



calpro range of expansion vessels for central heating applications

calpro range of expansion vessels for central heating applications

application

Water present in any unvented central heating system is incompressible in nature, therefore any increase in system volume caused by heat expansion must be accommodated in an expansion vessel designed and sized for that purpose.

design

- Factory pre-charge of 1.5 Bar (adjustable).
- Wall mounting option available for 24 litre vessels and smaller.
- Wide range of sizes for small scale central heating applications or larger scale installations.
- Assistance with appropriate sizing available on request.
- Wide range of siting options for ease of installation.

construction details

Body:	Cold Pressed Carbon Steel
Water Connection:	Steel
Membrane:	Synthetic Butyl Rubber

installation

The expansion vessel is ideally sited either on the return leg of a central heating circuit, although installation on the flow is also possible if sited on the suction side of the system circulating pump.

acceptance Factors

		Pi = initial pressure								
		bar	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Pf = final pressure (safety valve calibration)	1	0.25								
	1.5	0.40	0.20							
	2.0	0.50	0.33	0.16						
	2.5	0.58	0.42	0.28	0.14					
	3.0	0.62	0.50	0.37	0.25	0.12				
	3.5	0.67	0.55	0.44	0.33	0.22				
	4.0	0.70	0.60	0.50	0.40	0.30	0.20			
	4.5		0.63	0.54	0.45	0.36	0.27	0.18		
	5.0			0.58	0.50	0.41	0.33	0.25	0.16	
	5.5			0.62	0.54	0.47	0.38	0.30	0.23	
	6.0				0.57	0.50	0.42	0.35	0.28	



calpro range of expansion vessels for central heating applications

technical data

Max working temperature system	99°C
Minimum Working Temp	-10°C

sizing

Although a “reckoner” is available for sizing expansion vessels for smaller domestic systems, there are occasions where a vessel must be sized for larger commercial / industrial sized circuits. The below equation is used in these situations.

degrees (°C)	co-efficient (e)
0	0.00013
10	0.00025
20	0.00174
30	0.00426
40	0.00782
50	0.01207
55	0.01450
60	0.01704
65	0.01980
70	0.02269
75	0.02580
80	0.02899
85	0.03240
90	0.03590
95	0.03960
100	0.04343

$$V = \frac{e \times C}{1 - (P_i/P_f)}$$

Where e = co-efficient of expansion (listed below) (max - min expected values)

C = total system volume (litres) (as a general approximation, C is between expansion co-efficients 10 - 20 litres for every 1000kcal/hour of boiler output).

Pi = Initial pre-charge of system + 1 Bar

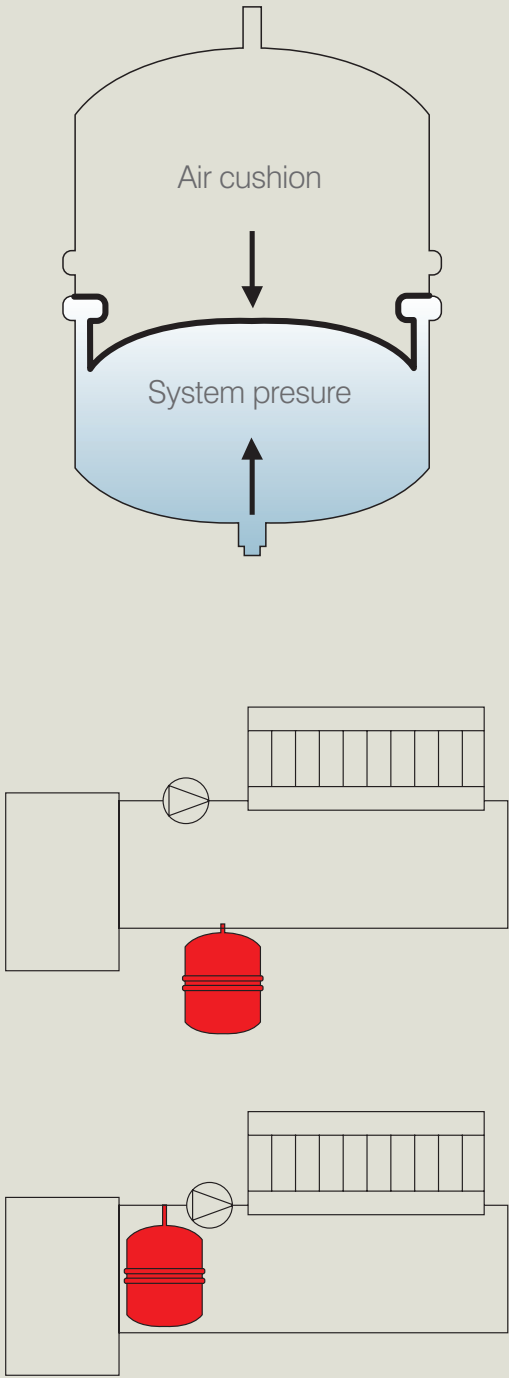
Pf = maximum operating pressure (taking into account any differences in operational pressure level between vessel and Safety Relief Valve + 1 Bar)

Note: the required vessel volume will almost certainly not correspond exactly to an existing size, therefore the nearest available size above the value returned for V must be selected from the wide variety of established vessels in the range.

example calculation

C = 500 Litres
Pi = 1.5 (2.5 Bar atmospheric)
Pf = 3 (4 Bar atmospheric)
e = 0.0324 (85°C) – 0.00025 (10°C) = 0.03215
$$V = \frac{0.03215 \times 500}{1 - (0.625)}$$
$$V = \frac{16.075}{0.375}$$

V = 42.866 Litres
Therefore the required vessel is a 50 Litre (as listed on the next page)



range	capacity	conn.	ø	height	pre-charge	max pres
ZI-301004	4 litres	¾" M BSP	225mm	195mm	1.5 Bar	4 bar
ZI-301008	8 litres	¾" M BSP	220mm	295mm	1.5 Bar	4 bar
ZI-301012	12 litres	¾" M BSP	294mm	281mm	1.5 Bar	4 bar
ZI-301018	18 litres	¾" M BSP	290mm	400mm	1.5 Bar	4 bar
ZI-301024	24 litres	¾" M BSP	324mm	415mm	1.5 Bar	4 bar
ZI-301035.CP	35 litres	¾" M BSP	404mm	408mm	1.5 Bar	4 bar
ZI-301050.CP	50 litres	¾" M BSP	404mm	530mm	1.5 Bar	4 bar
ZI-301080	80 litres	¾" M BSP	450mm	608mm	1.5 Bar	5 bar
ZI-302105	105 litres	¾" M BSP	500mm	665mm	1.5 Bar	6 bar
ZI-302150	150 litres	¾" M BSP	500mm	897mm	1.5 Bar	6 bar
ZI-302200	200 litres	¾" M BSP	600mm	812mm	1.5 Bar	6 bar
ZI-302250	250 litres	¾" M BSP	630mm	957mm	1.5 Bar	6 bar
ZI-302300	300 litres	¾" M BSP	630mm	1105mm	1.5 Bar	6 bar
ZI-302400	400 litres	¾" M BSP	630mm	1450mm	1.5 Bar	6 bar
ZI-302500	500 litres	1" M BSP	750mm	1340mm	1.5 Bar	6 bar
ZI-302600	600 litres	1" M BSP	750mm	1565mm	1.5 Bar	6 bar
ZI-302700	700 litres	1" M BSP	750mm	1755mm	1.5 Bar	6 bar

Air conditioning systems, initial pressure is equal to the maximum system pressure, corresponding to the maximum achievable temperature relative to the ambient temperature, which should be fixed at 50°C for safety.

The final working pressure is that achieved at minimum temperature of approximately 4°C. Under these conditions, the vessel sizing is as follows:

$$V = \frac{C \times e}{1 - (P_i/P_f)}$$

