

Sizing Guide



Working towards
a cleaner future



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This guide includes information on our extensive range of Storage Water Heaters to include. Standard, Hi-Flo, RFF, RSC, CSC, CWH Condensing, Oil Fired and Propane models.

Other Equipment Includes:

- Supa-Flo High Output Condensing Water Heaters
- Supa-Heat High Efficiency Condensing Boilers

Contact Andrews Water Heaters for further details

General & Safety Information

The Andrews Storage Water Heater has been designed and built to give efficient and reliable service. Like any other piece of mechanical equipment, however, the heater will only operate at maximum efficiency if the correct installation, commissioning and servicing procedures are followed.

The purpose of this Sizing Guide is to provide information helpful to specifiers and installers of Andrews Gas-Fired Storage Water Heaters together with technical data.

The guide has been adapted from CIBSE Guide.

The information given, however, may be subject to revision in compliance with the Andrews policy of continual improvement.

The ultimate responsibility for sizing and installation lies with the specifier and/or installer, having regard to the specific requirements of a particular project. It is not the responsibility of Andrews, its employees or agents.

The heater(s) must be installed in accordance with the following requirements;

The current GAS SAFETY (INSTALLATION AND USE) REGULATIONS

The current BUILDING REGULATIONS

The current LOCAL WATER BYELAWS

N.B. These are Statutory Requirements.

In addition the installation of the heater(s) should be in accordance with all relevant requirements of the Gas Supplier, Local Authority and the recommendations of the following British Standards and Code of Practice:

Standard Range, Fan Flued

BS 6700 (1997) Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. This standard supersedes and following British Standards and Codes of Practice: CP 99, CP 310, CP 324, 202, CP 342 Part 1, CP 324 Part 2, Centralised hot water supply.

BS 5546: 1990 Installation of gas hot water supplies for domestic purposes.

BS 5440: 2000 Installation of flues and ventilation for gas appliances of rated output not exceeding 70kW.

Part 1: Specification for installation of flues.

Part 2: Specification for installation of ventilation for gas appliances.

BS 6891: Installation of low pressure gas pipework of up to 28mm in domestic premises.

BS 7206: 1990 Specification for unvented hot water storage units and packages.

Hi-Flo Range Balanced Flue and Fanned Balanced Flue as above plus

BS 6644: Installation of gas-fired hot water boilers of rated inputs between 60kW and 2MW.

N.B. Consideration must be given to any amendments to, or updates of, the above Standards.

Details on installation are given in the 'Installation, Operation and Servicing Manual' which is supplied with each heater. Installation must be carried out by a CORGI registered operative.

Health & Safety Regulations 1993

Under Section 6 of the Act, it is the duty of manufacturers and suppliers of products for use at work to ensure, so far as is reasonably practicable, that such products are safe and without risk to health when properly used and to make available to users of such products adequate information about their safe and proper operation.

Andrews Water Heaters should only be used in the manner and purpose for which they were intended and in accordance with the recommendations detailed in this Guide. Andrews Water Heaters have been designed, produced and inspected with safety in mind. There are, however, certain basic precautions which must be taken by the user. Particular attention is drawn to the safety precautions in this Guide and in the Operating Instructions provided with each heater.

It is imperative that all persons who may use Andrews Storage Water Heaters are provided with all the information and instruction necessary to ensure that these appliances are operated correctly and safely.

Effectiveness in combating Legionellae Pneumophila

Water systems in buildings have been associated with outbreaks of Legionnaires' disease. This is particularly the case in health care facilities where the occupants are significantly more susceptible to infection than the general public. In recognition of the particular risks posed by water services in hospitals, a Code of Practice for the Control of Legionellae in Health Care premises has been issued by the UK Department of Health (1991). Codes of Practice applicable to non-health care buildings have been published by a number of organisations, principally the Health and Safety Executive (HS)(G)70 and the Chartered Institute of Building Services Engineers (CIBSE, TM13).

All Codes of Practice draw attention to the design and operation of water systems with reference to the avoidance of factors which favour colonisation by Legionellae bacteria. These factors include stagnation, lukewarm conditions (20°C to 45°C) and the accumulation of debris, scale and corrosion products in the base of the tanks and calorifiers.

Andrews Water Heaters has commissioned an independent evaluation of their water heaters to investigate their performances in terms of resistance to the build-up of Legionellae bacteria.

Experiments were conducted to determine whether, following a substantial challenge by Legionellae Pneumophila, after short term and overnight stagnation conditions, the system was rendered free from viable recoverable Legionellae. It was found that at 61°C, following a challenge of approximately 10⁷ organisms per litre, within one hour greater than 99.999% of organisms had been killed. After a subsequent stagnation period sampling did not reveal any residual contamination. The design of the base of the water heater precludes Legionellae colonisation, even after build up of debris, the burner positioning ensures that the water at the bottom of the heater reaches the same, or higher, temperature as in the rest of the heater.

Based on the data obtained through experiment the Andrews Water Heater can be described as *Legionellae resistant* as it is considered unlikely that, at the temperature tested, the organism would colonise the water heater and subsequently present a possible health risk. A copy of the full report is available from Andrews Water Heaters.

Sizing Information

The domestic hot water requirements for a building depend upon the number of occupants, the number of hot water appliances and the function of the building, e.g. Hotel, Flat, Office, Factory, School, etc. A guide to the consumption per person for various building types is shown in the Table II.1.

TABLE 1

Typical Hot Water Consumption per person for various types of buildings

Type of Building	Max Daily Demand per person – ltrs	Max Daily Demand per person – gals	Storage Requirement per person – ltrs	Storage Requirement per person – gals
Colleges & Schools				
Boarding	115	25.2	23	5.0
Day	15	3.3	4.5	1.0
Dwellings				
House - Luxury	136	29.8	45	9.9
House - Average	115	25.2	45	9.9
Flat - Luxury	136	29.8	32	7.0
Flat - Average	115	25.2	32	7.0
Factories	15	3.3	4.5	1.0
Hospitals				
General	136	29.8	27	5.9
Infectious	225	49.3	45	9.9
Infirmaries	68	14.9	23	5.0
Infirmaries (with Laundry)	90	19.7	27	5.9
Maternity	225	49.3	32	7.0
Mental	90	19.7	23	5.0
Nurses' Homes	136	29.8	45	9.9
Hostels	115	25.2	32	7.0
Hotels				
First Class	136	29.8	45	9.9
Average	114	25.0	36	7.9
Offices	14	3.1	4.5	1.0
Sports Pavilions (with spray-type showers)	40	8.8	40	8.8
Restaurants	per meal 6 ltrs		per meal 1.3 gals	

To determine the size of the water heater(s) required it is necessary to consider both the daily hot water consumption and the maximum peak demand for use in one hour.

To calculate these it is necessary to know the hot water consumption of various appliances and the water temperature required.

Table 2 gives information for guidance.

TABLE 2

Water Consumption and Temperature of use of various appliances

Appliance	Hot Water Temperature at draw off	Flow Rate of Taps	Approx capacity of appliance (hot & cold)	Typical temperature of use
Shower	45 - 65°C	0.15ltr/sec	45ltrs	43°C
Wash Basin	45 - 65°C	0.2ltr/sec	5ltrs	43°C
Bath	45 - 65°C	0.3ltr/sec	80ltrs	43°C
Kitchen Sink	65°C	0.3ltr/sec	12ltrs	60°C
Commercial Sink	65°C	0.3ltr/sec	80ltrs	60°C

- (a) Flow rate for hot water only
- (b) Flow rates for mixed hot and cold

If close temperature control is required the fitting of thermostatic mixing valves should be considered, as indicated in British Standard Code of Practice CP342 Part 11, Centralised Hot Water Supply.

These tables show the percentage of Hot Water which is mixed with cold water to obtain the desired outlet temperature

TABLE 3

Temperature of mixed water	Hot Water Stored Temperature - 82°C						
	Cold Water Supply 4°C	Cold Water Supply 10°C	Cold Water Supply 16°C	Cold Water Supply 21°C	Cold Water Supply 27°C	Cold Water Supply 32°C	Cold Water Supply 38°C
38°C	43	38	33	27	20	11	0
43°C	50	46	41	36	30	21	12
49°C	57	54	50	45	40	33	25
54°C	65	61	58	54	50	44	37
60°C	71	69	67	64	60	55	50
66°C	78	76	75	73	70	67	62
71°C	86	85	83	82	80	78	75
77°C	93	92	92	91	90	89	87
82°C	0	0	0	0	0	0	0

TABLE 4

Temperature of mixed water	Hot Water Stored Temperature - 66°C						
	Cold Water Supply 4°C	Cold Water Supply 10°C	Cold Water Supply 16°C	Cold Water Supply 21°C	Cold Water Supply 27°C	Cold Water Supply 32°C	Cold Water Supply 38°C
38°C	55	50	44	38	28	18	0
43°C	63	59	54	49	41	32	18
49°C	73	70	66	62	56	50	39
54°C	81	79	75	73	69	65	57
60°C	90	89	88	87	85	82	79

TABLE 5

Temperature of mixed water	Hot Water Stored Temperature - 54°C						
	Cold Water Supply 4°C	Cold Water Supply 10°C	Cold Water Supply 16°C	Cold Water Supply 21°C	Cold Water Supply 27°C	Cold Water Supply 32°C	Cold Water Supply 38°C
38°C	68	64	58	51	41	27	0
43°C	78	75	71	67	59	50	31
49°C	90	89	87	82	81	77	69

Sizing Information – Natural Gas Fired Heaters, LPG and Oil.

In order to determine the size of a water heater (or heaters) for a specific project it is necessary to have some knowledge of water heater performance.

This information is available from several sources, e.g.

- Specification Sheets
- Sales Literature
- Installation Guide, Operation and Servicing Manual

Tables 6 to 19 provide additional information regarding water heater outputs through various time periods, assuming that the stored water is at maximum temperature at the outset.

Maximum delivery at 56°C (133°F) rise in temperature Useable storage and recovery for complete draw off

TABLE 6

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
24/39	litres	109	142	2.4	46.1	12	100.0	111.8	123.6	147.3	182.8	218.3
	gallons	24	31	0.5	46.5		22.0	24.6	27.1	32.3	40.1	47.8
32/40	litres	145	146	2.4	59.6	12.5	125.8	138.0	150.2	174.5	211.0	247.5
	gallons	32	32	0.5	60.0		27.7	30.4	33.1	38.4	46.4	54.4
40/61	litres	182	220	3.7	49.6	19	164.1	182.4	200.7	237.4	292.4	347.4
	gallons	40	49	0.8	49.0		36.2	40.3	44.3	52.5	64.8	77.0
63/62	litres	286	227	3.8	75.6	19	238.0	257.0	275.9	313.7	370.5	427.2
	gallons	63	50	0.8	75.6		52.4	56.6	60.8	69.1	81.6	94.1
84/87	litres	382	316	5.3	72.5	26	320.1	346.4	372.7	425.4	504.4	583.4
	gallons	84	70	1.2	72.0		70.5	76.3	82.1	93.8	111.3	128.8

TABLE 7

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
32/143	litres	145	517	8.6	16.8	42.8	187.7	230.8	273.8	360.0	489.3	618.5
	gallons	32	114	1.9	16.8		41.4	50.9	60.4	79.4	107.9	136.4
65/173	litres	295	629	10.5	28.1	50	311.3	363.8	416.2	521.0	678.3	835.5
	gallons	65	138	2.3	28.3		68.5	80.0	91.5	114.5	149.0	183.5
81/264	litres	368	959	16.0	23.0	80	417.4	497.4	577.3	737.1	976.9	1216.6
	gallons	81	212	3.5	22.9		92.0	109.7	127.4	162.7	215.7	268.7
62/341	litres	282	1239	20.7	13.7	102	403.9	507.2	610.4	816.9	1126.7	1436.4
	gallons	62	273	4.6	13.6		88.9	111.7	134.4	179.9	248.2	316.4
54/418	litres	245	1520	25.3	9.7	128	424.8	551.5	678.2	931.5	1311.5	1691.5
	gallons	54	334	5.6	9.7		93.5	121.3	149.1	204.8	288.3	371.8
54/440	litres	245	1598	26.6	9.2	139	437.8	571.0	704.2	970.5	1370.0	1769.5
	gallons	54	352	5.9	9.2		96.5	125.8	155.1	213.8	301.8	389.8

TABLE 8

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
RFF 190	litres	190	232	3.9	49.1	19.5	171.7	191.0	210.3	249.0	307.0	365.0
	gallons	42	51	0.9	49.4		37.9	42.2	46.4	54.9	67.7	80.4
RFF 280	litres	280	272	4.5	61.8	23	241.3	264.0	286.7	332.0	400.0	468.0
	gallons	62	60	1.0	62.0		53.4	58.4	63.4	73.4	88.4	103.4

TABLE 9

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
CWH30/200	litres	200	450	7.50	27.0	31.1	245.0	282.5	320.0	395.0	507.5	620.0
	gallons	44	99	1.65	27.0		53.9	62.2	70.4	86.9	111.6	136.4
CWH60/200	litres	200	900	15.0	14.0	62.2	320.0	395.0	470.0	620.0	845.0	1070.0
	gallons	44	198	3.30	14.0		70.4	86.9	103.4	136.4	185.9	235.4
CWH90/200	litres	200	1350	22.50	9.0	93.3	395.0	507.5	620.0	845.0	1182.5	1520.0
	gallons	44	297	4.95	9.0		86.9	111.6	136.4	185.9	260.2	334.4
CWH120/200	litres	200	1800	30.0	7.0	124.4	470.0	620.0	770.0	1070.0	1520.0	1970.0
	gallons	44	396	6.60	7.0		103.4	136.4	169.4	235.4	334.4	433.3
CWH30/300	litres	300	450	7.50	40.0	31.1	330.0	367.5	405.0	480.0	592.5	705.0
	gallons	66	99	1.65	40.0		72.6	80.9	89.1	105.6	130.3	155.1
CWH60/300	litres	300	900	15.0	20.0	62.2	405.0	480.0	555.0	705.0	930.0	1155.0
	gallons	66	198	3.30	20.0		89.1	105.6	122.1	155.1	204.6	254.1
CWH90/300	litres	300	1350	22.50	14.0	93.3	480.0	592.5	705.0	930.0	1267.5	1605.0
	gallons	66	297	4.95	14.0		105.6	130.3	155.1	204.6	278.9	353.1
CWH120/300	litres	300	1800	30.0	10.0	124.4	555.0	705.0	855.0	1155.0	1605.0	2055.0
	gallons	66	396	6.60	10.0		122.1	155.1	188.1	254.1	353.1	452.0

NB The above figures also apply to the CWH Propane range.

TABLE 10

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
RSC150	litres	150	127	2.1	70.9	9.5	126.2	136.8	147.3	168.5	200.3	232.0
	gallons	33	28	0.5	70.7		27.8	30.1	32.4	37.1	44.1	51.1
RSC190	litres	190	145	2.4	78.6	10.5	157.2	169.3	181.3	205.5	241.8	278.0
	gallons	42	32	0.5	78.8		34.7	37.4	40.1	45.4	53.4	61.4
CSC39	litres	276	600	10.0	27.6	44	293.2	343.2	393.2	493.2	643.2	793.2
	gallons	61	132	2.2	27.7		64.7	75.7	86.7	108.7	141.7	174.7
CSC59	litres	276	922	15.4	18.0	66	346.9	423.7	500.5	654.2	884.7	1115.2
	gallons	61	203	3.4	18.0		76.5	93.5	110.4	144.2	195.0	245.7
CSC78	litres	276	1213	20.2	13.7	88	395.4	496.5	597.5	799.7	1103.0	1406.2
	gallons	61	267	4.5	13.7		87.2	109.5	131.7	176.2	243.0	309.7
CSC93	litres	350	1445	24.1	14.5	106	485.8	606.3	726.7	967.5	1328.8	1690.0
	gallons	77	318	5.3	14.5		106.9	133.4	159.9	212.9	292.4	371.9

TABLE 11

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
L24/31	litres	109	113	1.9	57.9	9.5	95.1	104.6	114.0	132.8	161.1	189.3
	gallons	24	25	0.4	57.6		21.0	23.1	25.1	29.3	35.6	41.8
L32/35	litres	145	127	2.1	68.5	11	122.7	133.3	143.8	165.0	196.8	228.5
	gallons	32	28	0.5	68.6		27.1	29.4	31.7	36.4	43.4	50.4
L40/36	litres	182	131	2.2	83.4	11	149.2	160.2	171.1	192.9	225.7	258.4
	gallons	40	29	0.5	82.8		32.8	35.3	37.7	42.5	49.8	57.0
L63/71	litres	286	258	4.3	66.5	22	243.2	264.7	286.2	329.2	393.7	458.2
	gallons	63	57	1.0	66.3		53.6	58.4	63.1	72.6	86.9	101.1
L84/74	litres	382	269	4.5	85.2	22	312.2	334.7	357.1	401.9	469.2	536.4
	gallons	84	59	1.0	85.4		68.6	73.6	78.5	88.3	103.1	117.8

TABLE 12

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
L32/143	litres	145	517	8.62	16.8	41.8	187.7	230.8	273.8	360.0	489.3	618.5
	gallons	32	114	1.90	16.8		41.4	50.9	60.4	79.4	107.9	136.4
L65/169	litres	297	613	10.22	29.1	49	308.7	359.8	410.8	513.0	666.3	819.5
	gallons	65	135	2.25	29.1		68.0	79.3	90.5	113.0	146.8	180.5
L81/251	litres	370	913	15.22	24.3	76	409.8	485.9	561.9	714.1	942.4	1170.6
	gallons	81	201	3.35	24.3		90.2	107.0	123.7	157.2	207.5	257.7
L62/309	litres	280	1122	18.70	15.0	92.5	384.4	477.9	571.4	758.4	1038.9	1319.4
	gallons	62	247	4.12	15.0		84.6	105.2	125.7	166.9	228.7	290.4
L54/399	litres	245	1449	24.15	10.1	122	413.0	533.8	654.5	896.0	1258.3	1620.5
	gallons	54	319	5.32	10.2		91.0	117.6	144.1	197.3	277.1	356.8

TABLE 13

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
LCSC39	litres	276	600	10.0	27.6	44	293.2	343.2	393.2	493.2	643.2	793.2
	gallons	61	132	2.2	27.7		64.7	75.7	86.7	108.7	141.7	174.7
LCSC59	litres	276	922	15.4	18.0	66	346.9	423.7	500.5	654.2	884.7	1115.2
	gallons	61	203	3.4	18.0		76.5	93.5	110.4	144.2	195.0	245.7
LCSC78	litres	276	1213	20.2	13.7	88	395.4	496.5	597.5	799.7	1103.0	1406.2
	gallons	61	267	4.5	13.7		87.2	109.5	131.7	176.2	243.0	309.7
LCSC93	litres	350	1445	24.1	14.5	106	485.8	606.3	726.7	967.5	1328.8	1690.0
	gallons	77	318	5.3	14.5		592.0	133.4	159.9	212.9	292.4	371.9

TABLE 14

Model No.	Units	Storage Capacity	Recovery Rate/hr (56 deg)	Recovery Rate/min (56 deg)	Recovery Minutes (56 deg)	Heat Input kW	10 Mins	15 Mins	20 Mins	30 Mins	45 Mins	60 Mins
OFS25	litres	192	390	6.5	29.5	30.8	199.4	231.9	264.4	329.4	426.9	524.4
	gallons	42	86	1.43	29.5		43.7	50.9	58.1	72.4	93.9	115.4
OFS29	litres	265	443	7.4	35.8	34.9	259.5	296.5	333.5	407.5	518.5	629.5
	gallons	58	97	1.62	35.8		56.8	64.9	72.9	89.1	113.4	137.6
OFS63	litres	146	975	16.2	9.0	71.8	264.7	346.0	427.2	589.7	833.5	1077.2
	gallons	32	214	3.57	9.0		58.1	75.9	93.7	129.4	182.9	236.4
OFS90	litres	146	1398	23.3	6.3	102.6	335.2	451.7	568.2	801.2	1150.7	1500.2
	gallons	32	307	5.12	6.3		73.6	99.2	124.7	175.9	252.7	329.4
OFS108	litres	378	1677	27.9	13.5	123.1	544.1	683.9	823.6	1103.1	1522.4	1941.6
	gallons	83	368	6.13	13.5		119.4	150.1	180.8	242.1	334.1	426.1
OFS163	litres	306	2516	41.9	7.3	184.6	633.5	843.2	1052.9	1472.2	2101.2	2730.2
	gallons	67	552	9.2	7.3		138.9	184.9	230.9	322.9	460.9	598.9

As a further guide Tables 15 to 19 give details of the recovery rates for various temperature rises for Standard, Hi-Flo, CSC, Oil Fired and CWH Ranges.

TABLE 15

		Recovery Rates Per Hour											
		Andrews Model No.											
Temp Rise	Units	24/39	32/40	40/61	63/62	84/87		32/143	65/173	81/264	62/341	54/418	54/440
50°C	litres	158	161	244	252	350		573	695	1064	1373	1682	1771
	gallons	35	35	53	55	77		126	152	233	301	368	388
55°C	litres	144	147	222	229	318		521	632	967	1248	1529	1610
	gallons	31	32	49	50	70		114	138	212	273	335	353
60°C	litres	132	134	203	210	292		478	579	887	1144	1401	1476
	gallons	29	29	44	46	64		105	127	194	251	307	323
65°C	litres	0	0	0	0	0		441	535	818	1056	1294	1362
	gallons	0	0	0	0	0		97	117	179	231	283	298

Note: Maximum thermostat temperature settings

Standard Range 71°C (160°F)

Hi-Flo Range 82°C (180°F)

CSC Range 80°C (176°F)

Oil Fired Range 82°C (180°F)

CWH Range 70°C (158°F)

TABLE 16

		Recovery Rates Per Hour											
		Andrews Model No.											
Temp Rise	Units	RFF190	RFF280	RSC150	RSC190	CSC39	CSC59	CSC78	CSC93	CWH30	CWH60	CWH90	CWH120
50°C	litres	257	300	141	161	664	1019	1344	1601	510	1020	1530	2040
	gallons	56	66	31	35	146	223	294	351	112	224	336	448
55°C	litres	234	273	128	147	604	927	1221	1455	460	920	1380	1840
	gallons	51	60	28	32	132	203	268	319	101	202	303	404
60°C	litres	215	250	117	134	553	849	1120	1334	420	840	1260	1680
	gallons	47	55	26	29	121	186	245	292	92	184	276	368
65°C	litres	0	0	0	0	511	784	1034	1232	n/a	n/a	n/a	n/a
	gallons	0	0	0	0	112	172	226	270	n/a	n/a	n/a	n/a

TABLE 17

		Recovery Rates Per Hour											
		Andrews Model No.											
Temp Rise	Units	L24/31	L32/35	L40/36	L63/71	L84/74		L32/143	L65/169	L81/251	L62/309	L54/399	
50°C	litres	163	189	189	378	378		717	841	1304	1587	2094	
	gallons	36	41	41	83	83		157	184	286	348	459	
55°C	litres	148	172	172	343	343		652	764	1186	1443	1903	
	gallons	32	38	38	75	75		143	167	260	316	417	
60°C	litres	136	157	157	315	315		598	701	1087	1323	1745	
	gallons	30	34	34	69	69		131	154	238	290	382	
65°C	litres	0	0	0	0	0		552	647	1003	1221	1610	
	gallons	0	0	0	0	0		121	142	220	268	353	

TABLE 18

		Recovery Rates Per Hour											
		Andrews Model No.											
Temp Rise	Units	LCSC39			LCSC59			LCSC78			LCSC93		
50°C	litres	664			1019			1344			1601		
	gallons	146			223			294			351		
55°C	litres	604			927			1221			1455		
	gallons	132			203			268			319		
60°C	litres	553			849			1120			1334		
	gallons	121			186			245			292		
65°C	litres	511			784			1034			1232		
	gallons	112			172			226			270		

TABLE 19

		Recovery Rates Per Hour											
		Andrews Model No.											
Temp Rise	Units	OFS25	OFS29	OFS63	OFS90	OFS108	OFS163						
50°C	litres	432	491	1081	1550	1858	2789						
	gallons	95	108	237	340	407	611						
55°C	litres	393	446	983	1409	1689	2535						
	gallons	86	98	215	309	370	555						
60°C	litres	360	409	901	1291	1549	2324						
	gallons	79	90	197	283	339	509						
65°C	litres	333	378	832	1192	1430	2145						
	gallons	73	83	182	261	313	470						

Hot Water for Shower Rooms

The domestic hot water requirements for a building depend upon the number of occupants, the number of hot water appliances and the function of the building, e.g. Hotel, Flat, Office, Factory, School, etc. A guide to indicate the possible number of outlet uses from an individual model water heater is shown in tables 20 to 24.

TABLE 20

Sizing chart for modern (multiple) spray type showers (5 minutes shower assumed)

Model	Max showers in 10 mins	Max showers in 20 mins	Max showers in 30 mins	Max showers in 60 mins
24/39	4	5	6	8
32/40	5	6	7	9
40/61	6	8	9	13
63/62	9	10	12	16
84/87	12	14	16	22
32/143	7	10	14	23
65/173	12	16	20	31
81/264	16	22	28	46
62/341	15	23	31	54
54/418	16	26	35	64
54/440	16	27	37	67
RFF190	6	7	9	14
RFF280	9	10	13	18
RSC150	5	6	6	9
RSC190	6	7	8	10
CSC39	11	15	19	30
CSC59	13	19	25	42
CSC78	15	23	30	53
CSC93	18	27	36	64
L24/31	4	4	5	7
L32/35	5	5	6	9
L40/36	6	6	7	10
L63/71	9	11	12	17
L84/74	12	13	15	20
L32/143	7	10	14	23
L65/169	12	15	19	31
L81/251	15	21	27	44
L62/309	14	22	29	50
L54/399	16	25	34	61
LCSC39	11	15	19	30
LCSC59	13	19	25	42
LCSC78	15	23	30	53
LCSC93	18	27	36	64
OFS25	8	10	12	20
OFS29	10	13	15	24
OFS63	10	16	22	41
OFS90	13	21	30	57
OFS108	20	31	42	73
OFS163	24	40	55	103
CWH30/200	9	12	15	23
CWH60/200	12	18	23	40
CWH90/200	15	23	32	57
CWH120/200	18	29	40	74
CWH30/300	12	15	18	27
CWH60/300	15	21	27	44
CWH90/300	18	27	35	60
CWH120/300	21	32	44	77

This table assumes a mixed water temperature of 43°C (109°F) with the water heater thermostat set at 66°C (151°F); a cold water inflow temperature of 10°C (50°F) and a discharge rate for a typical shower of 0.15 litres/sec (2.0 gals/min).

If the output of the largest water heater is insufficient to satisfy the maximum hot water demand of the system it may be necessary to use more than one unit or, alternatively, install an auxiliary storage tank. (Contact Andrews for details.)

The use of time flow valves is recommended to save water and energy.

TABLE 21

Wash Basins

(average capacity 5 litres/1.1 gals, initial temperature of hot water 66°C (151°F) temperature of use 43°C (109°F))

Model	Max wash basins in 10 mins	Max wash basins in 20 mins	Max wash basins in 30 mins	Max wash basins in 60 mins
24/39	34	42	50	74
32/40	43	51	59	84
40/61	56	68	80	118
63/62	81	94	106	145
84/87	109	126	144	198
32/143	64	93	122	210
65/173	106	141	177	283
81/264	141	196	250	412
62/341	137	207	277	487
54/418	144	230	316	573
54/440	148	239	329	600
RFF190	58	71	84	124
RFF280	82	97	113	159
RSC150	43	50	57	79
RSC190	53	61	70	94
CSC39	99	133	167	269
CSC59	118	170	222	378
CSC78	134	203	271	477
CSC93	165	246	328	573
L24/31	32	39	45	64
L32/35	42	49	56	77
L40/36	51	58	65	88
L63/71	82	97	112	155
L84/74	106	121	136	182
L32/143	64	93	122	210
L65/169	105	139	174	278
L81/251	139	190	242	397
L62/309	130	194	257	447
L54/399	140	222	304	549
LCSC39	99	133	167	269
LCSC59	118	170	222	378
LCSC78	134	203	271	477
LCSC93	165	246	328	573
OFS25	68	90	112	178
OFS29	88	113	138	213
OFS63	90	145	200	365
OFS90	114	193	272	509
OFS108	184	279	374	658
OFS163	215	357	499	925
CWH30/200	83	108	134	210
CWH60/200	108	159	210	363
CWH90/200	134	210	286	515
CWH120/200	159	261	363	668
CWH30/300	112	137	163	239
CWH60/300	137	188	239	392
CWH90/300	163	239	315	544
CWH120/300	188	290	392	697

TABLE 22

Baths

(average capacity 80 litres/18 gals, temperature of use 43°C (109°F), initial hot water temperature 66°C (151°F))

Model	Max baths in 30 mins	Max baths in 60 mins
24/39	3	4
32/40	4	5
40/61	5	7
63/62	7	9
84/87	9	12
32/143	8	13
65/173	11	18
81/264	16	26
62/341	17	30
54/418	20	36
54/440	21	37
RFF190	5	8
RFF280	7	10
RSC150	4	5
RSC190	4	6
CSC39	10	17
CSC59	14	24
CSC78	17	30
CSC93	20	36
L24/31	3	4
L32/35	3	5
L40/36	4	5
L63/71	7	10
L84/74	9	11
L32/143	8	13
L65/169	11	17
L81/251	15	25
L62/309	16	28
L54/399	19	34
LCSC39	10	17
LCSC59	14	24
LCSC78	17	30
LCSC93	20	36
OFS25	7	11
OFS29	9	13
OFS63	12	23
OFS90	17	32
OFS108	23	41
OFS163	31	58
CWH30/200	8	13
CWH60/200	13	23
CWH90/200	18	32
CWH120/200	23	42
CWH30/300	10	15
CWH60/300	15	24
CWH90/300	20	34
CWH120/300	24	44

TABLE 23

Kitchen Sinks

(average capacity 12 litres/2.6 gals, initial hot water temperature 66°C (151°F), temperature of use 60°C (140°F))

Model	Max kitchen sinks in 30 mins	Max kitchen sinks in 60 mins
24/39	14	20
32/40	16	23
40/61	22	33
63/62	29	40
84/87	40	55
32/143	34	58
65/173	49	78
81/264	69	114
62/341	76	134
54/418	87	158
54/440	91	166
RFF190	23	34
RFF280	31	44
RSC150	16	22
RSC190	19	26
CSC39	46	74
CSC59	61	104
CSC78	75	132
CSC93	91	158
L24/31	12	18
L32/35	15	21
L40/36	18	24
L63/71	31	43
L84/74	38	50
L32/143	34	58
L65/169	48	77
L81/251	67	110
L62/309	71	124
L54/399	84	152
LCSC39	46	74
LCSC59	61	104
LCSC78	75	132
LCSC93	91	158
OFS25	31	49
OFS29	38	59
OFS63	55	101
OFS90	75	140
OFS108	103	182
OFS163	138	256
CWH30/200	37	58
CWH60/200	58	100
CWH90/200	79	142
CWH120/200	100	184
CWH30/300	45	66
CWH60/300	66	108
CWH90/300	87	150
CWH120/300	108	192

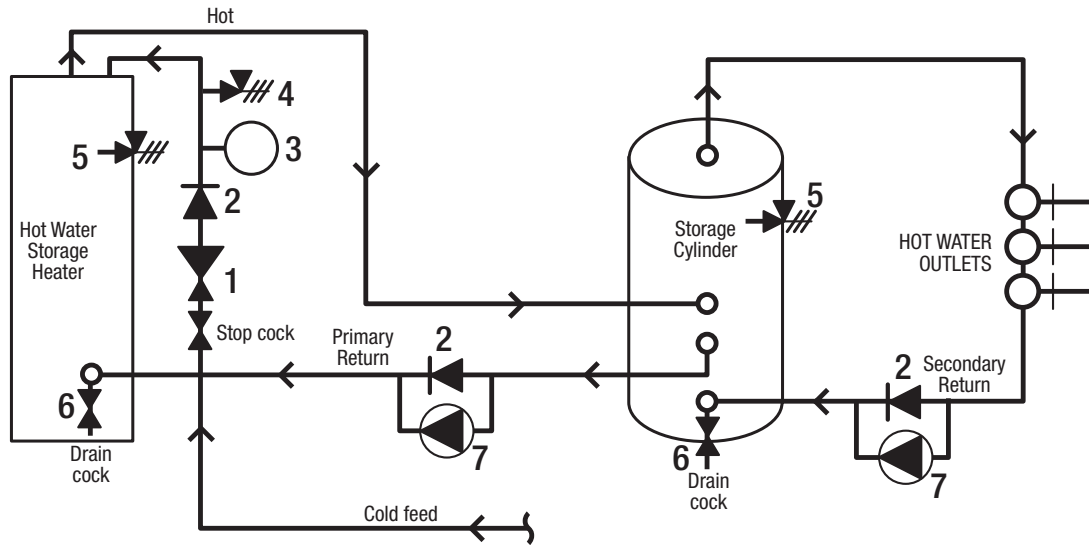
TABLE 24

Commercial Sinks

(average capacity 80 litres/18 gals, temperature 65°C (149°F))

Model	Max commercial sinks in 10 mins	Max commercial sinks in 20 mins	Max commercial sinks in 30 mins	Max commercial sinks in 60 mins
24/39	1	2	2	3
32/40	2	2	2	3
40/61	2	3	3	5
63/62	3	4	4	6
84/87	4	5	6	8
32/143	3	4	5	9
65/173	4	6	7	12
81/264	6	8	10	17
62/341	6	9	11	20
54/418	6	10	13	24
54/440	6	10	14	25
RFF190	2	3	3	5
RFF280	3	4	5	7
RSC150	2	2	2	3
RSC190	2	3	3	4
CSC39	4	6	7	11
CSC59	5	7	9	16
CSC78	6	8	11	20
CSC93	7	10	14	24
L24/31	1	2	2	3
L32/35	2	2	2	3
L40/36	2	2	3	4
L63/71	3	4	5	6
L84/74	4	5	6	8
L32/143	3	4	5	9
L65/169	4	6	7	12
L81/251	6	8	10	16
L62/309	5	8	11	19
L54/399	6	9	13	23
LCSC39	4	6	7	11
LCSC59	5	7	9	16
LCSC78	6	8	11	20
LCSC93	7	10	14	24
OFS25	3	4	5	7
OFS29	4	5	6	9
OFS63	4	6	8	15
OFS90	5	8	11	21
OFS108	8	12	15	27
OFS163	9	15	21	38
CWH30/200	3	4	6	9
CWH60/200	4	7	9	15
CWH90/200	6	9	12	21
CWH120/200	7	11	15	28
CWH30/300	5	6	7	10
CWH60/300	6	8	10	16
CWH90/300	7	10	13	23
CWH120/300	8	12	16	29

Standard, RFF, RSC or Oil Fired unvented hot water storage heater with a ST storage cylinder

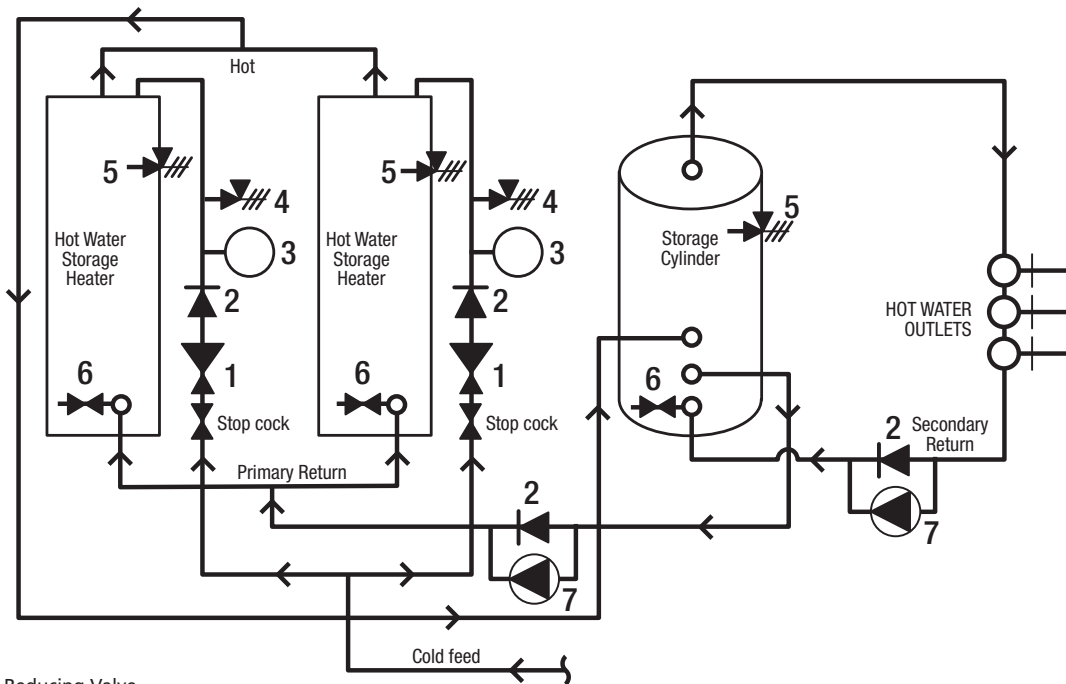


- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel(s)
(NB To be sized in accordance with the total system capacity)
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve
 - 6 – Drain Valve
 - 7 – Bronze Circulator

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The final system design is the responsibility
of the specifier or consultant.

FIG 1

Two Standard, RFF, RSC or Oil Fired unvented hot water storage heaters in parallel with a ST storage cylinder

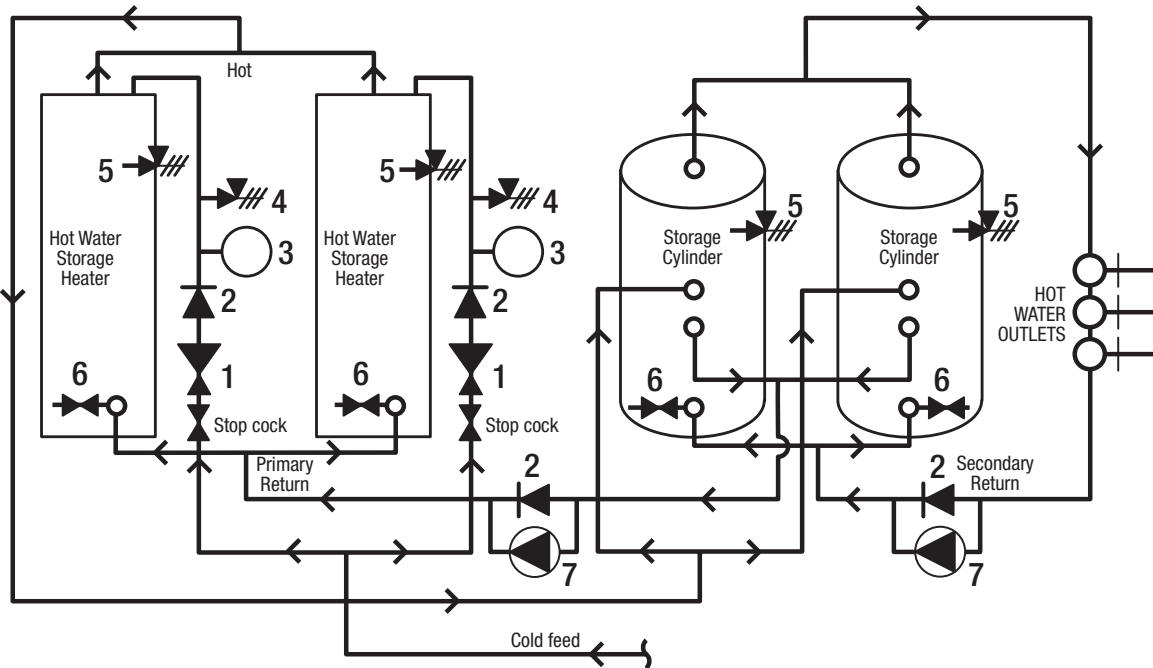


- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel(s)
(NB To be sized in accordance with the total system capacity)
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve
 - 6 – Drain Valve
 - 7 – Bronze Circulator

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FIG 2

Two Standard, RFF, RSC or Oil Fired unvented hot water storage heaters in parallel with two ST storage cylinders

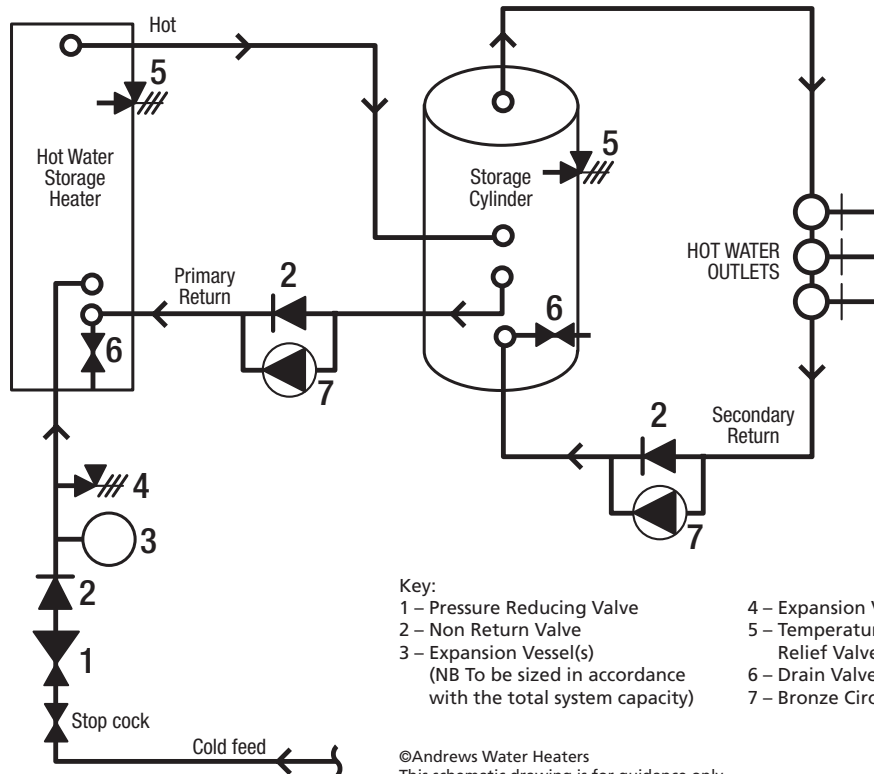


- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel(s)
(NB To be sized in accordance with the total system capacity)
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve
 - 6 – Drain Valve
 - 7 – Bronze Circulator

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FIG 3

Hi-Flo or CSC unvented hot water storage heater with a ST storage cylinder

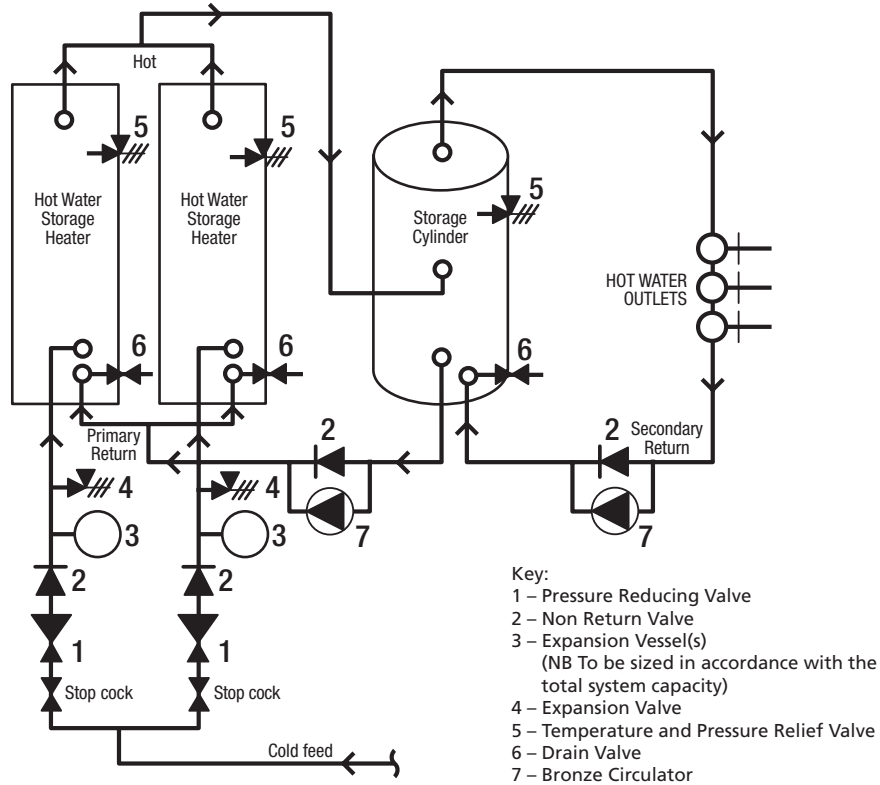


- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel(s)
(NB To be sized in accordance with the total system capacity)
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve
 - 6 – Drain Valve
 - 7 – Bronze Circulator

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FIG 4

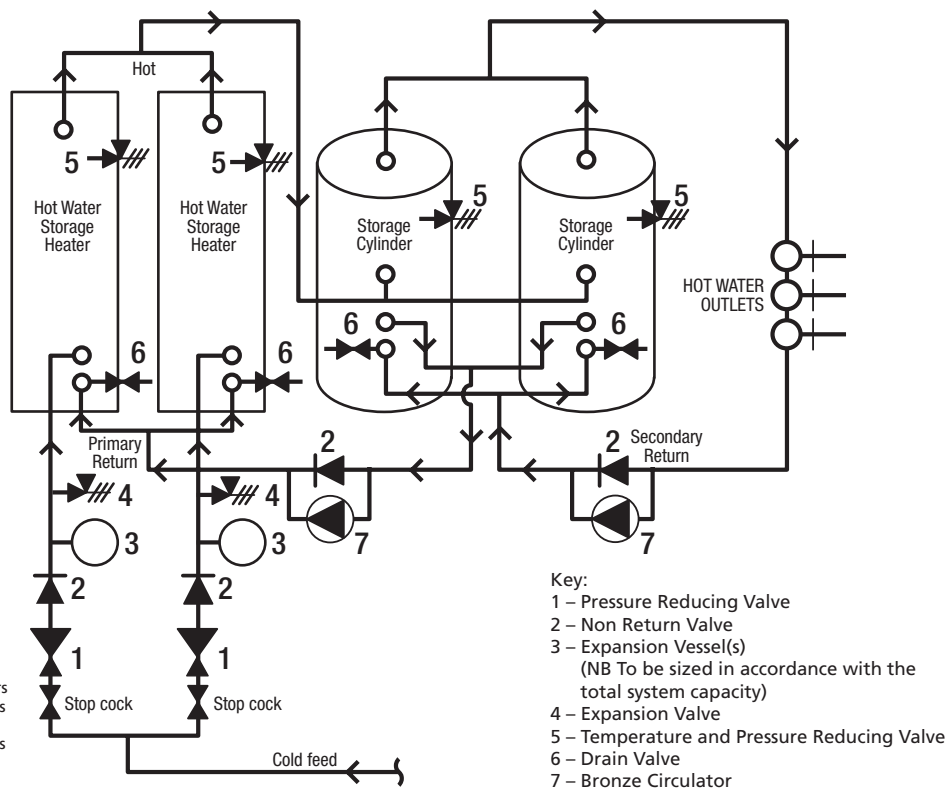
Two Hi-Flo or CSC unvented hot water storage heaters in parallel with a ST storage cylinder



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FIG 5

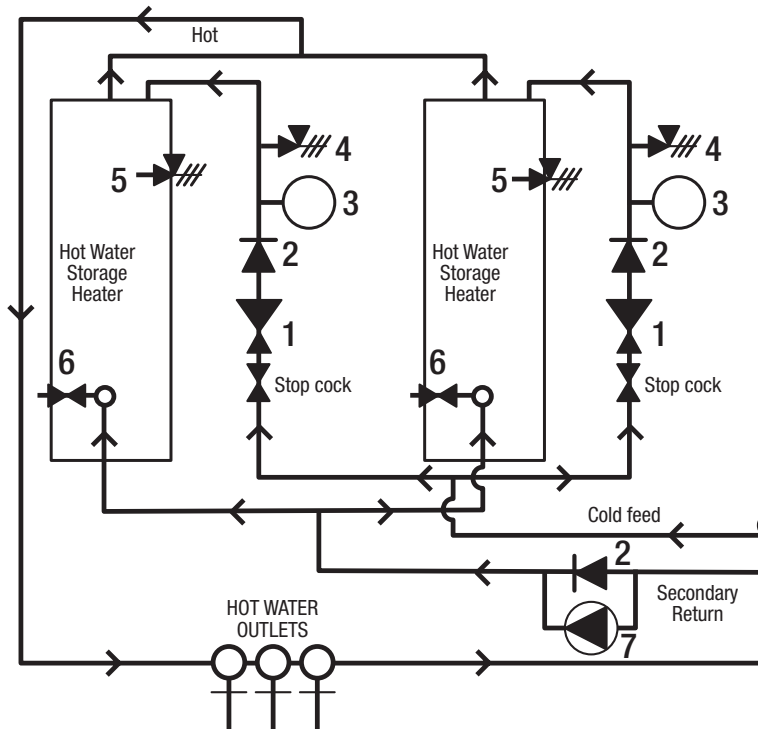
Two Hi-Flo or CSC unvented hot water storage heaters in parallel with two ST storage cylinders



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FIG 6

Two Standard, RFF, RSC or Oil Fired unvented hot water storage heaters in parallel

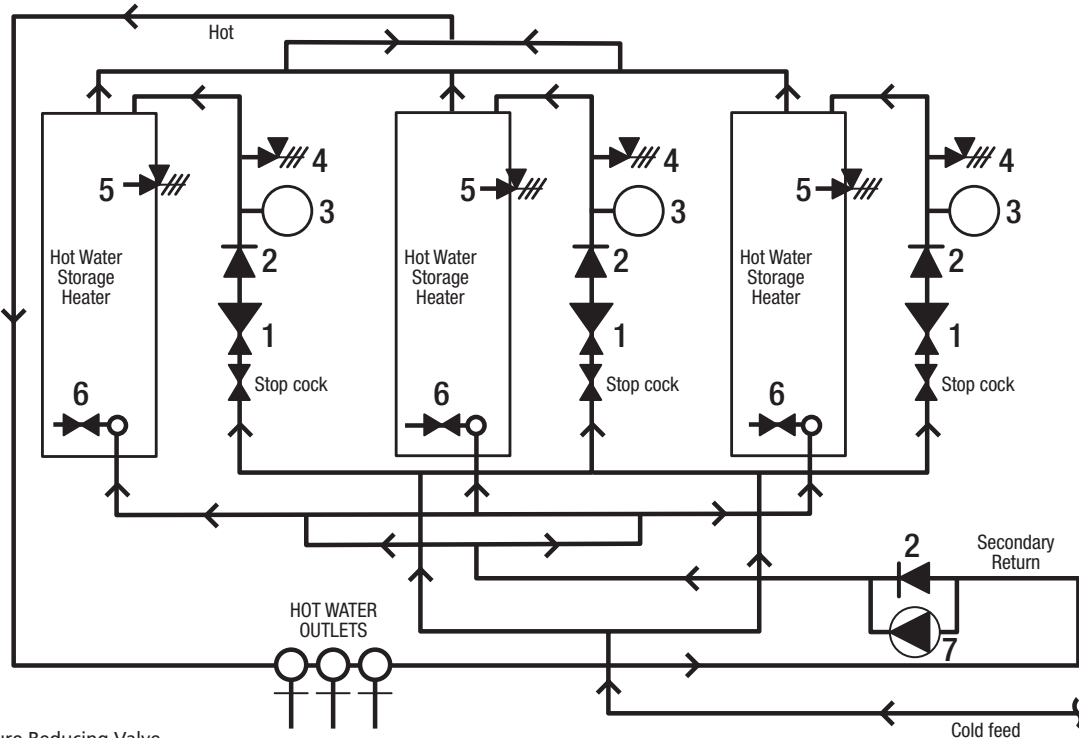


- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve
 - 6 – Drain Valve
 - 7 – Bronze Circulator

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FIG 7

Three Standard, RFF, RSC or Oil Fired unvented hot water storage heaters in parallel

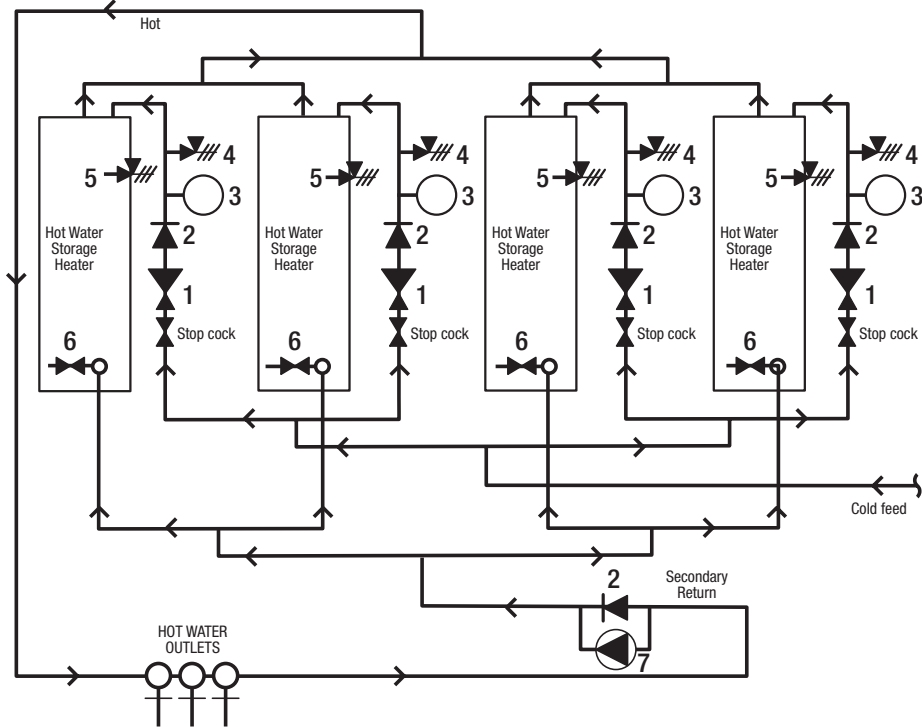


- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve
 - 6 – Drain Valve
 - 7 – Bronze Circulator

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FIG 8

Four Standard, RFF, RSC or Oil Fired unvented hot water storage heaters in parallel



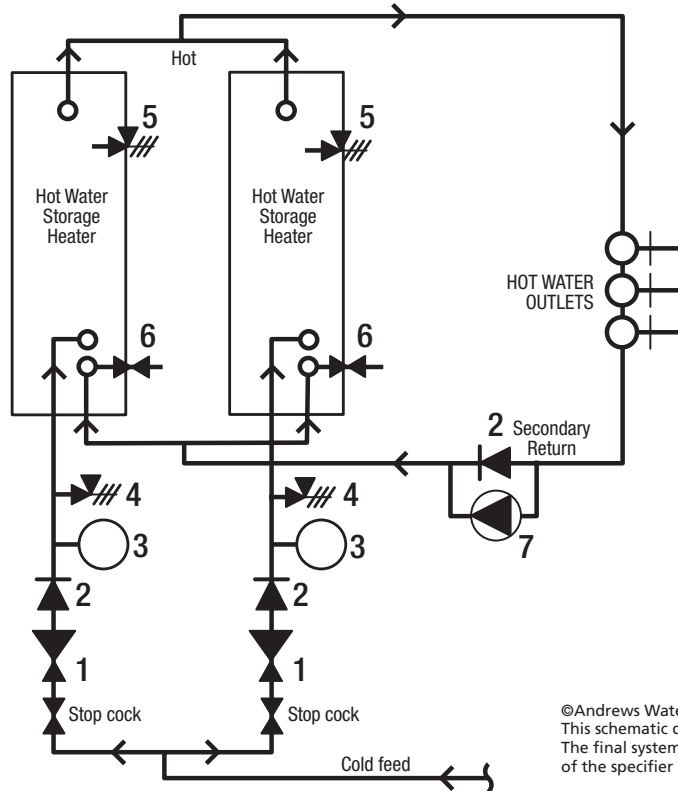
- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel
 - 4 – Expansion Valve

- 5 – Temperature and Pressure Relief Valve
- 6 – Drain Valve
- 7 – Bronze Circulator

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FIG 9

Two Hi-Flo or CSC unvented hot water storage heaters in parallel



- Key:
- 1 – Pressure Reducing Valve
 - 2 – Non Return Valve
 - 3 – Expansion Vessel
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve
 - 6 – Drain Valve

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FIG 10

Three Hi-Flo or CSC unvented hot water storage heaters in parallel

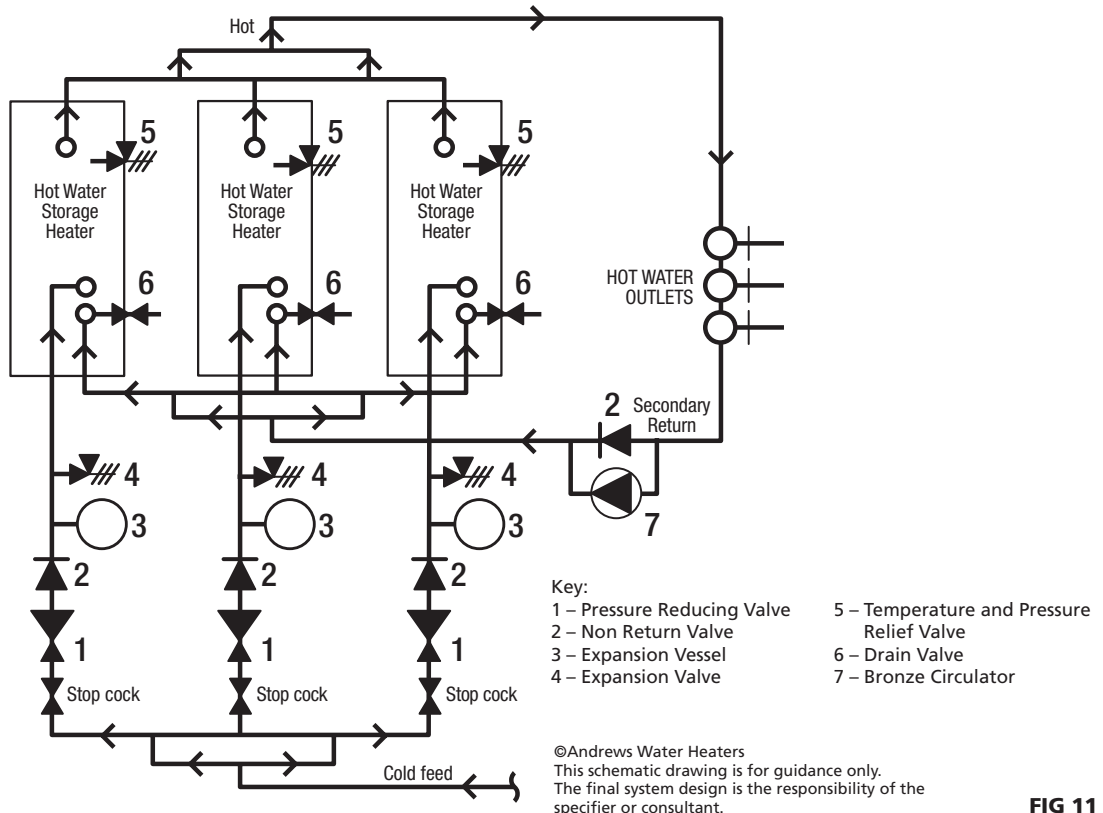


FIG 11

Four Hi-Flo or CSC unvented hot water storage heaters in parallel

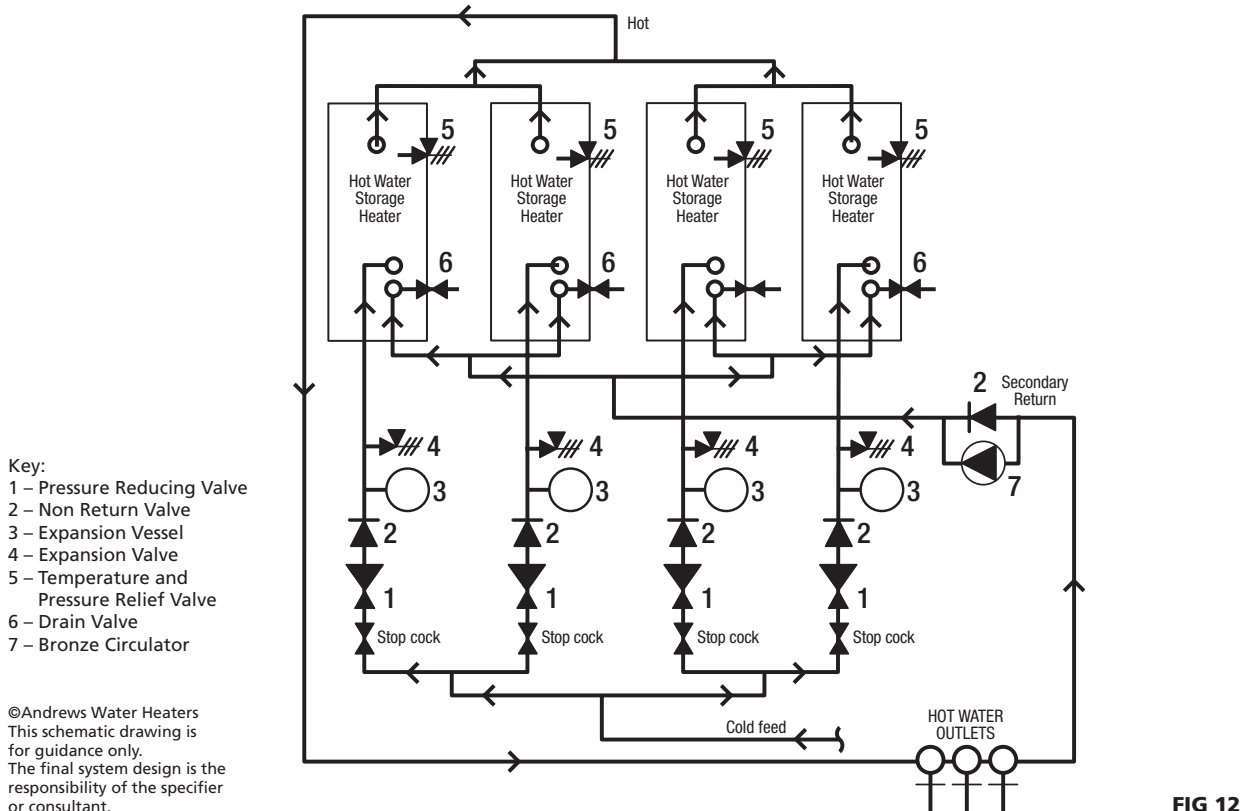
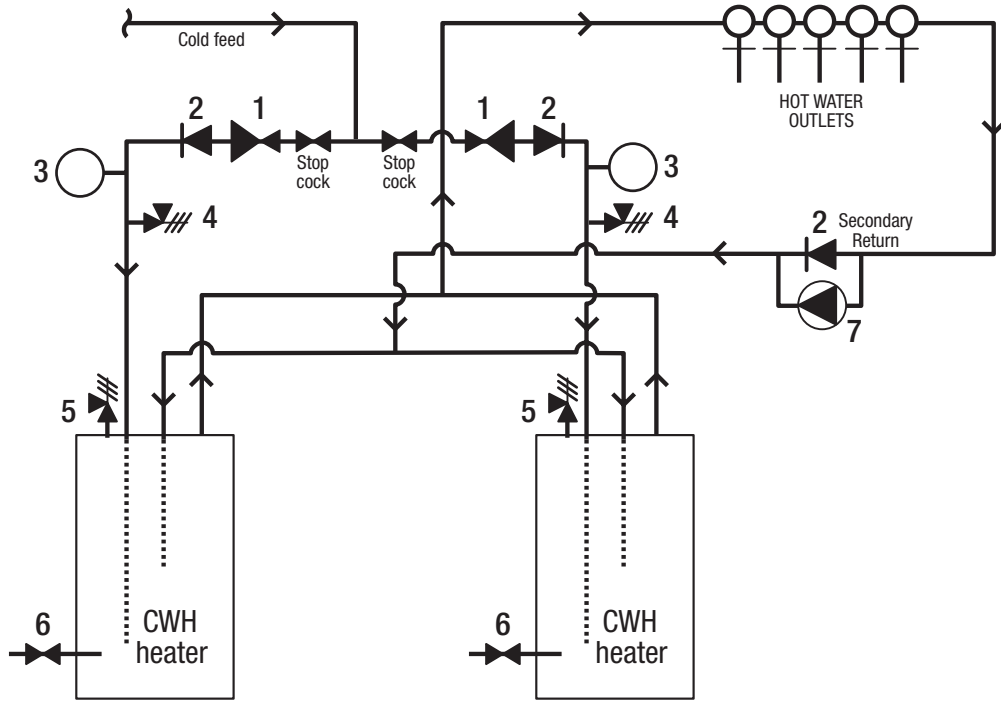


FIG 12

Typical installation of two Andrews CWH condensing water heaters

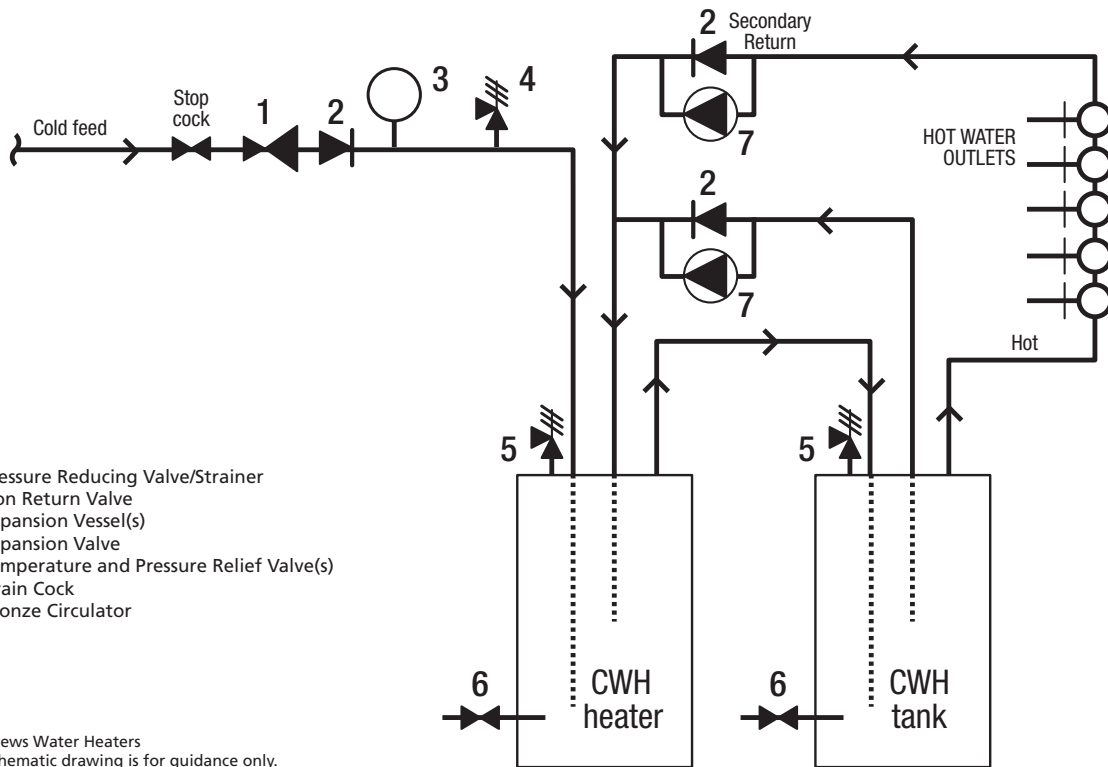


- Key:
- 1 – Pressure Reducing Valve/Strainer
 - 2 – Non Return Valve
 - 3 – Expansion Vessel(s)
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve(s)
 - 6 – Drain Cock
 - 7 – Bronze Circulator

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FIG 13

Typical installation of an Andrews CWH condensing water heater and a CWH buffer tank



- Key:
- 1 – Pressure Reducing Valve/Strainer
 - 2 – Non Return Valve
 - 3 – Expansion Vessel(s)
 - 4 – Expansion Valve
 - 5 – Temperature and Pressure Relief Valve(s)
 - 6 – Drain Cock
 - 7 – Bronze Circulator

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FIG 14

Typical installation of an Andrews CWH condensing water heater and an ST range buffer tank

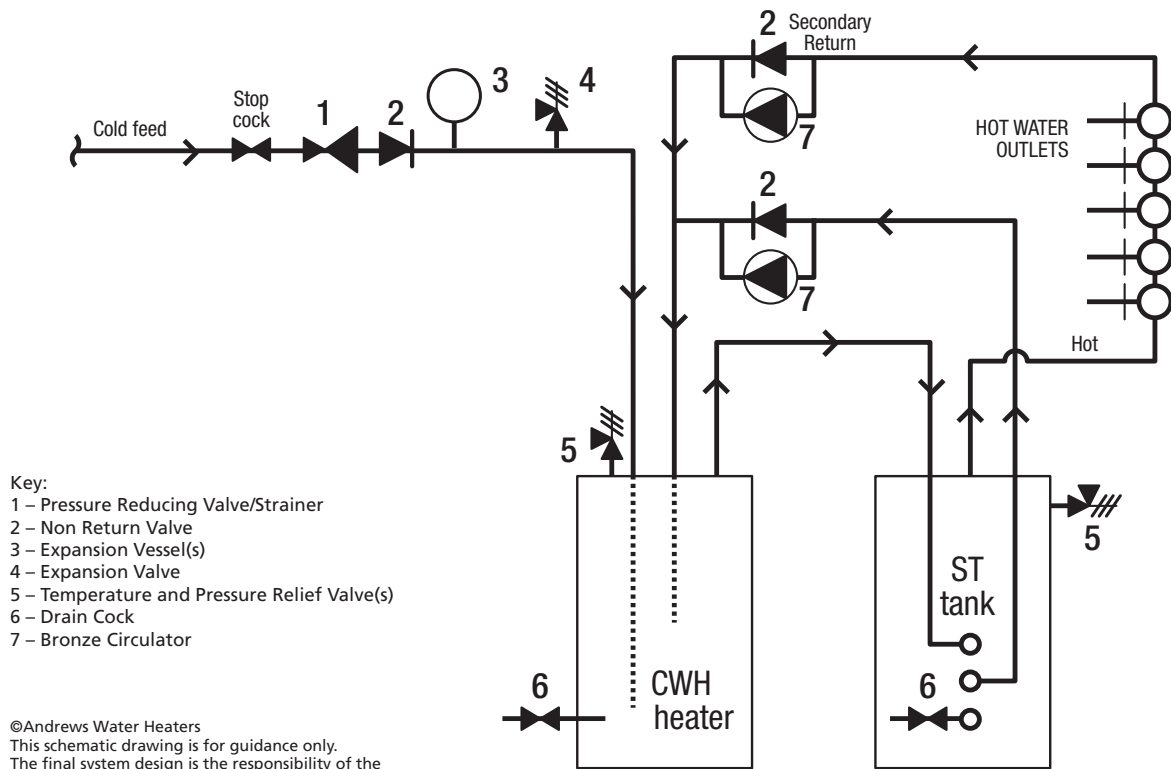


FIG 15



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Andrews Storage Water Heaters have been designed and manufactured to comply with current International standards of safety. In the interests of the health and safety of personnel and the continued safe, reliable operation of the equipment, safe working practices must be employed at all times. The attention of U.K. users is drawn to their responsibilities under the Health and Safety Regulations 1993.

All installation and service on the Andrews Water Heater must be carried out by properly qualified personnel, and therefore no liability can be accepted for any damage or malfunction caused as a result of intervention by unauthorised personnel.

The Andrews Water Heaters policy is one of continuous product improvement, and therefore the information in this manual, whilst completely up to date at the time of publication, may be subject to revision without prior notice.

Further information and assistance can be obtained from:

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