Flo-Rite-Temp™ Instantaneous Steam/Water Heater Single Wall and Double Wall Sizing Chart

Armstrong®

Water and Steam Capacities

Inlet Temp.	Set Temp.	Standard: Hot Water Capacities* (Steam Pressure)				Standard: Steam Capacities (Steam Pressure)				Inlet Temp.	Set Temp.	Metric: Hot Water Capacities* (Steam Pressure)				Metric: Steam Capacities (Steam Pressure)				Model
		psig	psig	psig	psig	psig	psig	psig	psig			bar	bar	bar	bar	bar	bar	bar	bar	
°F	°F	2	5	10	15	2	5	10	15	°C	°C	0.14	0.35	0.7	1	0.14	0.35	0.7	1	
		gpm	gpm	gpm	gpm	lbs/hr	lbs/hr	lbs/hr	lbs/hr			m³/h	m³/h	m³/h	m³/h	kg/h	kg/h	kg/h	kg/h	
40	120	17	18	20	20	714	767	839	901	4	49	3.8	4.1	4.5	4.5	323	347	379	407	415
		37	40	43	45	1,543	1,657	1,814	1,946			8.4	9.1	9.8	10.2	697	749	820	880	535
		69	74	80	80	2,855	3,067	3,356	3,601			15.7	16.8	18.2	18.2	1,290	1,386	1,517	1,628	665
		142	145	145	145	5,680	6,160	6,760	7,160			32.2	32.9	32.9	32.9	2,576	2,794	3,066	3,248	8120
	130	15	16	17	18	681	734	807	868		54	3.4	3.6	3.8	4.1	308	332	365	392	415
		32	34	37	39	1,472	1,587	1,743	1,876			7.3	7.7	8.4	8.8	665	717	788	848	535
		58	63	68	73	2,723	2,936	3,226	3,472			13.2	14.3	15.4	16.6	1,230	1,327	1,458	1,569	665
		112	122	136	145	5,040	5,490	6,120	6,705			25.4	27.7	30.9	32.9	2,286	2,490	2,776	3,041	8120
	140	12	13	15	16	646	700	773	835		60	2.7	3.0	3.4	3.6	292	316	349	377	415
		27	29	32	34	1,397	1,513	1,671	1,804			6.1	6.6	7.3	7.7	631	684	755	815	535
		50	54	59	63	2,585	2,799	3,091	3,338			11.3	12.2	13.3	14.3	1,168	1,265	1,397	1,509	665
		88	97	109	120	4,400	4,850	5,450	6,000			20.0	22.0	24.7	27.2	1,996	2,200	2,472	2,722	8120
	160	9	10	11	12	572	627	702	765		71	2.0	2.3	2.5	2.7	259	283	317	346	415
		20	22	24	26	1,235	1,355	1,517	1,652			4.5	5.0	5.5	5.9	558	612	686	747	535
		37	40	45	48	2,286	2,508	2,806	3,057			8.4	9.1	10.2	10.9	1,033	1,134	1,268	1,382	665
		69	83	89	95	4,140	4,980	5,340	5,700			15.6	18.8	20.2	21.6	1,878	2,259	2,422	2,585	8120
	180	5	5	6	7	344	386	441	487		82	1.1	1.1	1.4	1.6	156	175	200	221	415
		12	13	15	16	861	966	1,104	1,219			2.7	3.0	3.4	3.6	390	438	501	553	535
		23	26	29	32	1,663	1,866	2,134	2,355			5.2	5.9	6.6	7.3	754	846	968	1,068	665
		43	47	52	59	3,010	3,290	3,640	4,130			9.7	10.7	11.8	13.4	1,365	1,492	1,651	1,873	8120
50	120	19	20	20	20	692	745	816	877	10	49	4.3	4.5	4.5	4.5	313	337	369	396	415
		41	44	45	45	1,495	1,609	1,764	1,896			9.3	10.0	10.2	10.2	676	727	797	857	535
		76	80	80	80	2,767	2,977	3,264	3,508			17.3	18.2	18.2	18.2	1,251	1,346	1,475	1,586	665
		145	145	145	145	5,740	6,090	6,580	7,035			32.2	32.2	32.2	32.2	2,603	2,762	2,985	3,191	8120
	130	16	17	19	20	660	712	785	846		54	3.6	3.8	4.3	4.5	298	322	355	382	415
		34	37	40	43	1,425	1,539	1,695	1,827			7.7	8.4	9.1	9.8	644	696	766	826	535
		64	68	75	80	2,637	2,848	3,137	3,381			14.5	15.4	17.0	18.2	1,192	1,287	1,418	1,528	665
		127	138	145	145	5,080	5,520	6,120	6,760			28.8	31.3	32.2	32.2	2,304	2,504	2,776	3,066	8120
	140	13	14	16	17	626	679	752	813		60	2.9	3.2	3.6	3.8	283	307	340	367	415
		29	31	34	37	1,352	1,467	1,624	1,756			6.6	7.0	7.7	8.4	611	663	734	794	535
		54	58	64	68	2,502	2,715	3,005	3,250			12.2	13.2	14.5	15.4	1,131	1,227	1,358	1,474	665
		99	108	121	134	4,455	4,860	5,445	6,030			22.5	24.5	27.5	30.4	2,021	2,204	2,470	2,735	8120
	160	10	11	12	13	553	608	682	744		71	2.3	2.5	2.7	3.0	250	275	308	336	415
		21	23	25	28	1,194	1,313	1,473	1,607			4.7	5.2	5.7	6.4	540	593	665	726	535
		39	42	47	51	2,210	2,429	2,725	2,974			8.9	9.5	10.7	11.6	999	1,098	1,232	1,344	665
		76	90	95	102	4,180	4,950	5,225	5,610			17.2	20.4	21.6	23.1	1,896	2,245	2,370	2,545	8120
	180	5	6	6	7	332	373	428	473		82	1.1	1.4	1.4	1.6	151	169	194	214	415
		12	14	16	17	831	934	1,071	1,185			2.7	3.2	3.6	3.9	377	424	486	537	535
		24	27	30	33	1,605	1,805	2,069	2,289			5.4	6.1	6.8	7.5	728	819	938	1,037	665
		49	55	63	72	3,185	3,575	4,095	4,680			11.1	12.5	14.3	16.3	1,445	1,622	1,857	2,123	8120
60	130	18	19	20	20	638	690	762	822	16	54	4.1	4.3	4.5	4.5	288	312	344	372	415
		38	41	45	45	1,378	1,491	1,646	1,777			8.7	9.3	10.2	10.2	623	674	744	803	535
		70	76	80	80	2,550	2,760	3,046	3,288			15.9	17.3	18.2	18.2	1,152	1,247	1,377	1,486	665
		145	145	145	145	5,110	5,565	6,090	6,510			32.2	32.2	32.2	32.2	2,318	2,524	2,762	2,953	8120
	140	15	16	17	19	605	658	729	790		60	3.4	3.6	3.8	4.3	273	297	330	357	415
		32	34	38	40	1,307	1,421	1,576	1,708			7.3	7.7	8.6	9.1	591	642	712	772	535
		58	63	69	75	2,418	2,629	2,917	3,160			13.2	14.3	15.7	17.0	1,093	1,188	1,318	1,428	665
		111	123	137	145	4,440	4,920	5,480	6,080			25.2	27.9	31.1	32.2	2,014	2,232	2,486	2,758	8120
	160	10	11	13	14	533	588	661	723		71	2.3	2.5	2.9	3.2	241	266	299	327	415
		22	24	27	30	1,152	1,270	1,428	1,561			5.0	5.5	6.1	6.8	521	574	645	706	535
		41	45	50	55	2,132	2,349	2,642	2,889			9.3	10.2	11.3	12.5	964	1,062	1,194	1,306	665
		85	99	104	115	4,250	4,950	5,200	5,750			19.3	22.5	23.6	26.1	1,928	2,245	2,359	2,608	8120
	180	5	6	7	7	320	360	414	459		82	1.1	1.4	1.6	1.6	145	163	188	208	415
		13	14	16	18	800	902	1,037	1,150			3.0	3.2	3.6	4.1	363	409	470	522	535
		25	28	32	35	1,546	1,743	2,004	2,221			5.7	6.4	7.3	7.9	701	791	909	1,007	665
		59	67	80	90	3,540	4,020	4,800	5,400			13.4	15.2	18.1	20.4	1,606	1,823	2,177	2,449	8120

*Units may be piped in parallel when desired capacities exceed that of a single unit.

NOTES: Minimum water temperature increase is 60°F (33°C). Consult factory if less than 60°F (33°C) increase is required or a set temperature below 120°F (49°C) is required.

ASHRAE Modified Hunter Curve - Fixture Units

140°F Temperature From Heater

Hospital

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
Semi-Private Lavatory	1.2
†Private Shower	1.5
†Ward Shower	2.5
†Semi-Private Shower	1.5
Private Bath	1.5
Ward Bath	2.0
Sink - Flushing Rim	2.0
Sink - Scrub-Up	1.5
Sink - Laboratory	1.5
Sink - General Purpose	1.0
Bath - Leg	6.0
Bath - Arm	4.0
Bath - Sitz	3.0
Bath - Foot	3.0
Bath - Emergency	2.0
Hydrotherapeutic Showers	
#1 Shower Head	8.0
#2 Spray	12.0
Continuous Flow Bath	
Continuous Flow Fill	2.0
Continuous Flow Operate	1.5
Hubbard	4.0
Autopsy Table	2.0
Autopsy Sink and Table	2.5

Club

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
†Private Shower	1.5
†Public Shower	1.7
†Tub and Shower	1.5
Sink - Slop	2.5
36" Half Bradley	1.0
36" Full Bradley	1.5
54" Half Bradley	1.5
50" Full Bradley	2.0

Gymnasium

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
Private Shower	1.5
Public Shower	3.0
Sink - Slop	1.5
Basin - Foot	1.2
36" Half Bradley	1.0
36" Full Bradley	1.5
54" Half Bradley	1.5
54" Full Bradley	2.0

Assoc. Bldg. YMCA

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
†Private Shower	1.5
†Tub and Shower	1.7
Sink - Slop	2.5
Janitor Drop	2.0

Restaurant**

Type of Fixture	Fix. Units
Private Lavatory	.70
Public Lavatory	2.0
†Private Shower	1.5
†Public Shower	1.7
Sink - Kitchen	3.0
Sink - Pantry	2.5
Sink - Slop	2.0
Sink - Pot (Single)	2.5
Sink - Pot (Double)	3.5
Sink - Pot (Triple)	5.5
Sink - Vegetable	2.0
Sink - Bar	2.5
Washer - Silver	2.0*
Washer - Glass	2.0*
Washer - Can	3.0
Coffee Urn	1.2
Bain Marie	1.0
Pot and Pan Washer	2.0*
Dish Pre-Rinse	2.5
Pre-Scraper	2.0
Pre-Scraper Conveyor	2.5
36" Half Bradley	1.0
36" Full Bradley	1.5

*Dishwashers (use booster to heat from 140° to 180°F)

Type of Fixture	Fix. Units
Single Tank - Stationary Rack	
16 x 16 Rack	2.5
18 x 18 Rack	3.9
20 x 20 Rack	4.2
Multiple Tank Conveyor Type	
Dishes - Inclined	2.0
Dishes - Flat	2.5
Single Tank Conveyor Type	2.3

Hotel - Motel

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
†Private Shower	1.5
†Tub and Shower	1.5
Basin - Barber	2.0
Sink - Slop	2.5
Basin - Beauty Parlor	2.5

Office Building

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
Private Shower	1.5
Sink - Slop	2.5
Janitor Drop	2.5
36" Half Bradley	1.0
36" Full Bradley	1.5

Factory

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
†Private Shower	1.5
†Public Shower	3.0
Sink - Slop	2.5
36" Half Bradley	1.0
36" Full Bradley	1.5
54" Half Bradley	1.5
54" Full Bradley	2.0

Correctional or Mental Institution

Type of Fixture	Fix. Units
Private Lavatory	.70
Public Lavatory	1.0
†Private Shower	1.5
†Public Shower	3.0
†Tub and Shower	1.5
Sink - Slop	2.0
Janitor Drop	2.0
36" Half Bradley	1.0
36" Full Bradley	1.5
54" Half Bradley	1.5
54" Full Bradley	2.0

Apartment

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
†Private Shower	1.5
†Public Shower	1.5
†Tub and Shower	1.5
Sink - Kitchen	.75
Sink - Slop	1.5
Sink - Pantry	1.5
Domestic Clothes Washer	1.2
Domestic Dishwasher	1.5
Laundry Tray	1.5

Private - Public School

Type of Fixture	Fix. Units
Private Lavatory	.75
Public Lavatory	1.0
†Private Shower	1.5
†Tub and Shower	1.7
Sink - Slop	2.5
Janitor Drop	1.5
Domestic Clothes Washer	2.0
Domestic Dishwasher	2.0

Institution - Home

Type of Fixture	Fix. Units
Private Lavatory	.70
Public Lavatory	1.0
†Private Shower	1.5
†Tub and Shower	1.5
Sink - Slop	2.0
Janitor Drop	2.0

*These items require 180°F hot water. The consumption figures are based on supplying 140°F water with a booster heater used to obtain 180°F water.
**Add 20% to all figures when not used in combination with other building services from same heater.
†The fixture units listed for shower heads are based on a flow rate of 3 gpm. These units should be corrected for other flow rates. Multiply the fixture units by Correction Factor "C" from the formula: C = G x .33, where C = Correction Factor and G = gpm of shower head being used. Example: Shower head 4 gpm = C = 4 x .33 or 1.32. From Fixture Units Table, Hotel-Motel (shower) which shows 1.5 fixture units, multiply 1.5 x 1.32 = 2.10 fixture units per shower head using 4 gpm.

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ASHRAE Modified Hunter Curve - Flow Charts

Chart 39-1

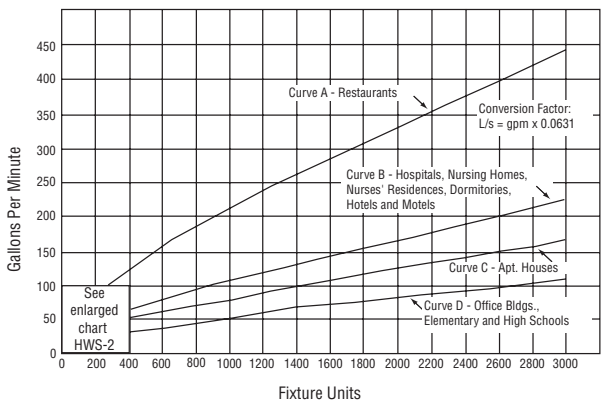
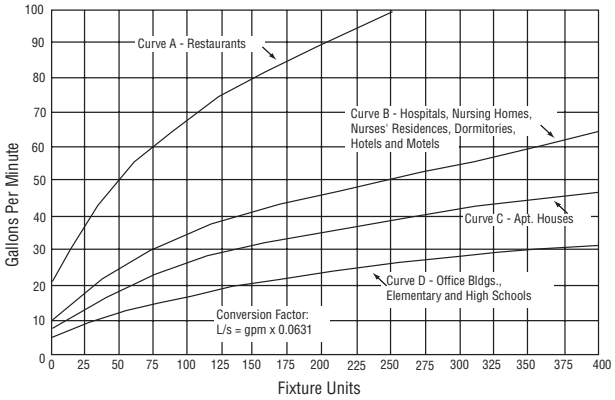


Chart 39-2. Enlarged Section



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Hunter curves should be used for intermittent, insignificant fixtures only.

Step 1

Determine the total fixture unit load for all the fixtures serviced by your water heater application using the Fixture Units Table on page 38. See example below.

Step 2

Using the total fixture units for your application, enter the Hunter Curves (Chart 39-1) from the bottom on the total fixture units line for your application. Read up to the curve that best fits the application. Then read to the left for the corresponding gpm requirement.

Step 3

Select the proper Armstrong Water Heater/Water Temperature Controller.

Example: College Dormitory

No. Fixtures	Type of Fixture	Fix. Unit	Demand Fix. Unit
150	Private Lavatory	.75	113
120	Private Shower	1.5	180
20	Slop Basin	2.5	50
8	Clothes Washer	2.0	16
Total Fixture Units			**359**

Refer to the modified Hunter Curves in Chart 39-2. Curve B represents dormitories. Enter the graph from the bottom at 359 fixture units and go up to curve B. Then move to the left horizontally to read approximately 60 gallons per minute of hot water capacity required. NOTE: Remember to add any constant flow capacities, as determined under “Important Note” below, to this 60 gpm.

Important Note

Special consideration should be given to applications involving periodic use of gang showers, process equipment, laundry machines, etc., as may occur in field houses, gymnasiums, factories, hospitals, etc. Because these applications could have all equipment on at the same time, their total hot water capacity should be determined and then added to the maximum hot water demand as read from the modified Hunter Curves. Use the following formula to determine total hot water capacity needed for these applications when final water temperatures are lower than that of the water heater.

$$\frac{(B - C)}{(H - C)} \times \left(\begin{array}{c} \text{Total water flow from all} \\ \text{gang shower heads in gpm} \end{array} \right) = \text{Hot water needed (gpm)}$$

Where:

B = Blended water temperature out of the fixture
H = Hot water temperature to the fixture
C = Cold water temperature to the fixture