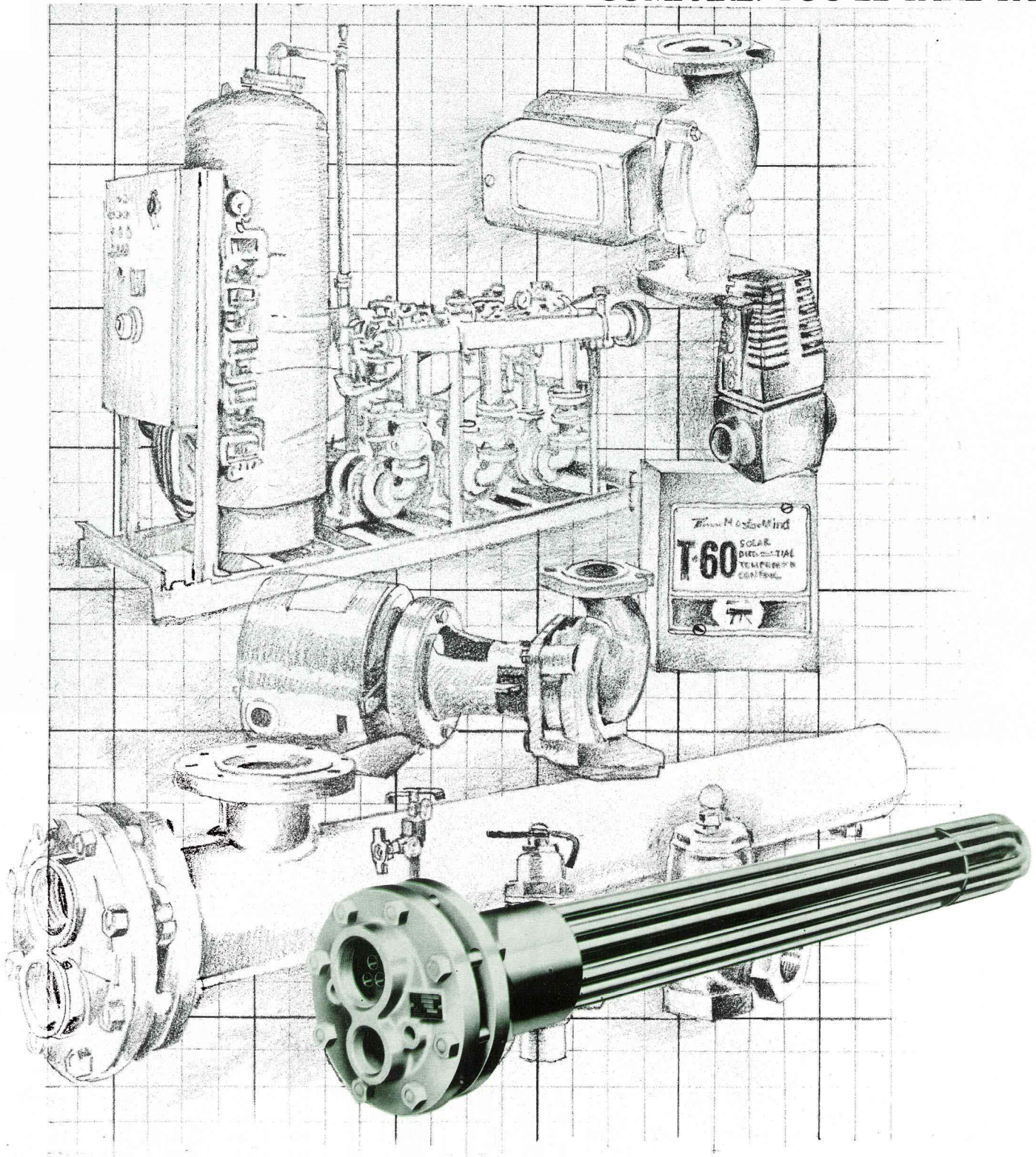




COMPARE. YOU'LL TAKE TACO.

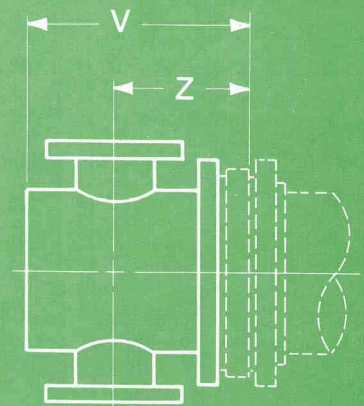
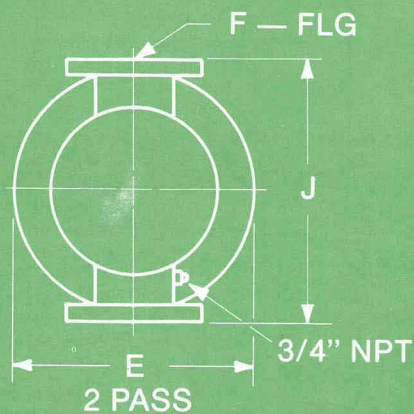
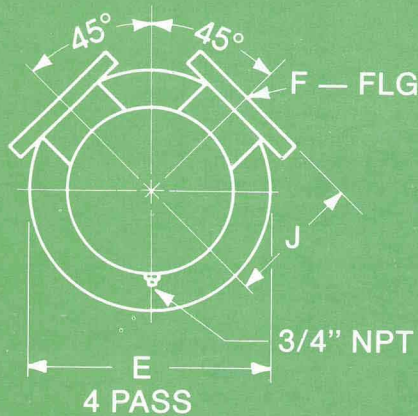


TANK HEATING UNITS

CATALOG 200-3

SPECIFICATIONS AND

STEEL HEADS



UNIT DIA. IN.	MAT'L			TEST PRESS PSI	WORKING PRESS		MAX OPER TEMP °F	A	B	C	D	E	2 PASS				
	TUBING 3/4" O.D.	TUBE PLATE	HEAD		TUBE SIDE ASME PSI	TANK SIDE ASME PSI							J	F	V	Z	
TA & TB SERIES																	
4 (1)	C O P P E R	S T E E L	C.I. C.I. C.I. C.I. S T E E L	300	150	150	375	4 1/2	9	.237	4	9	2 1/2	1 1/2 T	2 1/2	10 12 1/4 13 1/4 13 7/8 15	
6								6 5/8	9	.280	6	11	4	2T	2 3/4		
8								8 3/8	9	.322	7	13 1/2	5	3T	3 1/4		
10								10 3/4	9	.365	8	16	6 1/4	3T	3 3/8		
12								12 3/4	10	.375	9	19	24	4F (2)	14 3/4		
14								14	10	.375	11	21	26	6F (2)	18 1/4		
16								16	10	.375		23 1/2	28 1/2	6F (2)	19 1/2		
18								18	10	.375		25	30	6F (2)	20 1/8		
20								20	10	.375		27 1/2	32 1/2	6F (2)	21 1/2		
TX SERIES																	
4	90-10 CU-N1	S T E E L	S T E E L	600	400	150	450	4 1/2	9	.237	4	10	13 1/2	1 1/2 F (3)	10 1/4	7	
6								6 5/8	9	.280	6	12 1/2	16	2 1/2 F (3)	11 3/8	7 3/8	
8								8 3/8	9	.322	7	15	18 1/2	2 1/2 F (3)	11 3/8	7 1/8	
10								10 3/4	9	.365	8	17 1/2	21	4F (3)	15 7/8	10 1/2	
12								12 3/4	10	.375	9	20 1/2	24	4F (3)	15 7/8	10 1/4	

(1) TA ONLY

* CAST IRON

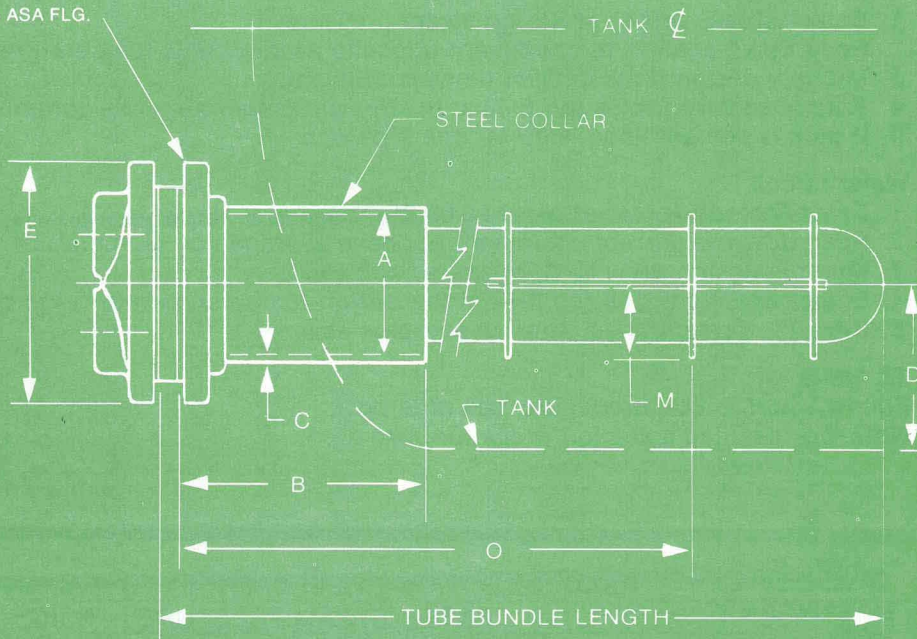
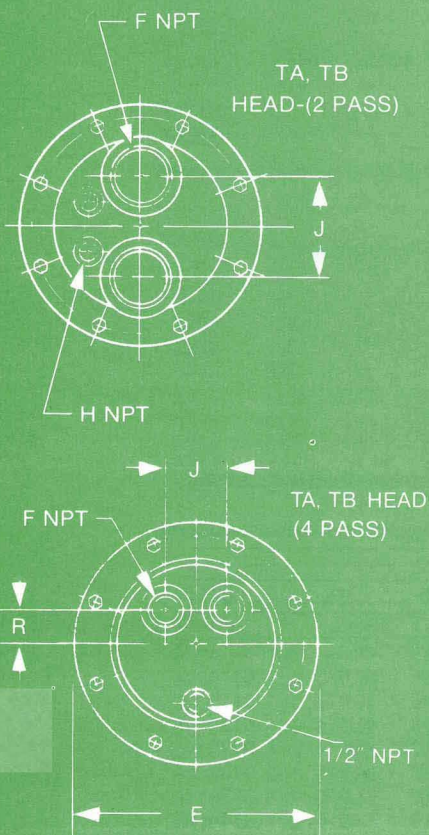
(2) 150 # FLGS

(3) 300 # FLGS

DIMENSIONS

C.I. HEADS

TA & TB — 150 LB ASA STD FLG.
TX — 300 LB ASA FLG.



4 PASS					H	(TA) M	(TB) M	(TX) M	BOLT HOLES		DIA. B. C.	COLLAR WT. LBS.
J	R	F	V	Z					SIZE	QTY		
2 3/8	7/8	1T	2 1/2		1/4 T	2			3/4	8	7 1/2	20
3 3/4	1 1/4	1 1/2 T	2 3/4		1/2 T	3			7/8	8	9 1/2	31
4	2	2T	3 1/4		3/4 T	3 15/16	2		7/8	8	11 3/4	50
5 1/2	2 1/4	3T	3 7/8		3/4 T	4 15/16	3 15/16		1	12	14 1/4	68
12		3F (2)	14 3/4	10 1/4		5 15/16	4 15/16		1	12	17	103
13		4F (2)	18 1/4	11 1/2		6 9/16	5 15/16		1 1/8	12	18 3/4	128
14 1/4		4F (2)	19 1/2	12		7 9/16	6 9/16		1 1/8	16	21 1/4	140
15		4F (2)	20 1/8	12 5/8		8 9/16	7 9/16		1 1/4	16	22 3/4	173
16 1/4		4F (2)	21 1/2	14		9 9/16	8 9/16		1 1/4	20	25	214
6 3/4		1F (3)	8 1/2	5 1/2				2	7/8	8	7 7/8	30
7 3/4		1 1/2 F (3)	9 3/8	5 7/8				3	7/8	12	10 5/8	51
9 1/4		2F (3)	10 5/8	6 5/8				3 15/16	1	12	13	79
10 1/2		2 1/2 F (3)	14 1/8	9 9/8				4 15/16	1 1/8	16	15 1/4	113
12		3F (3)	15 5/8	10 3/8				5 15/16	1 1/4	16	17 3/4	167

TUBE BUNDLE LENGTH IN INCHES	42	48	54	60	66	72	78	84	90	96	102	108	114	120
"O" SUPPORT LOCATION	22	28	34	40	46	48	54	56	56	64	64	64	68	76

TANK UNIT SELECTION PROCEDURE

Only 5 simple steps to size any tank unit.

Steam in coil

1. Enter Table S (pg. 4) at design steam pressure.
2. Read down column to coefficient opposite average tank temperature.
3. Multiply design draw in GPH times coefficient.
4. Enter Capacity Tables (pg. 5-7) at the design temperature rise column and select unit.
5. If tank is cement lined, step up one pipe size.

Water in coil

1. Enter Table W (pg. 4) at average tank water temperature.
2. Read down to correct coefficient opposite average coil temperature.
3. Multiply design draw in GPH times coefficient.
4. Enter capacity tables (pg. 5-7) at the design temperature rise column and select unit.
5. If tank is cement lined, step up one pipe size.

TX Units

Follow water in coil procedure; see note pg. 8.

Note: For detailed selection procedure see pg. 7.

TABLE S

READ SELECTION COEFFICIENTS — STEAM IN COIL

ENTER AVERAGE TANK TEMP. °F	ENTER STEAM PRESSURE — PSIG										
	0	2	5	10	15	20	30	40	50	75	100
60	.03	.027	.025	.022	.021	.019	.017	.015	.014	—	—
70	.031	.029	.027	.024	.022	.02	.018	.016	.015	—	—
80	.033	.03	.028	.025	.022	.021	.018	.016	.015	.013	.011
90	.036	.033	.03	.026	.024	.022	.019	.017	.016	.013	.011
100	.039	.035	.032	.028	.025	.023	.02	.018	.016	.014	.012
110	.043	.039	.035	.03	.027	.024	.021	.018	.017	.014	.012
120	.047	.042	.037	.032	.028	.026	.022	.02	.018	.015	.013
130	.053	.046	.041	.035	.03	.027	.023	.02	.018	.015	.013
140	.061	.053	.046	.038	.033	.03	.025	.022	.019	.016	.014
150	.071	.062	.052	.043	.037	.032	.027	.023	.021	.017	.014
160	.09	.072	.061	.048	.041	.035	.029	.025	.022	.017	.015
170	.108	.088	.071	.055	.046	.039	.032	.027	.024	.019	.016
180	.153	.115	.09	.065	.053	.045	.036	.029	.026	.02	.017
190	.235	.163	.117	.079	.063	.051	.039	.033	.028	.021	.017

TABLE W

READ SELECTION COEFFICIENTS — WATER IN COIL

ENTER AVERAGE COIL TEMP. °F	ENTER AVERAGE TANK WATER TEMP.									
	60	70	80	90	100	110	120	130	140	
70	1.316	—	—	—	—	—	—	—	—	—
80	.535	1.22	—	—	—	—	—	—	—	—
90	.319	.503	1.136	—	—	—	—	—	—	—
100	.215	.295	.478	1.087	—	—	—	—	—	—
110	.157	.202	.28	.442	1.02	—	—	—	—	—
120	.123	.149	.189	.265	.417	.98	—	—	—	—
130	.099	.116	.14	.181	.248	.397	.909	—	—	—
140	.081	.092	.11	.134	.171	.235	.375	.877	—	—
150	.068	.076	.087	.104	.126	.16	.224	.358	.82	—
160	.057	.064	.073	.084	.098	.119	.151	.214	.336	—
170	.05	.054	.06	.069	.079	.093	.112	.146	.201	—
180	.044	.047	.053	.058	.065	.074	.088	.108	.138	—
190	.038	.041	.045	.05	.054	.062	.071	.085	.104	—
200	.033	.037	.039	.044	.046	.052	.058	.067	.08	—
210	.029	.032	.036	.038	.04	.045	.049	.055	.065	—
220	.025	.028	.031	.035	.036	.038	.042	.047	.053	—
230	.023	.025	.028	.031	.033	.035	.037	.041	.045	—
240	.020	.022	.025	.027	.030	.032	.033	.035	.038	—
250	.018	.020	.022	.024	.027	.029	.030	.032	.033	—
260	.016	.018	.019	.021	.024	.026	.028	.029	.030	—

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
4204TA	46	23	15	12	9	8	7	6	5	4.6	4.2	3.8	3.5	3.3
4206TA	70	35	23	18	14	12	10	9	8	7	6	5.8	5.4	5.0
4208TA	93	47	31	23	19	16	13	12	10	9	8	7.8	7.2	6.6
4210TA	117	59	39	29	23	20	17	15	13	12	11	10	9	8
4212TA	141	71	47	35	28	24	20	18	16	14	13	12	11	10
4214TA	164	82	55	41	33	27	23	21	18	16	15	14	13	12
4216TA	188	94	63	47	38	31	27	24	21	19	17	16	14	13
4218TA	211	106	70	53	42	35	30	26	23	21	19	18	16	15
4220TA	235	118	78	59	47	39	34	29	26	24	21	20	18	17

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
6204	91	46	30	23	18	15	13	11	10	9	8	7.6	7.0	6.5
6206	138	69	46	35	28	23	20	17	15	14	13	12	11	10
6208	185	93	62	46	37	31	26	23	20	19	17	15	14	13
6210	232	116	77	58	46	39	33	29	26	23	21	19	18	17
6212	279	140	93	70	56	47	40	35	31	28	25	23	21	20
6214	326	163	109	82	65	54	47	40	36	33	30	27	25	23
6216	373	187	124	93	75	62	53	47	41	37	34	31	29	27
6218	421	211	140	105	84	70	60	53	47	42	38	35	32	30
6220	468	234	156	117	94	78	67	59	52	47	43	39	36	33

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
8204	165	83	55	41	33	28	24	21	18	17	15	14	13	12
8206	251	126	84	63	50	42	36	31	28	25	23	21	19	18
8208	337	169	112	84	67	56	48	42	37	34	31	28	26	24
8210	424	212	141	106	85	71	61	53	47	42	39	35	33	30
8212	510	255	170	128	100	85	73	64	57	51	46	43	39	36
8214	597	299	199	149	119	100	85	75	66	60	54	50	46	43
8216	683	342	228	171	137	114	98	85	76	68	62	57	53	49
8218	769	385	256	192	154	128	110	96	85	77	70	64	59	55
8220	856	428	285	214	171	143	122	107	95	86	78	71	66	61

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
10204	268	134	89	67	54	45	38	34	30	27	24	22	21	19
10206	409	205	136	102	82	68	58	51	45	41	37	34	31	29
10208	550	275	183	138	110	92	79	69	61	55	50	46	42	39
10210	692	346	231	173	138	115	100	87	77	69	63	58	53	49
10212	833	417	278	208	167	139	119	104	93	83	76	69	64	60
10214	975	488	325	244	195	163	139	122	108	98	89	81	75	70
10216	1116	558	372	279	223	186	159	140	124	111	101	93	86	80
10218	1257	629	419	314	251	210	180	157	140	126	114	105	97	90
10220	1399	700	466	350	280	233	200	175	155	140	127	117	108	100

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
12204	382	191	127	96	76	64	55	48	42	38	35	32	29	27
12206	586	293	195	147	117	98	84	73	65	59	53	49	45	42
12208	790	395	263	198	158	132	113	99	88	79	72	66	61	56
12210	995	498	332	249	199	166	142	124	111	100	90	83	77	71
12212	1199	600	400	300	240	200	171	150	133	120	109	100	92	86
12214	1403	702	468	351	281	234	200	175	156	140	128	117	108	100
12216	1608	804	536	402	322	268	230	201	179	161	146	134	124	115
12218	1812	906	604	453	362	302	259	227	201	181	165	151	139	129
12220	2016	1008	672	504	403	336	288	252	224	202	183	168	155	144

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
14204	490	245	163	123	98	82	70	61	54	49	45	41	38	35
14206	757	379	252	189	151	126	108	95	84	76	69	63	58	54
14208	1024	512	341	256	205	171	146	128	114	102	93	85	79	73
14210	1291	646	430	323	258	215	184	161	143	129	117	108	99	92
14212	1558	779	519	390	312	260	223	195	173	156	142	130	120	111
14214	1825	913	608	456	365	304	261	228	203	183	166	152	140	130
14216	2092	1046	697	523	418	349	299	262	232	209	190	174	161	149
14218	2360	1180	787	590	472	393	337	295	262	236	215	197	182	169
14220	2627	1314	876	657	525	438	375	328	292	263	239	219	202	188

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
16204	676	338	225	169	135	113	97	85	75	68	61	56	52	48
16206	1045	523	348	261	209	174	149	131	116	105	95	87	80	75
16208	1414	707	471	354	283	236	202	177	157	141	129	118	109	101
16210	1784	892	595	446	357	297	255	223	198	178	162	149	137	127
16212	2153	1077	718	538	431	359	308	269	239	215	196	179	166	154
16214	2522	1261	841	631	504	420	360	315	280	252	229	210	194	180
16216	2891	1446	964	723	578	482	413	361	321	289	263	241	222	206
16218	3260	1630	1087	815	652	543	466	408	362	326	296	272	251	233
16220	3630	1815	1210	908	726	605	519	454	403	363	330	302	279	259

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
18204	843	422	281	211	169	141	120	105	94	84	77	70	65	60
18206	1307	654	435	327	261	218	187	163	145	131	119	109	101	93
18208	1770	885	590	443	354	295	253	221	197	177	161	147	136	126
18210	2234	1117	745	559	447	372	319	279	248	223	203	186	172	160
18212	2697	1349	899	674	539	450	385	337	300	270	245	225	207	193
18214	3161	1581	1053	790	632	527	452	395	351	316	287	263	243	226
18216	3624	1812	1208	906	725	604	518	453	403	362	329	302	279	259
18218	4088	2044	1363	1022	818	681	584	511	454	409	372	341	314	292
18220	4551	2276	1517	1138	910	759	650	569	506	455	414	379	350	325

READ	ENTER TANK WATER TEMPERATURE RISE — °F													
MODEL	10	20	30	40	50	60	70	80	90	100	110	120	130	140
20204	1042	521	347	261	208	174	149	130	116	104	95	87	80	74
20206	1639	820	546	410	328	273	234	205	182	164	149	137	126	117
20208	2236	1118	745	559	447	373	320	280	248	224	203	186	172	160
20210	2833	1417	944	708	567	472	405	354	315	283	258	236	218	202
20212	3430	1715	1143	858	686	572	490	429	381	343	312	286	264	245
20214	4027	2014	1342	1007	805	671	575	503	447	403	366	335	310	288
20216	4624	2312	1541	1156	925	771	661	578	514	462	420	385	356	330
20218	5222	2611	1740	1306	1044	871	746	653	580	522	475	435	402	373
20220	5819	2910	1939	1455	1164	970	832	727	646	582	529	485	447	415

TANK UNIT SELECTION EXAMPLES

For **any** unit you need to know:

1. The **load**, usually expressed as **draw** in gallons per hour (GPH) to be heated from an entering water temperature (if unknown — assume 40°F) to some higher water temperature in degrees fahrenheit (°F).
2. The **size of the tank** in gallons.
3. The **heating medium**, either **saturated steam** at some gauge pressure or **hot water** at a temperature at least 10°F higher than the design discharge temperature.
4. The **location** of the tank unit **coil** in the tank.
5. Any **special conditions** such as:
 - Rapid recovery.
 - Tank to be maintained at design discharge temperature.
 - Tank to be continuously circulated.
 - Limited volume of heating medium.
 - Tank is cement lined.

For **any** unit you must establish an average tank water temperature in °F from the given data. (This may be given by the designer). To estimate average tank temperature use the following rules:

- A. If tank size is equal to or less than twice the draw in GPH use the average of inlet and outlet temperature.

Example: Load = 160 GPH at 140°F

Tank size = 300 gal. (less than 2 x 160)

Entering water temperature = 40°F

$$\text{Average tank temperature} = \frac{40^\circ + 140^\circ}{2} = 90^\circ \text{F}$$

- B. If tank size is 5 or more times the draw in GPH use the tank outlet temperature as the average tank temperature.

Example: Load = 160 GPM at 140°F

Tank size = 1000 gal. (6.25 x 160) Average Tank temperature — use 140°F

- C. If tank unit is located in tank near cold water inlet use Rule A.

- D. If tank unit is located near outlet use Rule B.

- E. If tank is continuously circulated use Rule A.

- F. If tank size is more than 2 and less than 5 times the draw in GPH and tank unit is not located near inlet or outlet use the formula:

$$\frac{T_i + 3T_o}{4} = \text{average tank temperature}$$

(T_i = Inlet Temp. T_o = Outlet Temp.)

$$\text{Example: } \frac{40^\circ \text{F} + 3(140^\circ \text{F})}{4} = \frac{460}{4} = 115^\circ \text{F average tank temp.}$$

- G. If rapid recovery is required (e.g. 15 minutes) remember that all charts are based on load in terms of gallons per hour and convert accordingly.

Example: Load = 160 GPH at 140°F with 15 minute recovery

$$\frac{60 \text{ min}}{15 \text{ min}} = 4 \times 160 \text{ GPH} = 640 \text{ GPH}$$

Use 640 GPH in sizing tank unit.

- H. If tank temperature must be maintained at the outlet temperature use Rule B.

For units using **hot water** as the heating medium you must calculate an **average coil temperature** in °F.

The calculations: $Q = \text{Draw (GPH)} \times 8\frac{1}{3} \times \text{TR} = \text{BTU/hr.}$

In which:

Draw in GPH is given

TR = Temperature Rise = Outlet Temp minus Inlet Temp. in °F (given)

Example: Available hot water — 200°F boiler water

Load = 160 GPH heated from 40°F to 140°F

$$Q = 160 \times 8\frac{1}{3} \times (140^\circ - 40^\circ)$$

$$Q = 160 \times 8\frac{1}{3} \times 100 = 133,330 \text{ BTU/hr.}$$

Next — assume a 20°F drop in the temperature of the hot water through the coil using the Q calculated above.

$$\text{Formula: } Q = 20 \times 500 \times \text{GPM}$$

$$\text{Example: } 133,330 = 20 \times 500 \times \text{GPM}$$

$$13.3 = \text{GPM (Note: This flow rate will be needed by designer for pump sizing)}$$

NOTE: At this point check the given **special conditions** to be sure there is a sufficient volume of hot water available. If not, recalculate using the formula:

$$Q = \Delta T \times 500 \times (\text{given GPM})$$

solve for ΔT

Example: Available hot water — 8.9 GPM at 200°F

$$Q = \Delta T \times 500 \times 8.9$$

$$133,330 = \Delta T \times 4450$$

$$30^\circ \text{F} = \Delta T$$

Next — calculate average coil temperature

Using the formula:

$$\text{Average coil temp.} = \text{entering water temp. minus } \frac{\Delta T}{2}$$

$$\text{Example: (first case above) — } \frac{20^\circ}{2} = 190^\circ \text{F}$$

$$\text{(second case above) — } \frac{30^\circ}{2} = 185^\circ \text{F}$$

You are now ready to size the tank unit.

Steam in coil units

1. Enter table S (pg. 4) at given saturated steam pressure.
2. Read down steam pressure column to correct coefficient opposite average tank temperature.
3. Multiply design draw in GPH times coefficient.
4. Enter the capacity tables at the design temperature rise column and select unit.
5. If tank is cement lined, step up one pipe size.

Example: Steam pressure — 10 PSIG
 Draw — 160 GPH
 Temperature rise — $40^{\circ} - 140^{\circ}F = 100^{\circ}F$
 Average tank temperature = $90^{\circ}F$

1. Enter table S at 10 PSIG column
2. Read down to $90^{\circ}F$ block — coefficient — .026
3. Multiply draw — $160 \times .026 = 4.16$
4. Enter capacity tables at $100^{\circ}F$ temperature rise column... Select — 4204TA unit
5. If tank is cement lined: Specify — 6204TE unit

Hot water in coil units

1. Enter table W (pg. 4) at average tank water temperature column.
2. Read down to correct coefficient opposite average coil water temperature.
3. Multiply design draw in GPH times coefficient.
4. Enter the capacity tables at the design temperature rise column and select unit with higher value than result of step 3.
5. If tank is cement lined, step up one pipe size.

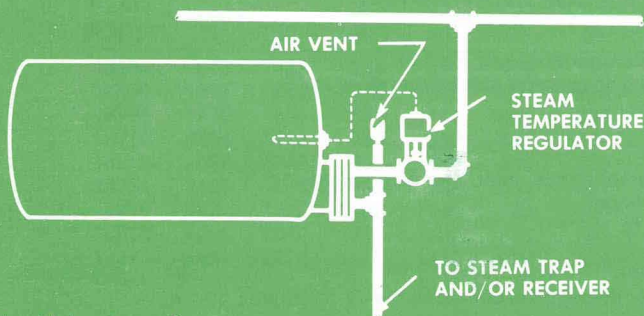
Example: Average tank water temperature = $90^{\circ}F$
 Average coil water temperature = $190^{\circ}F$
 Draw = 160 GPH
 Temperature rise = $40^{\circ}F - 140^{\circ}F = 100^{\circ}F$

1. Enter table W at $90^{\circ}F$ column.
2. Read down to $190^{\circ}F$ Block — coefficient = .05.
3. Multiply draw — $160 \times .05 = 8$.
4. Enter capacity tables at $100^{\circ}F$ temperature rise column.
 Select — 4208TA unit or 6204TA unit.
5. If tank is cement lined:
 Specify — 6208TE unit or 8204TE unit.

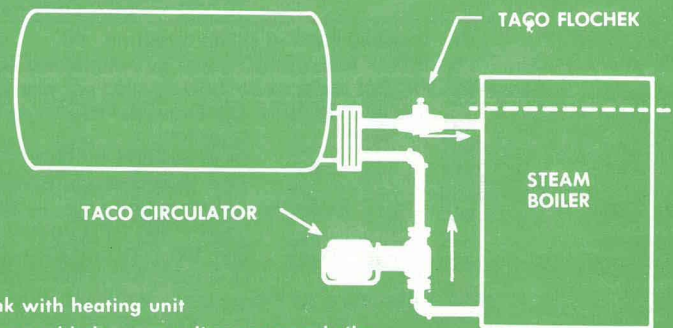
Follow the hot water in coil procedure for sizing TX units.

NOTE: TX units are all 4-pass units. The second digit in the part numbers designates the number of passes. After selecting the unit change the second digit from 2 to 4.

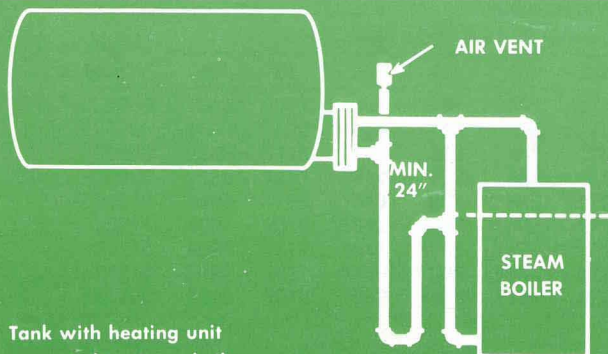
Example: Selection — 6204TA unit
 Specify — 6404TX unit



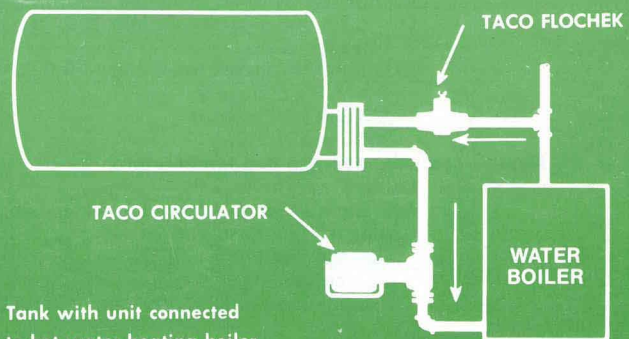
Tank with heating unit connected to steam line



Tank with heating unit connected below water line or steam boiler



Tank with heating unit connected to steam boiler



Tank with unit connected to hot water heating boiler



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