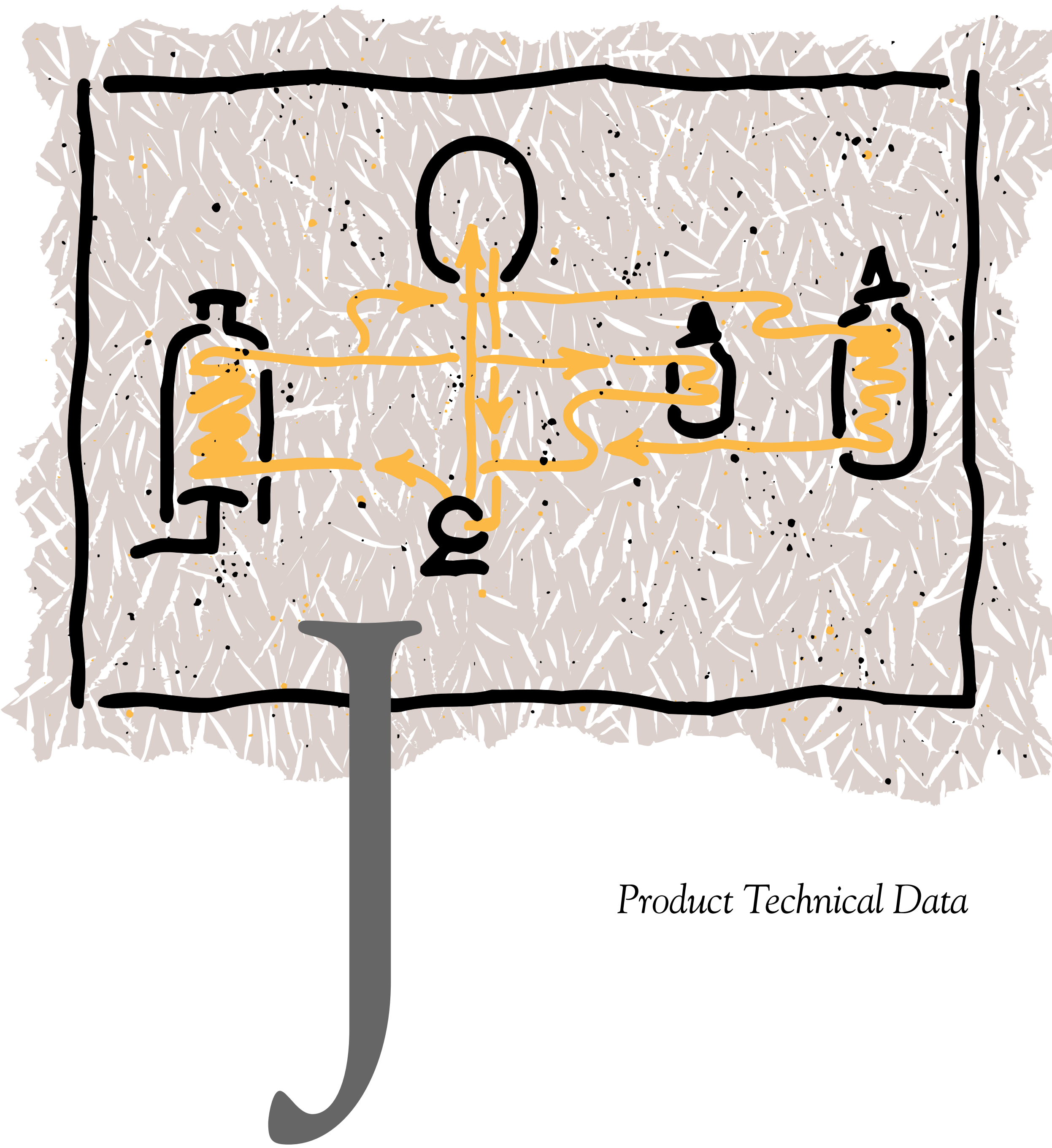
DOWTHERM J
Heat Transfer Fluid



Product Technical Data

CONTENTS

Pumpability To Below -100°F (-75°C) Makes DOWTHERM J The Answer For Demanding Low-Temperature Service

DOWTHERM* J heat transfer fluid is a mixture of isomers of an alkylated aromatic specially engineered for demanding low-temperature applications in liquid phase pressurized systems. With a recommended use temperature range of -110°F to 600°F (-80°C to 315°C), DOWTHERM J offers outstanding low-temperature pumpability, plus excellent thermal stability for protection against accidental overheating.

The extremely low crystal point of the fluid can completely eliminate the need for steam tracing, although vent lines may require freeze protection. A viscosity of approximately 8 cps at -100°F (approximately 8 mPa·s at -75°C) assures good heat transfer properties even at very cold temperatures.

DOWTHERM J fluid can also be used in vapor phase systems operating from 358°F to 600°F (181°C to 315°C).

The broad operating range of DOWTHERM J fluid makes it ideal for single fluid heating and cooling applications. Batch processing with DOWTHERM J fluid eliminates system flush requirements associated with steam/brine and steam/glycol systems. DOWTHERM J fluid is noncorrosive toward metals and alloys commonly used in heat transfer systems.

In addition to the performance advantages of DOWTHERM J fluid, Dow's supporting services are unequaled. They include technical backup in the design phase, during operation, and after shutdown. Moreover, free analytical testing is provided to monitor fluid condition.

For Information About Our Full Line of Fluids…

To learn more about the full line of heat transfer fluids manufactured or distributed by Dow—including DOWTHERM synthetic organic, SYLTHERM† silicone and DOWTHERM, DOWFROST*, and DOWCAL* glycol-based fluids—request our product line guide. Call the number for your area listed on the back of this brochure.

*Trademark of The Dow Chemical Company
†Trademark of Dow Corning Corporation

Fluid Selection Criteria

When evaluating thermal fluids for specific applications, a variety of physical properties should be considered. Four of the most important properties are thermal stability, vapor pressure, freeze point, and viscosity.

Thermal Stability

DOWTHERM J fluid offers excellent thermal stability at temperatures between -110°F and 600°F (-80°C to 315°C). The maximum recommended film temperature is 650°F (345°C).

Vapor Pressure

DOWTHERM J fluid can be used in liquid phase applications from -110°F to 600°F (-80°C to 315°C) and in vapor phase applications from 358°F to 600°F (181°C to 315°C). For operation at liquid temperatures which approach or exceed the boiling point, 358°F (181°C), a positive pressure at least 15 to 25 psi (1 to 1.7 bar) above the vapor pressure of the system should be maintained in the expansion tank. This back pressure maintains adequate NPSH for the pump and prevents film boiling. To create and maintain this back pressure, apply inert gas pressure on the expansion tank, or elevate the tank.

Freeze Point

DOWTHERM J fluid remains liquid and is easily pumped at temperatures as low as -110°F (-80°C). This eliminates many of the problems associated with cold weather start-ups and shutdowns. Steam tracing, which is costly to install and operate, is not needed.

Viscosity

The excellent viscosity characteristics of DOWTHERM J fluid at low temperatures make it an efficient choice for very low temperature applications. In addition, high heat transfer coefficients can be obtained over the entire temperature range. This can reduce refrigeration equipment energy consumption and cut process heat exchanger surface area requirements.

Thermal Stability

The thermal stability of a heat transfer fluid is dependent not only on its chemical structure, but also on the design and operating temperature profile of the system in which it is used. Maximum life for a fluid can be obtained by following sound engineering practices in the design of the heat transfer system. Three key areas of focus are: designing and operating the heater, vaporizer and/or energy recovery unit; preventing chemical contamination; and eliminating contact of the fluid with air.

Heater Design and Operation

Poor design and/or operation of the fired heater can cause overheating, resulting in excessive thermal degradation of the fluid. When units are operated at high temperatures, liquid velocities in heaters should be a minimum of 6 feet per second (2 m/s); a range of 6–12 feet per second (2–4 m/s) should cover most cases. The actual velocity selected will depend on an economic balance between the cost of circulation and heat transfer surface. Operating limitations are usually placed on heat flux by the equipment manufacturer. This heat flux is determined for a maximum film temperature by the operating conditions of the particular unit.

Some problem areas to be avoided include:

1. Flame impingement.

2. Operating the heater above its rated capacity.

3. Modifying the fuel-to-air mixing procedure to change the flame height and pattern. This can yield higher flame and gas temperatures together with higher heat flux.

4. Low fluid velocity—This can cause high heat flux areas resulting in excessive heat transfer fluid film temperatures.

5. Low fluid levels in natural circulation vaporizers.

The manufacturer of the fired heater should be the primary contact in supplying you with the proper equipment for your heat transfer system needs.

Chemical Contamination

A primary concern regarding chemical contaminants in a heat transfer system is their relatively poor thermal stability at elevated temperatures. The thermal degradation of chemical contaminants may be very rapid which may lead to fouling of heat transfer surfaces and corrosion of system components. The severity and nature of the corrosion will depend upon the amount and type of contaminant introduced into the system.

Air Oxidation

Organic heat transfer fluids operated at elevated temperatures are susceptible to air oxidation. The degree of oxidation and the rate of reaction are dependent upon the temperature and the amount of air mixing. Undesirable by-products of this reaction may include carboxylic acids which will likely result in system operating problems.

Preventive measures should be taken to ensure that air is eliminated from the system prior to bringing the heat transfer fluid up to operating temperatures. A positive pressure inert gas blanket should be maintained at all times on the expansion tank during system operation.

Units can be designed to operate at higher temperatures than those presently recommended in cases where the greater replacement costs of DOWTHERM J fluid—resulting from its increased decomposition rate—can be economically justified. In such units, adequate provision must be made for good circulation, lower heat fluxes, and more frequent replacement of fluid.

Corrosivity

DOWTHERM J heat transfer fluid is noncorrosive toward common metals and alloys. Even at the high temperatures involved, equipment usually exhibits excellent service life.

Steel is used predominantly, although low alloy steels, stainless steels, Monel alloy, etc., are also used in miscellaneous pieces of equipment and instruments.

Most corrosion problems are caused by chemicals introduced into the system during cleaning or from process leaks. The severity and nature of the attack will depend upon the amounts and type of contamination involved.

When special materials of construction are used, extra precaution should be taken to avoid contaminating materials containing the following:

Construction Material	***Contaminant***
Austenitic Stainless Steel	*Chloride*
Nickel	*Sulfur*
Copper Alloys	*Ammonia*

Flammability

DOWTHERM J heat transfer fluid is a combustible material with a flash point of 136°F (57°C) (closed cup), a fire point of 140°F (60°C) (C.O.C.), and an autoignition temperature of 788°F (420°C) (A.S.T.M. Method E659-78). The autoignition temperature of DOWTHERM J fluid provides a safety margin of 188°F (105°C) above the fluid's recommended upper use temperature. This safety margin is an important consideration because planned and unplanned temperature excursions must be accommodated.

Vapor leaks to the atmosphere are also sometimes encountered. Such leaks, however small, should not be tolerated because of the cost of replacing lost medium. Experience has shown that leaking vapors have usually cooled well below the fire point and fire has rarely resulted. Due to the odor of the medium, such leaks rarely go undetected without corrective action.

Leaks from pipelines into insulation are potentially hazardous as they can lead to fires in the insulation. It has been found, for example, that leakage of organic materials into some types of insulation at elevated temperatures may result in spontaneous ignition due to auto-oxidation.

Vapors of DOWTHERM J fluid do not pose a serious flammability hazard at room temperature because the saturation concentration is below the lower flammability limit, making ignition unlikely. Flammable mists are, however, possible under unusual circumstances where the time of exposure to an ignition source, the temperature of the source and the atmosphere, the volume of mixture, the fuel-air ratio, and the mist particle size all fall within a somewhat narrow range.

HEALTH AND SAFETY CONSIDERATIONS

A Material Safety Data Sheet (MSDS) for DOWTHERM J heat transfer fluid is available by calling the number listed on the back of this brochure. The MSDS contains complete health and safety information regarding the use of this product. Read and understand the MSDS before handling or otherwise using this product.

Prolonged and repeated exposure to vapors should be limited to time-weighted average concentrations of no more than 10 ppm for daily exposures of eight hours' duration based upon toxicity as well as discomfort. Levels greater than 10 ppm are likely to be disagreeable. It has been found that it is not difficult to maintain concentrations below the level which may result in discomfort or strong odor, which is 10 ppm. However, appropriate respiratory protection should be used when excessive exposure is likely.

Liquid DOWTHERM J fluid is moderately irritating to eyes and skin. If skin contact occurs, the contaminated areas should be flushed with copious quantities of flowing water. Wash contaminated clothing before reuse. Eye protection should be worn to avoid any temporary effects that might result from direct contact with the eyes. If such contact does occur, wash the eyes for fifteen minutes with flowing water and consult medical personnel.

DOWTHERM J fluid is low in acute oral toxicity. However, vomiting should not be induced in cases of ingestion. If the fluid is ingested, obtain medical attention immediately.

Precautions must be taken to prevent spills or leaks of fluid from entering public waters.

For more complete information, request Dow Bulletin No. 176-1336: "Health, Environmental and Safety Considerations in High Temperature Heat Transfer Fluid Systems."

Customer Service for Users of DOWTHERM J Heat Transfer Fluid

Fluid Analysis

The Dow Chemical Company offers an analytical service for DOWTHERM J heat transfer fluid. It is recommended that users send a one-pint (0.5 liter) representative sample at least annually to:

North America & Pacific
The Dow Chemical Company
Larkin Lab/Thermal Fluids
1691 North Swede Road
Midland, Michigan 48674
United States of America

Europe
Dow Benelux NV
Testing Laboratory for SYLTHERM and DOWTHERM Fluids
Oude Maasweg 4
3197 KJ Rotterdam – Botlek
The Netherlands

Latin America
Dow Quimica S.A.
Fluid Analysis Service
1671, Alexandre Dumas
Santo Amaro – Sao Paulo –
Brazil 04717-903

This analysis gives a profile of fluid changes to help identify trouble from product contamination or thermal decomposition.

When a sample is taken from a hot system, it should be cooled to below 100°F (40°C) before it is put into the shipping container. Cooling the sample below 100°F (40°C) will prevent the possibility of thermal burns to personnel; also, the fluid is then below its flash point. In addition, any low boilers will not flash and be lost from the sample. Cooling can be done by either a batch or continuous process. The batch method consists of isolating the hot sample of fluid from the system in a properly designed sample collector and then cooling it to below 100°F (40°C). After it is cooled, it can be withdrawn from the sampling collector into a container for shipment.

The continuous method consists of controlling the fluid at a very low rate through a steel or stainless steel cooling coil so as to maintain it at 100°F (40°C) or lower as it comes out of the end of the cooler into the sample collector. Before a sample is taken, the sampler should be thoroughly flushed. This initial fluid should be returned to the system or disposed of in a safe manner in compliance with all laws and regulations.

It is important that samples sent for analysis be representative of the charge in the unit. Ordinarily, samples should be taken from the main circulating line of a liquid system. Occasionally, additional samples may have to be taken from other parts of the system where specific problems exist. A detailed method for analyzing the fluid to determine its quality is available upon request.

Used heat transfer fluid which has been stored in drums or tanks should be sampled in such a fashion as to ensure a representative sample.

Table 1—Physical Properties of DOWTHERM J Fluid†

Composition: Mixture of Isomers of an Alkylated Aromatic

Color: Clear, Colorless Solution

Property	English Units	SI Units
Freeze Point	<-100°F	<-81°C
Boiling Point	358°F	181°C
Flash Point[1]	136°F	57°C
Fire Point[2]	140°F	60°C
Autoignition Temperature[3]	788°F	420°C
Density @ 60°F	54.13 lb/ft³	
	7.25 lb/gal	860 kg/m³ @ 25°C
Surface Tension in Air	28 Dynes/cm @ 77°F	
Estimated Critical Constants:		
T_C	721°F	383°C
P_C	28 Atm	28.4 bar
V_C	.0585 ft³/lb	3.65 l/kg
Average Molecular Weight	134	
Heat of Combustion	17,800 Btu/lb	41,400 kJ/kg

†Not to be construed as specifications

[1]Closed cup

[2]C.O.C.

[3]The old ASTM procedure, D-2155-66, has been withdrawn by the testing society and replaced by ASTM E659-78

Table 2—Saturated Liquid Properties of DOWTHERM J Fluid (English Units)

Temp °F	Specific Heat Btu/lb °F	Density lb/ft³	Thermal Cond. Btu/hr ft²(°F/ft)	Viscosity cP	Vapor Pressure psia
-100	0.379	58.07	0.0856	7.96	
-80	0.385	57.59	0.0843	5.50	
-60	0.391	57.11	0.0829	3.91	
-40	0.397	56.63	0.0816	2.88	
-20	0.404	56.14	0.0802	2.19	
0	0.411	55.64	0.0788	1.72	
20	0.418	55.14	0.0775	1.39	
40	0.426	54.64	0.0761	1.15	
60	0.434	54.13	0.0747	0.96	0.01
80	0.442	53.61	0.0734	0.83	0.02
100	0.450	53.09	0.0720	0.72	0.05
120	0.459	52.56	0.0707	0.63	0.10
140	0.467	52.02	0.0693	0.56	0.18
160	0.476	51.47	0.0679	0.51	0.31
180	0.485	50.92	0.0666	0.46	0.52
200	0.495	50.36	0.0652	0.42	0.85
220	0.504	49.79	0.0638	0.39	1.33
240	0.514	49.21	0.0625	0.36	2.02
260	0.523	48.62	0.0611	0.34	2.99
280	0.533	48.01	0.0598	0.31	4.31
300	0.543	47.40	0.0584	0.30	6.06
320	0.553	46.77	0.0570	0.28	8.36
340	0.564	46.13	0.0557	0.27	11.30
358.4	0.573	45.53	0.0544	0.25	14.69
360	0.574	45.48	0.0543	0.25	15.02
380	0.584	44.80	0.0529	0.24	19.63
400	0.595	44.11	0.0516	0.23	25.27
420	0.606	43.40	0.0502	0.22	32.10
440	0.617	42.67	0.0488	0.21	40.25
460	0.628	41.91	0.0475	0.20	49.90
480	0.639	41.12	0.0461	0.20	61.20
500	0.651	40.30	0.0448	0.19	74.34
520	0.663	39.44	0.0434	0.18	89.50
540	0.676	38.53	0.0420	0.18	106.87
560	0.689	37.58	0.0407	0.17	126.67
580	0.704	36.56	0.0393	0.17	149.14
600	0.720	35.46	0.0379	0.16	174.52
620	0.738	34.25	0.0366	0.16	203.12
640	0.761	32.90	0.0352	0.16	235.24
650	0.776	32.16	0.0345	0.15	252.74

Table 3—Saturated Liquid Properties of DOWTHERM J Fluid (SI Units)

Temp °C	Specific Heat kJ/kg K	Density kg/m³	Thermal Cond. W/mK	Viscosity mPa sec	Vapor Pressure bar
-80	1.584	931.3	0.1485	8.43	
-70	1.594	927.9	0.1475	7.11	
-60	1.616	921.0	0.1453	5.12	
-50	1.639	914.1	0.1432	3.78	
-40	1.663	907.1	0.1411	2.88	
-30	1.688	900.0	0.1390	2.25	
-20	1.714	892.9	0.1368	1.80	
-10	1.741	885.7	0.1347	1.48	
0	1.769	878.5	0.1326	1.23	
10	1.798	871.1	0.1305	1.05	
20	1.828	863.7	0.1284	0.91	
30	1.859	856.2	0.1262	0.79	
40	1.890	848.7	0.1241	0.70	
50	1.923	841.0	0.1220	0.63	0.01
60	1.955	833.2	0.1199	0.56	0.01
70	1.989	825.4	0.1177	0.51	0.02
80	2.023	817.4	0.1156	0.47	0.03
90	2.058	809.4	0.1135	0.43	0.05
100	2.093	801.2	0.1114	0.40	0.08
110	2.129	792.9	0.1093	0.37	0.11
120	2.165	784.4	0.1071	0.35	0.16
130	2.202	775.9	0.1050	0.33	0.23
140	2.239	767.1	0.1029	0.31	0.32
150	2.277	758.3	0.1008	0.29	0.43
160	2.315	749.2	0.0987	0.28	0.58
170	2.353	740.0	0.0965	0.27	0.76
180	2.392	730.6	0.0944	0.25	0.98
181.3	2.397	729.3	0.0941	0.25	1.01
190	2.432	720.9	0.0923	0.24	1.25
200	2.472	711.0	0.0902	0.23	1.58
210	2.512	700.9	0.0880	0.23	1.97
220	2.553	690.5	0.0859	0.22	2.43
230	2.594	679.8	0.0838	0.21	2.96
240	2.636	668.8	0.0817	0.20	3.59
250	2.680	657.3	0.0796	0.20	4.30
260	2.724	645.5	0.0774	0.19	5.13
270	2.769	633.1	0.0753	0.18	6.06
280	2.816	620.2	0.0732	0.18	7.12
290	2.866	606.6	0.0711	0.17	8.31
300	2.919	592.2	0.0690	0.17	9.64
310	2.976	576.9	0.0668	0.17	11.13
320	3.040	560.4	0.0647	0.16	12.79
330	3.115	542.4	0.0626	0.16	14.64
340	3.208	522.4	0.0605	0.16	16.69
345	3.265	511.4	0.0594	0.15	17.80

Table 4—Saturated Vapor Properties of DOWTHERM J Fluid (English Units)

Temp °F	Vapor Pressure psia	Liquid Enthalpy Btu/lb	Latent Heat Btu/lb	Vapor Enthalpy Btu/lb	Vapor Density lb/ft³	Z_{vapor}	Vapor Viscosity cP	Vapor Thermal Cond. Btu/hr ft²(°F/ft)	Specific Heat (c_p) Btu/lb °F	Ratio of Specific Heats c_P/c_V
100	0.05	9.7	161.8	171.4	0.0011	0.9994	0.006	0.0063	0.329	1.047
120	0.10	18.4	159.7	178.1	0.0020	0.9989	0.006	0.0067	0.340	1.046
140	0.18	27.3	157.6	185.0	0.0037	0.9982	0.006	0.0072	0.351	1.044
160	0.31	36.6	155.5	192.1	0.0063	0.9972	0.007	0.0077	0.362	1.043
180	0.52	46.0	153.4	199.4	0.0103	0.9958	0.007	0.0081	0.373	1.042
200	0.85	55.7	151.1	206.9	0.0163	0.9939	0.007	0.0086	0.384	1.042
220	1.33	65.7	148.9	214.5	0.0249	0.9913	0.007	0.0091	0.395	1.041
240	2.02	75.8	146.6	222.4	0.0369	0.9881	0.007	0.0096	0.405	1.040
260	2.99	86.2	144.2	230.4	0.0532	0.9841	0.008	0.0102	0.416	1.040
280	4.31	96.8	141.7	238.5	0.0749	0.9791	0.008	0.0107	0.426	1.040
300	6.06	107.6	139.2	246.8	0.1031	0.9732	0.008	0.0112	0.436	1.041
320	8.36	118.6	136.6	255.2	0.1392	0.9662	0.008	0.0118	0.446	1.041
340	11.30	129.9	133.9	263.8	0.1847	0.9580	0.009	0.0123	0.457	1.042
358.4	14.69	140.3	131.4	271.7	0.2363	0.9494	0.009	0.0128	0.466	1.043
360	15.02	141.3	131.2	272.4	0.2413	0.9486	0.009	0.0129	0.467	1.043
380	19.63	152.9	128.3	281.2	0.3109	0.9380	0.009	0.0134	0.477	1.045
400	25.27	164.7	125.4	290.0	0.3955	0.9260	0.009	0.0140	0.488	1.046
420	32.10	176.6	122.3	298.9	0.4976	0.9125	0.009	0.0146	0.498	1.049
440	40.25	188.8	119.1	307.9	0.6199	0.8976	0.010	0.0152	0.509	1.052
460	49.90	201.1	115.7	316.9	0.7656	0.8811	0.010	0.0158	0.520	1.055
480	61.20	213.7	112.2	325.9	0.9383	0.8630	0.010	0.0164	0.532	1.060
500	74.34	226.4	108.5	335.0	1.143	0.8432	0.011	0.0171	0.544	1.065
520	89.50	239.4	104.7	344.0	1.384	0.8214	0.011	0.0177	0.556	1.072
540	106.87	252.5	100.5	353.0	1.669	0.7977	0.011	0.0184	0.570	1.081
560	126.67	265.9	96.1	362.0	2.007	0.7716	0.012	0.0191	0.585	1.092
580	149.14	279.5	91.3	370.8	2.409	0.7430	0.012	0.0198	0.603	1.106
600	174.52	293.4	86.1	379.5	2.892	0.7114	0.012	0.0205	0.623	1.126
620	203.12	307.6	80.4	388.0	3.480	0.6761	0.013	0.0213	0.649	1.155
640	235.24	322.2	73.9	396.1	4.210	0.6361	0.013	0.0221	0.684	1.199
650	252.74	329.7	70.3	400.0	4.648	0.6139	0.014	0.0225	0.707	1.231

Table 5—Saturated Vapor Properties of DOWTHERM J Fluid (SI Units)

Temp °C	Vapor Pressure bar	Liquid Enthalpy kJ/kg	Latent Heat kJ/kg	Vapor Enthalpy kJ/kg	Vapor Density kg/m³	Z_{vapor}	Vapor Viscosity mPa sec	Vapor Thermal Cond. W/mK	Specific Heat (c_p) kJ/kg K	Ratio of Specific Heats c_p/c_V
40	0.004	26.5	375.1	401.6	0.02	0.999	0.006	0.011	1.385	1.047
50	0.007	44.8	370.8	415.6	0.03	0.999	0.006	0.012	1.428	1.046
60	0.012	63.6	366.4	430.0	0.06	0.998	0.006	0.012	1.470	1.044
70	0.020	82.8	362.0	444.8	0.10	0.997	0.007	0.013	1.512	1.043
80	0.033	102.5	357.5	460.0	0.15	0.996	0.007	0.014	1.553	1.042
90	0.051	122.7	352.9	475.6	0.23	0.995	0.007	0.015	1.593	1.042
100	0.077	143.3	348.2	491.5	0.34	0.992	0.007	0.015	1.633	1.041
110	0.113	164.4	343.4	507.8	0.49	0.990	0.007	0.016	1.673	1.041
120	0.163	185.9	338.5	524.3	0.69	0.987	0.007	0.017	1.713	1.040
130	0.230	207.7	333.4	541.2	0.95	0.983	0.008	0.018	1.752	1.040
140	0.318	230.0	328.3	558.3	1.28	0.978	0.008	0.019	1.791	1.040
150	0.432	252.7	323.0	575.7	1.70	0.973	0.008	0.019	1.829	1.041
160	0.576	275.8	317.5	593.3	2.23	0.966	0.008	0.020	1.868	1.041
170	0.757	299.2	312.0	611.2	2.88	0.959	0.008	0.021	1.906	1.042
180	0.980	323.0	306.2	629.2	3.67	0.951	0.009	0.022	1.945	1.043
181.3	1.012	326.1	305.4	631.6	3.78	0.949	0.009	0.022	1.950	1.043
190	1.251	347.2	300.3	647.5	4.62	0.941	0.009	0.023	1.984	1.044
200	1.578	371.7	294.2	665.9	5.76	0.931	0.009	0.024	2.023	1.046
210	1.967	396.6	287.8	684.4	7.12	0.919	0.009	0.025	2.063	1.048
220	2.426	421.8	281.3	703.1	8.71	0.907	0.010	0.026	2.103	1.050
230	2.963	447.4	274.5	721.9	10.59	0.893	0.010	0.027	2.144	1.053
240	3.587	473.3	267.4	740.8	12.78	0.878	0.010	0.028	2.186	1.056
250	4.304	499.6	260.0	759.7	15.33	0.861	0.010	0.029	2.229	1.060
260	5.126	526.3	252.3	778.6	18.30	0.843	0.011	0.030	2.275	1.065
270	6.059	553.3	244.2	797.5	21.75	0.824	0.011	0.031	2.323	1.071
280	7.116	580.8	235.6	816.4	25.76	0.803	0.011	0.032	2.374	1.079
290	8.306	608.6	226.5	835.2	30.42	0.780	0.011	0.033	2.429	1.088
300	9.640	637.0	216.8	853.8	35.87	0.755	0.012	0.034	2.491	1.100
310	11.131	665.8	206.4	872.1	42.28	0.728	0.012	0.035	2.562	1.115
320	12.794	695.1	195.0	890.1	49.87	0.698	0.013	0.036	2.647	1.136
330	14.642	725.1	182.5	907.6	58.98	0.665	0.013	0.037	2.753	1.166
340	16.693	755.9	168.5	924.4	70.14	0.627	0.014	0.039	2.898	1.211
345	17.801	771.6	160.7	932.4	76.74	0.607	0.014	0.039	2.995	1.242

Figure 1—Thermal Conductivity of DOWTHERM J Fluid (English Units)

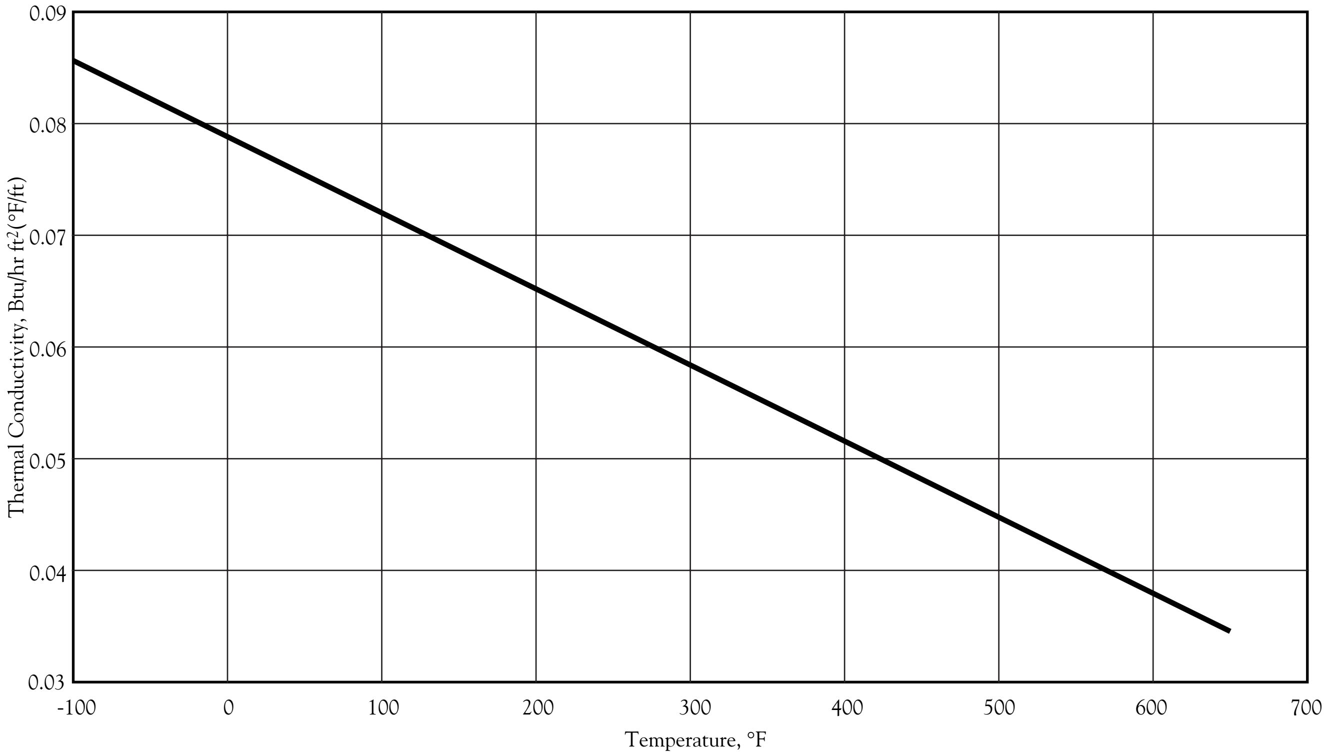


Figure 2—Thermal Conductivity of DOWTHERM J Fluid (SI Units)

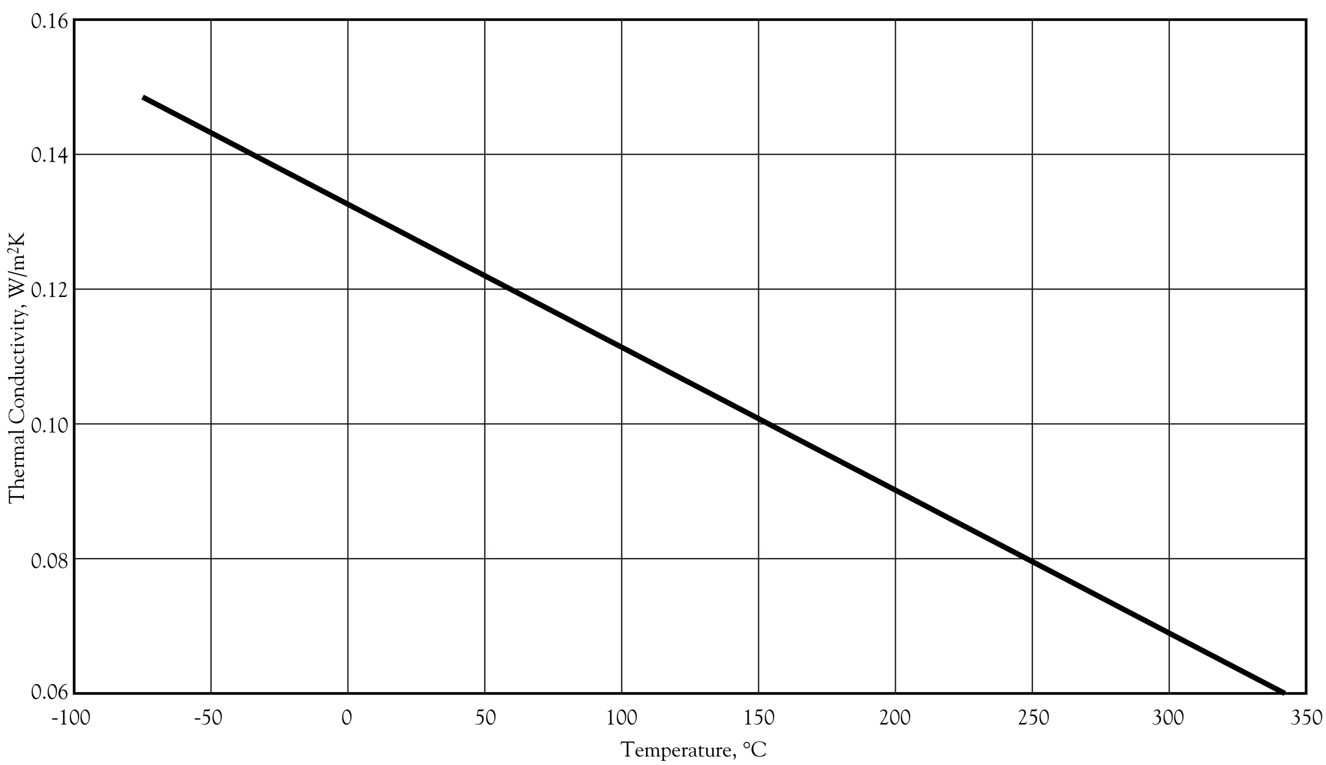


Figure 3—Vapor Pressure of DOWTHERM J Fluid (English Units)

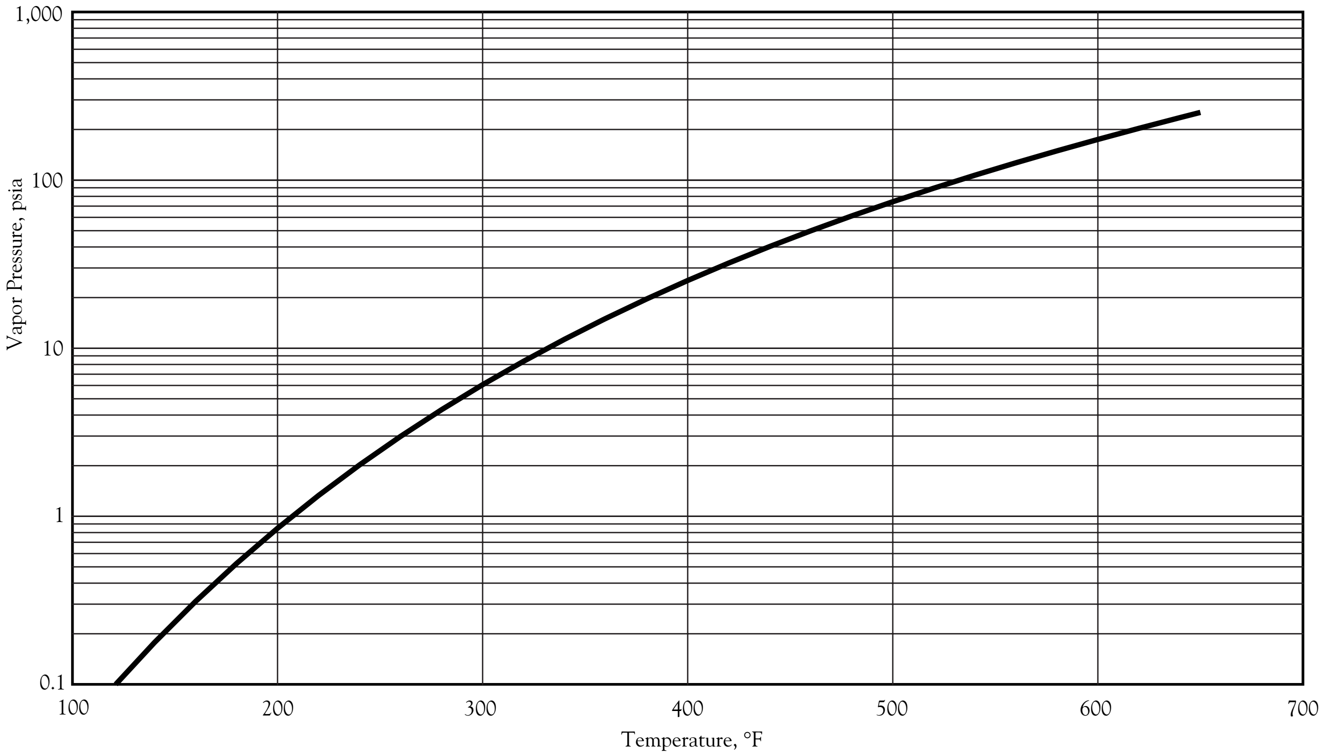


Figure 4—Vapor Pressure of DOWTHERM J Fluid (SI Units)

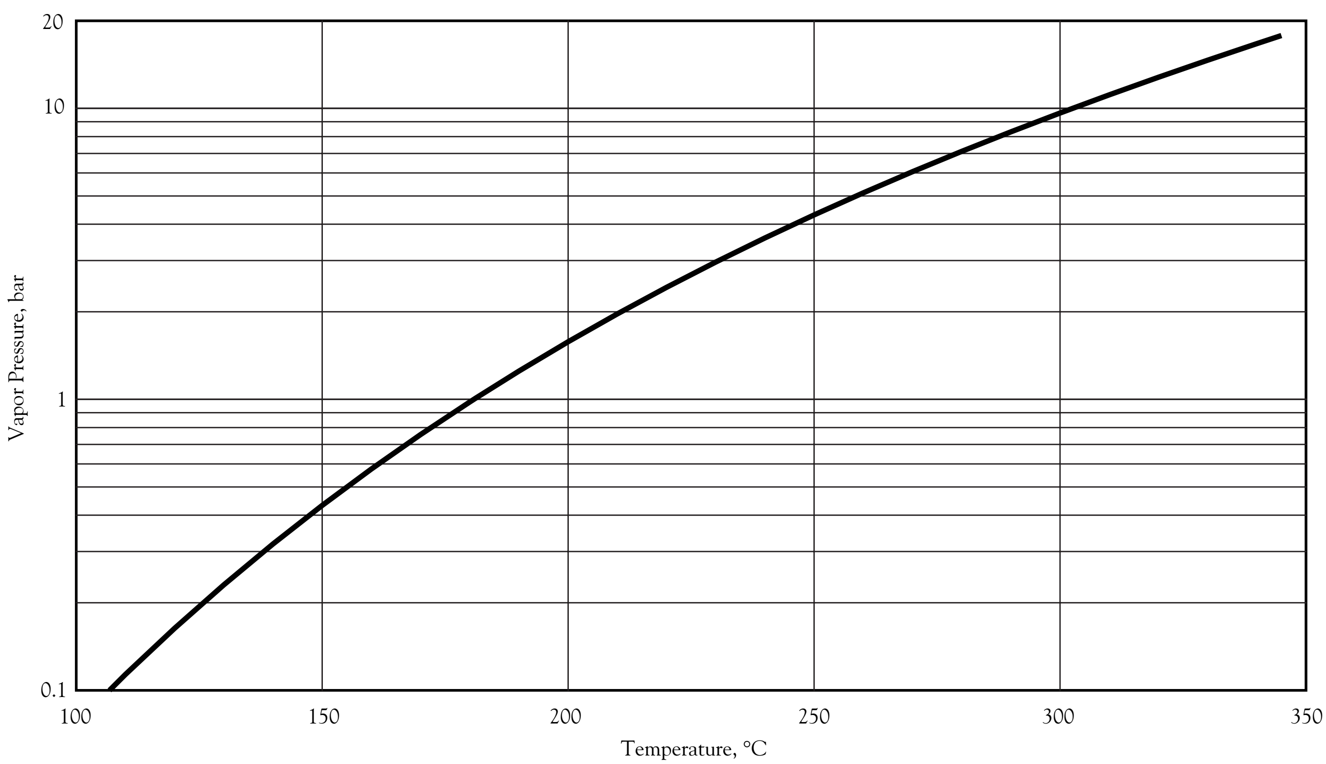


Figure 5—Specific Heat of DOWTHERM J Fluid (English Units)

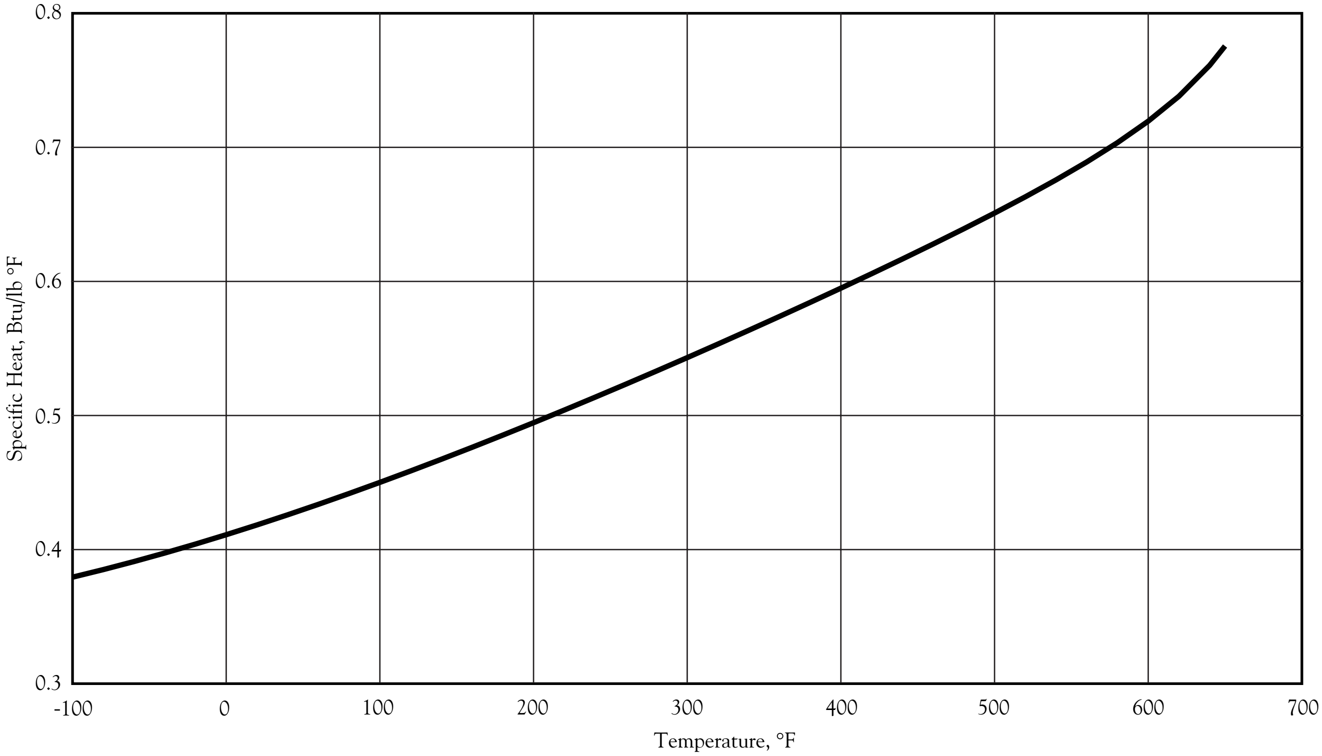


Figure 6—Specific Heat of DOWTHERM J Fluid (SI Units)

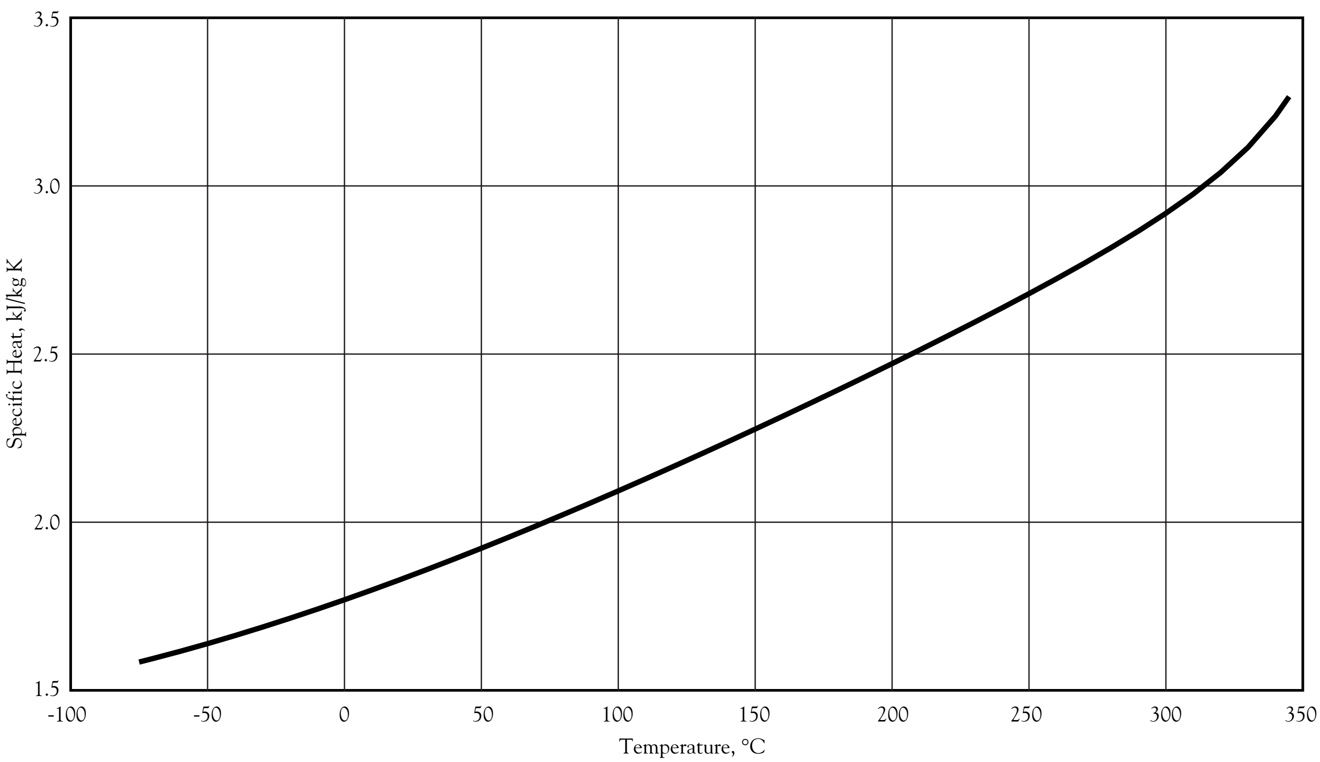


Figure 7—Liquid Density of DOWTHERM J Fluid (English Units)

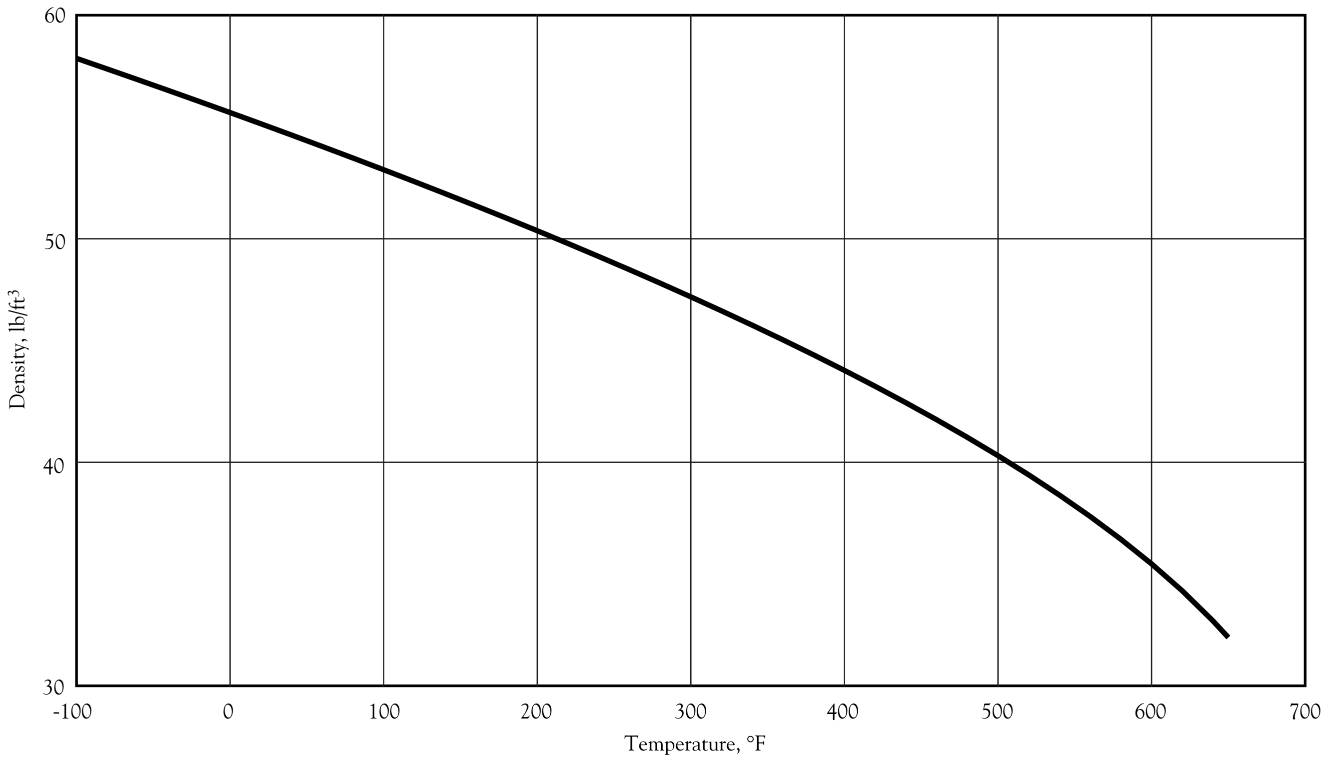


Figure 8—Liquid Density of DOWTHERM J Fluid (SI Units)

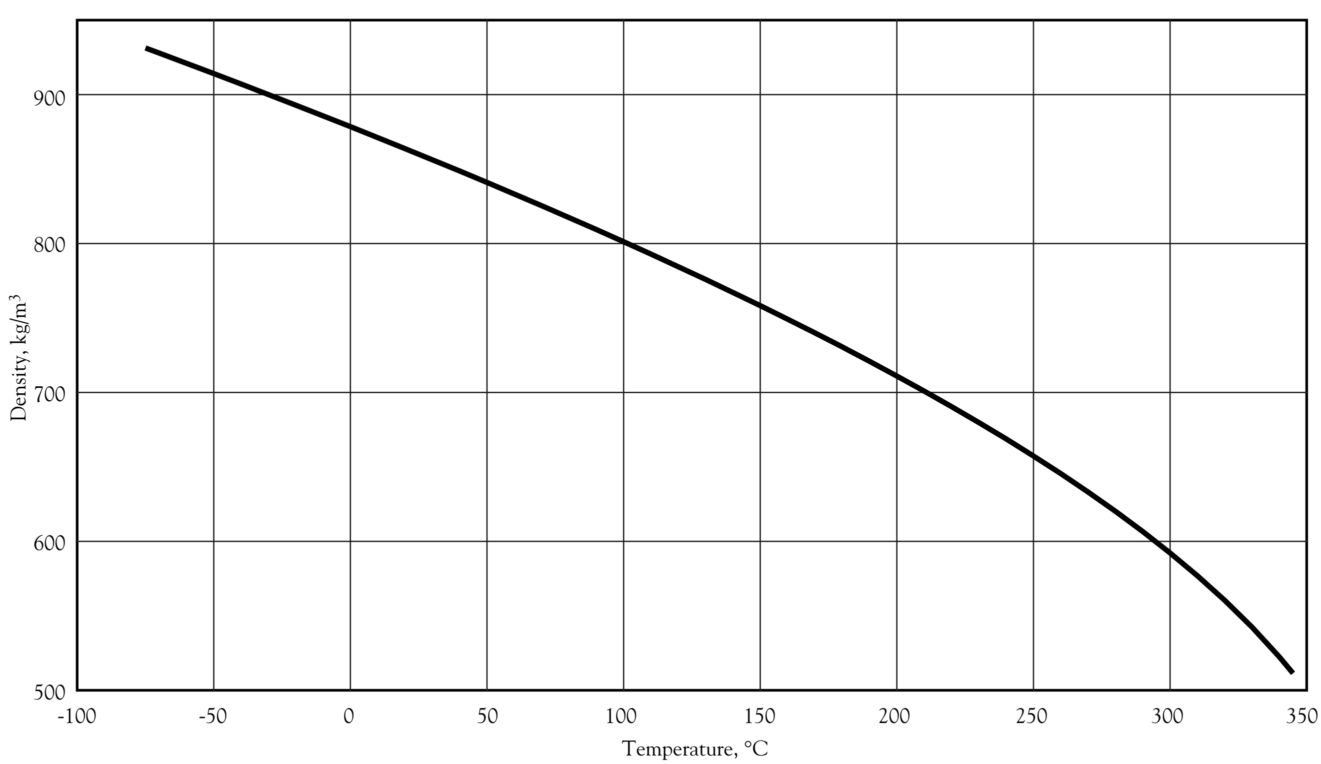


Figure 9—Liquid Viscosity of DOWTHERM J Fluid (English Units)

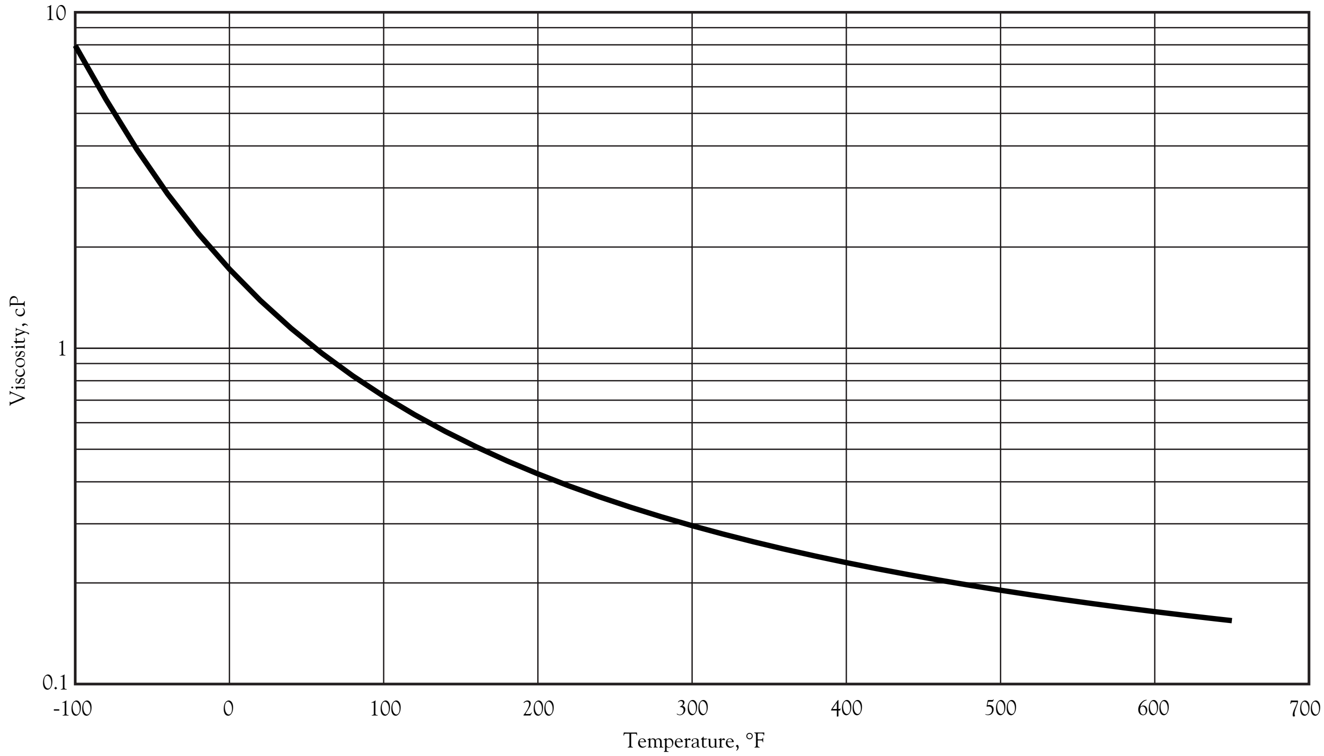


Figure 10—Liquid Viscosity of DOWTHERM J Fluid (SI Units)

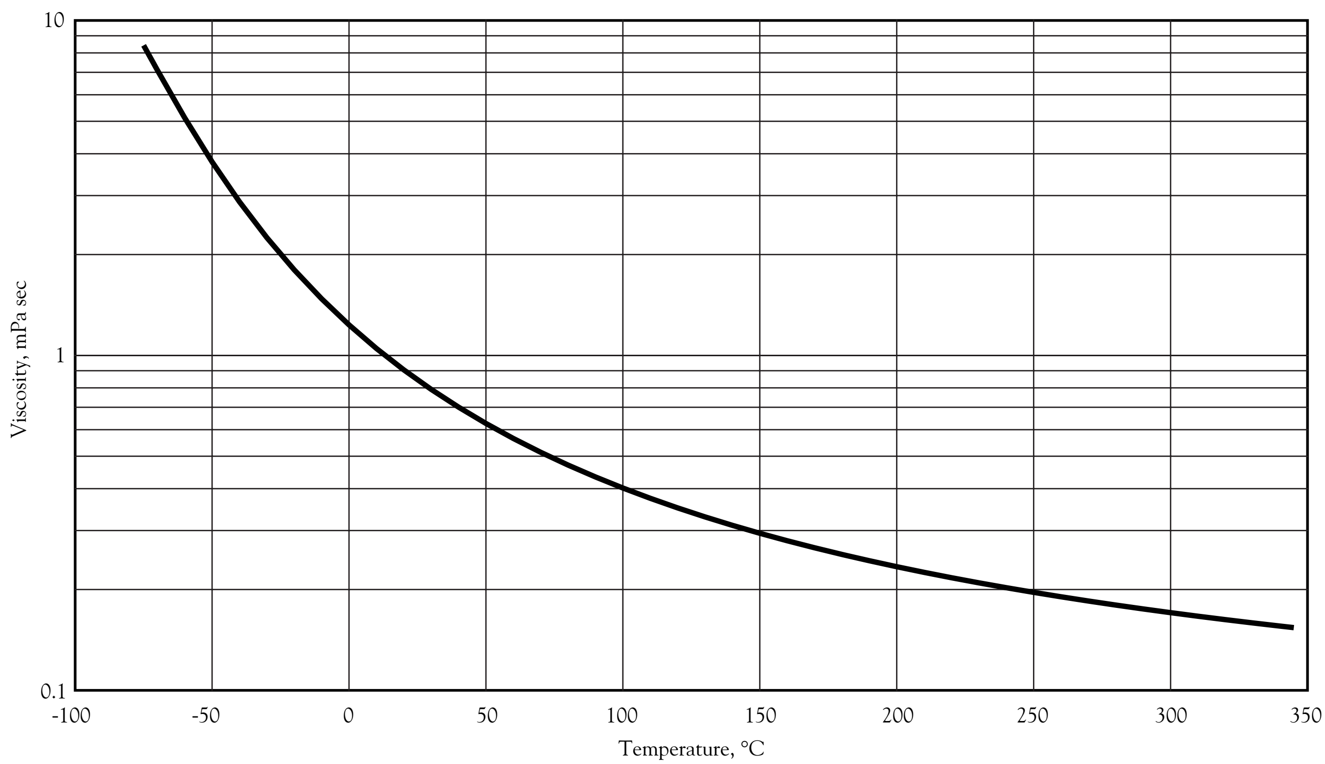
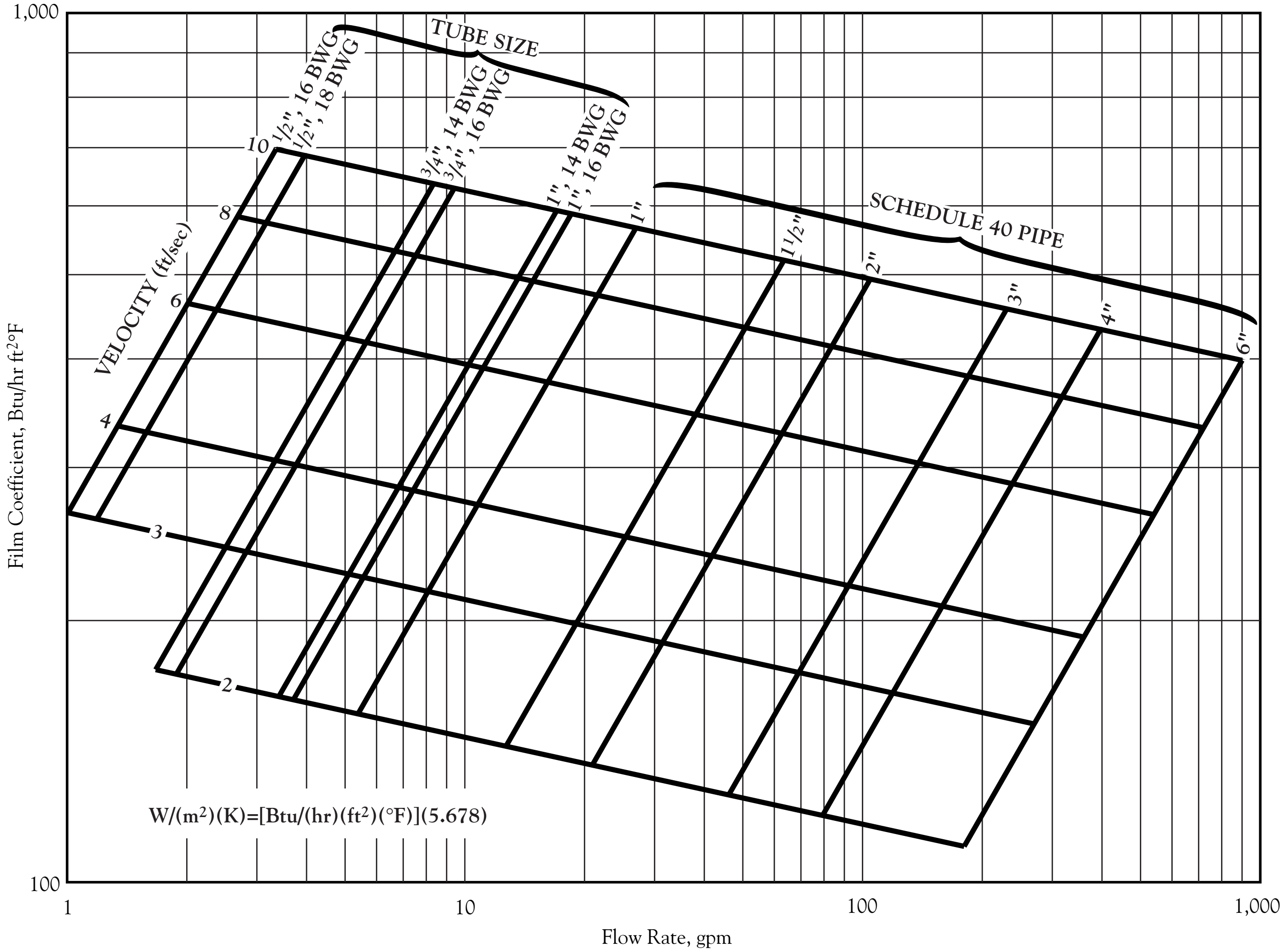
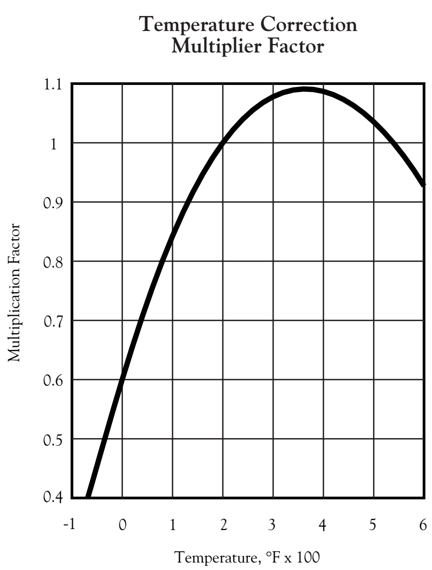


Figure 11—Liquid Film Coefficient for DOWTHERM *J Fluid Inside Pipes and Tubes (Turbulent Flow Only) (English Units)*



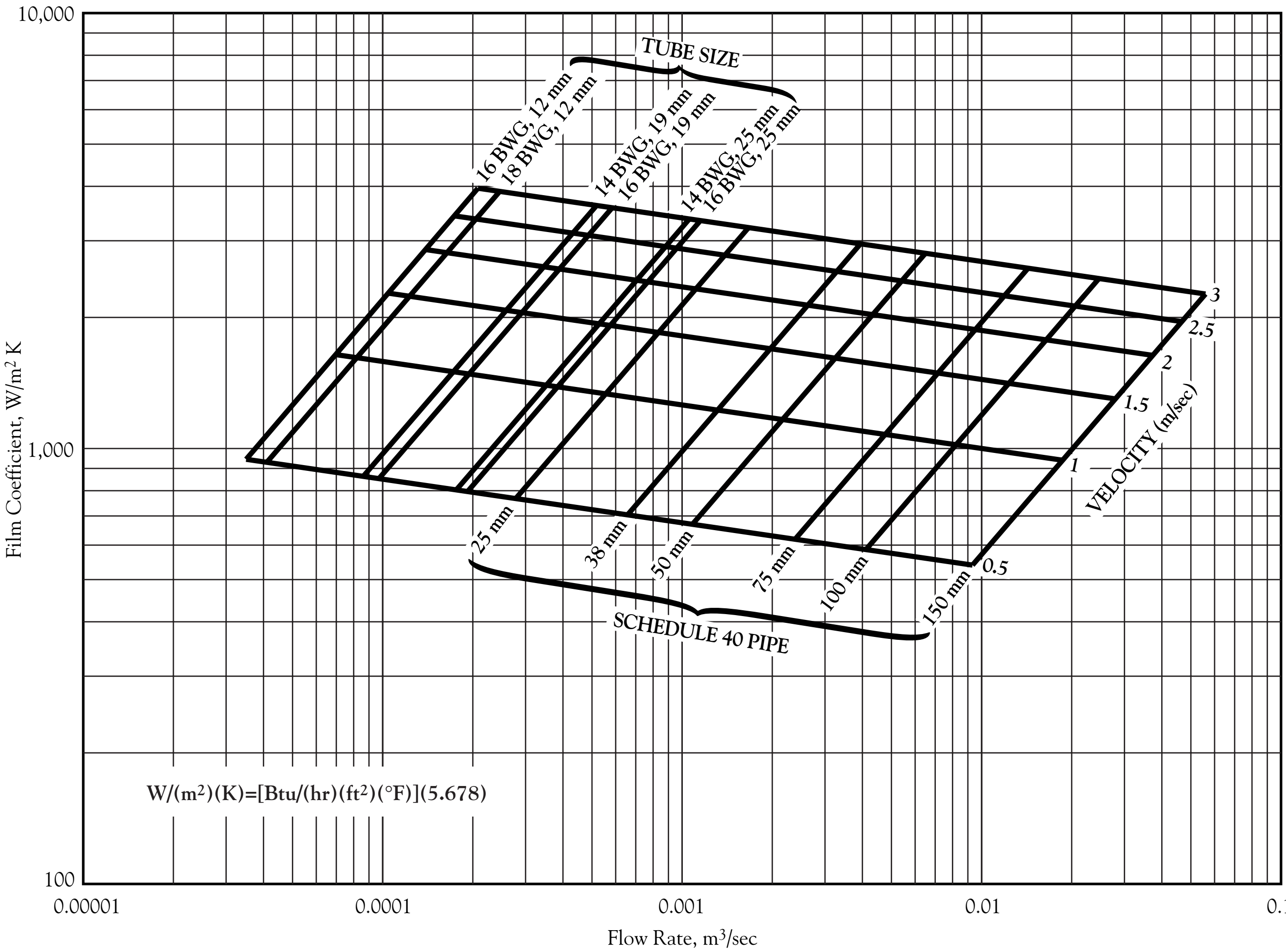


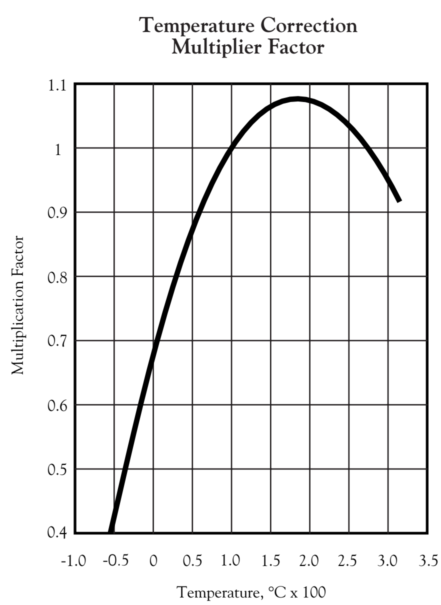
Sieder and Tate Equation Process Heat Transfer, D.Q. Kern (1950) p. 103

$$Nu = 0.027\, Re^{0.8} Pr^{1/3} \left(\frac{\mu}{\mu_w}\right)^{0.14} \qquad \text{Chart based on} \left(\frac{\mu}{\mu_w}\right)^{0.14} = 1$$

Note: The values in this graph are based on the viscosity of fluid as supplied.

Figure 12—Liquid Film Coefficient for DOWTHERM J Fluid Inside Pipes and Tubes (Turbulent Flow Only) (SI Units)



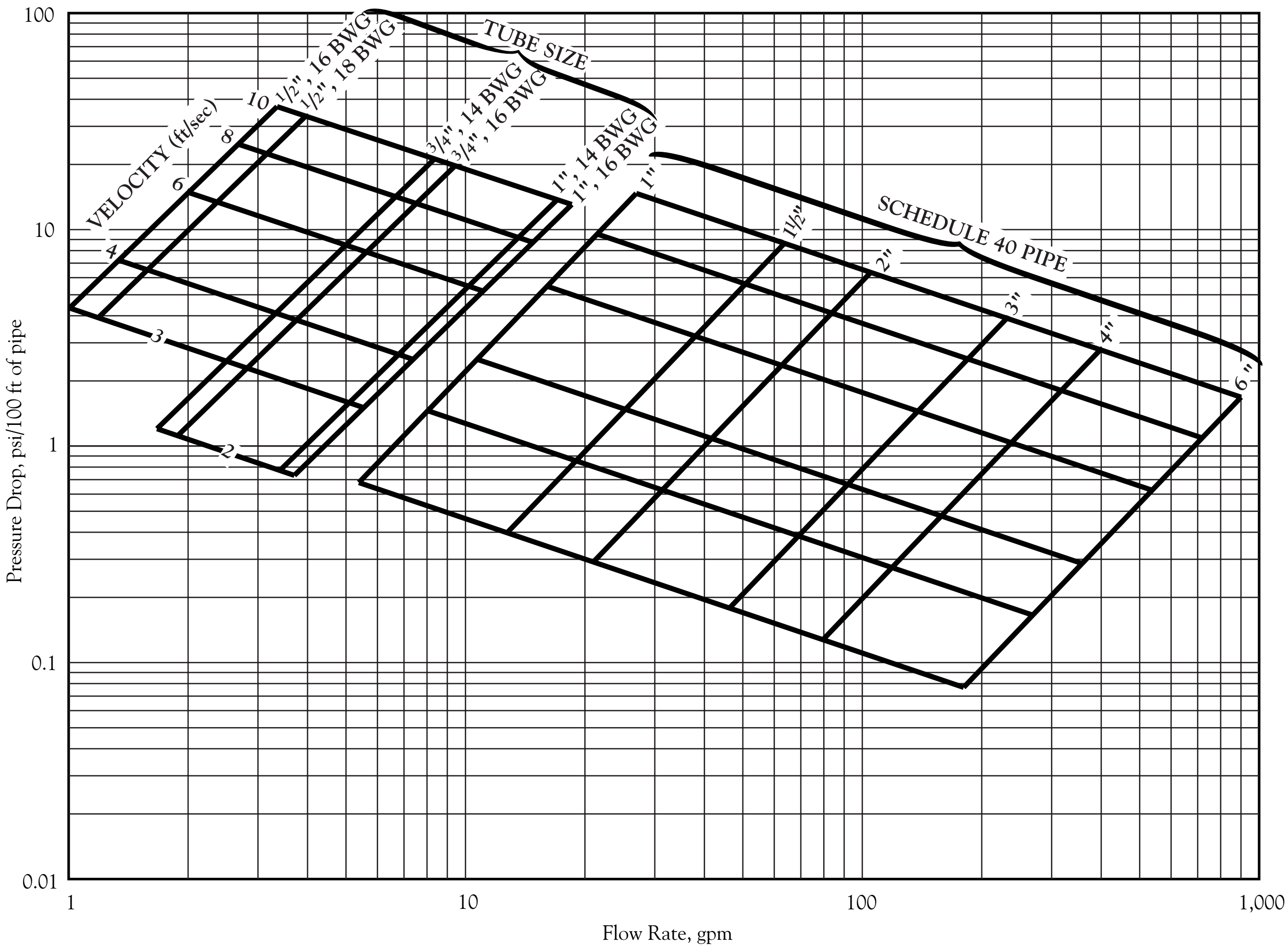


Sieder and Tate Equation Process Heat Transfer, D.Q. Kern (1950) p. 103

$$Nu = 0.027\, Re^{0.8} Pr^{1/3} \left(\frac{\mu}{\mu_w}\right)^{0.14} \qquad \text{Chart based on} \left(\frac{\mu}{\mu_w}\right)^{0.14} = 1$$

Note: The values in this graph are based on the viscosity of fluid as supplied.

Figure 13—Pressure Drop vs. Flow Rate for DOWTHERM J Fluid in Schedule 40 Nominal Pipe and Tube (English Units)



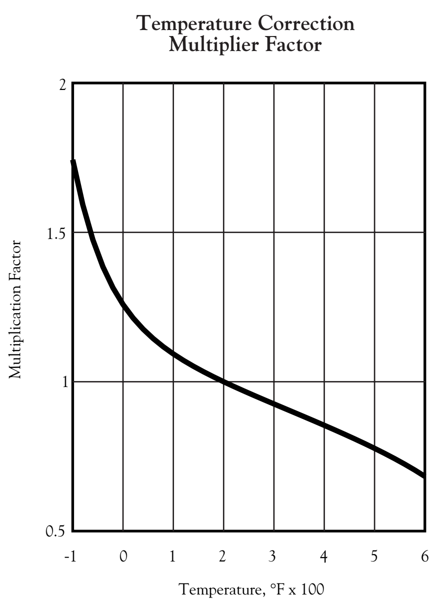
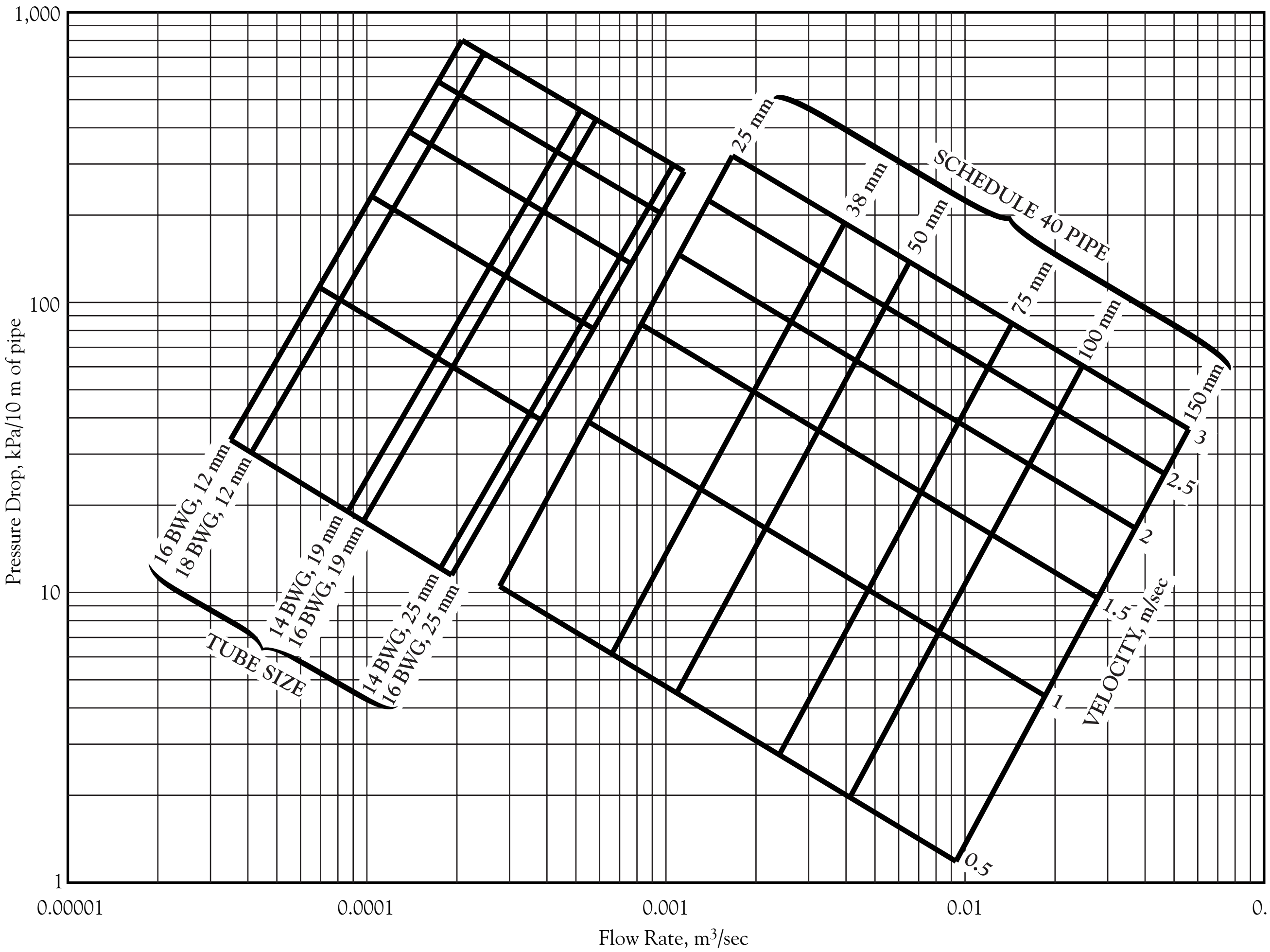


Figure 14—Pressure Drop vs. Flow Rate for DOWTHERM J Fluid in Schedule 40 Nominal Pipe and Tube (SI Units)



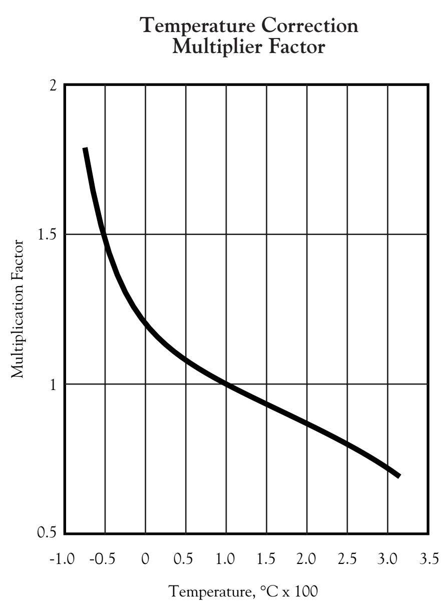


Figure 15—Thermal Expansion of Liquid DOWTHERM J Fluid (English Units)
Basis: 1 gallon at 75°F

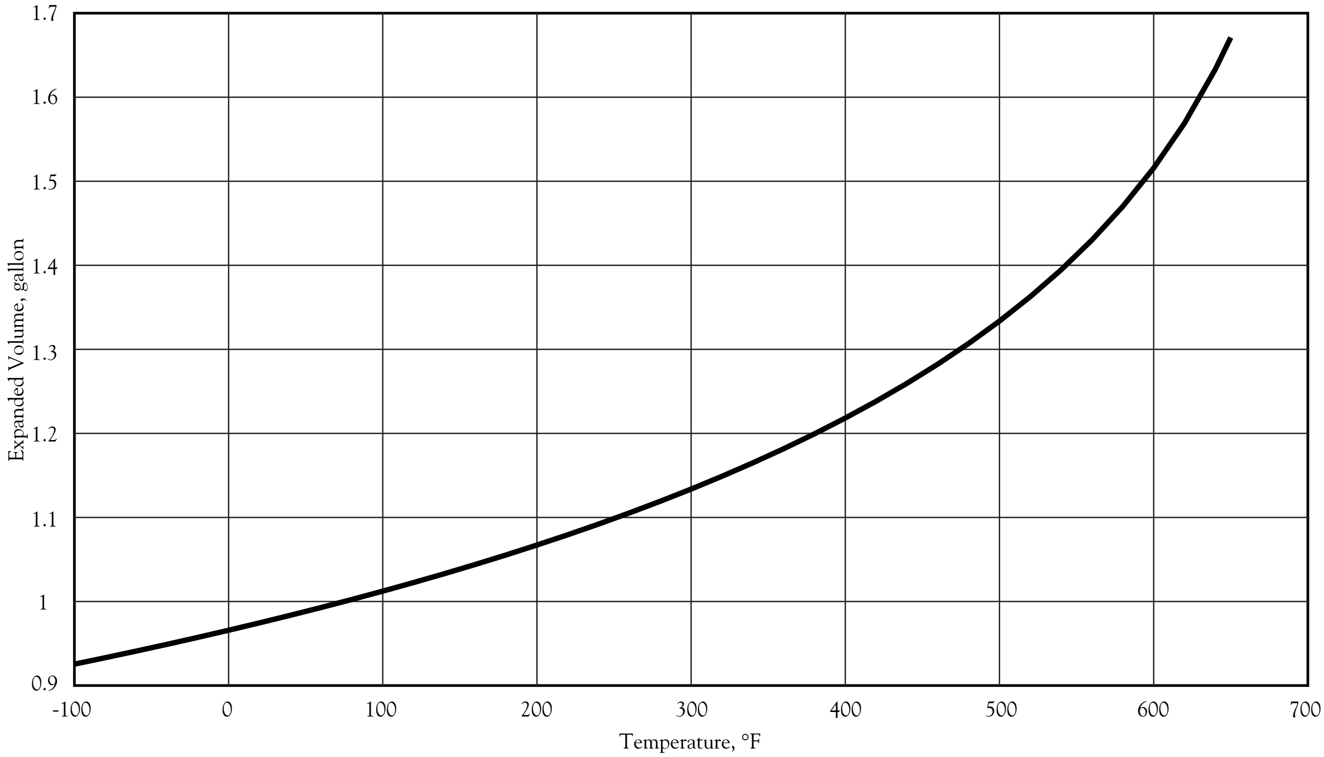


Figure 16—Thermal Expansion of Liquid DOWTHERM J Fluid (SI Units)
Basis: 1 m³ at 25°C

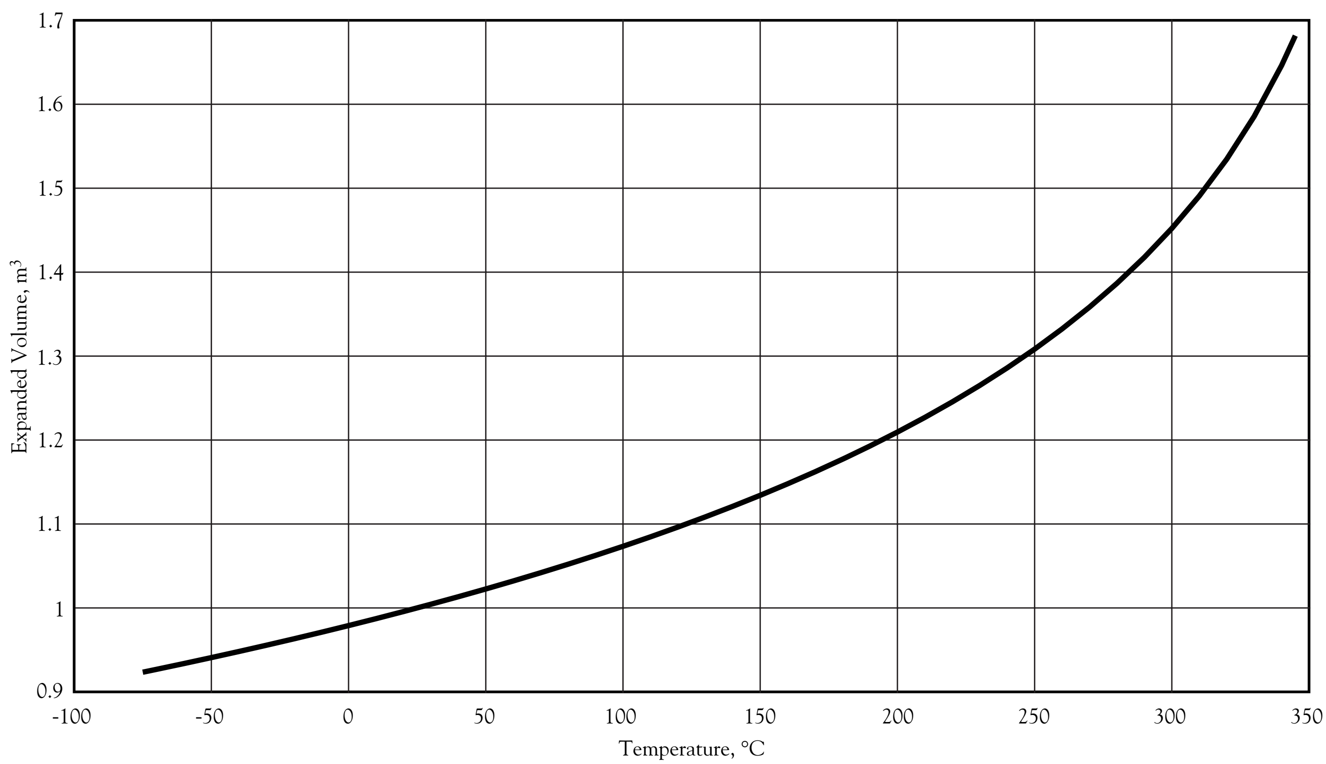


Figure 17—Water Saturation of DOWTHERM J Fluid (English Units)

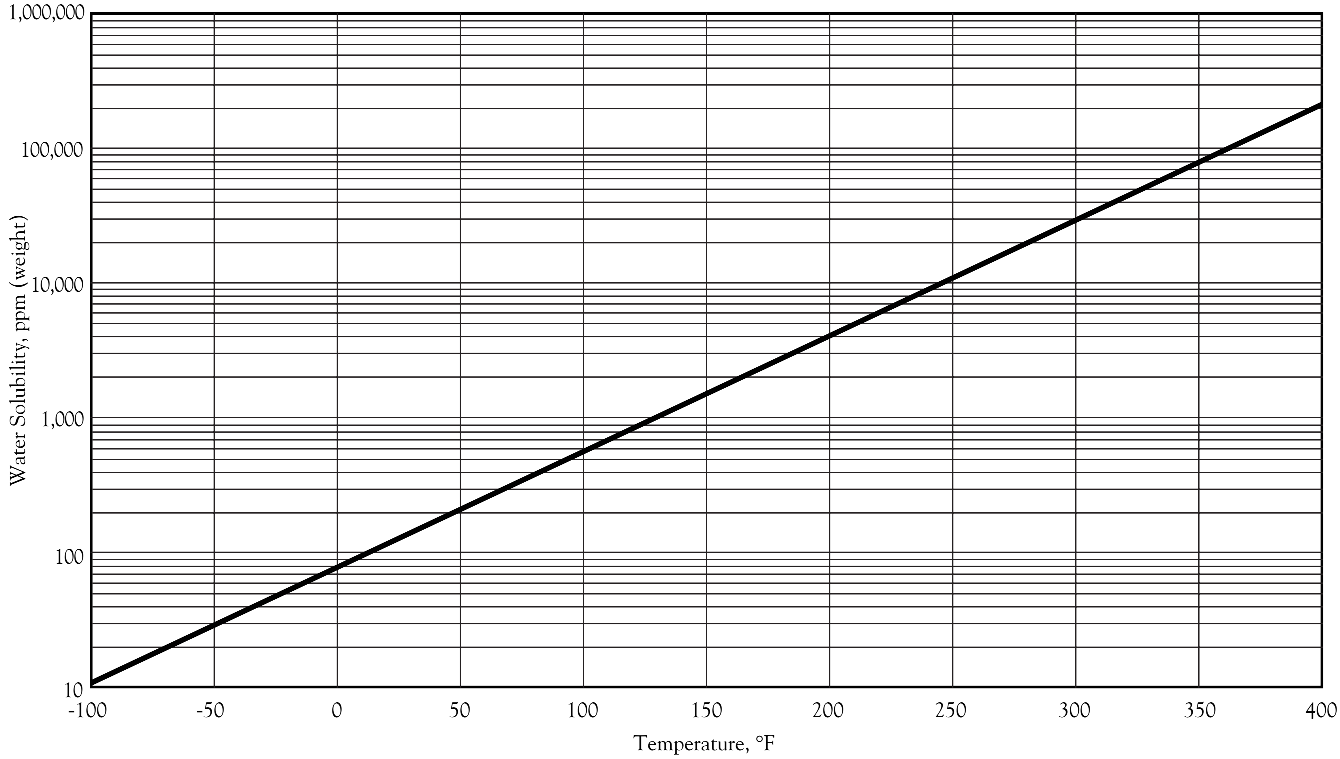


Figure 18—Water Saturation of DOWTHERM J Fluid (SI Units)

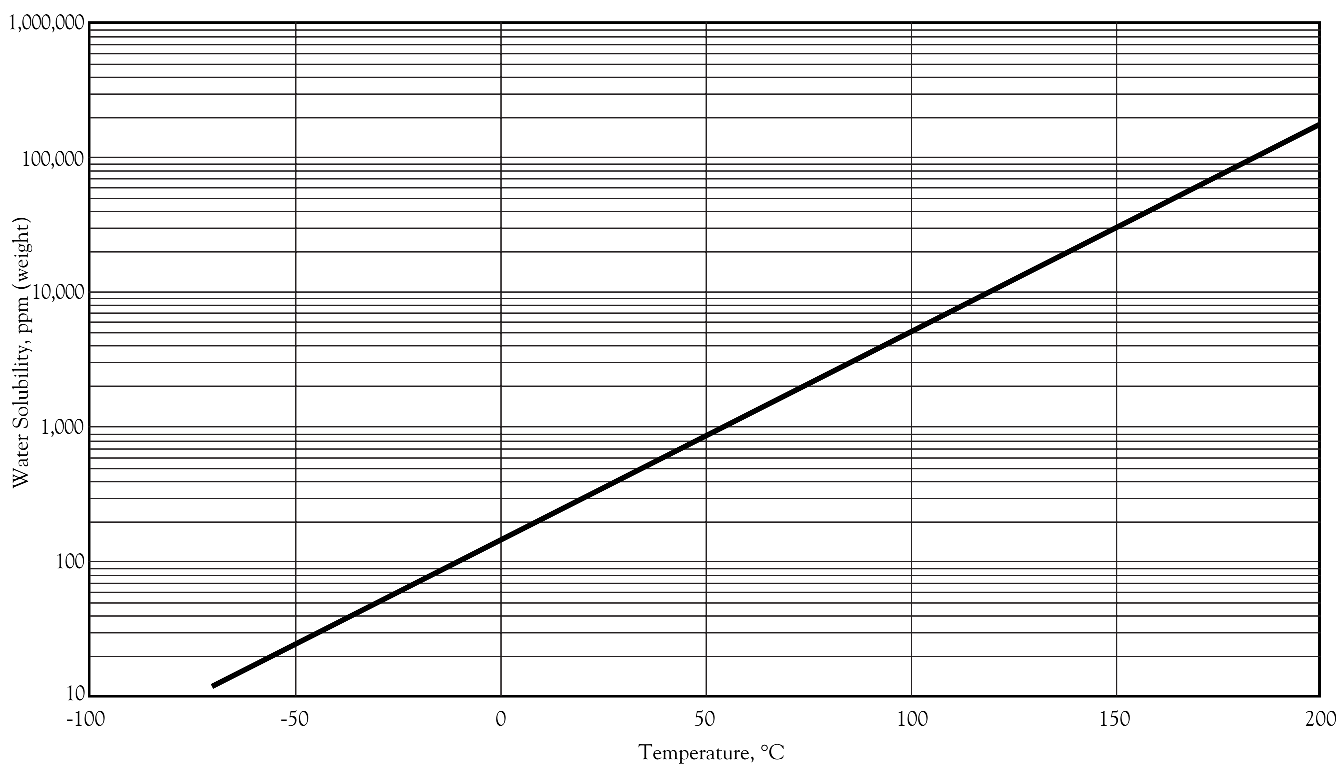


Figure 20 — Typical Liquid Phase Heating Scheme Using DOWTHERM Fluids

Instrument Legend

- BA – Burner Alarm
- BC – Burner Control
- BE – Burner Element (Fire-Eye)
- FI – Flow Indicator (Orifice)
- FRC – Flow Recording Controller
- FSL – Flow Switch Low
- LA^H/L – Level Alarm–High/Low
- LI – Level Indicator
- LC – Level Controller
- LSL – Level Switch Low
- PCV – Pressure Control Valve
- PI – Pressure Indicator
- PIC – Pressure Indicating Controller
- PRV – Pressure Relief Valve
- PSH – Pressure Switch High
- PSL – Pressure Switch Low
- TIC – Temperature Indicating Controller
- TRC – Temperature Recorder Controller
- TSH – Temperature Switch High

- ——— Principal Circuits with DOWTHERM Fluid
- – – – Electrical Lines
- –//–//– Instrument Air Lines

(A) – Heat exchanger #2 is cooled with DOWTHERM J fluid to avoid any possibility of contaminating the process fluid with water in the event of a tube leak.

(B) – Process fluid freezes at 100°F (81°C).

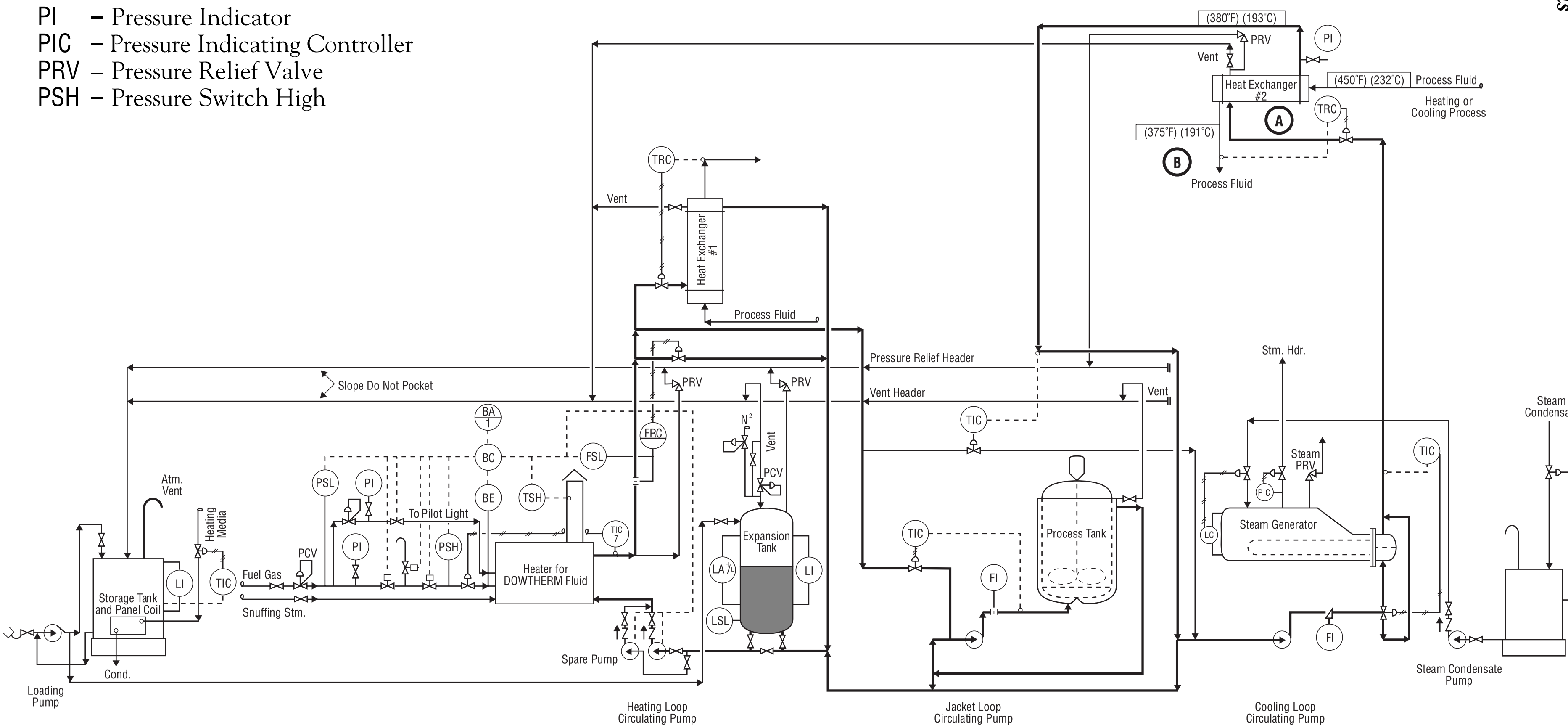


Figure 20— Typical Vapor Phase Heating Scheme Using DOWTHERM J Fluid

Instrument Legend

BA – Burner Alarm
BC – Burner Control
BE – Burner Element (Fire-Eye)
FI – Flow Indicator (Orifice)
FRC – Flow Recording Controller
FSL – Flow Switch Low
$LA^{H}/_{L}$ – Level Alarm–High/Low
LI – Level Indicator
LC – Level Controller
LSL – Level Switch Low
PCV – Pressure Control Valve
PI – Pressure Indicator
PIC – Pressure Indicating Controller
PRV – Pressure Relief Valve
PSH – Pressure Switch High
PSL – Pressure Switch Low
TIC – Temperature Indicating Controller
TRC – Temperature Recorder Controller
TSH – Temperature Switch High

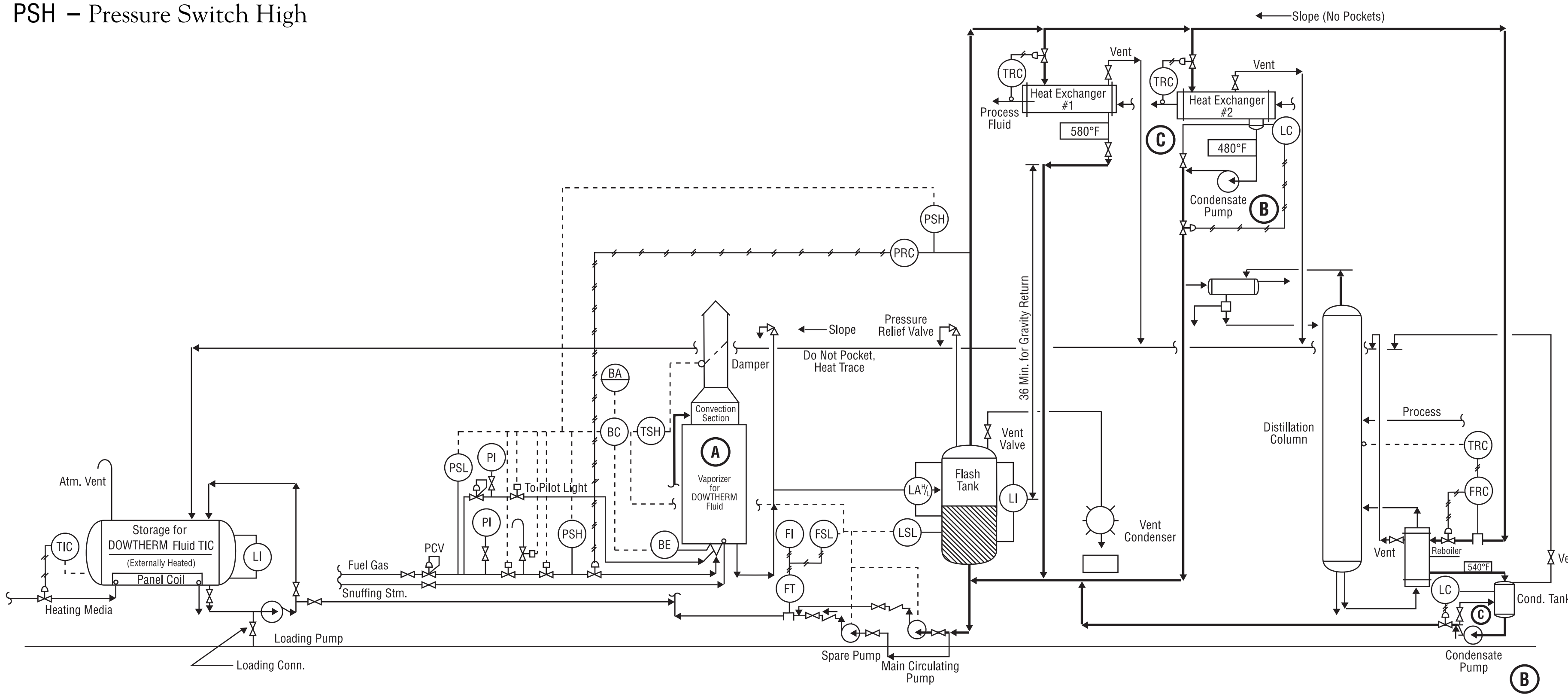
——— Principal Circuits with DOWTHERM Fluid
– – – Electrical Lines
–//–//– Instrument Air Lines

Thermal Tracing System required if ambient temperature = <60°F (15°C).

(A) – Vaporizers for DOWTHERM J fluid utilize both natural and forced circulation.

(B) – A pump is required where there is insufficient elevation between vaporizer and heat user to return condensate by gravity.

(C) – Hand-throttled bypass required to prevent pump heat-up.



DOWTHERM* J
Heat Transfer Fluid

Product Technical Data

For further information, call...

In The United States And Canada: 1-800-447-4369 • FAX: 1-517-832-1465

In Europe: +31 20691 6268 • FAX: +31 20691 6418

In The Pacific: +886 2 715 3388 • FAX: +886 2 717 4115

In Other Global Areas: 1-517-832-1556 • FAX: 1-517-832-1465

http://www.dow.com/heattrans

NOTICE: No freedom from any patent owned by Seller or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Seller assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

Published June1997

NOTE: SYLTHERM heat transfer fluids are manufactured by Dow Corning Corporation and distributed by The Dow Chemical Company under an exclusive agreement.

Printed in U.S.A.

*Trademark of The Dow Chemical Company

NA/LA/Pacific: Form No. 176-01240-697 AMS
Europe: CH 153-042-E-697