



Raytherm[®]

Selection Guide

Specifications for **Commercial Atmospheric Hydronic Heating Boilers & Water Heaters**



The Hot Water Management Experts

 Proudly based in the U.S.A.

Specifications and Dimensions

The Raytherm Selection Guide is a ready-reference to Raypak's full line of atmospheric commercial hydronic heating boiler or water heater. The user, the specifier and the installer will find nearly all the significant information they require to select the proper Raytherm boiler and water heater for their particular need or application.

MODEL	AVAILABLE TYPES		MBTUH NATURAL GAS (a)				DIMENSIONS (INCHES)									Approximate Operating Weight LBS.	
			INDOOR		OUTDOOR		Width A	Height Overall B	Jacket Height C	Gas Conn. G	Water Conn. H	J	Flue Dia. K	L	Less Pump	W/Pump	
			Input	Output	Input	Output											
514	•	•	511.5	419.4	511.5	419.4	32-3/4	57.0	33	1	2		10	25-3/8	455	510	
624	•	•	627.0	514.0	627.0	514.0	37-1/2	57.0	33	1	2		12	29-1/2	465	520	
724	•	•	726.0	595.0	726.0	595.0	41-5/8	57.0	33	1	2		12	34-1/4	575	630	
824	•	•	825.0	676.5	825.0	676.5	45-3/4	57.0	33	1	2		14	38-1/2	605	660	
926	•	•			926.0	759.0	52-3/8			1	2-1/2 (c)				785	840	
962	•	•	961.7	788.6			52-3/8	76-1/8	33-1/2	1	2-1/2 (c)	23-5/8	14	28	705	760	
1083	•	•			1083.0	888.0	59-1/4			(b)	2-1/2 (c)				865	920	
1125	•	•	1124.7	922.0			59-1/4	78-1/8	33-1/2	(b)	2-1/2 (c)	23-5/8	16	32	745	800	
1178	•	•			1178.0	966.0	63-5/8			(b)	2-1/2 (c)				925	980	
1223	•	•	1222.5	1002.4			63-5/8	78-1/8	33-1/2	(b)	2-1/2 (c)	23-5/8	16	32	805	860	
1287	•	•			1287.0	1055.0	68-5/8			1-1/4	2-1/2 (c)				980	1035	
1336	•	•	1336.6	1096.0			68-5/8	80-1/8	33-1/2	1-1/4	2-1/2 (c)	23-5/8	18	36	875	930	
1414	•	•			1413.0	1158.5	74-7/8			1-1/4	2-1/2 (c)				1080	1130	
1468	•	•	1467.0	1203.0			74-7/8	80-1/8	33-1/2	1-1/4	2-1/2 (c)	23-5/8	18	36	945	1000	
1571	•	•			1570.0	1287.0	81-1/8			1-1/4	2-1/2 (c)				1130	1190	
1631	•	•	1630.0	1336.6			81-1/8	83-1/8	36-1/2	1-1/4	2-1/2 (c)	23-5/8	18	36	985	1040	
1758	•	•			1758.0	1441.5	89-3/8			1-1/4	2-1/2 (c)				1160	1220	
1826	•	•	1825.6	1497.0			89-3/8	85-1/8	36-1/2	1-1/4	2-1/2 (c)	23-5/8	20	40	1035	1090	
2100	•	•	2100.0	1722.0			61.0	68-1/4		(d)	3(c)		24		1400		
2500	•	•	2499.0	2049.0			70.0	68-1/4		(d)	3(c)		26		1580		
3001	•	•	3000.0	2460.0			81-1/4	68-1/4		2	3(c)		28		1750		
3500	•	•	3500.0	2870.0			92-1/2	68-1/4		2	3(c)		30		1920		
4001	•	•	4000.0	3280.0			103-3/4	68-1/4		2	3(c)		32		2100		

Hydronic

- H1 Mechanical modulation, high temp (514-1826)
- H3 2-Stage (514-4001)
- H4 On/Off (514-4001)
- H5 Mechanical modulation, low-temp (514-1826)
- H9 4-Stage (514-4001)

Hot Water Supply

- WH1 On/Off (514-4001)
- WH2 Mechanical modulation (514-1826)
- WH3 2-Stage (514-4001)
- WH9 4-Stage (514-4001)

Note:

Ratings shown are for elevations up to 2000 feet. Ratings for elevations over 2000 feet ratings should be reduced at the rate of 4% for each 1000 feet above sea level.

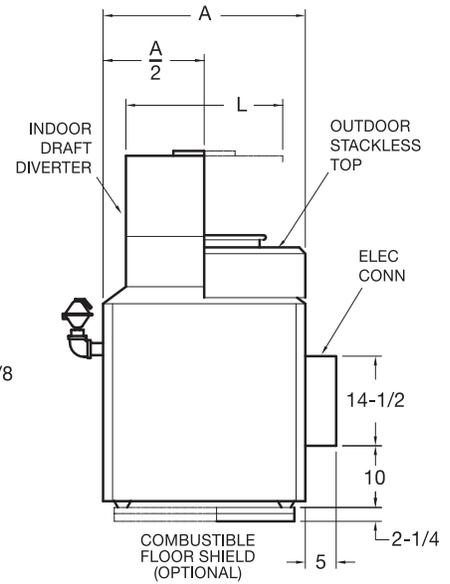
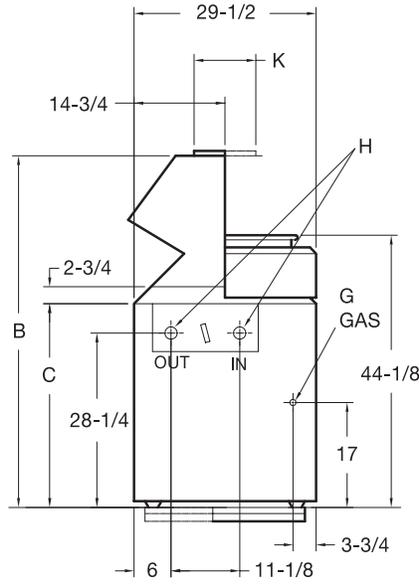
- (a) For Propane, see MBTUH Propane Gas chart below
- (b) 1" or 1-1/4" gas connection contingent on boiler type & code requirements
- (c) 3" NPT on Single-Pass Option for Model H 926 - 1826 4" Flanges on Single-Pass Option for Model H 2100 - 4001
- (d) 1-1/2" or 2" gas connection contingent on boiler type & code requirements

Models	ELECTRICAL RATINGS		MIN CLEARANCES TO COMBUSTIBLE CONSTRUCTION					PROPANE GAS	
			Rear	Left Side	Right Side	Top			
	With Pump	Without Pump				Indoor	Outdoor	Multiplier	
514 - 824	Less than	Less than	12"	18"	6"	36"	Unobstr.	0.94	
926-1826	10 amps @ 120V	4 amp @ 120V	24"	24"	24"	24"	Unobstr.	0.92 Indoor/0.955 Outdoor	
2100 - 4001	951276 pump* 11 amps @ 230V 22 amps @ 110 V	Less than 8 amps @ 120V	24"	24"	24"	24"	N/A	1.0 (Same as natural gas)	

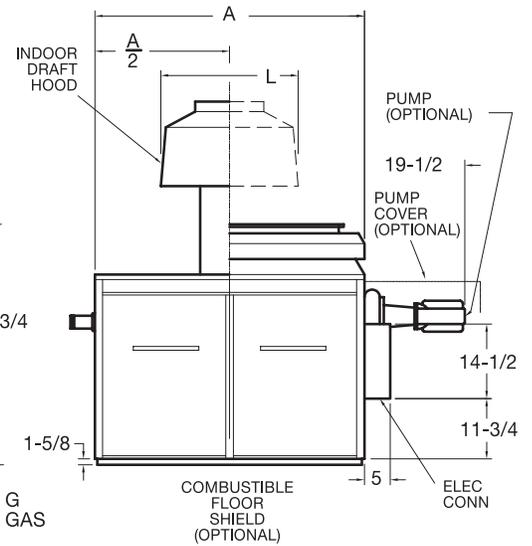
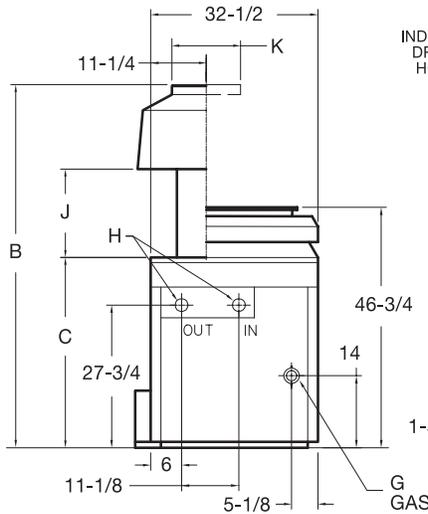
*Pump requires separate power supply

Dimensional Drawings

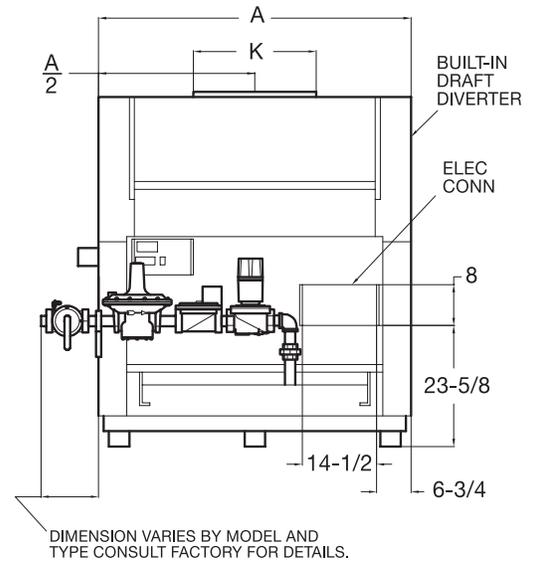
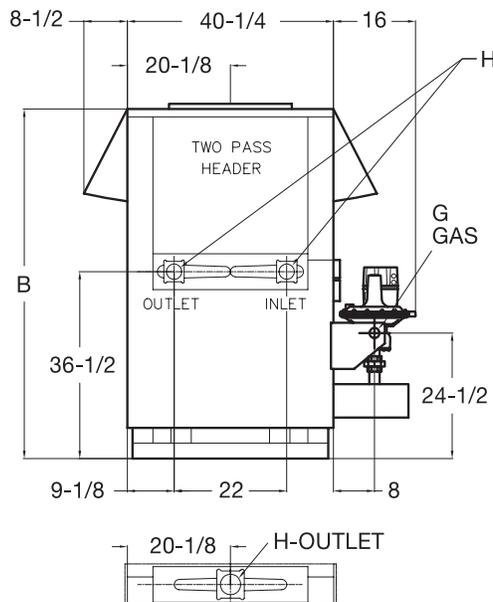
514-824



926-1758
962-1826



2100-4001



OPTIONAL ONE PASS

H Features

– Hydronic heating boiler. Used on closed-loop space heating systems

FEATURES		H Models				
		514-824	926-1826	2100-2500	3001-4001	
HEAT EXCHANGER	ASME Inspected and Stamped – 160 psi	•	•	•	•	
	National Board registered	•	•	•	•	
	Heat Exchanger Tubes – Copper	•	•	•	•	
	Headers	– Cast Iron	•	•	•	•
		– Bronze	○	○	○	○
		– Cast Iron – Single-Pass	■	○	○	○
	Pressure Relief Valve	– 30 psi	○	○	○	○
		– 45 psi	○	○	○	(a)
		– 60 psi	•	•	•	•
		– 75 psi	○	○	○	○
– 125 psi		○	○	○	○	
– 150 psi	○	○	○	○		
Temperature & Pressure Gauge	•	•	•	•		
Pump -120VAC 1-ph 60 Hz	○	○	■	■		
JACKET	Bolted Cabinet	•	•	•	•	
	Draft Diverters	– Stack Type – Indoor	•	•	■	■
		– Low Profile – Outdoor	•	•	■	■
		– Built-in – Indoor	■	■	•	•
		– Field Interchangeable – Indoor/Outdoor	•	■	■	■
Enclosed Controls (b)	•	•	■	■		
Combustible Floor Shield	○	○	■	■		
ELECT.	Power Supply, 120VAC 1-ph 60 Hz	•	•	•	•	
	Transformer 120V/24V	•	•	•	•	
	On/Off Switch	•	•	•	•	
OPER. CTRLS.	Economaster II Pump Time Delay – 120V 10A Max.	•	•	•	•	
	Temperature Control	– Mech. Modulating Valves H1 H5	•	•	■	■
		– Staged Controller H3 H9	○	○	○	○
		– On/Off Controller H4	○	○	○	○
SAFETY CONTROLS	Flame Safeguard – 24V, 100% Pilot Safety	•	•	•	•	
	Pilot – Electronic, Intermittent Pilot Ign. W/ Lockout	•	•	•	•	
	High Gas Pressure Switch (c)	○	○	○	•	
	Low Gas Pressure Switch (c)	○	○	○	○	
	Low Water Cut-off	○	○	○	○	
	High Limit Switch	– Manual Reset – Adjustable 240F max	•	•	•	•
		– Automatic Reset – Adjustable	○	○	○	•
		– Automatic Reset – Fixed 240°F	■	■	■	■
Flow Switch	•	•	•	•		
GAS TRAIN	Gas Pressure Regulator	•	•	•	•	
	Manual Gas Valve - Main Gas Shut-Off ("A" valve)	•	•	•	•	
	Control Valve	– Modulating – Mechanical H1 H5	•	•	■	■
		– Staged – Diaphragm H3 H9	•	•	•	■
		– Staged – Motorized H3 H9	■	■	■	•
		– On/Off – Diaphragm H4	•	•	•	■
		– On/Off – Motorized H4	■	■	■	•
	Leak Test Ports	•	•	•	•	
Safety Valve (Redundant)	– Diaphragm	•	•	•	■	
	– Motorized	○	○	○	•	
OPTIONS	Right-Hand Water Connections	○	○	○	○	
	Power Vent	○	○	○	○	
	CSD-1 Code	(d)	(d)	(d)	(d)	
	Factory Mutual Insurers Control System (FM)	■	■	■	○	
	Diagnostic Alarm System	○	○	○	○	
Outdoor Reset Control – Stage (B-23, B-27, B-42)	○	○	○	○		

(a) 45 PSI PRV not available on models 3500 or 4001.

(b) On certain applications, controls may be mounted on other than the front of the boiler.

(c) Required as part of certain code-compliant configurations.

(d) Parts added vary with firing mode.

• = Standard item

○ = Optional item

■ = Not Applicable

- Direct-fired hot water supply for use with storage tank

FEATURES		WH MODELS				
		514-824	926-1826	2100-2500	3001-4001	
HEAT EXCHANGER	ASME Inspected and Stamped – 160 psi	•	•	•	•	
	National Board registered	•	•	•	•	
	Heat Exchanger Tubes – Copper	•	•	•	•	
	Headers	– Bronze	•	•	•	•
		– Cast Iron	○	○	○	○
		– Cast Iron – Single-Pass	○	○	○	○
	Pressure Relief Valve	– 125 psi	•	•	•	•
		– 150 psi	○	○	○	○
Temperature & Pressure Gauge	•	•	•	•		
Pump - 120VAC 1-ph 60 Hz	○	○				
JACKET	Bolted Cabinet	•	•	•	•	
	Draft Diverters	– Stack Type – Indoor	•	•		
		– Low Profile – Outdoor	•	•		
		– Built-in – Indoor			•	•
		– Field Interchangeable – Indoor/Outdoor	•			
	Enclosed Controls (a)	•	•			
Combustible Floor Shield	○	○				
ELECT.	Power Supply, 120VAC 1-ph 60 Hz	•	•	•	•	
	Transformer 120V/24V	•	•	•	•	
	On/Off Switch	•	•	•	•	
OPER. CTRLS.	Economaster II Pump Time Delay – 120V 10A Max.	•	•	•	•	
	Temperature Control	– On/Off Controller WH1 & WH2	○	○	○	○
		– Mech. Modulating Valves –110-170°F WH2	•	•		
		– Staged Controller WH3	○	○	○	○
SAFETY CONTROLS	Flame Safeguard	•	•	•	•	
	Pilot – Electronic, Intermittent Pilot Ign. W/ Lockout	•	•	•	•	
	High Gas Pressure Switch (b)	○	○	○	•	
	Low Gas Pressure Switch (b)	○	○	○	○	
	Low Water Cut-Off	○	○	○	○	
	High Limit Switch	– Manual Reset – Adjustable 200°F max	•	•	•	•
		– Automatic Reset – Adjustable	○	○	○	•
		– Automatic Reset – Fixed 200°F				
Flow Switch	•	•	•	•		
GAS TRAIN	Gas Pressure Regulator	•	•	•	•	
	Manual Gas Valve - Main Gas Shut-Off ("A" valve)	•	•	•	•	
	Control Valve	– On/Off – Diaphragm WH1	•	•	•	
		– On/Off – Motorized WH1				•
		– Modulating – Mechanical WH2	•	•		
		– Staged – Diaphragm WH3	•	•	•	
		– Staged – Motorized WH3				•
Safety Valve (Redundant)	– Diaphragm	•	•	•		
	– Motorized	○	○	○	•	
OPTIONS	Right-Hand Water Connections	○	○	○	○	
	Power Vent	○	○	○	○	
	CSD-1 Code(c)	○	○	○	○	
	Factory Mutual Insurers Control System (FM)				○	
	Diagnostic Alarm System	○	○	○	○	

- (a) On certain applications, controls may be mounted on other than the front of the boiler.
- (b) Required as part of certain code-compliant configurations.
- (c) CSD-1 exempts water heaters. See CG-130(b). State and local codes may require compliance to these requirements.

• = Standard item
 ○ = Optional item
 ■ = Not Applicable

Flow Rates and Pressure Drops

	MAXIMUM & MINIMUM FLOW RATES						PRESSURE DROPS												
	Model Size	MAX FLOW / MIN ΔT			MIN FLOW / MAX ΔT			10°F ΔT		20°F ΔT		30°F ΔT		40°F ΔT					
		CHART 1			CHART 2			GPM	ΔP FT	GPM	ΔP FT	GPM	ΔP FT	GPM	ΔP FT				
	GPM	ΔT	ΔP FT	GPM	ΔT	ΔP FT	GPM	ΔP FT	GPM	ΔP FT	GPM	ΔP FT	GPM	ΔP FT					
TWO-PASS	514	90	9	9	40	21	1.8	84	7.8	42	1.9	2**							
	624	90	12	9.5	40	26	1.9	Exceeds maximum flow, See chart # 1		52	3.0								
	724	90	13	10	40	30	2.0			60	4.4					40	2.0		
	824	90	15	10.5	40	34	2.1			68	6.0					4.6	2.8		
	926	90	17	11	40	38	2.2			77	8.0					51	3.5		
	962	90	18	11	40	40	2.2			80	8.8					53	3.8		
	1083	90	20	12	45	40	3.1			90	12.0					60	5.3	45	3.1
	1125	90	21	12	47	40	3.3			90	12.0					62	5.6	47	3.3
	1178	90	22	12.5	49	40	3.8			Exceeds maximum flow, See chart # 1						65	6.5	49	3.8
	1223	90	22	12.5	51	40	4.0									68	7.1	51	4.0
	1287	90	24	13.2	53	40	4.5					71	8.2	53	4.5				
	1336	90	25	13.2	55	40	4.9	74	8.9			55	4.9						
	1414	90	26	14	58	40	5.8	78	10.5			58	5.8						
	1468	90	27	14	61	40	6.4	81	11.3			61	6.4						
	1571	90	29	14.5	65	40	7.5	87	13.5			65	7.5						
	1631	90	30	14.5	68	40	8.3	90	14.5			68	8.3						
	1758	90	32	15.4	73	40	10.0	Exceeds maximum flow, See chart # 1				73	10.0						
	1826	90	34	15.4	76	40	10.8					76	10.8						
	2100	200	17	14.8	90	38	3.2	174	11.2	116	5.1	2**							
	2500	200	21	15.8	103	40	4.4	Exceeds maximum flow, See chart # 1		138	7.8	103	4.4						
3001	200	25	16.7	124	40	6.7	166			11.6	124	6.7							
3500	200	29	17.5	145	40	9.5	191			16.2	145	9.5							
4001	200	33	18.7	166	40	13.0	Exceeds maximum flow, See chart # 1			166	13.0								
SINGLE-PASS	926	200	8	9.7	90	17	2.1	152	5.7	Less than minimum flow, See chart # 2**									
	962	200	8	9.7	90	18	2.1	157	6.1										
	1083	200	9	10.3	90	20	2.3	178	8.2										
	1125	200	9	10.3	90	20	2.3	184	8.8						92	2.3			
	1178	200	10	11	90	21	2.4	193	10.3						97	2.7			
	1223	200	10	11	90	22	2.4	200	11.0						100	2.9			
	1287	200	11	11.7	90	23	2.5	Exceeds maximum flow, See chart # 1							106	3.4			
	1336	200	11	11.7	90	24	2.5								110	3.7			
	1414	200	12	12.2	90	26	2.7								116	4.2			
	1468	200	12	12.2	90	27	2.7								120	4.5			
	1571	200	13	13	90	29	2.8			129	5.5								
	1631	200	13	13	90	30	2.8			134	6.0								
	1758	200	14	14.7	90	32	3.0			144	7.3	96	3.4						
	1826	200	15	14.7	90	33	3.0			150	8.0	100	3.7						
	2100	400	9	18	180	19	4.0			344	14	Less than minimum flow, See chart # 2**							
	2500	400	10	18.8	180	23	4.1			Exceeds maximum flow, See chart # 1							205	5.3	
	3001	400	12	19.5	180	27	4.3	246	7.8										
	3500	400	14	20.5	180	32	4.5	287	11.0								191	5.0	
	4001	400	16	21.5	180	36	4.7	328	14.8								219	6.8	

** Minimum flow rates in closed systems may be reduced to a flow rate consistent with a 40°F ΔT.

Maximum flow rates limited by maximum acceptable velocity through the heat exchanger tubes. May be increased by 10% for closed heating systems. Pressure drop would increase 21%. Single-pass heat exchangers are to be used only when flow rates exceed the allowable for two-pass.

Recommend maximum 35°F rise for domestic hot water.

Recovery Rates

		Recovery Rates														
		Indoor Models														
		Temperature Rise														
Model Number	Input MBTU	10F°	20F°	30F°	40F°	50F°	60F°	70F°	80F°	90F°	100F°	110F°	120F°	130F°	140F°	150F°
		Gallons per Hour (GPH)														
514	511.5	5084	2542	1695	1271	1017	847	726	636	565	508	462	424	391	363	339
624	627	6232	3116	2077	1558	1246	1039	890	779	692	623	567	519	479	445	415
724	726	7216	3608	2405	1804	1443	1203	1031	902	802	722	656	601	555	515	481
824	825	8200	4100	2733	2050	1640	1367	1171	1025	911	820	745	683	631	586	547
962	961.7	9559	4779	3186	2390	1912	1593	1366	1195	1062	956	869	797	735	683	637
1125	1124.7	11179	5589	3726	2795	2236	1863	1597	1397	1242	1118	1016	932	860	798	745
1223	1222.5	12151	6075	4050	3038	2430	2025	1736	1519	1350	1215	1105	1013	935	868	810
1336	1336.6	13285	6642	4428	3321	2657	2214	1898	1661	1476	1328	1208	1107	1022	949	886
1468	1467	14581	7291	4860	3645	2916	2430	2083	1823	1620	1458	1326	1215	1122	1042	972
1631	1630	16201	8101	5400	4050	3240	2700	2314	2025	1800	1620	1473	1350	1246	1157	1080
1826	1825.6	18145	9073	6048	4536	3629	3024	2592	2268	2016	1815	1650	1512	1396	1296	1210
2100	2100	20873	10436	6958	5218	4175	3479	2982	2609	2319	2087	1898	1739	1606	1491	1392
2500	2499	24839	12419	8280	6210	4968	4140	3548	3105	2760	2484	2258	2070	1911	1774	1656
3001	3000	29818	14909	9939	7455	5964	4970	4260	3727	3313	2982	2711	2485	2294	2130	1988
3500	3500	34788	17394	11596	8697	6958	5798	4970	4348	3865	3479	3163	2899	2676	2485	2319
4001	4000	39758	19879	13253	9939	7952	6626	5680	4970	4418	3976	3614	3313	3058	2840	2651
		Outdoor Models														
514	511.5	5084	2542	1695	1271	1017	847	726	636	565	508	462	424	391	363	339
624	627	6232	3116	2077	1558	1246	1039	890	779	692	623	567	519	479	445	415
724	726	7216	3608	2405	1804	1443	1203	1031	902	802	722	656	601	555	515	481
824	825	8200	4100	2733	2050	1640	1367	1171	1025	911	820	745	683	631	586	547
926	926	9204	4602	3068	2301	1841	1534	1315	1150	1023	920	837	767	708	657	614
1083	1083	10764	5382	3588	2691	2153	1794	1538	1346	1196	1076	979	897	828	769	718
1178	1178	11709	5854	3903	2927	2342	1951	1673	1464	1301	1171	1064	976	901	836	781
1287	1287	12792	6396	4264	3198	2558	2132	1827	1599	1421	1279	1163	1066	984	914	853
1414	1413	14044	7022	4681	3511	2809	2341	2006	1756	1560	1404	1277	1170	1080	1003	936
1571	1570	15605	7802	5202	3901	3121	2601	2229	1951	1734	1560	1419	1300	1200	1115	1040
1758	1758	17473	8737	5824	4368	3495	2912	2496	2184	1941	1747	1588	1456	1344	1248	1165

For gallons per minute (GPM) divide GPH by 60

www.raypak.com

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