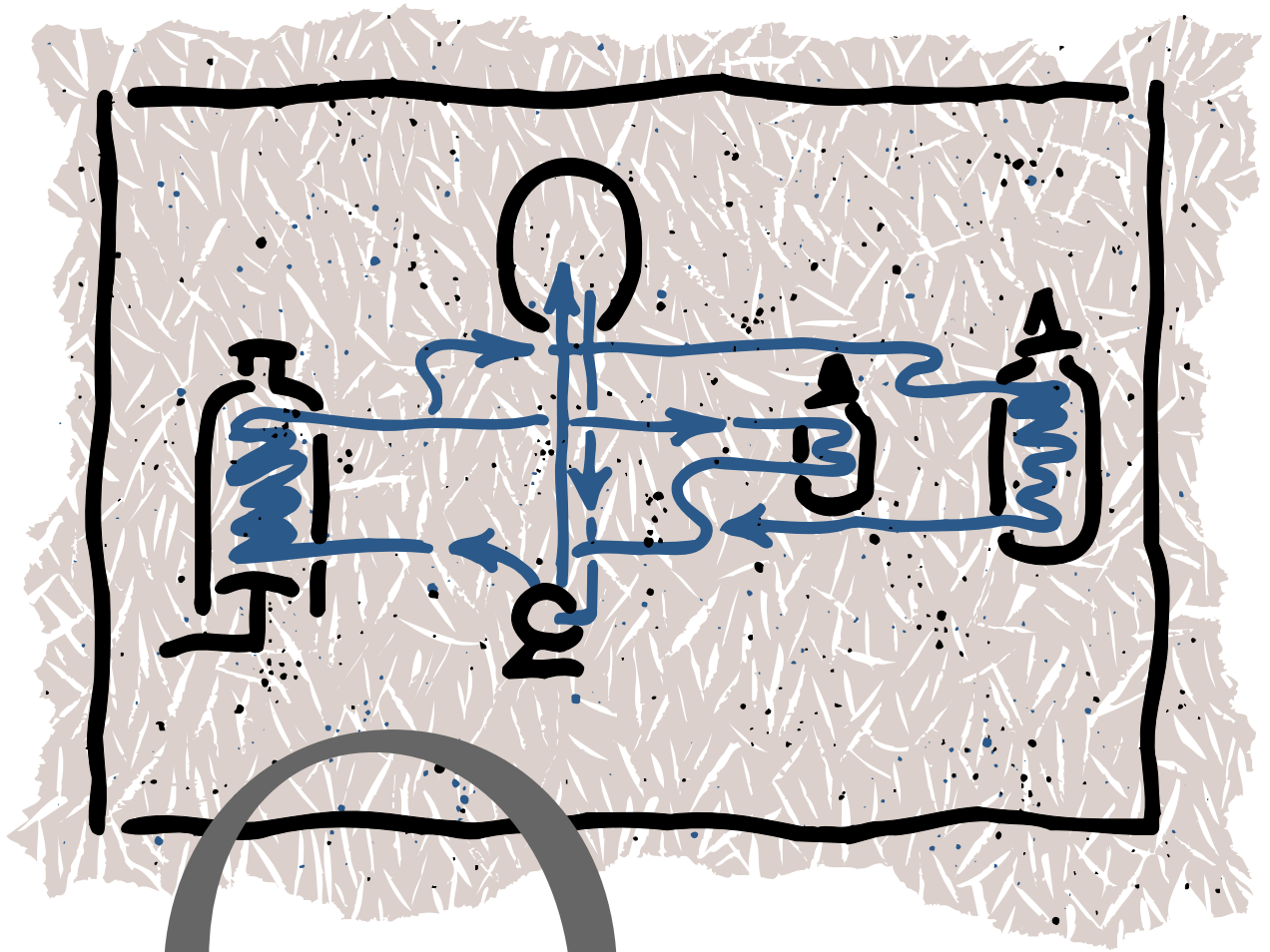




DOWTHERM Q Heat Transfer Fluid



Q

Product Technical Data

CONTENTS

DOWTHERM Q Heat Transfer Fluid, Introduction	4
Fluid Selection Criteria	
Thermal Stability	5
Corrosivity	6
Flammability	6
Health and Safety Considerations	6
Customer Service	
Fluid Analysis	7
Fluid Return Program	7
Properties and Engineering Characteristics	
Physical Properties	8
Saturation Properties	
Vapor English Units	9
Vapor SI Units	9
Liquid English Units	10
Liquid SI Units	11
Thermal Conductivity	12
Vapor Pressure	13
Specific Heat	14
Density	15
Viscosity	16
Calculated Heat of Vaporization	17
Engineering Data	
Liquid Film Coefficient	
English Units	18
Metric Units	19
Pressure Drop vs. Flow Rate	
English Units	20
Metric Units	21
Thermal Expansion	22
Typical Liquid Phase Heating Scheme	23

DOWTHERM Q HEAT TRANSFER FLUID

High-Temperature Thermal Stability and Low- Temperature Pumpability Make DOWTHERM Q Superior to Hot Oils

DOWTHERM* Q heat transfer fluid contains a mixture of diphenyl-ethane and alkylated aromatics and is designed for use as an alternative to hot oils in liquid phase heat transfer systems. Its normal application range is -30°F to 625°F (-35°C to 330°C). DOWTHERM Q fluid exhibits better thermal stability than hot oils, particularly noticeable at the upper end of hot oils' use range [at temperatures above 500°F (260°C)]. Furthermore, the low-temperature pumpability of DOWTHERM Q fluid is significantly better than that of a typical hot oil.

Throughout its operating range, the low viscosity of DOWTHERM Q fluid contributes to heat transfer efficiency. Its film coefficient at 600°F (315°C) is 42 percent higher than a typical hot oil. DOWTHERM Q fluid is also noncorrosive to common metals and alloys, assuring compatibility with most heat transfer systems.

DOWTHERM Q fluid provides several long-term economic advantages — and some potential immediate cost savings — over hot oils. These include: reduced pump and exchanger size requirements, possible elimination of costly steam tracing, lower fluid makeup requirements, reduced system fouling and related maintenance expenses, expanded changeout intervals, and a fluid credit program.

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

When it is time to change out your DOWTHERM Q heat transfer fluid, Dow's fluid credit program allows you to return the old fluid for credit toward the purchase of your new fluid charge.

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

Stability

DOWTHERM Q fluid offers good thermal stability at temperatures up to 625°F (330°C). The maximum recommended film temperature is 675°F (360°C). Between 550°F and 600°F (290°C and 315°C), its stability is 15 to 30 times greater than that of a typical hot oil.

Freeze Point

DOWTHERM Q fluid has a minimum pumpability temperature of -30°F (-35°C). Therefore, it can be used without steam tracing in most installations. Compare this lower use temperature to hot oil minimums as high as +32°F (0°C).

Viscosity

The viscosity of DOWTHERM Q fluid at 600°F is 0.18 cps (at 315°C it is 0.2 mPa·s), accounting for a film coefficient that is 42 percent higher than that of a typical hot oil. DOWTHERM Q fluid's low viscosity is responsible for its low temperature start-up and pumpability performance. Viscosity at -30°F is only 29 cps (at -30°C it is only 24 mPa·s).

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 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 heaters are operated at high temperatures, they are designed for minimum liquid velocities 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.

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 fluid 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 is dependent upon the temperature and the amount of air mixing. Undesirable by-products of this reaction may include carboxylic acids which would 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 Q 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 frequent or continuous purification.

Corrosivity

DOWTHERM Q 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
<i>Austenitic Stainless Steel</i>	<i>Chloride</i>
<i>Nickel</i>	<i>Sulfur</i>
<i>Copper Alloys</i>	<i>Ammonia</i>

Flammability

DOWTHERM Q heat transfer fluid is a combustible material, but has a relatively high flash point of 249°F (120°C) (SETA method), a fire point of 255°F (124°C) (C.O.C.), and an autoignition temperature of 773°F (412°C) (ASTM Method E659-78). The high autoignition temperature of

DOWTHERM Q fluid provides a safety margin nearly 150°F (85°C) above the fluid's recommended upper use temperature. This is more than double the 70°F (40°C) safety margin provided by a typical hot oil. Autoignition 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.

Leaks from pipelines into insulation are likewise 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 Q fluid do not pose a serious flammability hazard at room temperature, because the saturation concentration is so far below the lower flammability limit. Flammable mists are, however, possible under extremely 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.

If used and maintained properly, installations employing DOWTHERM Q fluid should present no unusual flammability hazards.

HEALTH AND SAFETY CONSIDERATIONS

A Material Safety Data Sheet (MSDS) for DOWTHERM Q 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.

Provisions must be made to prevent significant discharge into public waters.

CUSTOMER SERVICE FOR USERS OF DOWTHERM Q HEAT TRANSFER FLUID

Fluid Analysis

The Dow Chemical Company offers an analytical service for DOWTHERM Q 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.

Fluid Return Program for DOWTHERM Fluids (Available in North America only)

In the unlikely event that you need to change out DOWTHERM Q fluid, Dow offers a fluid return program. If analysis of a particular fluid sample reveals significant thermal degradation of the medium, the customer will be advised to return the fluid in his system to Dow. If the fluid is contaminated with organic materials of low thermal stability, it may not be acceptable for Dow processing and will not qualify for the return program. In this case, Dow will advise the customer that the fluid cannot be processed and therefore should not be returned to Dow. No material should be sent to Dow until the fluid analysis has been completed and the customer informed of the results.

If the analysis shows fluid change-out is necessary, the customer should order sufficient new material to recharge the system before sending the old fluid to Dow. Under the fluid return program, Dow will credit the customer for all usable material recovered.

The Dow fluid return program permits customers to minimize their heat transfer fluid investment, handling downtime and inventory, while assuring that replacement fluid is of the highest quality.

Before returning material for credit, contact Dow at the number for your area listed on the back of this brochure for details.

For further information, please contact your nearest Dow representative or call the number for your area listed on the back of this brochure. Ask for DOWTHERM Q Fluid.

Table 1—Physical Properties of DOWTHERM Q Fluid[†]

Composition: Mixture of Diphenylethane and Alkylated Aromatics

Property	English Units	SI Units
Temperature Range	..... -30 to 625°F	..... -35 to 330°C
Atmospheric Reflux Boiling Point	..... 513°F	..... 267°C
Flash Point ¹	..... 249°F	..... 120°C
Fire Point ²	..... 255°F	..... 124°C
Autoignition Temperature ³	..... 773°F	..... 412°C
Flammability Limits of Vapor in Air		
Upper Flammability Limit, 5.5 Vol. % in Air	..... 375°F	..... 190°C
Lower Flammability Limit, 0.55 Vol. % in Air	..... 275°F	..... 135°C
Calculated Critical Points		
Critical Temperature	..... 912°F	..... 489°C
Critical Pressure	..... 23.7 atm	..... 24 bar
Critical Volume	..... 0.0522 ft ³ /lb	..... 3.258 l/kg
Molecular Weight (average)	..... 190	

[†]Not to be construed as specifications

¹Closed Cup

²C.O.C.

³ASTM E659-78

Table 2—Saturated Vapor Properties of DOWTHERM Q (English Units)
Values are estimated by an Equation of State

Temp. °F	ΔH_{lv} Btu/lb	Z_{vapor}	C_p/C_v
300	134.6	0.996	1.0266
320	132.9	0.995	1.0264
340	131.1	0.993	1.0262
360	129.3	0.990	1.0261
380	127.5	0.987	1.0262
400	125.6	0.984	1.0263
420	123.7	0.979	1.0265
440	121.7	0.974	1.0269
460	119.7	0.969	1.0273
480	117.6	0.962	1.0280
500	115.4	0.954	1.0288
520	113.2	0.946	1.0298
540	110.9	0.936	1.0310
560	108.5	0.925	1.0324
580	106.1	0.913	1.0342
600	103.5	0.899	1.0363
620	100.8	0.885	1.0389
640	98.0	0.868	1.0419
660	95.1	0.851	1.0457
680	92.0	0.831	1.0503

Table 3—Saturated Vapor Properties of DOWTHERM Q (SI Units)
Values are estimated by an Equation of State

Temp. °C	ΔH_{lv} kJ/kg	Z_{vapor}	C_p/C_v
100	329.5	0.999	1.0283
110	326.2	0.999	1.0278
120	322.9	0.998	1.0274
130	319.5	0.998	1.0271
140	316.0	0.997	1.0268
150	312.5	0.996	1.0265
160	308.9	0.995	1.0264
170	305.2	0.993	1.0262
180	301.5	0.991	1.0261
190	297.6	0.988	1.0261
200	293.7	0.985	1.0262
210	289.7	0.982	1.0264
220	285.7	0.978	1.0266
230	281.5	0.973	1.0270
240	277.2	0.967	1.0275
250	272.8	0.961	1.0280
260	268.3	0.954	1.0288
270	263.6	0.947	1.0297
280	258.9	0.938	1.0307
290	253.9	0.928	1.0320
300	248.9	0.918	1.0334
310	243.6	0.906	1.0352
320	238.1	0.894	1.0373
330	232.5	0.880	1.0397
340	226.6	0.865	1.0426
350	220.4	0.849	1.0461
360	214.0	0.831	1.0503

Table 4—Saturated Liquid Properties of DOWTHERM Q Fluid (English Units)

Temp. °F	Specific Heat Btu/lb°F	Density lb/ft ³	Therm. Cond. Btu/hr ft ² (°F/ft)	Viscosity cP	Vapor Pressure psia
-30	0.353	62.84	0.0741	29.0	
-20	0.358	62.57	0.0737	23.1	
-10	0.362	62.31	0.0734	18.4	
0	0.366	62.05	0.0730	14.7	
10	0.370	61.79	0.0727	11.8	
20	0.375	61.53	0.0723	9.60	
30	0.379	61.26	0.0720	7.86	
40	0.383	61.00	0.0716	6.50	
50	0.387	60.74	0.0712	5.42	
60	0.392	60.48	0.0708	4.57	
70	0.396	60.21	0.0704	3.88	
80	0.400	59.95	0.0701	3.32	
90	0.404	59.69	0.0697	2.87	
100	0.409	59.43	0.0693	2.50	
110	0.413	59.17	0.0689	2.19	
120	0.417	58.90	0.0684	1.94	
130	0.421	58.64	0.0680	1.72	
140	0.425	58.38	0.0676	1.54	
150	0.429	58.12	0.0672	1.38	0.01
160	0.434	57.86	0.0668	1.25	0.01
170	0.438	57.59	0.0663	1.14	0.01
180	0.442	57.33	0.0659	1.04	0.02
190	0.446	57.07	0.0654	0.95	0.02
200	0.450	56.81	0.0650	0.88	0.03
210	0.454	56.54	0.0645	0.81	0.04
220	0.458	56.28	0.0641	0.75	0.06
230	0.462	56.02	0.0636	0.70	0.08
240	0.467	55.76	0.0632	0.65	0.10
250	0.471	55.50	0.0627	0.61	0.14
260	0.475	55.23	0.0623	0.57	0.18
270	0.479	54.97	0.0618	0.54	0.22
280	0.483	54.71	0.0613	0.51	0.28
290	0.487	54.45	0.0609	0.48	0.36
300	0.491	54.18	0.0604	0.46	0.45
310	0.495	53.92	0.0599	0.44	0.55
320	0.499	53.66	0.0594	0.41	0.68
330	0.503	53.40	0.0589	0.40	0.83
340	0.507	53.14	0.0585	0.38	1.01
350	0.511	52.87	0.0580	0.36	1.22
360	0.515	52.61	0.0575	0.35	1.46
370	0.519	52.35	0.0570	0.33	1.74
380	0.523	52.09	0.0565	0.32	2.07
390	0.527	51.82	0.0560	0.31	2.45
400	0.531	51.56	0.0555	0.30	2.88
410	0.535	51.30	0.0550	0.29	3.37
420	0.539	51.04	0.0545	0.28	3.93
430	0.543	50.78	0.0540	0.27	4.57
440	0.547	50.51	0.0535	0.26	5.28
450	0.551	50.25	0.0530	0.25	6.09
460	0.555	49.99	0.0525	0.25	6.99
470	0.558	49.73	0.0520	0.24	7.99
480	0.562	49.46	0.0515	0.23	9.11
490	0.566	49.20	0.0510	0.23	10.36
500	0.570	48.94	0.0505	0.22	11.73
510	0.574	48.68	0.0500	0.22	13.24
520	0.578	48.42	0.0495	0.21	14.91
530	0.582	48.15	0.0490	0.21	16.74
540	0.586	47.89	0.0485	0.20	18.75
550	0.589	47.63	0.0480	0.20	20.93
560	0.593	47.37	0.0475	0.19	23.32
570	0.597	47.10	0.0470	0.19	25.91
580	0.601	46.84	0.0465	0.18	28.72
590	0.605	46.58	0.0460	0.18	31.76
600	0.609	46.32	0.0455	0.18	35.05
610	0.612	46.06	0.0450	0.17	38.59
620	0.616	45.79	0.0445	0.17	42.41
630	0.620	45.53	0.0440	0.17	46.51
640	0.624	45.27	0.0435	0.16	50.90
650	0.627	45.01	0.0430	0.16	55.61
660	0.631	44.74	0.0425	0.16	60.64
670	0.635	44.48	0.0420	0.16	66.01
680	0.639	44.22	0.0416	0.15	71.72

Table 5—Saturated Liquid Properties of DOWTHERM Q Fluid (SI Units)

Temp. °C	Specific Heat kJ/kg K	Density kg/m ³	Therm. Cond. W/m K	Viscosity mPa·s	Vapor Pressure bar
-35	1.478	1011.4	0.1280	46.6	
-30	1.492	1003.2	0.1277	24.2	
-20	1.525	995.6	0.1266	16.1	
-10	1.557	988.0	0.1255	10.9	
0	1.589	980.5	0.1244	7.56	
10	1.621	972.9	0.1232	5.42	
20	1.653	965.4	0.1220	4.00	
30	1.685	957.8	0.1208	3.04	
40	1.716	950.2	0.1195	2.37	
50	1.748	942.7	0.1183	1.89	
60	1.779	935.1	0.1170	1.54	
70	1.811	927.6	0.1156	1.28	
80	1.842	920.0	0.1143	1.07	
90	1.873	912.4	0.1129	0.92	
100	1.904	904.9	0.1115	0.80	
110	1.935	897.3	0.1101	0.70	
120	1.966	889.8	0.1087	0.62	0.01
130	1.997	882.2	0.1072	0.55	0.01
140	2.027	874.6	0.1058	0.50	0.02
150	2.058	867.1	0.1043	0.45	0.03
160	2.088	859.5	0.1028	0.41	0.05
170	2.118	852.0	0.1013	0.38	0.07
180	2.148	844.4	0.0998	0.35	0.09
190	2.178	836.8	0.0982	0.33	0.13
200	2.208	829.3	0.0967	0.31	0.17
210	2.238	821.7	0.0952	0.29	0.23
220	2.268	814.2	0.0936	0.27	0.31
230	2.297	806.6	0.0921	0.26	0.40
240	2.327	799.0	0.0905	0.24	0.51
250	2.356	791.5	0.0889	0.23	0.64
260	2.386	783.9	0.0874	0.22	0.81
270	2.415	776.4	0.0858	0.21	1.00
280	2.444	768.8	0.0843	0.20	1.24
290	2.473	761.2	0.0827	0.19	1.51
300	2.502	753.7	0.0811	0.19	1.82
310	2.530	746.1	0.0796	0.18	2.19
320	2.559	738.6	0.0780	0.17	2.61
330	2.587	731.0	0.0765	0.17	3.09
340	2.616	723.4	0.0749	0.16	3.64
350	2.644	715.9	0.0734	0.16	4.25
360	2.672	708.3	0.0719	0.15	4.95

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

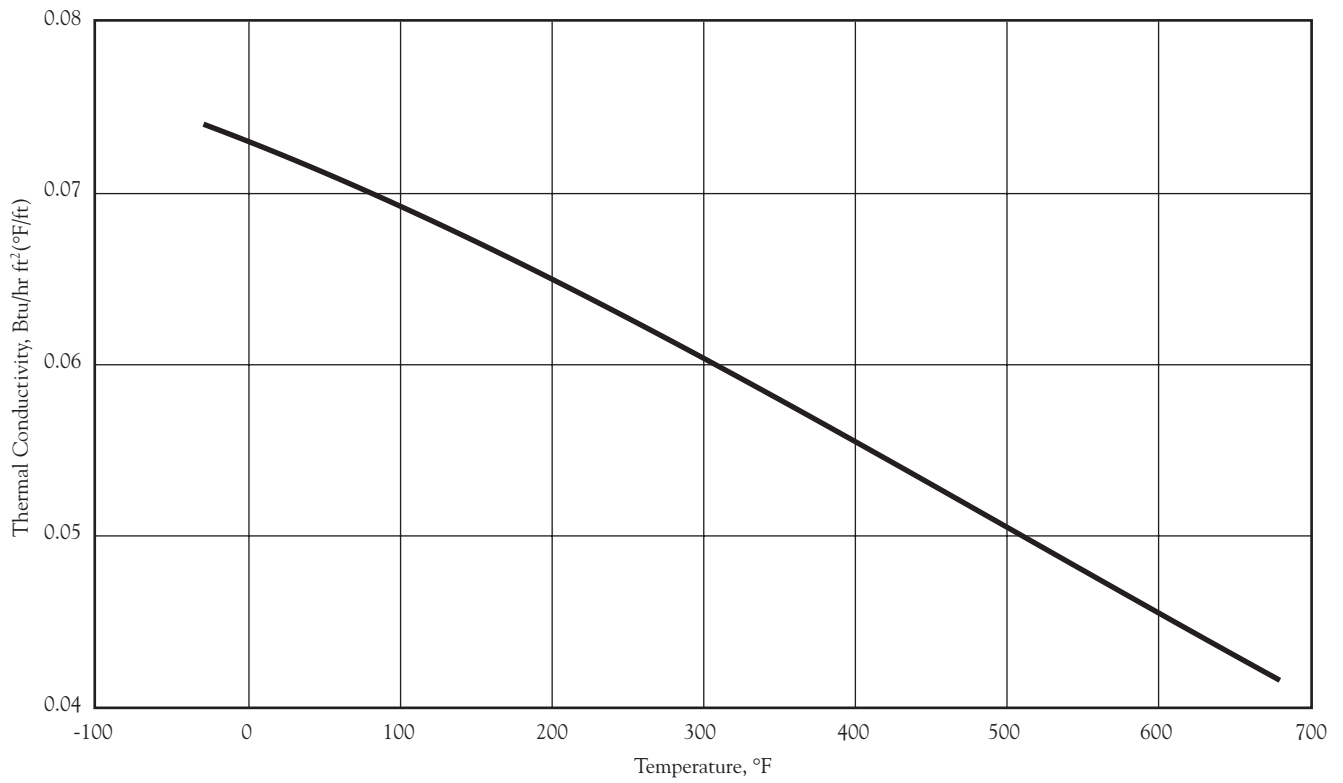


Figure 2— Thermal Conductivity of DOWTHERM Q Fluid (SI Units)

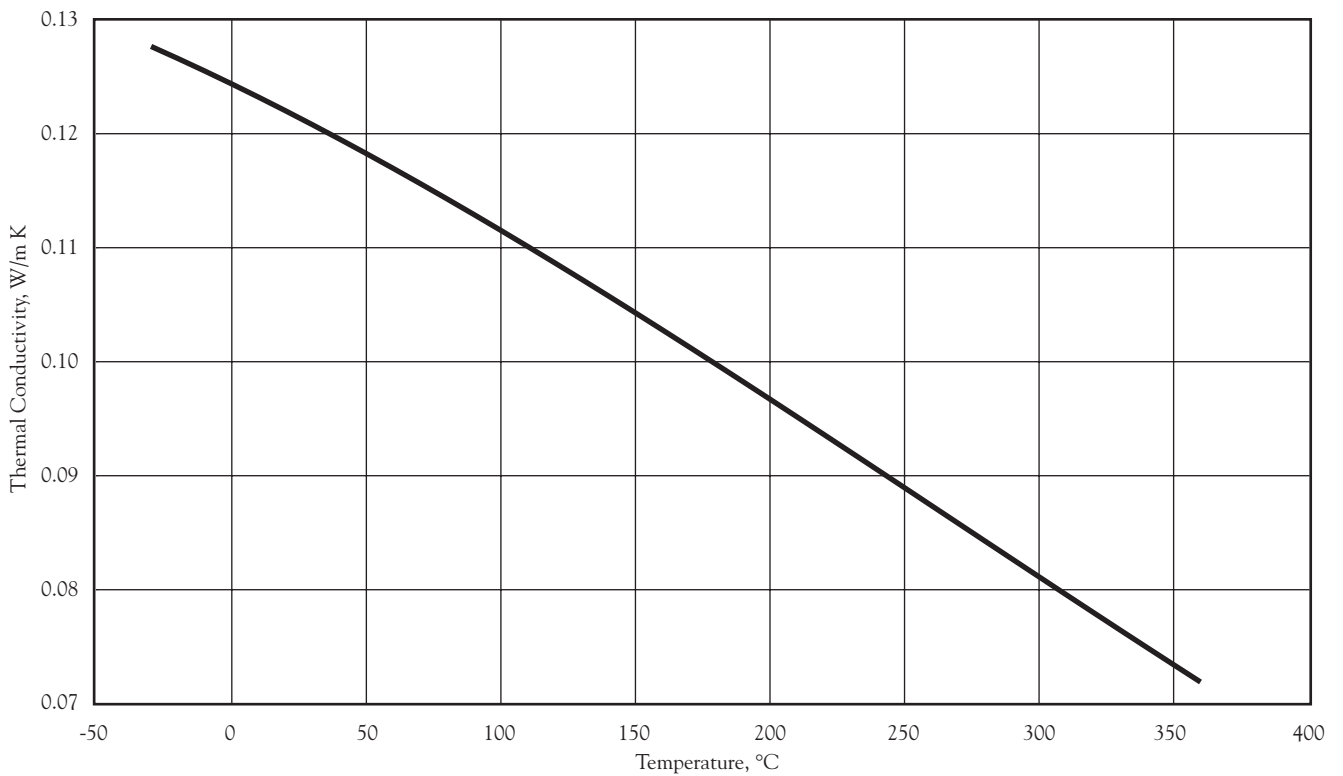


Figure 3—Vapor Pressure of DOWTHERM Q Fluid (English Units)

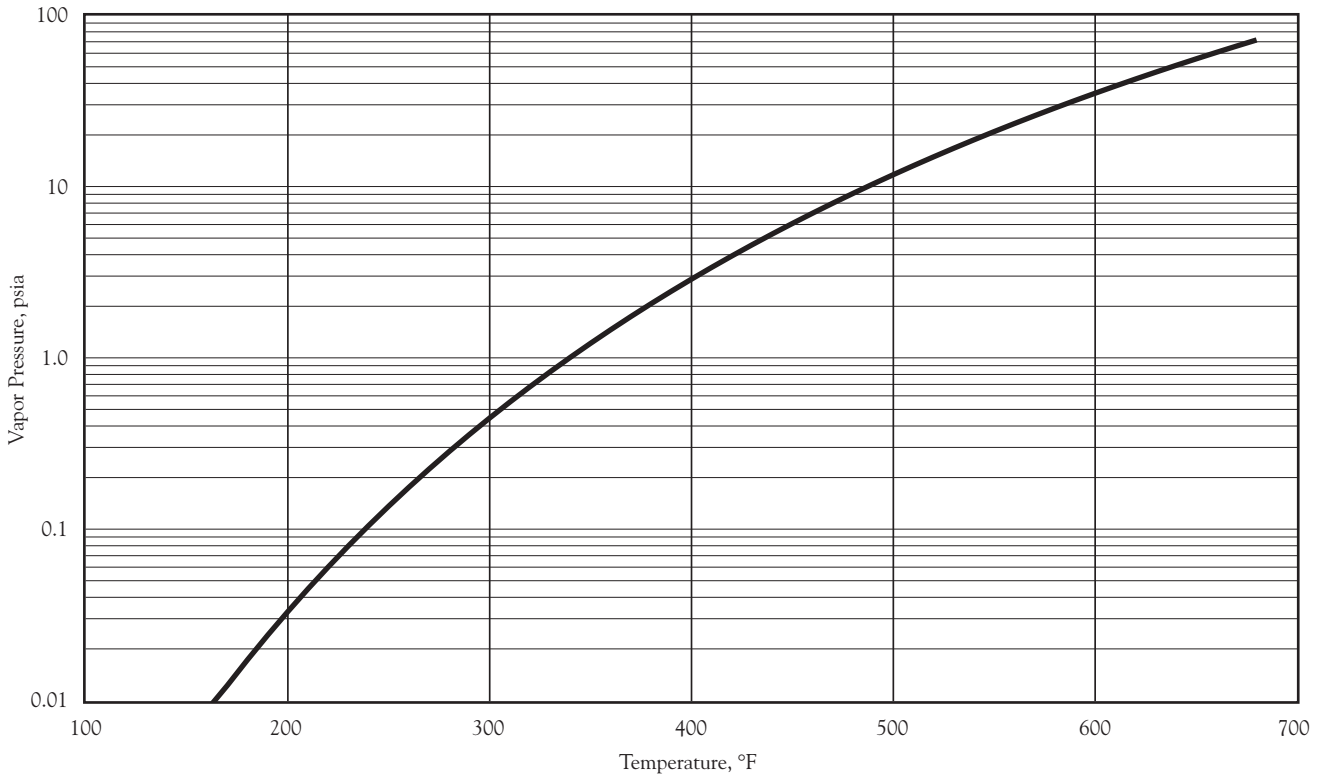


Figure 4—Vapor Pressure of DOWTHERM Q Fluid (SI Units)

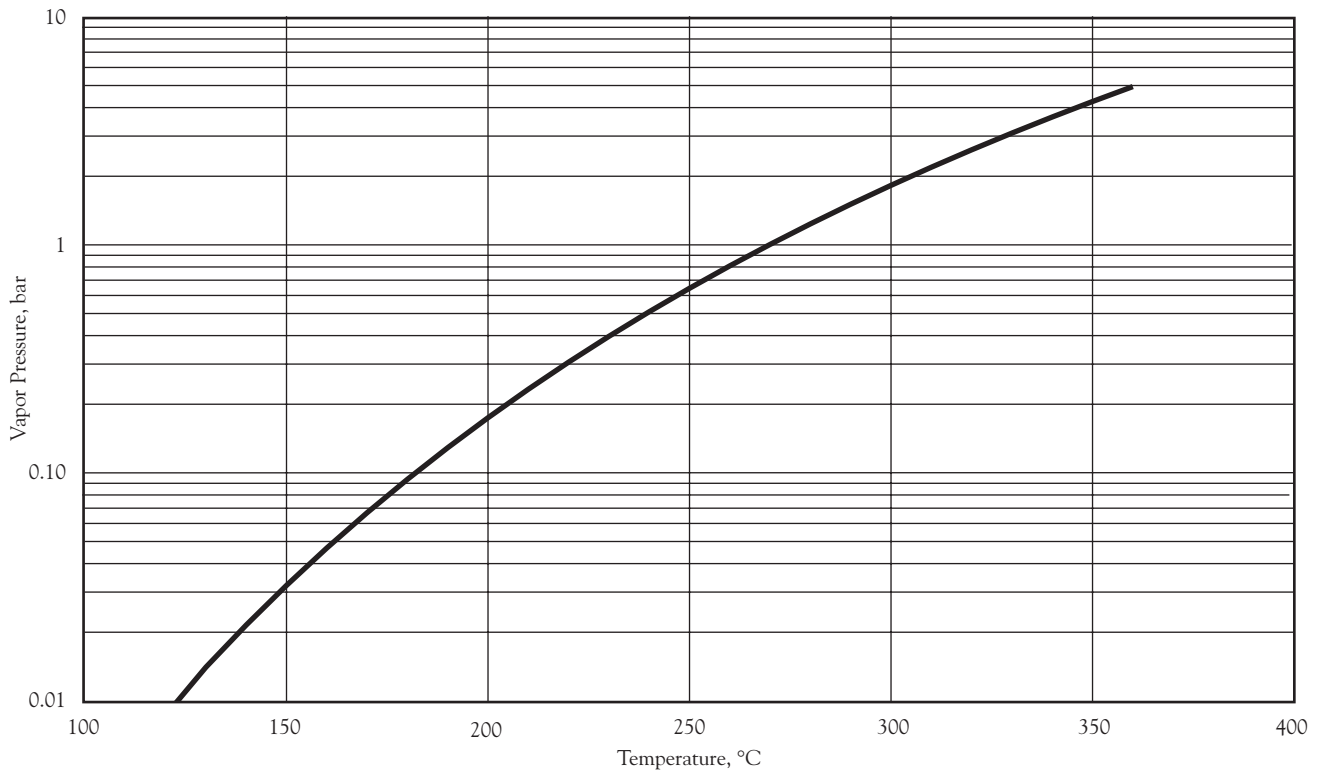


Figure 5—Specific Heat of DOWTHERM Q Fluid (English Units)

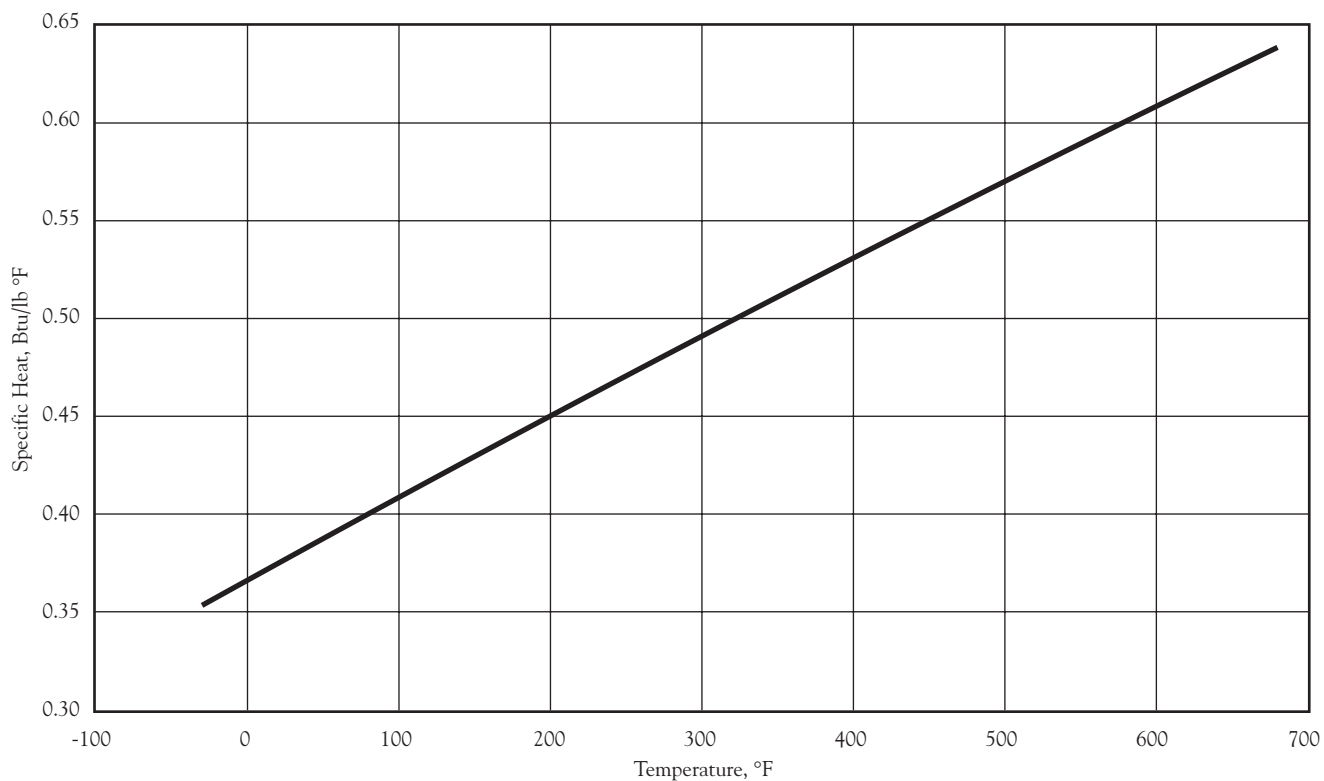


Figure 6—Specific Heat of DOWTHERM Q Fluid (SI Units)

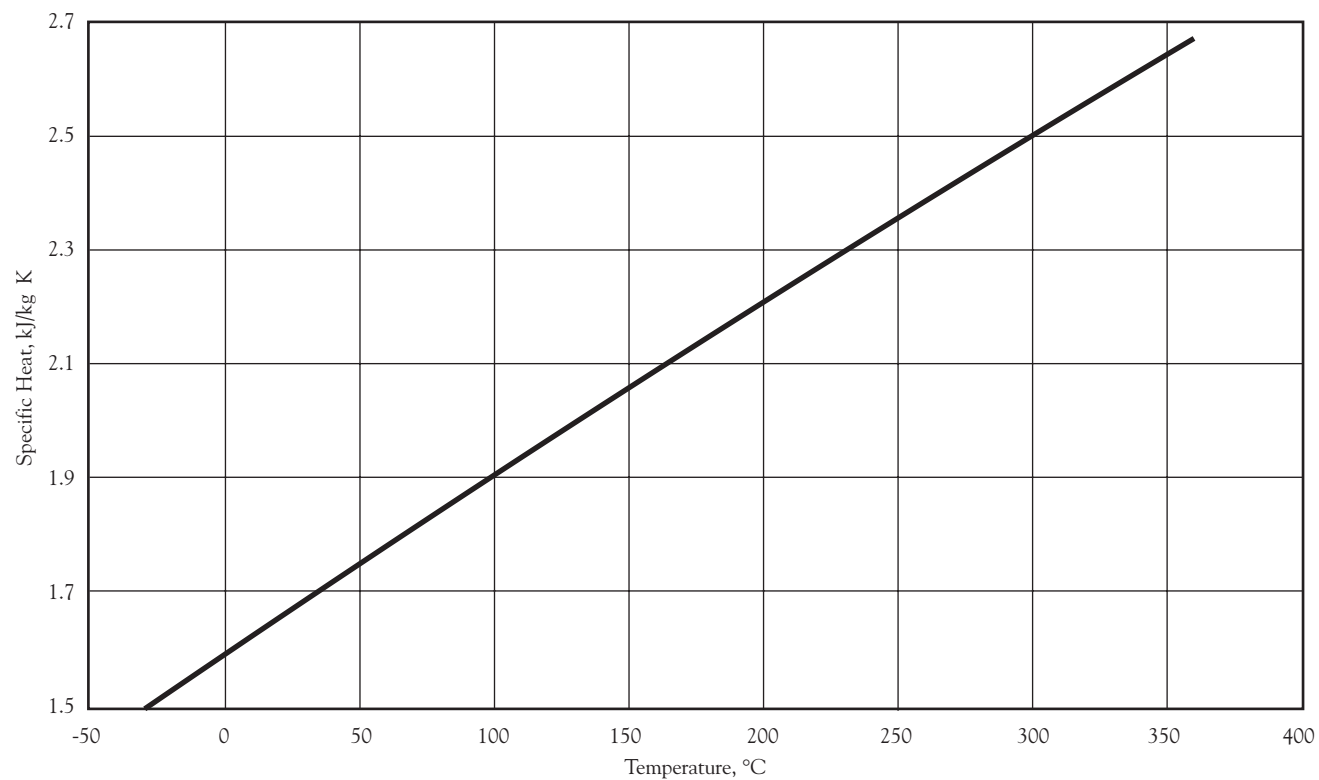


Figure 7—Liquid Density of DOWTHERM Q Fluid (English Units)

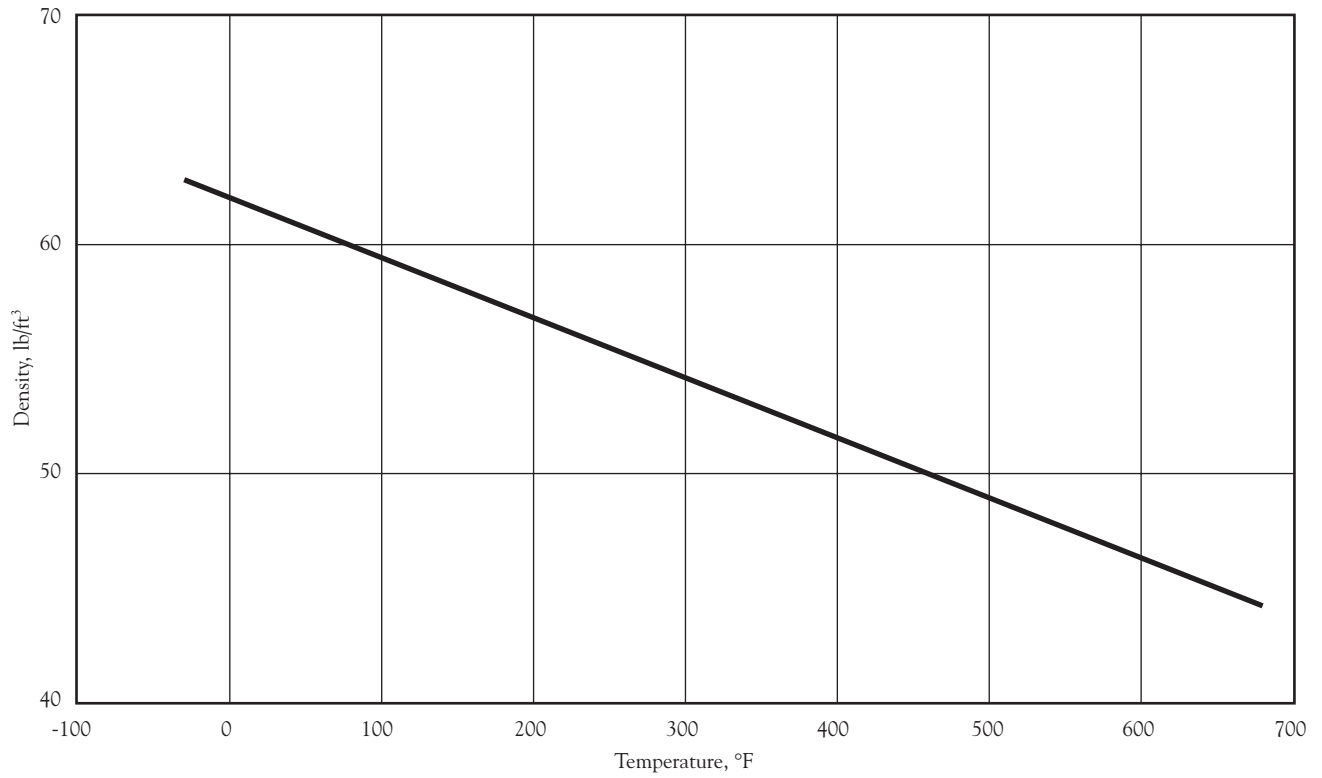


Figure 8—Liquid Density of DOWTHERM Q Fluid (SI Units)

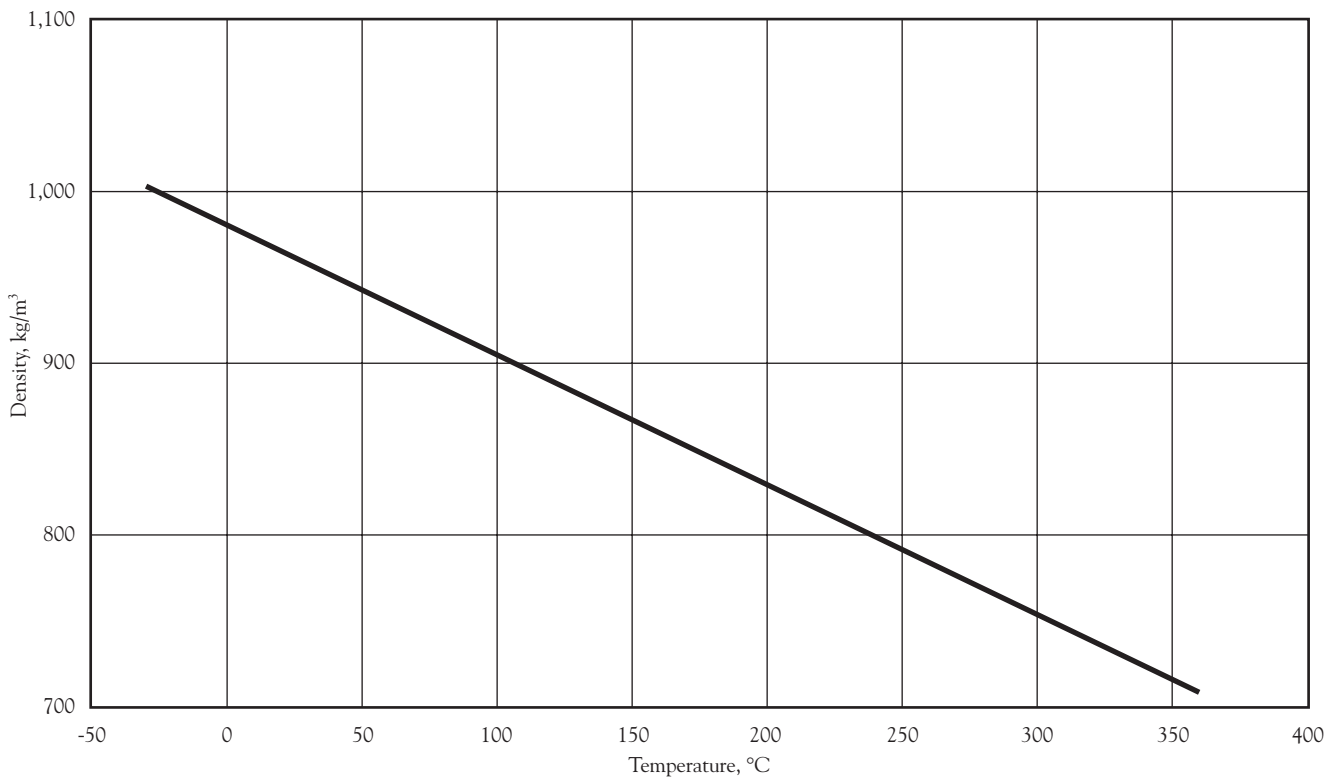


Figure 9—Liquid Viscosity of DOWTHERM Q Fluid (English Units)

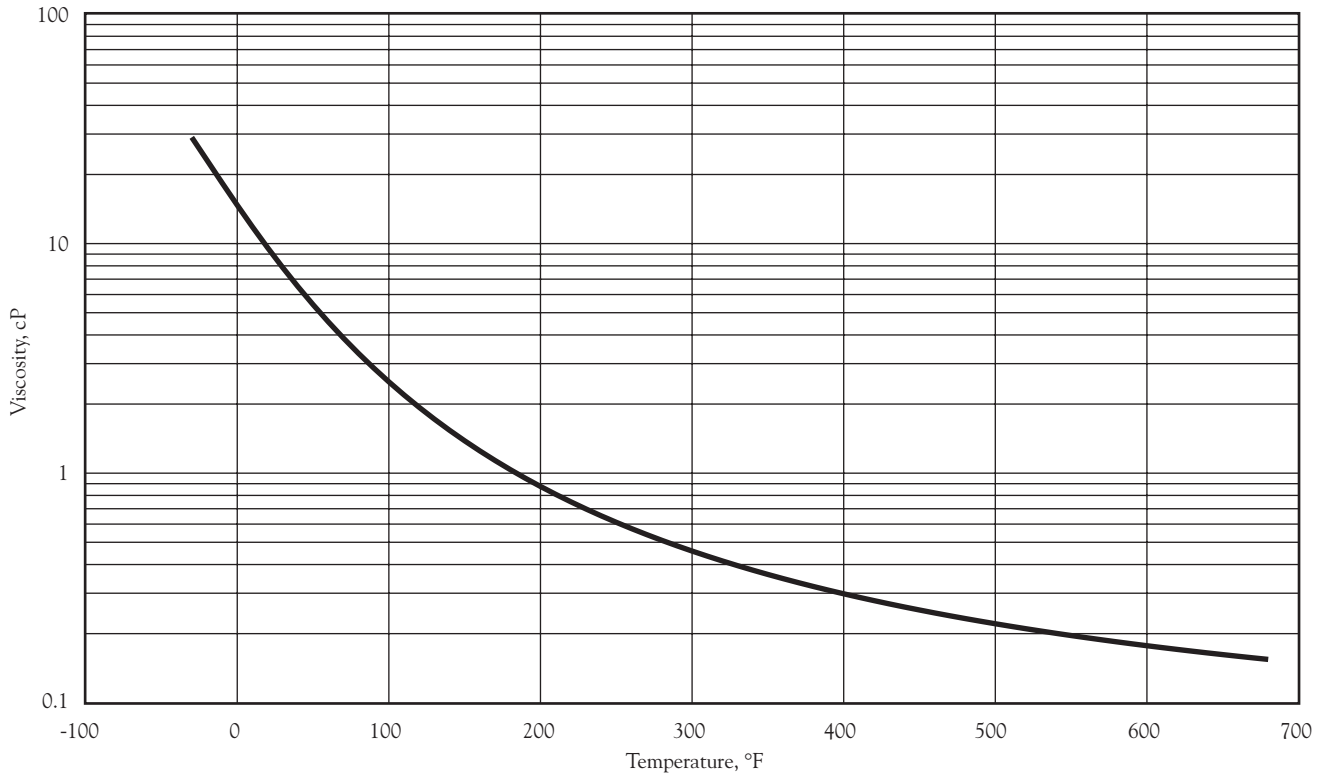


Figure 10—Liquid Viscosity of DOWTHERM Q Fluid (SI Units)

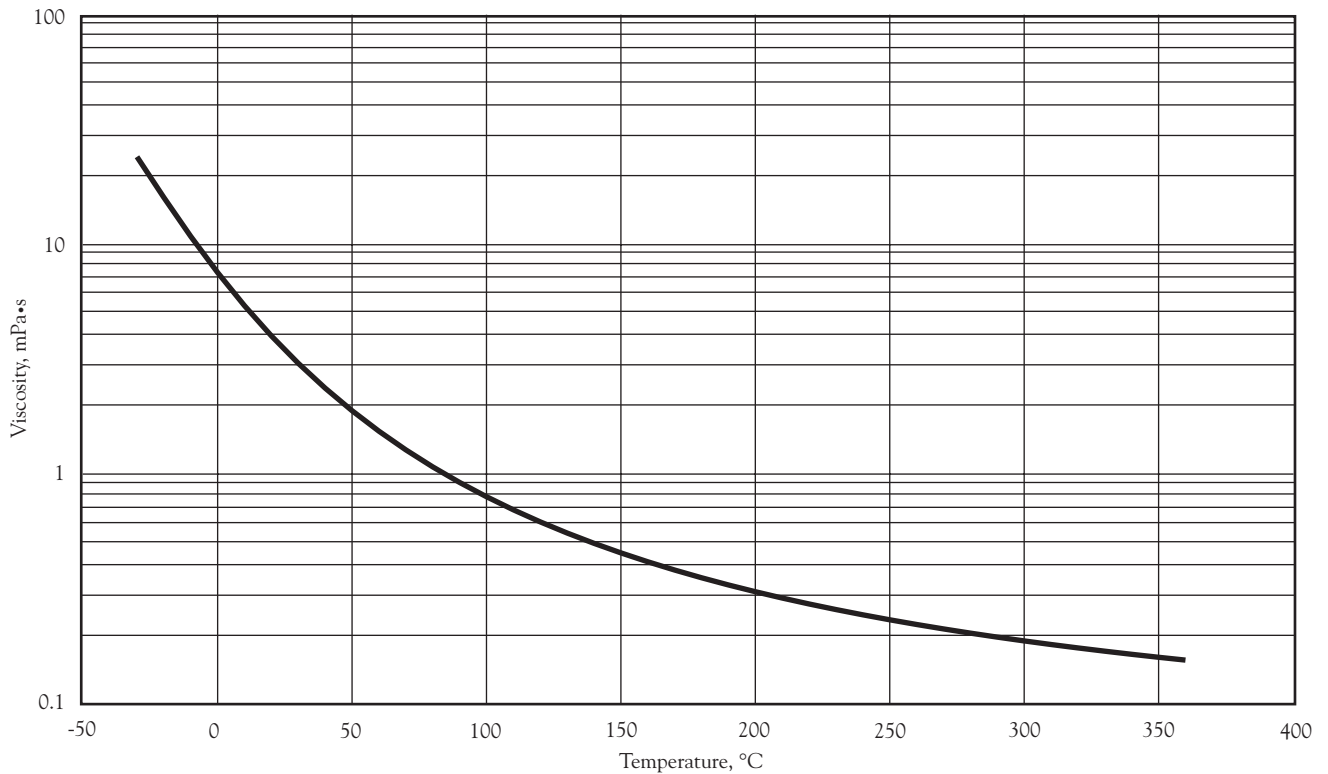


Figure 11 — Calculated Heat of Vaporization of DOWTHERM Q Fluid (English Units)

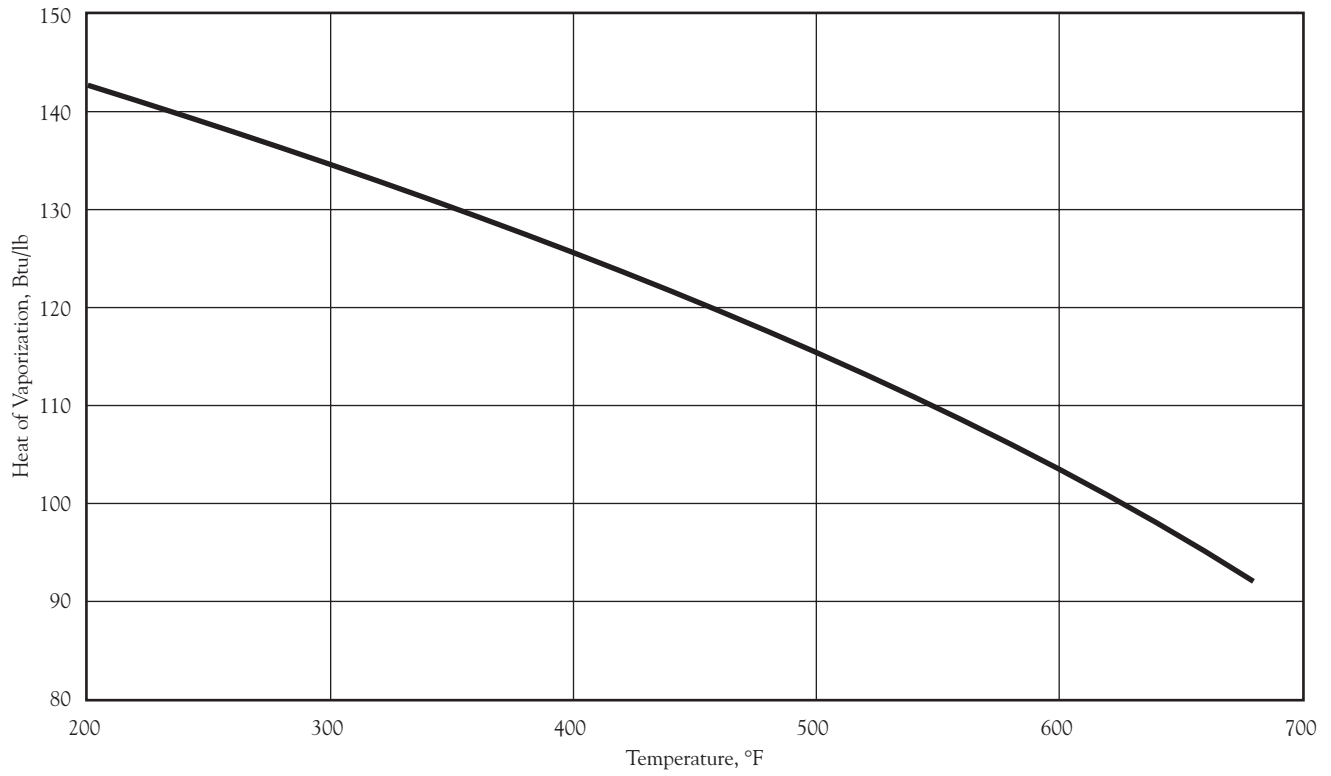


Figure 12 — Calculated Heat of Vaporization of DOWTHERM Q Fluid (SI Units)

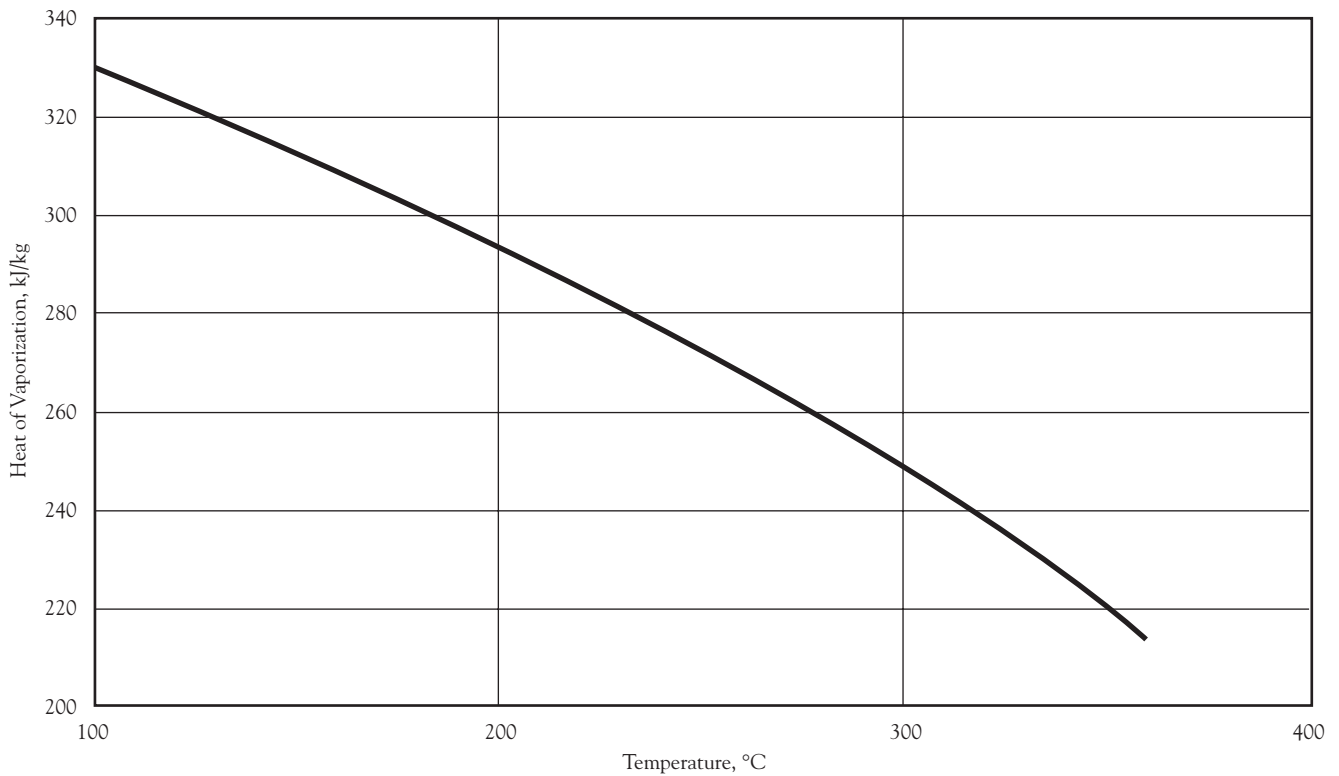
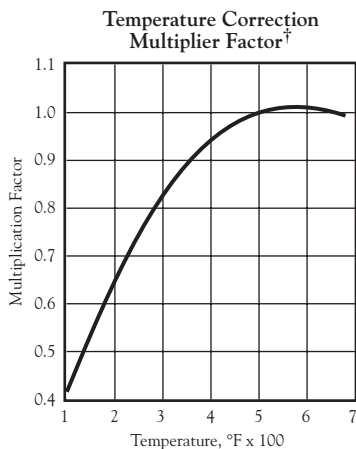
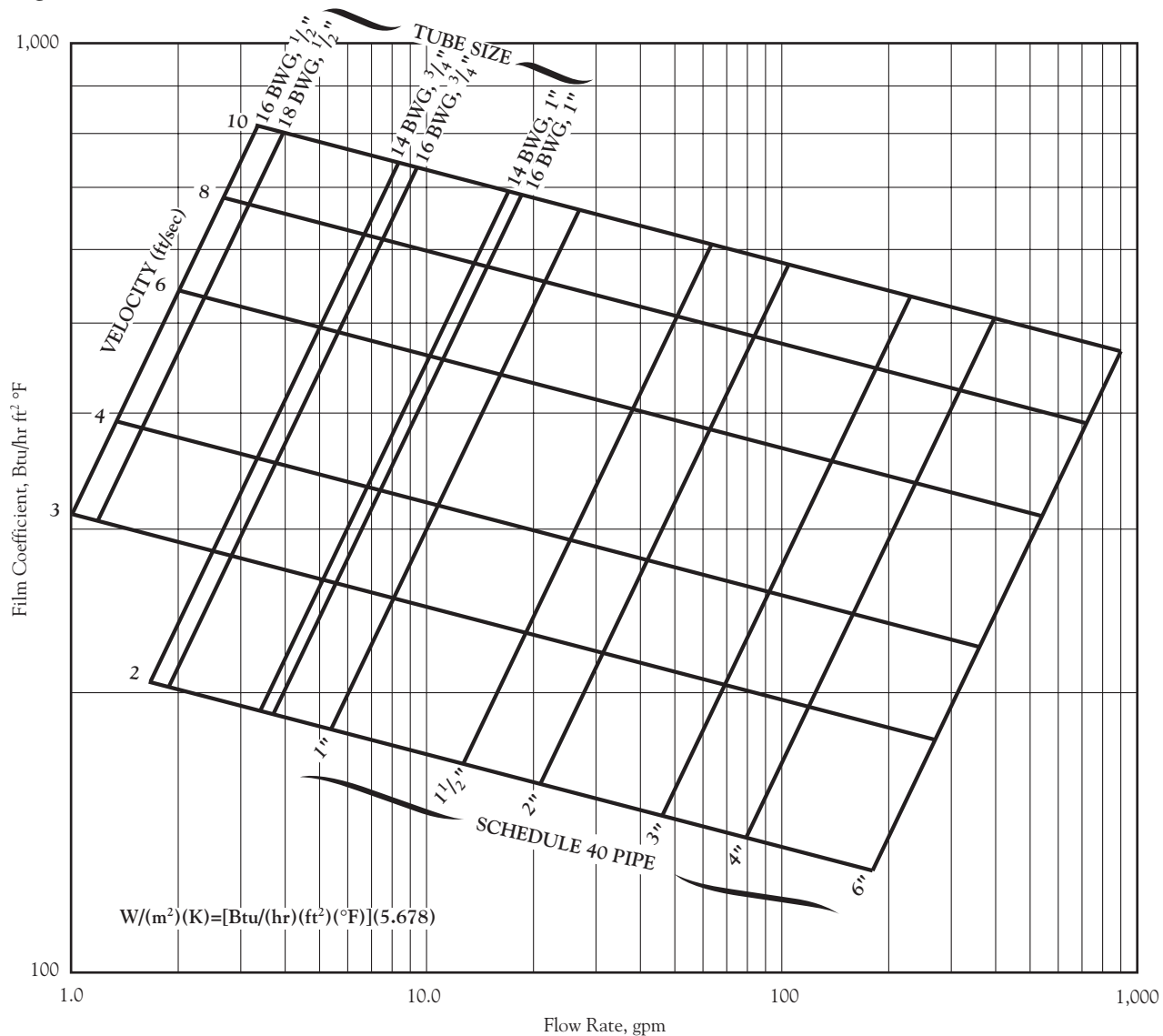


Figure 13—Liquid Film Coefficient for DOWTHERM Q Fluid Inside Pipes and Tubes (Turbulent Flow Only) (English Units)



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

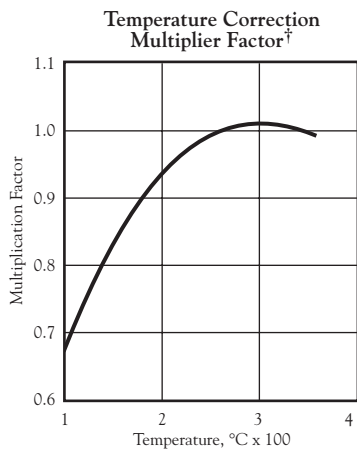
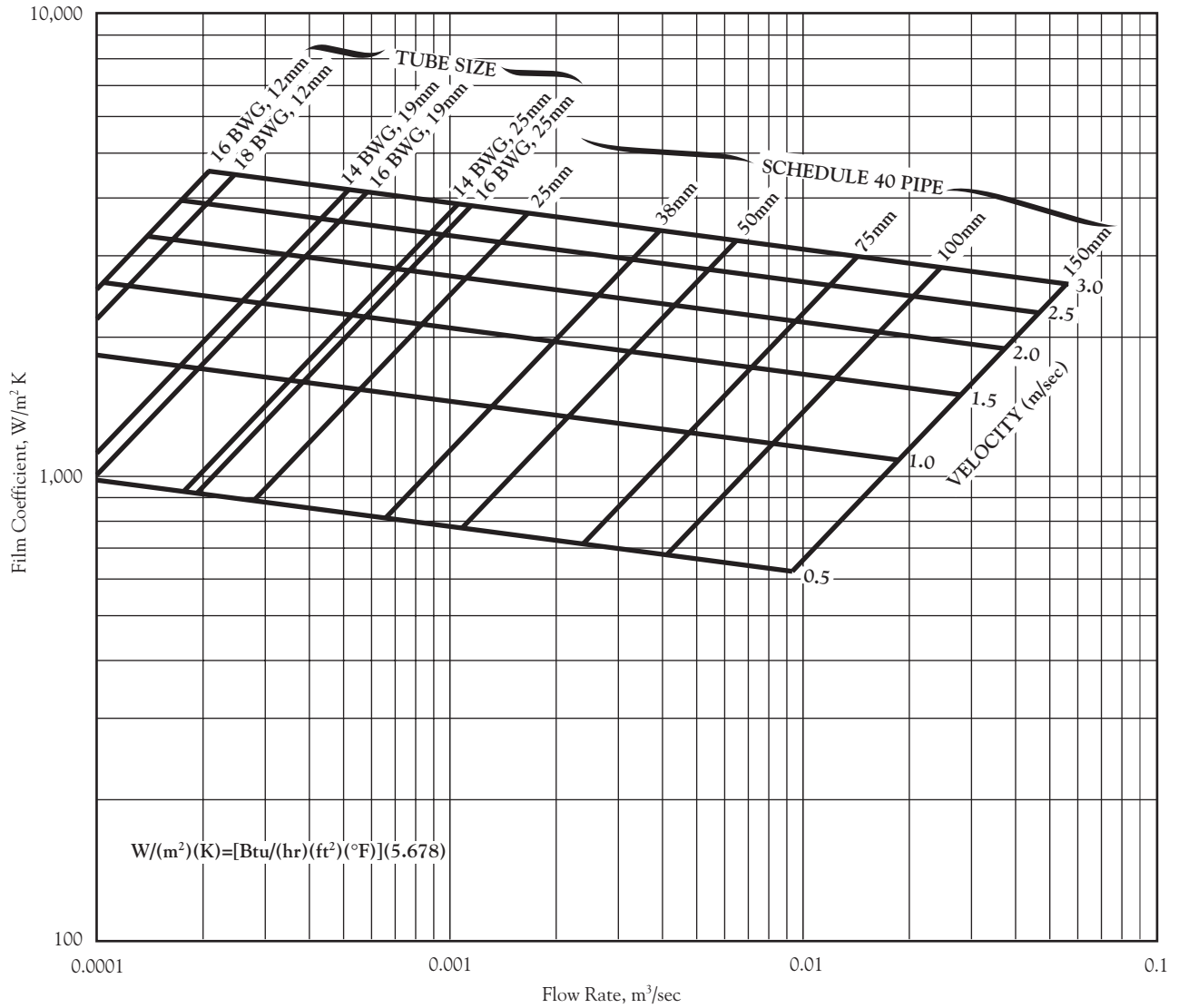
$$Nu = 0.027 Re^{0.8} Pr^{1/3} \left(\frac{\mu}{\mu_w} \right)^{0.14}$$

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.

†Note: Below 100°F, an error in the temperature correction factor above 5% may be incurred. This is dependent on the diameter and velocity effect on the Reynolds number and friction factor.

Figure 14—Liquid Film Coefficient for DOWTHERM Q Fluid Inside Pipes and Tubes (Turbulent Flow Only) (SI Units)



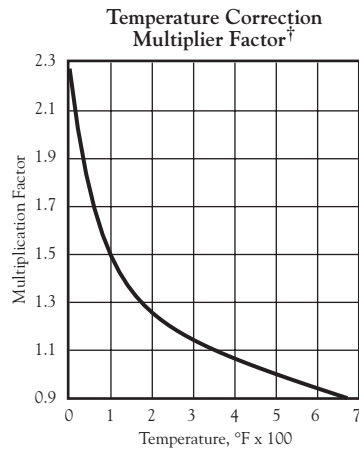
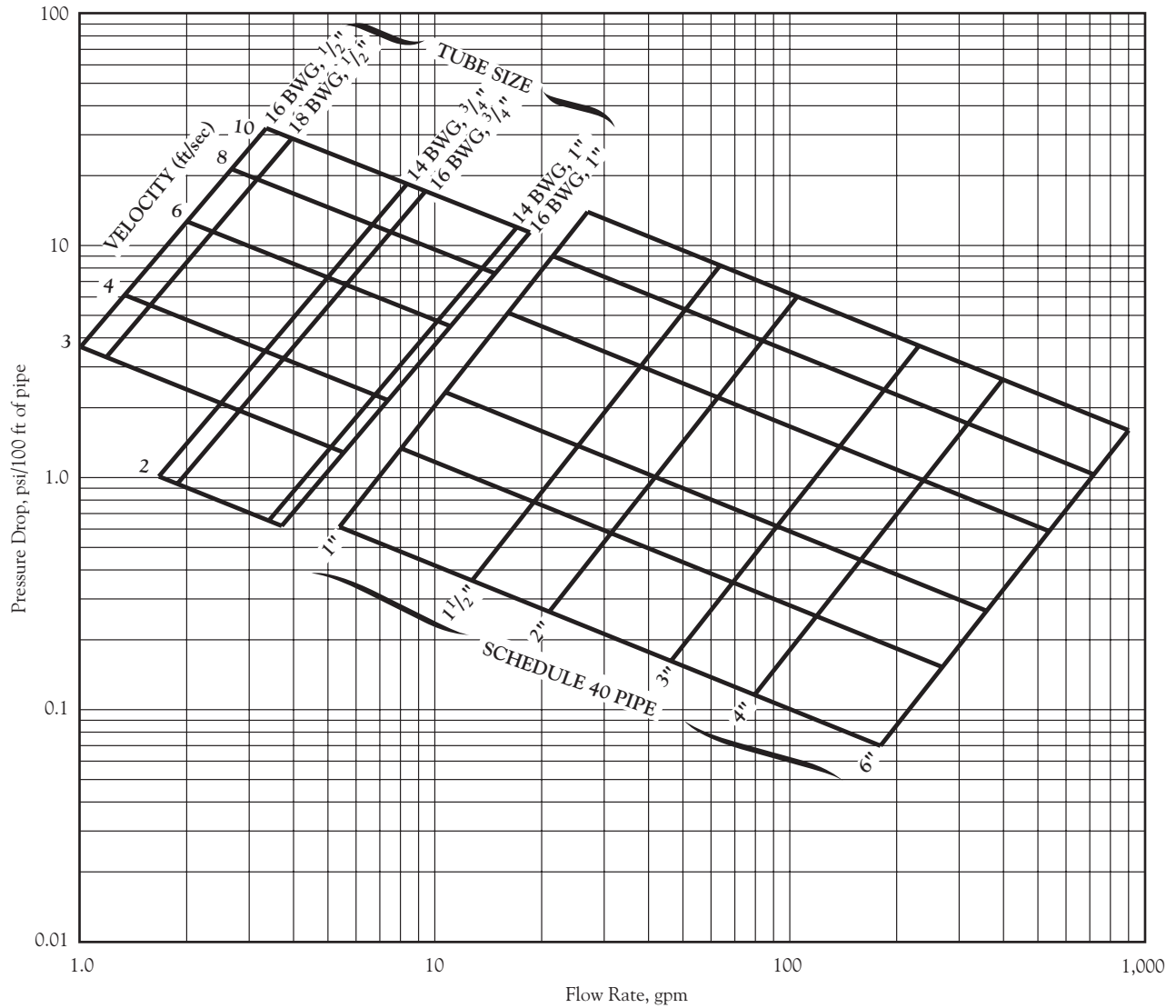
Sieder and Tate equation
Process Heat Transfer,
D.Q. Kern (1950) p. 103

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

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

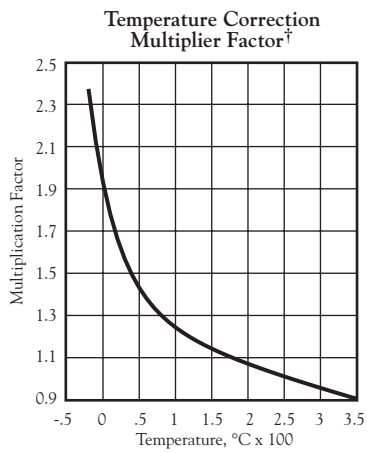
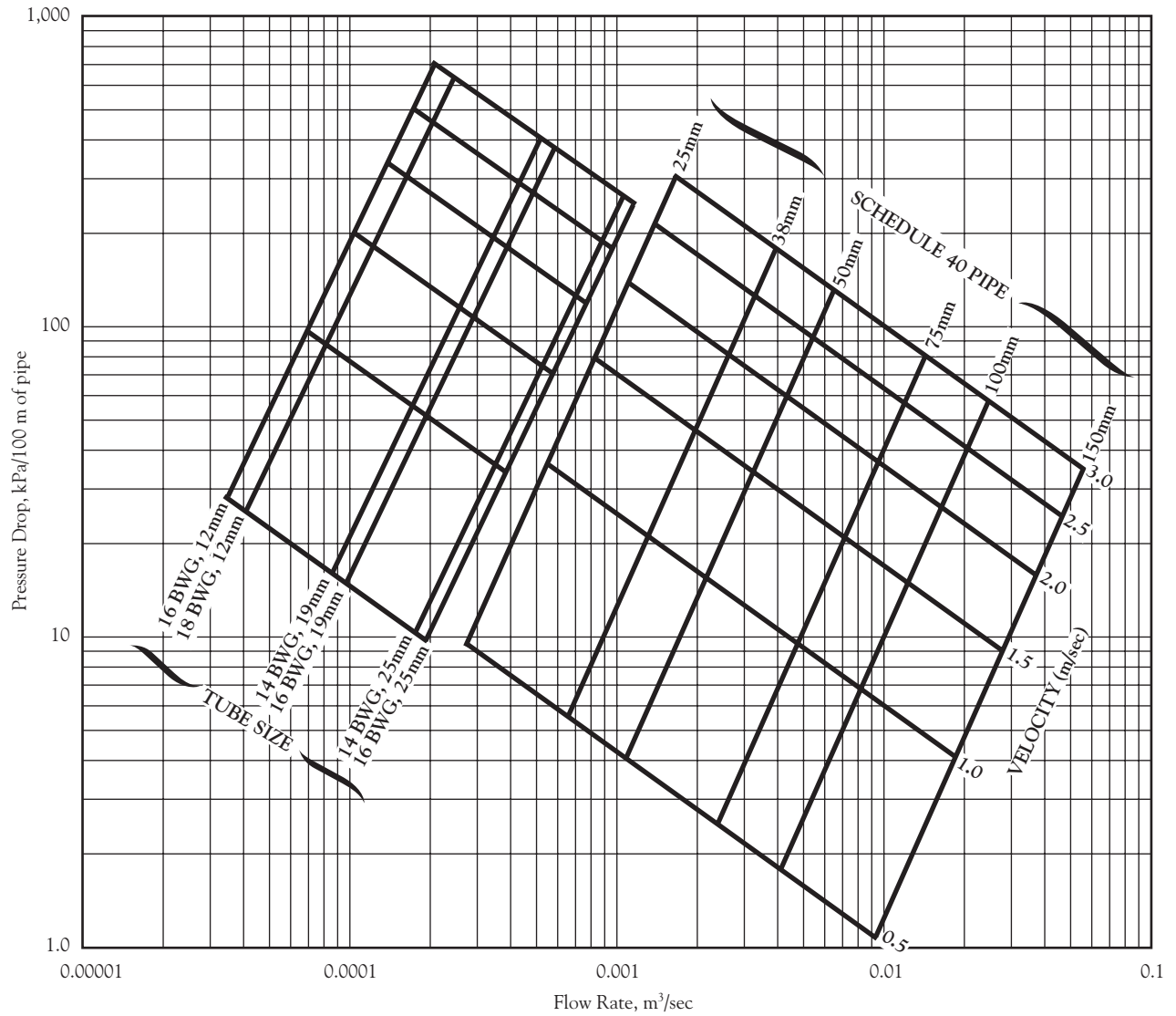
†Note: Below 40°C, an error in the temperature correction factor above 5% may be incurred. This is dependent on the diameter and velocity effect on the Reynolds number and friction factor.

Figure 15—Pressure Drop vs. Flow Rate of DOWTHERM Q Fluid in Schedule 40 Nominal Pipe and BWG Tube (English Units)



†Note: Below 100°F, an error in the temperature correction factor above 5% may be incurred. This is dependent on the diameter and velocity effect on the Reynolds number and friction factor.

Figure 16—Pressure Drop vs. Flow Rate of DOWTHERM Q Fluid in Schedule 40 Nominal Pipe and BWG Tube (SI Units)



†Note: Below 40°C, an error in the temperature correction factor above 5% may be incurred. This is dependent on the diameter and velocity effect on the Reynolds number and friction factor.

Figure 17— Thermal Expansion of DOWTHERM Q Fluid (English Units)

Basis: 1 gallon at 77°F

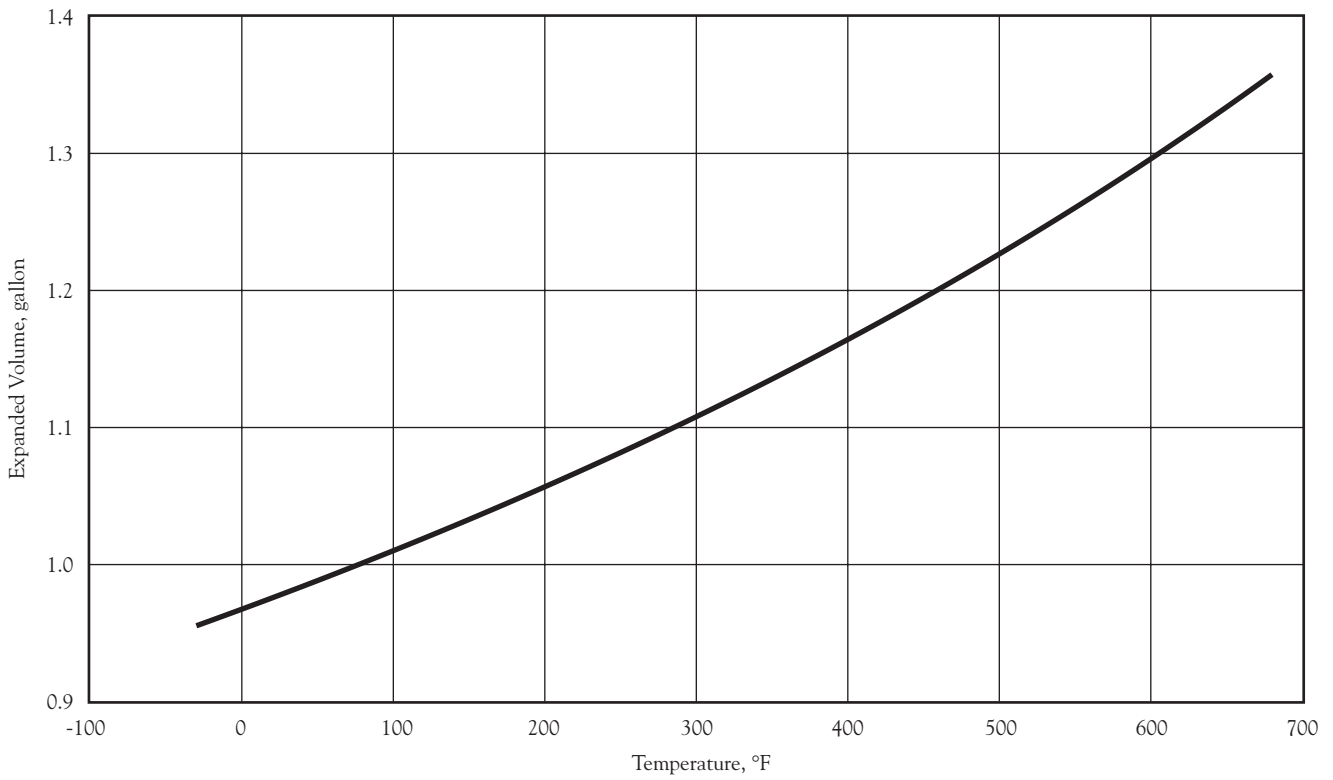


Figure 18— Thermal Expansion of DOWTHERM Q Fluid (SI Units)

Basis: 1 m³ at 25°C

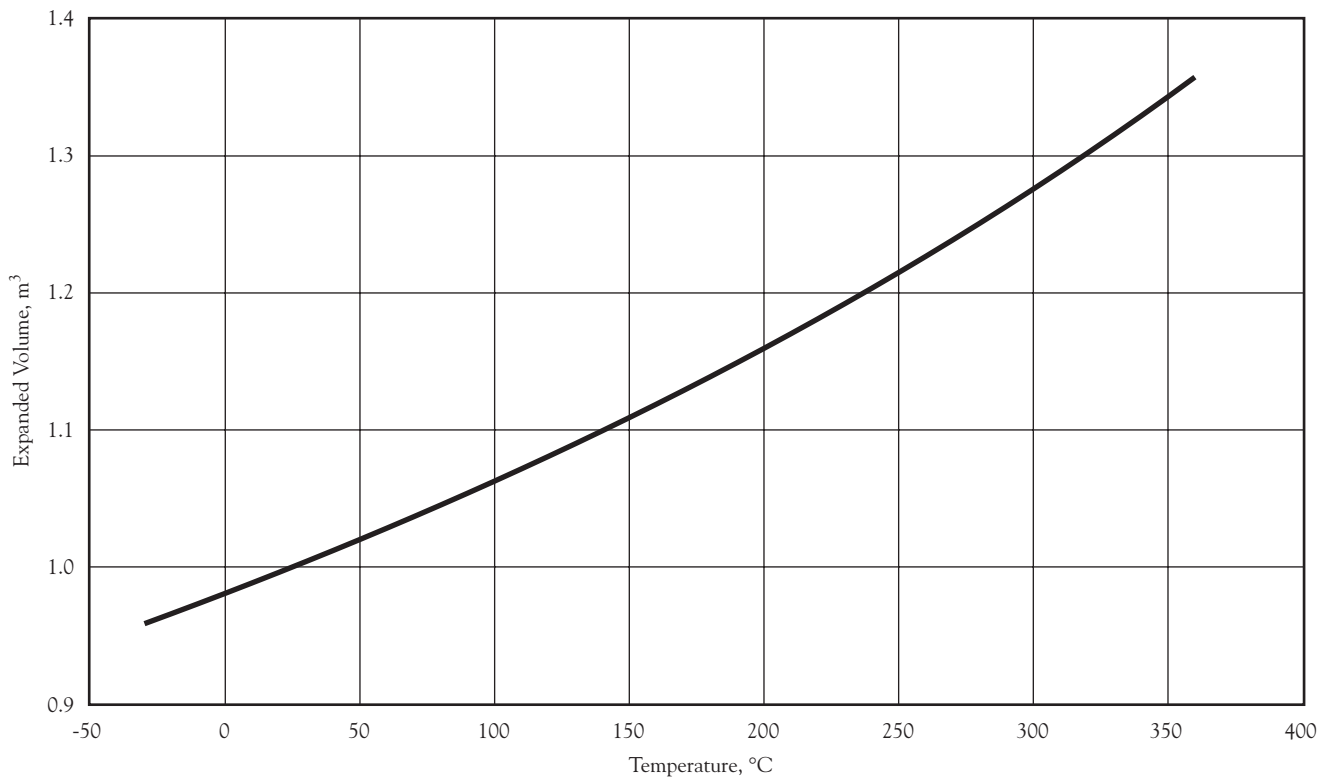
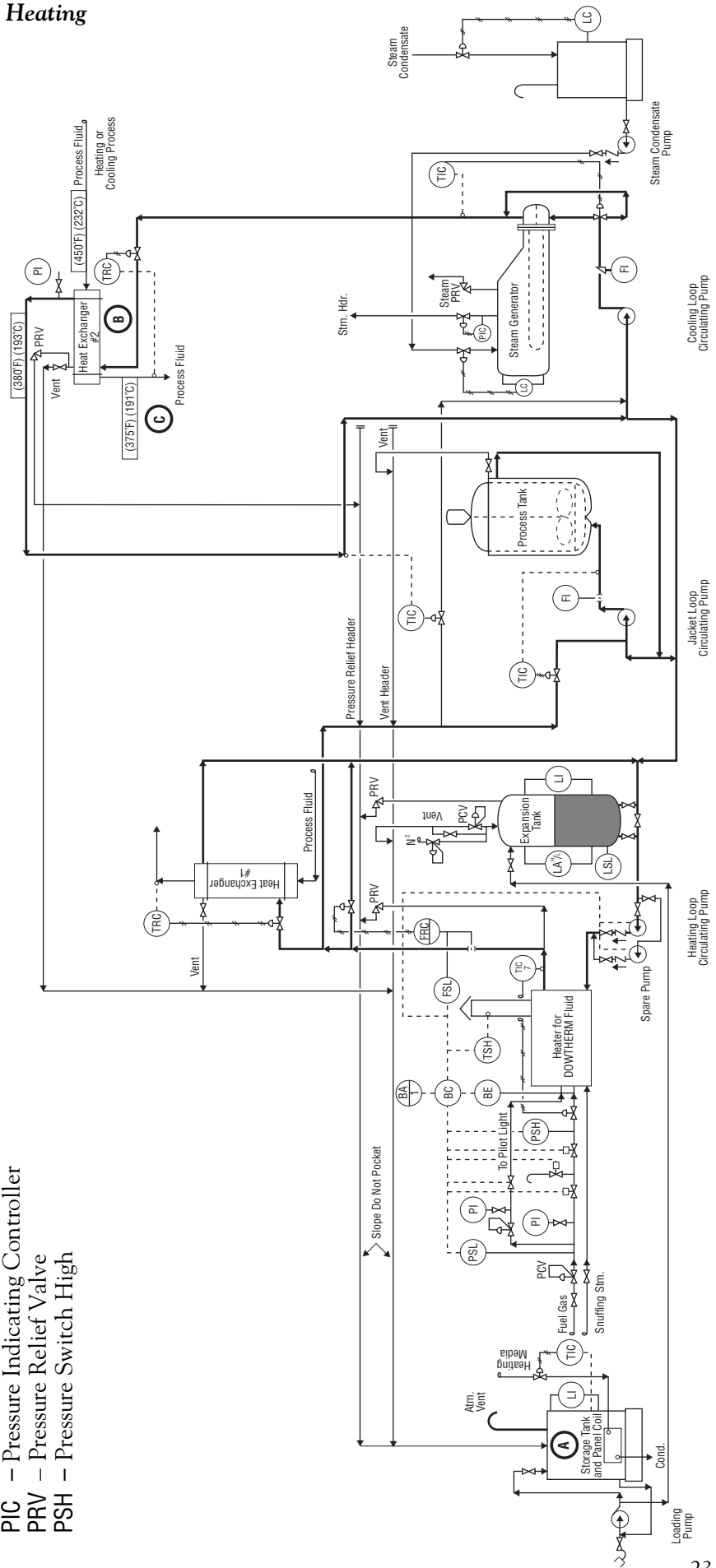


Figure 19— Typical Liquid Phase Heating Scheme Using DOWTHERM Fluids

- 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)** – External heating required if fluid pumpability is limiting in cold weather.
- (B)** – Heat exchanger #2 is cooled with DOWTHERM Q Fluid to avoid any possibility of contaminating the process fluid with water in the event of a tube leak.
- (C)** – Process fluid freezes at 100°F (81°C).



DOWTHERM[®] Q 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 June 1997

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

