ARMSTRONG

FILE No.	114.10
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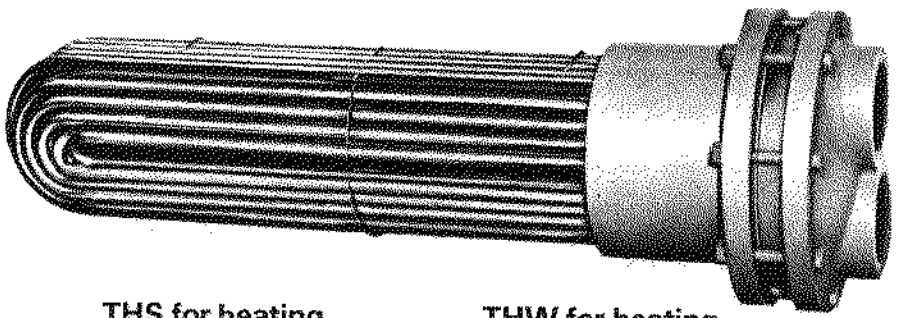
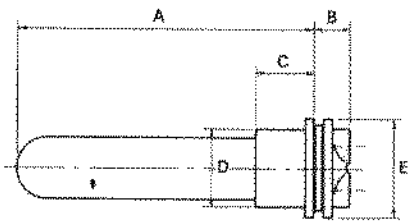
Tank Heater Units

FOR IMMERSION HEATING OF WATER IN STORAGE TANKS



THS for heating with steam

THW for heating with boiler water



For dimensions see table

SIZES — CAPACITIES — DIMENSIONS

Heater Number THW Using Boiler Water THS Using Steam	Capacities in U.S. Gals. per Hr. Heating Tank Water 40° to 140°F. with Boiler Water		Dimensions in Inches					NPT HEAD CONNECTIONS (in inches)			Heating Surface
								THS		THW In & Out	
	180°F. Gravity	180°F. Pumped	A	B	C	D	E	Stm.	Cond.		Sq. Ft.
THW - THS - 412	20	32	12								1.5
418	30	48	18								2.3
424	40	64	24								3.1
430	50	80	30								3.9
436	60	96	36	2¾	6	4½	7¼	1¼	¾	1¼	4.7
448	80	128	48								6.2
460	100	158	60								7.8
472	120	186	72								9.4
484	140	232	84								10.9
496	160	280	96								12.5
THW - THS - 612	48	77	11¼								3.5
618	68	108	17¼								5.4
624	86	138	23¼								7.6
630	106	170	29¼								9.4
636	124	198	35¼	3¾	6½	6⅝	10½	2	1	2	11.5
648	164	262	47¼								15.3
660	202	324	59¼								19.3
672	240	384	71¼								23.1
684	280	450	83¼								27.1
696	318	510	95¼								31.0
THW - THS - 824	127	279	24								15.0
830	195	353	30								19.0
836	264	427	36								23.0
842	308	500	42								27.0
848	350	560	48	4¼	8	8⅝	12½	3	1¼	3	31.0
860	408	655	60								38.0
872	500	805	72								46.0
884	588	930	84								54.0
896	665	1070	96								62.0
THW - THS - 1030	430	690	30								35.5
1036	510	820	36								43.0
1042	603	966	42								50.5
1048	698	1120	48								58.0
1060	872	1398	60	5	8½	10¾	14⅝	4	2	4	73.0
1072	1045	1670	72								88.0
1084	1190	1910	84								102.0
1096	1360	2190	96								117.0
10108	1535	2460	108								132.0
THW - THS - 1236	710	1136	36								61.0
1242	835	1338	42								72.0
1248	960	1540	48								83.0
1254	1070	1742	54								94.0
1260	1190	1944	60	5⅝	10	12¾	16⅝	4	2	4	104.0
1272	1425	2348	72								126.0
1284	1660	2752	84								147.0
1296	1900	3156	96								169.0
12108	2140	3560	108								191.0
12120	2380	3964	120								212.0
THW - THS - 1436	970	1535	36								83.0
1442	1130	1797	42								98.0
1448	1290	2060	48								112.0
1454	1455	2330	54								127.0
1460	1620	2605	60	6½	10½	14	17⅛	6	3	6	142.0
1472	1940	3120	72								171.0
1484	2260	3670	84								200.0
1496	2580	4220	96								230.0
14108	2900	4750	108								259.0
14120	3240	5310	120								289.0

For higher temperature boiler water, or when using steam as heating medium, see reverse side for capacity factors.

MAXIMUM RECOMMENDED FLOW OF BOILER WATER THROUGH TANK HEATERS

Size 4" —	27 USGPM
6" —	69 "
8" —	135 "
10" —	260 "
12" —	375 "
14" —	510 "

At these flows, pressure drop through the heaters may be approximated as 0.6 ft. head per foot of length.

STANDARD MATERIALS OF CONSTRUCTION

Tubing:	¾" O.D. #18 BWG copper
Tubesheet:	carbon steel
Tube supports:	brass
Head:	cast iron

STANDARD DESIGN PRESSURES

4" — 150 psig	10" — 125 psig
6" — 150 psig	12" — 125 psig
8" — 150 psig	14" — 125 psig

Units with special materials, higher design pressures or in larger sizes are available.

NOTES:

(1) Capacities given for Tank Heaters may be used when tanks have a capacity at least equal to the hourly demand. For other conditions, consult with Armstrong representative.

(2) Capacities given do not incorporate allowances for fouling or scaling. Extra length of Heater should be provided if needed, according to water conditions.

(3) It is recommended a vacuum breaker and air vent be installed on all heaters used on steam pressure systems. Tappings are provided in heater head for this purpose.

THW and THS Tank Heater Units

SELECTION DATA

CAPACITY FACTORS TO BE USED FOR VARIOUS BOILER WATER TEMPERATURES AND STEAM PRESSURES

Tank Water Temp. Rise °F.		PUMPED BOILER WATER INLET TEMP. °F.							STEAM PRESSURE AT HEATER (PSIG)								
		With 20° Temp. Drop					40° Temp. Drop		0#	2	5	10	15	25	50	75	100
From	To	180	200	210	220	240	220	240	212 °F	218 °F	227 °F	240 °F	250 °F	267 °F	298 °F	321 °F	338 °F
	100	2.33	2.87	3.10	3.36	3.87	3.12	3.63	3.80	4.12	4.24	4.50	4.78	5.25	5.95	6.88	7.70
	120	1.54	1.94	2.11	2.30	2.67	2.11	2.47	2.84	3.08	3.17	3.37	3.58	3.92	4.45	5.15	5.75
40	140	1.00	1.20	1.50	1.64	1.96	1.49	1.80	2.28	2.40	2.48	2.73	2.91	3.25	3.90	4.32	4.55
	160	0.57	0.91	1.07	1.21	1.46	1.05	1.32	1.63	1.78	1.91	2.08	2.28	2.54	3.03	3.45	3.67
	180	—	0.55	0.70	0.85	1.11	0.68	0.97	1.19	1.30	1.47	1.75	1.82	2.05	2.54	2.84	3.06
	200	—	—	—	0.52	0.80	—	0.65	0.75	0.87	1.09	1.30	1.39	1.61	2.05	2.35	2.56
	100	2.73	3.33	3.60	3.92	4.51	3.61	4.21	4.59	4.78	4.98	5.66	5.85	6.52	7.84	8.68	9.10
	120	1.67	2.12	2.34	2.55	2.97	2.36	2.71	3.27	3.41	3.55	4.03	4.17	4.65	5.58	6.18	6.50
50	140	1.06	1.43	1.49	1.77	2.10	1.55	1.93	2.54	2.65	2.76	3.13	3.24	3.61	4.33	4.80	5.05
	160	0.57	0.95	1.11	1.26	1.55	1.10	1.40	1.82	1.98	2.04	2.31	2.42	2.74	3.34	3.76	3.92
	180	—	0.58	0.73	0.88	1.14	0.70	1.00	1.24	1.40	1.51	1.78	1.94	2.18	2.69	2.96	3.18
	200	—	—	—	0.53	0.82	—	0.66	0.80	0.93	1.16	1.38	1.48	1.72	2.19	2.51	2.73
	100	3.26	4.00	4.38	4.74	5.51	4.33	5.09	5.78	5.98	6.22	7.07	7.30	8.15	9.80	10.85	11.40
	120	1.85	2.40	2.63	2.88	3.39	2.61	3.12	3.80	3.97	4.14	4.71	4.85	5.42	6.50	7.20	7.56
60	140	1.13	1.54	1.74	1.93	2.26	1.71	2.18	2.84	2.96	3.08	3.50	3.62	4.03	4.83	5.35	5.62
	160	0.60	0.99	1.17	1.32	1.65	1.16	1.48	2.00	2.18	2.25	2.54	2.66	2.90	3.68	4.13	4.31
	180	—	0.56	0.76	0.91	1.20	0.72	1.04	1.29	1.51	1.62	1.88	1.99	2.35	2.85	3.13	3.50
	200	—	—	—	0.54	0.85	—	0.69	0.85	1.00	1.24	1.48	1.58	1.84	2.35	2.68	2.93

The Capacity Factor 1.00 is for pumped boiler water entering at 180°F. to heat tank water from 40° to 140°F. To select a heater for other conditions, use the Factor in the table corresponding with the available heating medium. Divide the required capacity in USGPH by this Factor and, under the heater capacities given under the column "180°F. Boiler Water Pumped", choose the size of heater with a capacity equal to or greater than this figure.

Example: Select a heater to raise 2100 U.S. gals. per hour of water from 40°F. to 180°F., using steam entering the heater at 50 psig.

Solution: (a) From the above table, obtain a Capacity Factor of 2.54.

(b) Divide required capacity 2100 USGPH by 2.54 and obtain the figure 828.

(c) Under the Heater Capacity column for "180°F. Boiler Water Pumped", choose the heater size with a capacity equal to or greater than 828, which would be THS-884, or a shorter unit THS-1042. It is usually desirable to select a heater length at least one-half of the length of the tank in which it is installed.

BOILER WATER FLOW RATE

Boiler Water Minimum Pumping Rate is determined as follows:

Multiply capacity in USGPH by the required temperature rise °F. and divide by temperature drop in boiler water °F. x 60 to obtain pump capacity required in USGPM.

Example: To heat 1000 USGPH of water from 40°F. to 160°F. with boiler water entering at 200°F. and leaving at 180°F. would require a pumping rate of

$$\frac{1000 \times (160°F. \text{ minus } 40°F.)}{(200°F. \text{ minus } 180°F.) \times 60} = 100 \text{ USGPM}$$

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