.8260	155
160	0.0728	459.2	1.8470	0.0684	459.1	1.8430	0.0645	459.0	1.8390	0.0610	458.8	1.8350	160

Absolute Pressure kPa													Temp °C
Temp °C	500			525			550			575			
	(15.65°C)			(17.33°C)			(18.96°C)			(20.53°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0352)	(359.6)	(1.553)	(0.0335)	(360.3)	(1.553)	(0.0320)	(360.9)	(1.552)	(0.0307)	(361.6)	(1.552)	
20	0.0359	362.5	1.5630	0.0340	362.1	1.5590	0.0322	361.6	1.5550	-	-	-	20
25	0.0368	365.8	1.5750	0.0348	365.4	1.5700	0.0330	365	1.5660	0.0314	364.6	1.5620	25
30	0.0377	369.1	1.5860	0.0357	368.8	1.5820	0.0339	368.4	1.5780	0.0322	368.0	1.5740	30
35	0.0385	372.5	1.5970	0.0365	372.1	1.5930	0.0346	371.8	1.5890	0.0330	371.4	1.5850	35
40	0.0394	375.8	1.6070	0.0373	375.5	1.6030	0.0354	375.1	1.5990	0.0337	374.8	1.5960	40
45	0.0402	379.1	1.6180	0.0381	378.8	1.6140	0.0362	378.5	1.6100	0.0345	378.2	1.6060	45
50	0.0410	382.5	1.6280	0.0389	382.2	1.6240	0.0370	381.9	1.6200	0.0352	381.6	1.6170	50
55	0.0418	385.8	1.6390	0.0397	385.5	1.6350	0.0377	385.2	1.6310	0.0359	384.9	1.6270	55
60	0.0427	389.1	1.6490	0.0405	388.9	1.6450	0.0385	388.6	1.6410	0.0366	388.3	1.6370	60
65	0.0435	392.5	1.6590	0.0412	392.2	1.6550	0.0392	392.0	1.6510	0.0374	391.7	1.6470	65
70	0.0442	395.9	1.6690	0.0420	395.6	1.6650	0.0399	395.4	1.6610	0.0381	395.1	1.6570	70
75	0.0450	399.3	1.6780	0.0428	399.0	1.6750	0.0407	398.8	1.6710	0.0388	398.5	1.6670	75
80	0.0458	402.7	1.6880	0.0435	402.4	1.6840	0.0414	402.2	1.6810	0.0395	401.9	1.6770	80
85	0.0466	406.1	1.6980	0.0442	405.8	1.6940	0.0421	405.6	1.6900	0.0402	405.4	1.6870	85
90	0.0474	409.5	1.7070	0.0450	409.3	1.7030	0.0428	409.0	1.7000	0.0408	408.8	1.6960	90
95	0.0481	412.9	1.7170	0.0457	412.7	1.7130	0.0435	412.5	1.7090	0.0415	412.3	1.7060	95
100	0.0489	416.3	1.7260	0.0465	416.1	1.7220	0.0442	415.9	1.7180	0.0422	415.7	1.7150	100
105	0.0497	419.8	1.7350	0.0472	419.6	1.7310	0.0449	419.4	1.7280	0.0429	419.2	1.7240	105
110	0.0504	423.3	1.7440	0.0479	423.1	1.7400	0.0456	422.9	1.7370	0.0436	422.7	1.7330	110
115	0.0512	426.8	1.7530	0.0486	426.6	1.7490	0.0463	426.4	1.7460	0.0442	426.2	1.7430	115
120	0.0519	430.2	1.7620	0.0494	430.1	1.7580	0.0470	429.9	1.7550	0.0449	429.7	1.7520	120
125	0.0527	433.8	1.7710	0.0501	433.6	1.7670	0.0477	433.4	1.7640	0.0455	433.2	1.7600	125
130	0.0534	437.3	1.7800	0.0508	437.1	1.7760	0.0484	436.9	1.7730	0.0462	436.8	1.7690	130
135	0.0542	440.8	1.7880	0.0515	440.6	1.7850	0.0491	440.5	1.7810	0.0469	440.3	1.7780	135
140	0.0549	444.4	1.7970	0.0522	444.2	1.7930	0.0498	444.0	1.7900	0.0475	443.9	1.7870	140
145	0.0557	447.9	1.8060	0.0529	447.8	1.8020	0.0504	447.6	1.7990	0.0482	447.4	1.7950	145
150	0.0564	451.5	1.8140	0.0536	451.3	1.8110	0.0511	451.2	1.8070	0.0488	451.0	1.8040	150
155	0.0572	455.1	1.8230	0.0544	454.9	1.8190	0.0518	454.8	1.8160	0.0495	454.6	1.8120	155
160	0.0579	458.7	1.8310	0.0551	458.5	1.8270	0.0525	458.4	1.8240	0.0501	458.2	1.8210	160
165	0.0586	462.3	1.8390	0.0558	462.1	1.8360	0.0531	462.0	1.8320	0.0508	461.8	1.8290	165
170	0.0594	465.9	1.8470	0.0565	465.8	1.8440	0.0538	465.6	1.8400	0.0514	465.5	1.8370	170

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure Tables

V = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	600			625			650			675			Temp °C
	(22.06°C)			(23.53°C)			(24.97°C)			(26.36°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0294)	(362.2)	(1.551)	(0.0283)	(362.8)	(1.551)	(0.0272)	(363.4)	(1.551)	(0.0262)	(363.9)	(1.550)	
25	0.0299	364.2	1.5580	0.0285	363.8	1.5540	0.0272	363.4	1.5510	-	-	-	25
30	0.0306	367.6	1.5700	0.0292	367.3	1.5660	0.0279	366.9	1.5620	0.0267	366.5	1.5590	30
35	0.0314	371.1	1.5810	0.0300	370.7	1.5770	0.0286	370.3	1.5740	0.0274	369.9	1.5700	35
40	0.0321	374.5	1.5920	0.0307	374.1	1.5880	0.0293	373.8	1.5850	0.0281	373.4	1.5810	40
45	0.0329	377.9	1.6030	0.0314	377.5	1.5990	0.0300	377.2	1.5960	0.0288	376.9	1.5920	45
50	0.0336	381.2	1.6130	0.0321	380.9	1.6100	0.0307	380.6	1.6060	0.0294	380.3	1.6030	50
55	0.0343	384.6	1.6240	0.0328	384.3	1.6200	0.0314	384.0	1.6170	0.0301	383.7	1.6140	55
60	0.0350	388.0	1.6340	0.0334	387.8	1.6300	0.0320	387.5	1.6270	0.0307	387.2	1.6240	60
65	0.0357	391.4	1.6440	0.0341	391.2	1.6410	0.0327	390.9	1.6370	0.0313	390.6	1.6340	65
70	0.0364	394.9	1.6540	0.0348	394.6	1.6510	0.0333	394.3	1.6470	0.0320	394.1	1.6440	70
75	0.0370	398.3	1.6640	0.0354	398.0	1.6610	0.0339	397.8	1.6570	0.0326	397.5	1.6540	75
80	0.0377	401.7	1.6740	0.0361	401.5	1.6700	0.0346	401.2	1.6670	0.0332	401.0	1.6640	80
85	0.0384	405.1	1.6830	0.0367	404.9	1.6800	0.0352	404.7	1.6770	0.0338	404.4	1.6740	85
90	0.0390	408.6	1.6930	0.0374	408.4	1.6900	0.0358	408.1	1.6870	0.0344	407.9	1.6830	90
95	0.0397	412.1	1.7020	0.0380	411.8	1.6990	0.0364	411.6	1.6960	0.0350	411.4	1.6930	95
100	0.0403	415.5	1.7120	0.0386	415.3	1.7090	0.0370	415.1	1.7050	0.0356	414.9	1.7020	100
105	0.0410	419.0	1.7210	0.0393	418.8	1.7180	0.0376	418.6	1.7150	0.0362	418.4	1.7120	105
110	0.0416	422.5	1.7300	0.0399	422.3	1.7270	0.0383	422.1	1.7240	0.0367	421.9	1.7210	110
115	0.0423	426.0	1.7390	0.0405	425.8	1.7360	0.0389	425.6	1.7330	0.0373	425.4	1.7300	115
120	0.0429	429.5	1.7480	0.0411	429.3	1.7450	0.0394	429.1	1.7420	0.0379	429.0	1.7390	120
125	0.0436	433.0	1.7570	0.0417	432.9	1.7540	0.0400	432.7	1.7510	0.0385	432.5	1.7480	125
130	0.0442	436.6	1.7660	0.0423	436.4	1.7630	0.0406	436.2	1.7600	0.0391	436.1	1.7570	130
135	0.0448	440.1	1.7750	0.0430	440.0	1.7720	0.0412	439.8	1.7690	0.0396	439.6	1.7660	135
140	0.0455	443.7	1.7830	0.0436	443.5	1.7800	0.0418	443.4	1.7770	0.0402	443.2	1.7740	140
145	0.0461	447.3	1.7920	0.0442	447.1	1.7890	0.0424	447.0	1.7860	0.0408	446.8	1.7830	145
150	0.0467	450.9	1.8010	0.0448	450.7	1.7980	0.0430	450.6	1.7950	0.0413	450.4	1.7920	150
155	0.0473	454.5	1.8090	0.0454	454.3	1.8060	0.0436	454.2	1.8030	0.0419	454.0	1.8000	155
160	0.0480	458.1	1.8170	0.0460	457.9	1.8140	0.0441	457.8	1.8110	0.0424	457.6	1.8090	160
165	0.0486	461.7	1.8260	0.0466	461.6	1.8230	0.0447	461.4	1.8200	0.0430	461.3	1.8170	165
170	0.0492	465.3	1.8340	0.0472	465.2	1.8310	0.0453	465.0	1.8280	0.0436	464.9	1.8250	170
175	0.0498	469.0	1.8420	0.0478	468.8	1.8390	0.0459	468.7	1.8360	0.0441	468.6	1.8330	175

Absolute Pressure kPa													
Temp °C	700			725			750			800			Temp °C
	(27.72°C)			(29.04°C)			(30.32°C)			(32.81°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0253)	(364.4)	(1.550)	(0.0244)	(364.9)	(1.549)	(0.0236)	(365.4)	(1.549)	(0.0221)	(366.4)	(1.548)	
30	0.0256	366.0	1.5550	0.0245	365.6	1.5520	-	-	-	-	-	-	30
35	0.0263	369.6	1.5670	0.0252	369.2	1.5630	0.0242	368.8	1.5600	0.0224	368.0	1.5540	35
40	0.0269	373.1	1.5780	0.0258	372.7	1.5750	0.0248	372.3	1.5710	0.0230	371.6	1.5650	40
45	0.0276	376.5	1.5890	0.0265	376.2	1.5860	0.0255	375.8	1.5830	0.0236	375.1	1.5770	45
50	0.0282	380.0	1.6000	0.0271	379.7	1.5970	0.0261	379.3	1.5940	0.0242	378.7	1.5880	50
55	0.0289	383.4	1.6100	0.0277	383.1	1.6070	0.0267	382.8	1.6040	0.0248	382.2	1.5980	55
60	0.0295	386.9	1.6210	0.0283	386.6	1.6180	0.0273	386.3	1.6150	0.0253	385.7	1.6090	60
65	0.0301	390.4	1.6310	0.0289	390.1	1.6280	0.0279	389.8	1.6250	0.0259	389.2	1.6190	65
70	0.0307	393.8	1.6410	0.0295	393.5	1.6380	0.0284	393.3	1.6350	0.0264	392.7	1.6300	70
75	0.0313	397.3	1.6510	0.0301	397.0	1.6480	0.0290	396.8	1.6450	0.0270	396.2	1.6400	75
80	0.0319	400.7	1.6610	0.0307	400.5	1.6580	0.0296	400.2	1.6550	0.0275	399.7	1.6500	80
85	0.0325	404.2	1.6710	0.0313	404.0	1.6680	0.0301	403.7	1.6650	0.0281	403.3	1.6600	85
90	0.0331	407.7	1.6810	0.0318	407.5	1.6780	0.0307	407.2	1.6750	0.0286	406.8	1.6700	90
95	0.0336	411.2	1.6900	0.0324	411.0	1.6870	0.0312	410.7	1.6840	0.0291	410.3	1.6790	95
100	0.0342	414.7	1.7000	0.0329	414.5	1.6970	0.0318	414.3	1.6940	0.0296	413.8	1.6890	100
105	0.0348	418.2	1.7090	0.0335	418.0	1.7060	0.0323	417.8	1.7030	0.0301	417.4	1.6980	105
110	0.0353	421.7	1.7180	0.0340	421.5	1.7150	0.0328	421.3	1.7130	0.0306	420.9	1.7070	110
115	0.0359	425.2	1.7270	0.0346	425.0	1.7240	0.0334	424.8	1.7220	0.0311	424.5	1.7170	115
120	0.0365	428.8	1.7360	0.0351	428.6	1.7340	0.0339	428.4	1.7310	0.0316	428.0	1.7260	120
125	0.0370	432.3	1.7450	0.0357	432.1	1.7430	0.0344	432.0	1.7400	0.0321	431.6	1.7350	125
130	0.0376	435.9	1.7540	0.0362	435.7	1.7510	0.0349	435.5	1.7490	0.0326	435.2	1.7440	130
135	0.0381	439.5	1.7630	0.0368	439.3	1.7600	0.0355	439.1	1.7580	0.0331	438.8	1.7530	135
140	0.0387	443.0	1.7720	0.0373	442.9	1.7690	0.0360	442.7	1.7660	0.0336	442.4	1.7610	140
145	0.0392	446.6	1.7800	0.0378	446.5	1.7780	0.0365	446.3	1.7750	0.0341	446.0	1.7700	145
150	0.0398	450.2	1.7890	0.0383	450.1	1.7860	0.0370	449.9	1.7840	0.0346	449.6	1.7790	150
155	0.0403	453.9	1.7970	0.0389	453.7	1.7950	0.0375	453.5	1.7920	0.0351	453.2	1.7870	155
160	0.0409	457.5	1.8060	0.0394	457.3	1.8030	0.0380	457.2	1.8010	0.0355	456.9	1.7960	160
165	0.0414	461.1	1.8140	0.0399	461.0	1.8120	0.0385	460.8	1.8090	0.0360	460.5	1.8040	165
170	0.0419	464.8	1.8220	0.0404	464.6	1.8200	0.0390	464.5	1.8170	0.0365	464.2	1.8120	170
175	0.0425	468.4	1.8310	0.0410	468.3	1.8280	0.0395	468.1	1.8250	0.0370	467.9	1.8210	175
180	0.0430	472.1	1.8390	0.0415	472.0	1.8360	0.0400	471.8	1.8340	0.0374	471.6	1.8290	180

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure Tables

V = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	850			900			950			1000			Temp °C
	(35.18°C)			(37.45°C)			(39.62°C)			(41.72°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0208)	(367.2)	(1.548)	(0.0196)	(368.1)	(1.547)	(0.0186)	(368.8)	(1.547)	(0.0176)	(369.6)	(1.545)	
40	0.0214	370.8	1.5590	0.0199	370.0	1.5530	0.0186	369.1	1.5480	-	-	-	40
45	0.0220	374.4	1.5710	0.0205	373.6	1.5650	0.0192	372.9	1.5590	0.0180	372.1	1.5540	45
50	0.0225	378.0	1.5820	0.0210	377.3	1.5760	0.0197	376.6	1.5710	0.0185	375.8	1.5660	50
55	0.0231	381.5	1.5930	0.0216	380.9	1.5870	0.0202	380.2	1.5820	0.0190	379.5	1.5770	55
60	0.0236	385.1	1.6040	0.0221	384.5	1.5980	0.0207	383.8	1.5930	0.0195	383.2	1.5880	60
65	0.0242	388.6	1.6140	0.0226	388.0	1.6090	0.0212	387.4	1.6040	0.0200	386.8	1.5990	65
70	0.0247	392.2	1.6240	0.0231	391.6	1.6190	0.0217	391.0	1.6140	0.0205	390.4	1.6100	70
75	0.0252	395.7	1.6350	0.0236	395.2	1.6300	0.0222	394.6	1.6250	0.0209	394.1	1.6200	75
80	0.0257	399.2	1.6450	0.0241	398.7	1.6400	0.0227	398.2	1.6350	0.0214	397.7	1.6300	80
85	0.0262	402.8	1.6550	0.0246	402.3	1.6500	0.0232	401.8	1.6450	0.0218	401.3	1.6400	85
90	0.0267	406.3	1.6640	0.0251	405.8	1.6600	0.0236	405.3	1.6550	0.0223	404.9	1.6500	90
95	0.0272	409.8	1.6740	0.0256	409.4	1.6690	0.0241	408.9	1.6650	0.0227	408.5	1.6600	95
100	0.0277	413.4	1.6840	0.0260	412.9	1.6790	0.0245	412.5	1.6740	0.0232	412.1	1.6700	100
105	0.0282	416.9	1.6930	0.0265	416.5	1.6880	0.0250	416.1	1.6840	0.0236	415.7	1.6800	105
110	0.0287	420.5	1.7030	0.0270	420.1	1.6980	0.0254	419.7	1.6930	0.0240	419.3	1.6890	110
115	0.0292	424.1	1.7120	0.0274	423.7	1.7070	0.0258	423.3	1.7030	0.0244	422.9	1.6980	115
120	0.0296	427.6	1.7210	0.0279	427.3	1.7160	0.0263	426.9	1.7120	0.0248	426.5	1.7080	120
125	0.0301	431.2	1.7300	0.0283	430.9	1.7250	0.0267	430.5	1.7210	0.0253	430.1	1.7170	125
130	0.0306	434.8	1.7390	0.0288	434.5	1.7340	0.0271	434.1	1.7300	0.0257	433.7	1.7260	130
135	0.0310	438.4	1.7480	0.0292	438.1	1.7430	0.0276	437.7	1.7390	0.0261	437.4	1.7350	135
140	0.0315	442.0	1.7570	0.0297	441.7	1.7520	0.0280	441.4	1.7480	0.0265	441.0	1.7440	140
145	0.0320	445.7	1.7650	0.0301	445.3	1.7610	0.0284	445.0	1.7570	0.0269	444.7	1.7520	145
150	0.0324	449.3	1.7740	0.0305	449.0	1.7690	0.0288	448.6	1.7650	0.0273	448.3	1.7610	150
155	0.0329	452.9	1.7830	0.0310	452.6	1.7780	0.0292	452.3	1.7740	0.0277	452.0	1.7700	155
160	0.0333	456.6	1.7910	0.0314	456.3	1.7870	0.0297	456.0	1.7820	0.0281	455.7	1.7780	160
165	0.0338	460.2	1.7990	0.0318	459.9	1.7950	0.0301	459.6	1.7910	0.0285	459.3	1.7870	165
170	0.0343	463.9	1.8080	0.0323	463.6	1.8030	0.0305	463.3	1.7990	0.0289	463.0	1.7950	170
175	0.0347	467.6	1.8160	0.0327	467.3	1.8120	0.0309	467.0	1.8070	0.0293	466.7	1.8030	175
180	0.0352	471.3	1.8240	0.0331	471.0	1.8200	0.0313	470.7	1.8160	0.0296	470.5	1.8120	180
185	0.0356	475.0	1.8320	0.0335	474.7	1.8280	0.0317	474.4	1.8240	0.0300	474.2	1.8200	185
190	0.0360	478.7	1.8400	0.0340	478.4	1.8360	0.0321	478.2	1.8320	0.0304	477.9	1.8280	190

Absolute Pressure kPa													Temp °C
Temp °C	1100			1200			1300			1400			
	(45.69°C)			(49.41°C)			(52.9°C)			(56.20°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0159)	(370.9)	(1.545)	(0.01454)	(372.1)	(1.544)	(0.0134)	(373.1)	(1.543)	(0.0123)	(374.0)	(1.542)	
50	0.0164	374.2	1.5550	0.0146	372.5	1.5450	-	-	-	-	-	-	50
55	0.0169	378.1	1.5670	0.0151	376.5	1.5580	0.0136	374.8	1.5480	-	-	-	55
60	0.0174	381.8	1.5780	0.0156	380.4	1.5690	0.0140	378.9	1.5600	0.0127	377.2	1.5510	60
65	0.0178	385.5	1.5900	0.0160	384.2	1.5810	0.0145	382.8	1.5720	0.0131	381.3	1.5630	65
70	0.0183	389.2	1.6000	0.0164	388.0	1.5920	0.0149	386.7	1.5830	0.0135	385.3	1.5750	70
75	0.0187	392.9	1.6110	0.0169	391.7	1.6030	0.0153	390.5	1.5940	0.0139	389.2	1.5870	75
80	0.0191	396.6	1.6220	0.0173	395.5	1.6130	0.0157	394.3	1.6050	0.0143	393.1	1.5980	80
85	0.0196	400.2	1.6320	0.0177	399.2	1.6240	0.0161	398.1	1.6160	0.0147	396.9	1.6080	85
90	0.0200	403.9	1.6420	0.0181	402.9	1.6340	0.0164	401.8	1.6260	0.0150	400.7	1.6190	90
95	0.0204	407.5	1.6520	0.0185	406.5	1.6440	0.0168	405.5	1.6360	0.0154	404.5	1.6290	95
100	0.0208	411.1	1.6620	0.0188	410.2	1.6540	0.0172	409.3	1.6460	0.0157	408.3	1.6390	100
105	0.0212	414.8	1.6710	0.0192	413.9	1.6640	0.0175	413.0	1.6560	0.0161	412.0	1.6490	105
110	0.0216	418.4	1.6810	0.0196	417.6	1.6730	0.0179	416.7	1.6660	0.0164	415.8	1.6590	110
115	0.0220	422.1	1.6900	0.0200	421.2	1.6830	0.0182	420.4	1.6760	0.0167	419.5	1.6690	115
120	0.0224	425.7	1.7000	0.0203	424.9	1.6920	0.0186	424.1	1.6850	0.0171	423.2	1.6790	120
125	0.0228	429.3	1.7090	0.0207	428.6	1.7010	0.0189	427.8	1.6950	0.0174	427.0	1.6880	125
130	0.0231	433.0	1.7180	0.0210	432.2	1.7110	0.0192	431.5	1.7040	0.0177	430.7	1.6970	130
135	0.0235	436.7	1.7270	0.0214	435.9	1.7200	0.0196	435.2	1.7130	0.0180	434.4	1.7060	135
140	0.0239	440.3	1.7360	0.0217	439.6	1.7290	0.0199	438.9	1.7220	0.0183	438.2	1.7160	140
145	0.0243	444.0	1.7450	0.0221	443.3	1.7380	0.0202	442.6	1.7310	0.0186	441.9	1.7250	145
150	0.0246	447.7	1.7530	0.0224	447.0	1.7460	0.0206	446.3	1.7400	0.0189	445.7	1.7330	150
155	0.0250	451.4	1.7620	0.0228	450.7	1.7550	0.0209	450.1	1.7480	0.0192	449.4	1.7420	155
160	0.0254	455.0	1.7710	0.0231	454.4	1.7640	0.0212	453.8	1.7570	0.0195	453.2	1.7510	160
165	0.0257	458.7	1.7790	0.0234	458.1	1.7720	0.0215	457.5	1.7660	0.0198	456.9	1.7600	165
170	0.0261	462.5	1.7880	0.0238	461.9	1.7810	0.0218	461.3	1.7740	0.0201	460.7	1.7680	170
175	0.0265	466.2	1.7960	0.0241	465.6	1.7890	0.0221	465.0	1.7830	0.0204	464.4	1.7770	175
180	0.0268	469.9	1.8040	0.0244	469.3	1.7970	0.0224	468.8	1.7910	0.0207	468.2	1.7850	180
185	0.0272	473.6	1.8120	0.0248	473.1	1.8060	0.0228	472.5	1.7990	0.0210	472.0	1.7930	185
190	0.0275	477.4	1.8210	0.0251	476.8	1.8140	0.0231	476.3	1.8070	0.0213	475.8	1.8010	190

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure TablesV = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	1500			1600			1700			1800			°C
	(59.33°C)			(62.32°C)			(65.16°C)			(67.98°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0114)	(374.9)	(1.541)	(0.0106)	(375.6)	(1.540)	(0.0099)	(376.3)	(1.538)	(0.0093)	(376.8)	(1.537)	
60	0.0115	375.5	1.5420	-	-	-	-	-	-	-	-	-	60
65	0.0119	379.7	1.5550	0.0109	378.0	1.5470	-	-	-	-	-	-	65
70	0.0123	383.8	1.5670	0.0113	382.3	1.5590	0.0103	380.6	1.5510	0.0095	378.8	1.5430	70
75	0.0127	387.9	1.5790	0.0117	386.4	1.5710	0.0107	384.9	1.5640	0.0099	383.3	1.5560	75
80	0.0131	391.8	1.5900	0.0120	390.5	1.5830	0.0111	389.1	1.5760	0.0102	387.6	1.5680	80
85	0.0135	395.7	1.6010	0.0124	394.5	1.5940	0.0114	393.2	1.5870	0.0106	391.9	1.5800	85
90	0.0138	399.6	1.6120	0.0127	398.4	1.6050	0.0118	397.2	1.5980	0.0109	396.0	1.5920	90
95	0.0142	403.4	1.6220	0.0131	402.4	1.6160	0.0121	401.2	1.6090	0.0112	400.0	1.6030	95
100	0.0145	407.3	1.6330	0.0134	406.2	1.6260	0.0124	405.2	1.6200	0.0116	404.1	1.6140	100
105	0.0148	411.1	1.6430	0.0137	410.1	1.6360	0.0127	409.1	1.6300	0.0119	408.0	1.6240	105
110	0.0151	414.9	1.6530	0.0140	413.9	1.6460	0.0130	412.9	1.6400	0.0121	412.0	1.6350	110
115	0.0155	418.6	1.6630	0.0143	417.7	1.6560	0.0133	416.8	1.6500	0.0124	415.9	1.6450	115
120	0.0158	422.4	1.6720	0.0146	421.5	1.6660	0.0136	420.7	1.6600	0.0127	419.8	1.6550	120
125	0.0161	426.2	1.6820	0.0149	425.3	1.6760	0.0139	424.5	1.6700	0.0130	423.6	1.6640	125
130	0.0164	429.9	1.6910	0.0152	429.1	1.6850	0.0142	428.3	1.6800	0.0133	427.5	1.6740	130
135	0.0167	433.7	1.7000	0.0155	432.9	1.6950	0.0144	432.1	1.6890	0.0135	431.3	1.6840	135
140	0.0170	437.5	1.7100	0.0158	436.7	1.7040	0.0147	436.0	1.6980	0.0138	435.2	1.6930	140
145	0.0173	441.2	1.7190	0.0161	440.5	1.7130	0.0150	439.8	1.7070	0.0140	439.0	1.7020	145
150	0.0176	445.0	1.7280	0.0163	444.3	1.7220	0.0153	443.6	1.7170	0.0143	442.9	1.7110	150
155	0.0178	448.7	1.7360	0.0166	448.1	1.7310	0.0155	447.4	1.7250	0.0145	446.7	1.7200	155
160	0.0181	452.5	1.7450	0.0169	451.9	1.7400	0.0158	451.2	1.7340	0.0148	450.5	1.7290	160
165	0.0184	456.3	1.7540	0.0171	455.7	1.7480	0.0160	455.0	1.7430	0.0150	454.4	1.7380	165
170	0.0187	460.1	1.7620	0.0174	459.5	1.7570	0.0163	458.8	1.7520	0.0153	458.2	1.7470	170
175	0.0190	463.9	1.7710	0.0177	463.3	1.7650	0.0165	462.7	1.7600	0.0155	462.1	1.7550	175
180	0.0192	467.6	1.7790	0.0179	467.1	1.7740	0.0168	466.5	1.7690	0.0158	465.9	1.7640	180
185	0.0195	471.4	1.7880	0.0182	470.9	1.7820	0.0170	470.3	1.7770	0.0160	469.7	1.7720	185
190	0.0198	475.2	1.7960	0.0185	474.7	1.7910	0.0173	474.1	1.7850	0.0162	473.6	1.7810	190

Absolute Pressure kPa													
Temp °C	1900			2000			2200			2400			Temp °C
	(70.51°C)			(73.03°C)			(77.79°C)			(82.25°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0087)	(377.3)	(1.536)	(0.0082)	(377.7)	(1.535)	(0.0073)	(378.3)	(1.532)	(0.0065)	(378.6)	(1.527)	
75	0.0091	381.6	1.5480	0.0084	379.7	1.5400	-	-	-	-	-	-	75
80	0.0095	386.1	1.5610	0.0088	384.4	1.5540	0.0075	380.6	1.5390	-	-	-	80
85	0.0098	390.4	1.5740	0.0091	388.9	1.5670	0.0079	385.6	1.5530	0.0068	381.7	1.5380	85
90	0.0101	394.7	1.5850	0.0094	393.3	1.5790	0.0082	390.3	1.5660	0.0071	387.0	1.5520	90
95	0.0105	398.8	1.5970	0.0098	397.6	1.5900	0.0085	394.9	1.5780	0.0075	391.8	1.5660	95
100	0.0108	402.9	1.6080	0.0101	401.7	1.6020	0.0088	399.2	1.5900	0.0078	396.5	1.5780	100
105	0.0111	407.0	1.6180	0.0104	405.8	1.6130	0.0091	403.5	1.6010	0.0081	401.0	1.5900	105
110	0.0114	410.9	1.6290	0.0106	409.9	1.6230	0.0094	407.7	1.6120	0.0083	405.4	1.6020	110
115	0.0116	414.9	1.6390	0.0109	413.9	1.6340	0.0096	411.9	1.6230	0.0086	409.7	1.6130	115
120	0.0119	418.8	1.6490	0.0112	417.9	1.6440	0.0099	416.0	1.6340	0.0088	413.9	1.6240	120
125	0.0122	422.8	1.6590	0.0114	421.9	1.6540	0.0102	420.0	1.6440	0.0091	418.1	1.6340	125
130	0.0124	426.7	1.6690	0.0117	425.8	1.6640	0.0104	424.0	1.6540	0.0093	422.2	1.6440	130
135	0.0127	430.5	1.6780	0.0119	429.7	1.6730	0.0106	428.0	1.6640	0.0095	426.3	1.6550	135
140	0.0129	434.4	1.6880	0.0122	433.6	1.6830	0.0109	432.0	1.6730	0.0098	430.4	1.6640	140
145	0.0132	438.3	1.6970	0.0124	437.5	1.6920	0.0111	436.0	1.6830	0.0100	434.4	1.6740	145
150	0.0134	442.2	1.7060	0.0127	441.4	1.7020	0.0113	439.9	1.6920	0.0102	438.4	1.6840	150
155	0.0137	446.0	1.7150	0.0129	445.3	1.7110	0.0115	443.9	1.7020	0.0104	442.4	1.6930	155
160	0.0139	449.9	1.7240	0.0131	449.2	1.7200	0.0118	447.8	1.7110	0.0106	446.4	1.7020	160
165	0.0142	453.7	1.7330	0.0134	453.1	1.7290	0.0120	451.7	1.7200	0.0108	450.4	1.7110	165
170	0.0144	457.6	1.7420	0.0136	457.0	1.7370	0.0122	455.7	1.7290	0.0110	454.3	1.7200	170
175	0.0146	461.4	1.7510	0.0138	460.8	1.7460	0.0124	459.6	1.7370	0.0112	458.3	1.7290	175
180	0.0149	465.3	1.7590	0.0140	464.7	1.7550	0.0126	463.5	1.7460	0.0114	462.3	1.7380	180
185	0.0151	469.2	1.7680	0.0143	468.6	1.7630	0.0128	467.4	1.7550	0.0116	466.2	1.7470	185
190	0.0153	473.0	1.7760	0.0145	472.5	1.7720	0.0130	471.3	1.7630	0.0118	470.2	1.7550	190

Table 2 (continued)

DuPont™ Freon® 12 Superheated Vapor — Constant Pressure TablesV = Volume in m³/kg

H = Enthalpy in kJ/kg

S = Entropy in kJ/kg·K

Saturation Properties in ()

Absolute Pressure kPa													
Temp °C	2600			2800			3000			3200			Temp °C
	(86.43°C)			(90.37°C)			(94.10°C)			(97.63°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0059)	(378.6)	(1.526)	(0.0053)	(378.3)	(1.522)	(0.0048)	(377.7)	(1.517)	(0.0043)	(376.6)	(1.512)	
90	0.0062	382.9	1.5380	-	-	-	-	-	-	-	-	-	90
95	0.0065	388.4	1.5520	0.0057	384.3	1.5380	0.0048	379.1	1.5210	-	-	-	95
100	0.0068	393.5	1.5660	0.0060	390.0	1.5530	0.0053	385.9	1.5390	0.0045	380.7	1.5230	100
105	0.0071	398.3	1.5790	0.0063	395.2	1.5670	0.0056	391.8	1.5550	0.0049	387.7	1.5420	105
110	0.0074	402.9	1.5910	0.0066	400.2	1.5800	0.0059	397.1	1.5690	0.0053	393.7	1.5570	110
115	0.0077	407.4	1.6030	0.0069	404.9	1.5920	0.0062	402.2	1.5820	0.0056	399.2	1.5710	115
120	0.0079	411.7	1.6140	0.0071	409.4	1.6040	0.0064	407.0	1.5940	0.0058	404.3	1.5850	120
125	0.0082	416.0	1.6250	0.0074	413.9	1.6150	0.0067	411.6	1.6060	0.0061	409.2	1.5970	125
130	0.0084	420.3	1.6350	0.0076	418.3	1.6260	0.0069	416.2	1.6180	0.0063	413.9	1.6090	130
135	0.0086	424.5	1.6460	0.0078	422.6	1.6370	0.0071	420.6	1.6280	0.0065	418.5	1.6200	135
140	0.0088	428.6	1.6560	0.0080	426.8	1.6470	0.0073	425.0	1.6390	0.0067	423.0	1.6310	140
145	0.0090	432.7	1.6660	0.0082	431.0	1.6570	0.0075	429.3	1.6490	0.0069	427.4	1.6420	145
150	0.0093	436.8	1.6750	0.0084	435.2	1.6670	0.0077	433.5	1.6600	0.0071	431.8	1.6520	150
155	0.0095	440.9	1.6850	0.0086	439.3	1.6770	0.0079	437.7	1.6690	0.0073	436.1	1.6620	155
160	0.0097	444.9	1.6940	0.0088	443.5	1.6870	0.0081	441.9	1.6790	0.0075	440.4	1.6720	160
165	0.0098	449.0	1.7040	0.0090	447.5	1.6960	0.0083	446.1	1.6890	0.0076	444.6	1.6820	165
170	0.0100	453.0	1.7130	0.0092	451.6	1.7050	0.0085	450.2	1.6980	0.0078	448.8	1.6910	170
175	0.0102	457.0	1.7220	0.0094	455.7	1.7140	0.0086	454.3	1.7070	0.0080	453.0	1.7010	175
180	0.0104	461.0	1.7310	0.0095	459.7	1.7230	0.0088	458.4	1.7160	0.0081	457.1	1.7100	180
185	0.0106	465.0	1.7390	0.0097	463.8	1.7320	0.0090	462.5	1.7250	0.0083	461.2	1.7190	185
190	0.0108	469.0	1.7480	0.0099	467.8	1.7410	0.0091	466.6	1.7340	0.0085	465.4	1.7280	190

Absolute Pressure kPa													
Temp °C	3400			3600			3800			4000			Temp °C
	(101.0°C)			(104.2°C)			(107.2°C)			(110.1°C)			
	V	H	S	V	H	S	V	H	S	V	H	S	
	(0.0038)	(375.1)	(1.506)	(0.0034)	(372.8)	(1.498)	(0.0030)	(369.5)	(1.487)	(0.0025)	(363.6)	(1.470)	
105	0.0043	382.6	1.5260	0.0035	375.1	1.5040	-	-	-	-	-	-	105
110	0.0047	389.8	1.5440	0.0041	384.9	1.5290	0.0034	378.2	1.5100	-	-	-	110
115	0.0050	395.9	1.5600	0.0044	392.0	1.5480	0.0039	387.4	1.5340	0.0034	381.5	1.5170	115
120	0.0052	401.4	1.5740	0.0047	398.2	1.5640	0.0042	394.5	1.5520	0.0038	390.2	1.5390	120
125	0.0055	406.6	1.5870	0.0050	403.8	1.5780	0.0045	400.6	1.5680	0.0041	397.2	1.5570	125
130	0.0057	411.5	1.6000	0.0052	409.0	1.5910	0.0048	406.3	1.5820	0.0043	403.3	1.5720	130
135	0.0059	416.3	1.6120	0.0054	414.0	1.6030	0.0050	411.5	1.5950	0.0046	408.9	1.5860	135
140	0.0061	421.0	1.6230	0.0057	418.8	1.6150	0.0052	416.6	1.6070	0.0048	414.2	1.5990	140
145	0.0063	425.5	1.6340	0.0058	423.5	1.6260	0.0054	421.4	1.6190	0.0050	419.3	1.6110	145
150	0.0065	430.0	1.6450	0.0060	428.1	1.6370	0.0056	426.2	1.6300	0.0052	424.2	1.6220	150
155	0.0067	434.4	1.6550	0.0062	432.6	1.6480	0.0058	430.8	1.6410	0.0054	428.9	1.6340	155
160	0.0069	438.7	1.6650	0.0064	437.1	1.6580	0.0059	435.4	1.6510	0.0055	433.6	1.6450	160
165	0.0071	443.0	1.6750	0.0066	441.5	1.6680	0.0061	439.8	1.6620	0.0057	438.2	1.6550	165
170	0.0072	447.3	1.6850	0.0067	445.8	1.6780	0.0063	444.3	1.6720	0.0059	442.7	1.6650	170
175	0.0074	451.5	1.6940	0.0069	450.1	1.6880	0.0064	448.6	1.6810	0.0060	447.1	1.6750	175
180	0.0076	455.8	1.7030	0.0070	454.4	1.6970	0.0066	453.0	1.6910	0.0062	451.5	1.6850	180
185	0.0077	459.9	1.7130	0.0072	458.6	1.7060	0.0067	457.3	1.7000	0.0063	455.9	1.6950	185
190	0.0079	464.1	1.7220	0.0073	462.8	1.7160	0.0069	461.5	1.7100	0.0064	460.2	1.7040	190

For Further Information: (800) 235-SUVA

www.suva.dupont.com

DuPont Fluorochemicals
Wilmington, DE 19880-0711

Europe

DuPont de Nemours
International S.A.
2 Chemin du Pavillon
P.O. Box 50
CH-1218 Le Grand-Saconnex
Geneva, Switzerland
41-22-717-5111

Canada

DuPont Canada, Inc.
P.O. Box 2200, Streetsville
Mississauga, Ontario
Canada
L5M 2H3
(905) 821-3300

Mexico

DuPont, S.A. de C.V.
Homero 206
Col. Chapultepec Morales
C.P. 11570 Mexico, D.F.
52-5-722-1100

South America

DuPont do Brasil S.A.
Alameda Itapecuru, 506
Alphaville 06454-080 Barueri
São Paulo, Brazil
55-11-7266-8263

DuPont Argentina S.A.

Casilla Correo 1888
Correo Central
1000 Buenos Aires, Argentina
54-1-311-8167

Pacific

DuPont Australia
P.O. Box 930
North Sydney, NSW 2060
Australia
61-2-99236111

Japan

Mitsui DuPont Fluorochemicals Co., Ltd.
Chiyoda Honsha Bldg.
5-18, 1-Chome Sarugakucho
Chiyoda-Ku, Tokyo 101-0064 Japan
81-3-5281-5805

Asia

DuPont Taiwan
P.O. Box 81-777
Taipei, Taiwan
886-2-514-4400

DuPont China Limited
P.O. Box TST 98851
1122 New World Office Bldg. (East Wing)
Tsim Sha Tsui
Kowloon, Hong Kong
Phone: 852-734-5398
Fax: 852-236-83516

DuPont Thailand Ltd.
9-11 Floor, Yada Bldg.
56 Silom Road
Suriyawongse, Bankrak
Bangkok 10500
Phone: 66-2-238-0026
Fax: 66-2-238-4396

DuPont China Ltd.
Rm. 1704, Union Bldg.
100 Yenan Rd. East
Shanghai, PR China 200 002
Phone: 86-21-328-3738
Telex: 33448 DCLSH CN
Fax: 86-21-320-2304

DuPont Far East Inc.
6th Floor Bangunan Samudra
No. 1 JLN. Kontraktor U1/14, SEK U1
Hicom-Glenmarie Industrial Park
40150 Shah Alam, Selangor Malaysia
Phone 60-3-517-2534

DuPont Korea Inc.
4/5th Floor, Asia Tower
#726, Yeoksam-dong, Kangnam-ku
Seoul, 135-082, Korea
82-2-721-5114

DuPont Singapore Pte. Ltd.
1 Maritime Square #07 01
World Trade Centre
Singapore 0409
65-273-2244

DuPont Far East, Philippines
8th Floor, Solid Bank Bldg.
777 Paseo de Roxas
Makati, Metro Manila
Philippines
Phone: 63-2-818-9911
Fax: 63-2-818-9659

DuPont Far East Inc.
7A Murray's Gate Road
Alwarpet
Madras, 600 018, India
91-44-454-029

DuPont Far East Inc.—Pakistan
9 Khayaban-E-Shaheen
Defence Phase 5
Karachi, Pakistan
92-21-533-350

DuPont Far East Inc.
P.O. Box 2553/Jkt
Jakarta 10001, Indonesia
62-21-517-800

Copyright © 2005, DuPont or its affiliates. The DuPont Oval Logo, DuPont™, The miracles of science™, Freon®, and Suva®, are registered trademarks or trademarks of DuPont or its affiliates.

NO PART OF THIS MATERIAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF DUPONT.

