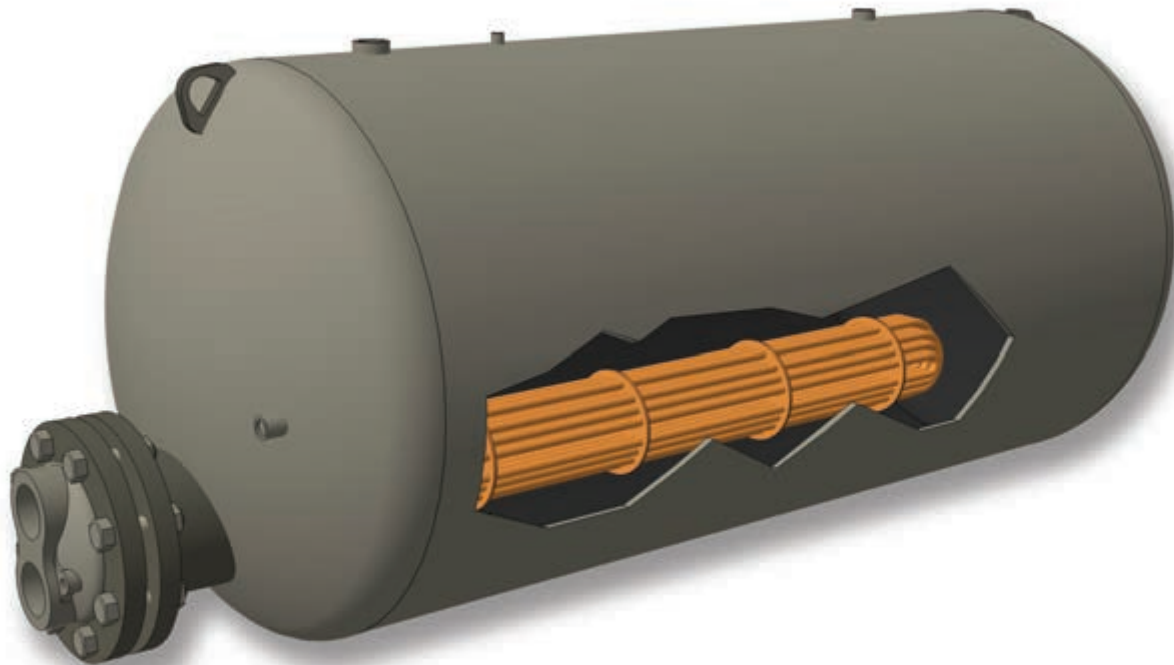


# Submerged Heating Coils



Domestic Water Heating and Steam Generators



STONESTEEL is a registered trademark of Cemline Corporation

**CEMLINE CORPORATION**

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# Construction of Cemline® Submerged Coils

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*Cemline Submerged Heating Coils are manufactured for use in storage tanks or steam generators which utilize steam, boiler water, solar water, or high temperature hot water as a heat source.*

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Cemline Submerged Heating Coils are used to heat water in storage tanks with steam, boiler water, solar water, or high temperature hot water passing through the coil, heating water in the tank.

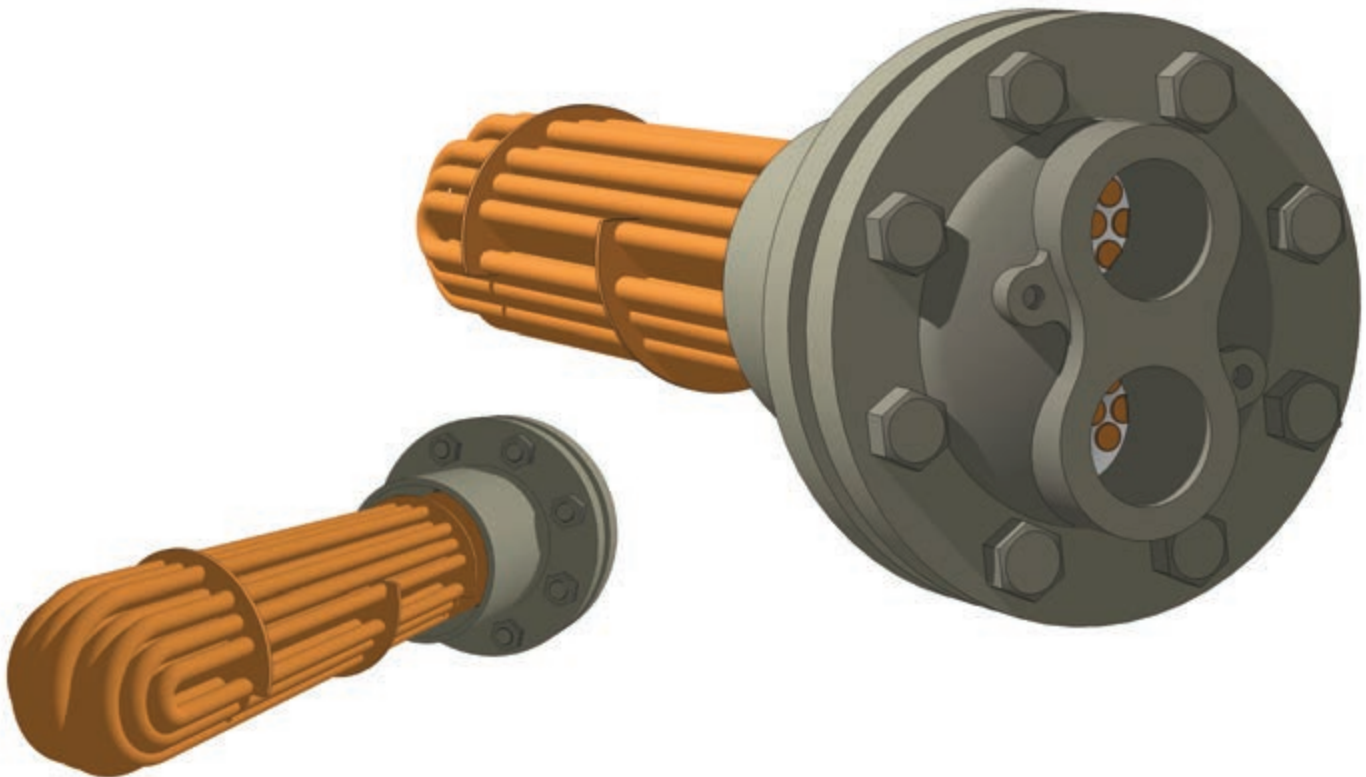
Cemline standard coils are manufactured with 3/4" O.D. copper tubes suitable for 150 psi working pressure, 275° F maximum temperature. Coils for high pressure steam or high temperature boiler water are constructed of 90:10 cupro-nickel, and have a working pressure of 400 psi, and 450° F maximum temperature rating.

Cemline heating coils use the between the bolt tube sheet bolting arrangement to allow tighter gasket seating.

Cemline coils, as shown in this brochure, can be installed in any of the Cement Lined Storage Tanks (CST Series brochure) or Jacketed Storage Tanks (JST Series brochure).

Cemline Submerged Heating Coils are also available as replacement coils. See Cemline Replacement Tube Bundle (RTB Series) brochure for an easy guide to providing information to allow us to fabricate an exact duplicate of an existing coil or exchanger bundle.

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# Submerged Heating Coils

## Standard Features

*Cemline Submerged Heating Coils are manufactured to the highest standards. Each coil is built right the first time — and designed to last. Coils are available with standard equipment as outlined below, or can be built to customer order with optional extras.*

Standard Submerged Coil	Features
<b>Tube Sheet</b> . . . . .	Specific grade steel, precision drilled on latest numerically controlled machines to assure accurate spacing and geometry.
<b>Tubes</b> . . . . .	Seamless deoxidized first quality copper tubes, precision bent and rolled into the tube sheet with torque controlled expander to assure proper tube seating every time.
<b>Spacers</b> . . . . .	Copper spacers precision fabricated to keep tubes in perfect alignment.
<b>Coil Heads</b> . . . . .	Close grain cast iron, cast in modern foundry and accurately machined to final dimensions.
<b>Gaskets</b> . . . . .	Die cut, compressed gasketing material suitable for temperature up to 750° F
<b>Bolts</b> . . . . .	Heavy bolts conforming to ANSI standards assures no leaks or stressing.
<b>Testing</b> . . . . .	Each coil is individually hydrostatically tested to assure final quality.
<b>Warranty</b> . . . . .	Each coil has a warranty for one (1) year.
<b>Military Specifications</b> . . . . .	Coils confirm to latest military specifications.

Options Available	
<b>Copper Lined Tube Sheet (Recommended for Domestic Water Heaters)</b> . . . . .	Economical, yet effective method of protecting water face of tube sheet. A 16 oz. copper sheet is bonded to steel tube sheet to assure a lifetime of rust free water.
<b>Tubing</b> . . . . .	For those applications requiring, we can furnish 90:10 cupro-nickel, admiralty brass or stainless steel tubes, built with the same care and to the same quality standards as our standard coils.
<b>Solid Brass or Other Non-Ferrous Tube Sheets</b> . . . . .	Available option, however, we recommend copper lined tube sheet as being the most suitable.
<b>Fabricated Steel or Brass Head</b> . . . . .	For high pressure (400 psi) or corrosive fluids.
<b>400# Working Pressure at 450° F.</b> . . . . .	Cemline coils can be fabricated for 400 psi working pressure at 450° F for high temperature hot water.

# Recovery Systems Steam Heating Medium

The listing below is for various steam pressures with 40-140° F temperature rise on the recovery side. Coils are available for other steam pressures and/or different temperature rises. Please refer to conversion chart on page 5 or consult factory or local representative for further information.

GPH Water Heated 40-140° F — 100° F Temperature Rise										
Cemline Coil Model No.	Sq. Ft. Heating Surface	Length	Steam Pressure (PSI)							
			0	2	5	10	15	25	50	100
418	2.7	18"	108	113	122	138	146	162	194	232
424	3.7	24"	148	155	167	189	200	222	266	318
430	4.7	30"	188	197	212	240	254	282	338	404
436	5.7	36"	228	239	257	291	308	342	410	490
442	6.7	42"	268	281	302	342	362	402	482	576
448	7.7	48"	308	323	347	393	416	462	554	662
460	9.7	60"	388	407	437	495	524	582	698	834
466	10.7	66"	428	449	482	546	578	642	770	920
472	11.7	72"	468	491	527	597	632	702	842	1,006
484	13.7	84"	548	575	617	699	740	822	986	1,178
618	7.2	18"	288	302	324	367	389	432	518	619
624	9.8	24"	392	412	441	500	529	588	706	843
630	12.4	30"	496	521	558	632	670	744	893	1,066
636	15.0	36"	600	630	675	765	810	900	1,080	1,290
642	17.6	42"	704	739	792	898	950	1,056	1,267	1,514
648	20.0	48"	800	840	900	1,020	1,080	1,200	1,440	1,720
660	25.0	60"	1,000	1,050	1,125	1,275	1,350	1,500	1,800	2,150
666	27.2	66"	1,088	1,142	1,224	1,387	1,469	1,632	1,958	2,339
672	31.0	72"	1,240	1,302	1,395	1,581	1,674	1,860	2,232	2,666
684	36.0	84"	1,440	1,512	1,620	1,836	1,944	2,160	2,592	3,096
696	41.0	96"	1,640	1,722	1,845	2,091	2,214	2,460	2,952	3,526
824	15	24"	600	630	675	765	810	900	1,080	1,290
830	20	30"	800	840	900	1,020	1,080	1,200	1,440	1,720
836	25	36"	1,000	1,050	1,125	1,275	1,350	1,500	1,800	2,150
842	30	42"	1,200	1,260	1,350	1,530	1,620	1,800	2,160	2,580
848	34	48"	1,360	1,428	1,530	1,734	1,836	2,040	2,448	2,924
860	44	60"	1,760	1,848	1,980	2,224	2,376	2,640	3,168	3,784
866	49	66"	1,960	2,058	2,205	2,499	2,646	2,940	3,528	4,214
872	53	72"	2,120	2,226	2,385	2,703	2,862	3,180	3,816	4,558
884	63	84"	2,520	2,646	2,835	3,213	3,402	3,780	4,536	5,418
896	72	96"	2,880	3,024	3,240	3,672	3,888	4,320	5,184	6,192
8108	81	108"	3,240	3,402	3,645	4,131	4,374	4,860	5,832	6,966
1024	27	24"	1,080	1,134	1,215	1,377	1,458	1,620	1,944	2,322
1030	35	30"	1,400	1,470	1,575	1,785	1,890	2,100	2,520	3,010
1036	42	36"	1,680	1,764	1,890	2,142	2,268	2,520	3,024	3,612
1042	50	42"	2,000	2,100	2,250	2,550	2,700	3,000	3,600	4,300
1048	57	48"	2,280	2,394	2,565	2,907	3,078	3,420	4,104	4,902
1060	72	60"	2,880	3,024	3,240	3,672	3,888	4,320	5,184	6,192
1066	80	66"	3,200	3,360	3,600	4,080	4,320	4,800	5,760	6,880
1072	87	72"	3,480	3,654	3,915	4,437	4,698	5,220	6,264	7,482
1084	102	84"	4,080	4,284	4,590	5,202	5,508	6,120	7,344	8,772
1096	117	96"	4,680	4,914	5,265	5,967	6,318	7,020	8,424	10,062
10108	130	108"	5,200	5,460	5,850	6,630	7,020	7,800	9,360	11,180
1236	63	36"	2,520	2,646	2,835	3,213	3,402	3,780	4,536	5,418
1248	87	48"	3,480	3,654	3,915	4,437	4,698	5,220	6,264	7,482
1260	111	60"	4,440	4,662	4,995	5,661	5,994	6,660	7,992	9,546
1272	135	72"	5,400	5,670	6,075	6,885	7,290	8,100	9,720	11,610
1284	159	84"	6,360	6,678	7,155	8,109	8,586	9,540	11,448	13,674
1296	161	96"	6,440	6,762	7,245	8,211	8,694	9,660	11,592	13,846
12108	181	108"	7,240	7,602	8,145	9,231	9,774	10,860	13,032	15,566
12120	202	120"	8,080	8,484	9,090	10,302	10,908	12,120	14,544	17,372
1436	82	36"	3,280	3,444	3,690	4,182	4,428	4,920	5,904	7,052
1448	111	48"	4,440	4,662	4,995	5,661	5,994	6,660	7,992	9,546
1460	141	60"	5,640	5,922	6,345	7,191	7,614	8,460	10,152	12,126
1472	170	72"	6,800	7,140	7,650	8,670	9,180	10,200	12,240	14,620
1484	199	84"	7,960	8,358	8,955	10,149	10,746	11,940	14,328	17,114
1496	229	96"	9,160	9,618	10,305	11,679	12,366	13,740	16,488	19,694
14108	258	108"	10,320	10,836	11,610	13,158	13,932	15,480	18,576	22,188
14120	288	120"	11,520	12,096	12,960	14,688	15,552	17,280	20,736	24,768

# Conversion Table — Steam Factors to Calculate Variations in Temperature Rises

The table as shown is to aid in sizing the proper Cemline coil required when conditions vary from 40-140° F. temperature rises shown on Recovery System chart (page 4).

		Conversion Factor							
Inlet Temperature °F	Outlet Temperature °F	Steam Pressure (PSI)							
		0	2	5	10	15	25	50	100
40°	80°	3.32	3.30	3.24	3.06	3.09	3.00	2.89	3.07
	100°	2.05	2.03	2.02	1.92	1.94	1.90	1.83	1.81
	120°	1.25	1.03	1.38	1.35	1.35	1.35	1.31	1.29
	140°	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	160°	.73	.74	.75	.74	.78	.77	.78	.78
	180°	.53	.54	.55	.57	.59	.60	.63	.64
50°	80°	4.32	4.30	4.22	4.00	4.04	4.00	3.80	3.74
	100°	2.40	2.38	2.35	2.55	2.26	2.23	2.15	2.15
	120°	1.55	1.55	1.55	1.51	1.52	1.52	1.47	1.46
	140°	1.10	1.10	1.11	1.07	1.09	1.08	1.08	1.08
	160°	.78	.79	.80	.80	.81	.83	.83	.85
	180°	.55	.56	.57	.61	.61	.65	.67	.67
60°	80°	6.25	6.20	6.15	5.80	5.91	5.88	5.58	5.52
	100°	2.88	2.88	2.87	2.72	2.78	2.73	2.64	2.64
	120°	1.75	1.75	1.76	1.71	1.72	1.72	1.68	1.67
	140°	1.18	1.18	1.20	1.16	1.18	1.20	1.19	1.20
	160°	.82	.84	.87	.84	.87	.88	.89	.92
	180°	.55	.57	.62	.63	.65	.68	.69	.72

To convert FROM other temperature conditions to 40-140° F temp. rise:

FORMULA: Factor divided into GPH at desired temp. rise = GPH at 40-140° F temp. rise.

Example #1 (using 5 psi steam)

400 GPH @ 40-180° F temp. rise  
Factor (see chart) — .55  
400 GPH ÷ .55 = 727 GPH, 40-140° F temp. rise

Select Cemline coil no. 642 or 830 coil  
(closest GPH to 727 which will fit into storage tank selected)

Example #2 (using 5 psi steam)

500 GPH @ 60-140° F temp. rise  
Factor (see chart) — .120  
500 GPH ÷ 1.20 = 417 GPH, 40-140° F temp. rise

Select Cemline coil no. 460 or 624 coil  
(closest GPH to 417 which will fit into storage tank selected)

To convert FROM 40-140° F temp. rise TO other temperature conditions:

FORMULA: Factor multiplied by GPH at 40-140° F temp. rise = GPH at desired temp. rise.

Example #1 (using 10 psi steam)

600 GPH, @ 40-160° F. temp. rise  
Factor (see chart) — .74  
600 GPH x .74 = 444 GPH, 40-160° F temp. rise

Select Cemline coil no. 484 or 636 coil  
(the coil will supply 600 GPH, 40-140° F. or 444 GPH, 40-160° F.)

# Recovery Systems

## Boiler Water — Heating Medium

The listing below is for various boiler water and high temperature hot water heating mediums when used with 40-140° F temperature rise on the recovery side. Coils are available for other temperatures not listed and/or different temperature rises. Please refer to conversion chart on page 7.

GPH Water Heated 40-140° F. — 100° F. Temperature Rise												
Cemline Coil Model No.	Sq. Ft. Heating Surface	Length	180° BW		190° BW		200° BW		212° BW		380° BW	
			Wtr. Htd. GPH	GPM BW REQ'D.	Wtr. Htd. GPH	GPM BW REQ'D.	Wtr. Htd. GPH	GPM BW REQ'D.	Wtr. Htd. GPH	GPM BW REQ'D.	Wtr. Htd. GPH	GPM BW REQ'D.
418	2.7	18"	49	4.1	57	4.7	65	5.4	76	6.3	114	1.1
424	3.7	24"	67	5.6	78	6.5	89	7.4	104	8.6	163	1.6
430	4.7	30"	85	7.1	99	8.2	113	9.4	132	11.0	197	1.9
436	5.7	36"	103	8.5	120	10.0	137	11.3	160	13.3	226	2.2
442	6.7	42"	121	10.0	141	11.7	161	13.4	188	15.6	281	2.8
448	7.7	48"	139	11.5	162	13.4	185	15.4	216	17.9	322	3.1
460	9.7	60"	175	14.5	204	17.0	233	19.3	272	22.8	407	4.1
466	10.7	66"	193	16.0	225	18.7	257	21.3	300	24.9	449	4.5
472	11.7	72"	211	17.5	246	20.4	281	23.3	328	27.2	491	4.9
484	13.7	84"	247	20.5	288	23.9	329	27.3	384	31.9	575	5.7
618	7.2	18"	130	10.8	151	12.5	173	14.4	202	16.8	180	1.8
624	9.8	24"	177	14.7	206	17.1	235	19.5	274	22.7	240	2.4
630	12.4	30"	223	18.5	260	21.6	298	24.7	347	28.8	310	3.1
636	15.0	36"	270	22.4	315	26.1	360	30.0	420	34.9	384	3.7
642	17.6	42"	317	26.3	370	30.7	422	35.0	493	41.0	440	4.4
648	20.0	48"	360	29.9	420	34.9	480	39.8	560	46.5	528	5.1
660	25.0	60"	450	37.4	525	43.6	600	49.8	700	58.1	625	6.2
666	27.2	66"	490	40.7	571	47.4	653	54.2	762	63.2	680	6.8
672	31.0	72"	558	46.3	651	54.0	744	61.8	868	72.0	775	7.7
684	36.0	84"	648	53.8	756	62.7	864	71.7	1008	83.7	900	9.0
696	41.0	96"	738	61.3	861	71.5	984	81.7	1148	95.3	1025	10.2
824	15	24"	270	22.4	315	26.1	360	29.9	420	34.9	384	3.7
830	20	30"	360	30.1	420	34.9	480	39.8	560	46.5	480	4.8
836	25	36"	450	37.4	525	43.6	600	49.8	700	58.1	571	5.5
842	30	42"	540	44.8	630	52.3	720	59.8	840	69.7	720	7.2
848	34	48"	612	51.0	714	59.3	816	67.7	952	79.0	763	7.3
860	44	60"	792	66.0	924	76.7	1056	87.6	1232	102.2	1052	10.1
866	49	66"	882	73.2	1029	85.4	1176	97.6	1372	114.0	1176	11.7
872	53	72"	954	79.2	1113	92.4	1272	105.6	1484	123.1	1272	12.7
884	63	84"	1134	94.1	1323	110.0	1512	125.5	1764	146.4	1512	15.1
896	72	96"	1296	108.0	1512	125.5	1728	143.4	2016	167.3	1728	17.3
8108	81	108"	1458	121.0	1701	141.2	1944	161.3	2268	188.2	1944	19.4
1024	27	24"	486	40.3	567	47.1	648	53.8	756	62.7	729	7.3
1030	35	30"	630	52.3	735	61.0	840	69.7	980	81.3	805	8.0
1036	42	36"	756	62.7	882	73.2	1008	83.7	1176	97.6	945	9.0
1042	50	42"	900	74.7	1050	87.1	1200	99.6	1400	116.2	1200	12.0
1048	57	48"	1026	85.2	1197	99.4	1368	113.5	1596	132.5	1584	15.1
1060	72	60"	1296	108.0	1512	125.5	1728	143.4	2016	167.3	1903	18.2
1066	80	66"	1440	120.0	1680	139.4	1920	159.4	2240	185.9	1920	19.2
1072	87	72"	1566	130.0	1827	151.6	2088	173.3	2436	202.2	2088	20.9
1084	102	84"	1836	152.3	2142	177.8	2448	203.2	2856	237.0	2448	24.4
1096	117	96"	2106	175.0	2457	204.0	2808	233.1	3276	272.0	2808	28.0
10108	130	108"	2340	194.2	2730	227.1	3120	259.0	3640	302.1	3120	31.2
1236	63	36"	1134	94.1	1323	110.0	1512	125.4	1764	146.4	1584	15.1
1248	87	48"	1566	130.0	1827	152.0	2088	173.3	2436	202.1	2223	21.2
1260	111	60"	1998	166.0	2331	193.4	2664	221.1	3108	258.0	2702	25.7
1272	135	72"	2430	202.0	2835	235.3	3240	269.0	3780	314.0	3322	31.7
1284	159	84"	2862	238.0	3339	277.1	3816	317.0	4452	370.0	3975	39.8
1296	161	96"	2898	241.0	3381	281.0	3864	321.0	4508	374.1	4025	40.2
12108	181	108"	3258	270.4	3801	315.4	4344	361.0	5068	421.0	4525	45.2
12120	202	120"	3636	302.0	4242	352.1	4848	402.3	5656	469.4	5050	50.5
1436	82	36"	1476	123.0	1722	143.0	1968	163.3	2296	191.0	1884	18.0
1448	111	48"	1998	166.0	2331	193.4	2664	221.1	3108	258.0	2542	24.2
1460	141	60"	2538	211.0	2961	246.0	3384	281.0	3948	328.0	3181	30.3
1472	170	72"	3060	254.0	3570	296.3	4080	339.0	4760	395.0	3801	36.3
1484	199	84"	3582	297.3	4179	347.0	4776	396.4	5572	462.4	4975	49.7
1496	229	96"	4122	342.1	4809	399.1	5496	456.1	6142	532.1	5725	57.2
14108	258	108"	4644	385.4	5418	450.0	6192	514.0	7224	617.4	6450	64.5
14120	288	120"	5184	430.2	6048	502.0	6912	574.0	8064	669.3	7200	72.0

# Conversion Table — Boiler Water Factors to Calculate Variations in Temperature Rises

The table as shown is to aid in sizing the proper Cemline coil required when conditions vary from 40-140° F temperature rises shown on Recovery System chart (page 6).

Inlet Temperature °F	Outlet Temperature °F	Conversion Factor			
		Boiler Water Temperature °F			
		180°	190°	200°	212°
40°	80°	3.78	3.60	3.40	3.25
	100°	2.28	2.20	2.11	2.04
	120°	1.50	1.45	1.42	1.39
	140°	1.00	1.00	1.00	1.00
	160°	.56	.62	.64	.71
	180°	—	—	.42	.46
50°	80°	4.89	4.60	4.42	4.11
	100°	2.61	3.50	2.42	2.32
	120°	1.61	1.58	1.56	1.54
	140°	1.06	1.06	1.06	1.07
	160°	.61	.64	.68	.75
	180°	—	—	.43	.50
60°	80°	7.22	6.90	6.50	6.10
	100°	3.11	3.01	2.92	2.82
	120°	1.78	1.76	1.74	1.71
	140°	1.11	1.12	1.13	1.14
	160°	.61	.65	.69	.79
	180°	—	—	.43	.50

For high temperature hot water variations — please consult factory.

**To convert FROM other temperature conditions to 40-140° F temp. rise:**

**FORMULA:** Factor divided into GPH at desired temp. rise = GPH at 40-140° F temp. rise.

**Example #1** (using 200° F boiler water)

400 GPH @ 40-160° F temp. rise  
 Factor (see chart) — .64  
 $400 \text{ GPH} \div .64 = 625 \text{ GPH, } 40-140^\circ \text{ F temp. rise}$

Select Cemline coil no. 666 or 842 coil  
 (closest GPH to 625 which will fit into storage tank selected)

**Example #2** (using 180° boiler water)

350 GPH @ 60-160° F temp. rise  
 Factor (see chart) — .61  
 $350 \text{ GPH} \div .61 = 574 \text{ GPH, } 40-140^\circ \text{ F temp. rise}$

Select Cemline coil no. 684 or 848 coil  
 (closest GPH to 574 which will fit into storage tank selected)

**To convert FROM 40-140° F temp. rise TO other temperature conditions:**

**FORMULA:** Factor multiplied by GPH at 40-140° F temp. rise = GPH at desired temp. rise.

**Example #1** (using 200° F boiler water)

1500 GPH, @ 50-140° F temp. rise  
 Factor (see chart) — 1.06  
 $1500 \text{ GPH} \times 1.06 = 1590 \text{ GPH, } 50-140^\circ \text{ F temp. rise}$

Select Cemline coil no. 884 or 1060 coil  
 (the coil will supply 1500 GPH, 40-140° F or 1590 GPH, 50-140° F)

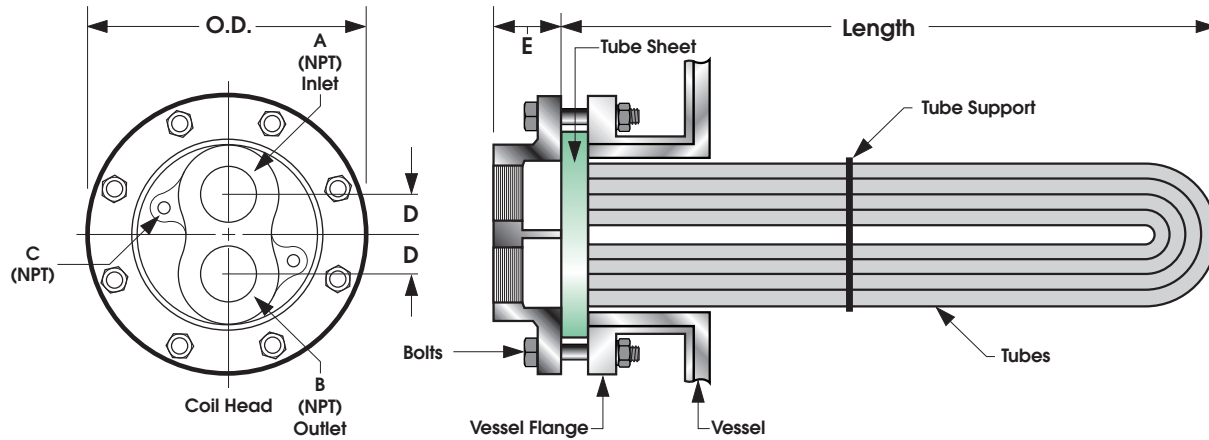




# Cemline Submerged Coils



*Cemline coils are furnished with dimensions as shown below.*



Coil Size	Steam/Boiler Water 150 PSI Maximum Working Pressure Cast Iron Head					High Pressure Steam/High Temperature Hot Water 400 PSI Maximum Working Pressure Fabricated Steel Head				
	O.D.	A&B	C	D	E	O.D.	A&B	C	D	E
4"	9"	1 1/2"	1/4"	1 1/4"	1 3/4"	10"	1"	1/4"	1 1/4"	3"
6"	11"	2"	1/4"	2"	2 3/4"	12 1/2"	1 1/2"	1/4"	1 1/2"	4"
8"	13 1/2"	3"	1/4"	2 1/2"	2 1/2"	15"	2"	1/4"	2"	5"
10"	16"	4"	1/4"	3 3/8"	2 3/4"	17 1/2"	2 1/2"	1/4"	2 1/2"	6"
12"	19"	4"	1/4"	4 3/8"	3 1/4"	20 1/2"	3"	1/4"	3"	7"
14"	21"	4"	1/4"	4"	4 1/2"	23"	3"	1/4"	3"	7 1/2"

Coil lengths are shown on recovery system charts (pages 4 & 6)

Refer to Section I, and Section II of the Cemline catalog for a complete guide to sizing and selecting a storage tank for use with a submerged heating bundle. Section I describes un-insulated tanks, and Section II describes tanks which feature the convenience of factory insulation and enameled steel jacket. Both type tanks are A.S.M.E. Code constructed and stamped and are provided with Cemline's exclusive Stonesteel® lining. Stonesteel® lining has proven over 50 years to be the most effective lining made to protect the inner tank surface from rust and corrosion and prevent failure of hot water storage tanks and hot water generators.

To replace an existing bundle see "Cemline Replacement Tube Bundle" catalog section.

