EXPANSION VESSELS

Extensive range of high quality vessels for a wide variety of environments

Reliance WATER CONTROLS

The Safety Valve Specialist

Reliance Water Controls Ltd

A Reliance Worldwide Company

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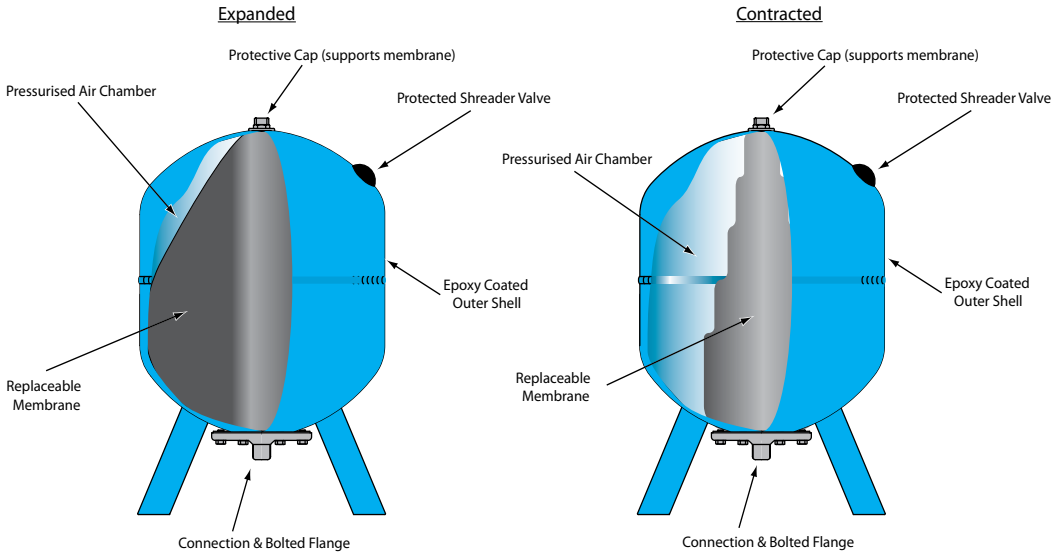
Pressurised Vessels

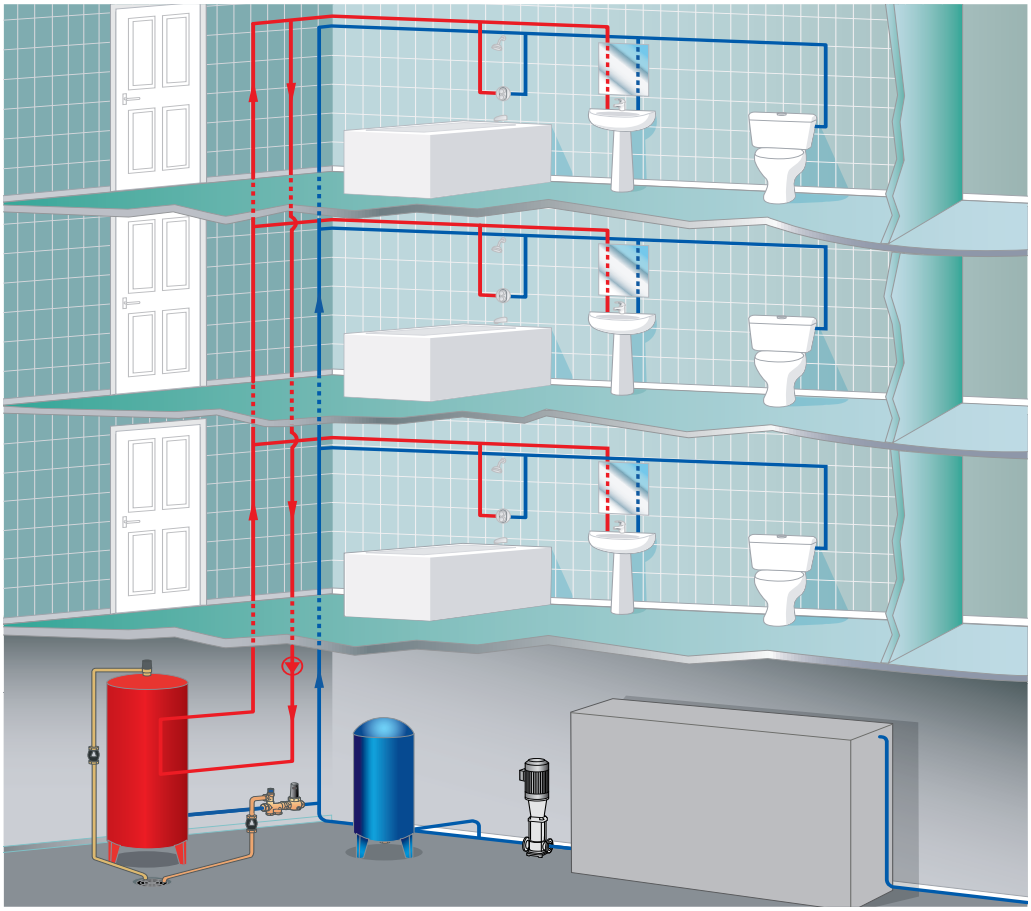
All Reliance pressure vessels are supplied with a replaceable membrane, which separates the water and air, to prevent contamination of the water, corrosion of the pressure vessel, or pressure loss in the water system.

Typically pressure vessels are used in pumped systems. When the pump starts the pressure inside the vessel begins to increase; once the vessel is full and the pump has reached its high pressure setting it will switch off. When water is then drawn off from the system the air pressure surrounding the membrane will force the water out of the pressure vessel and into the system. Once the membrane is fully contracted and the system has reached its minimum pressure the pump will start on its low pressure setting and will begin its cycle again.

The purpose of this system is to prevent constant cycling of the pump and continuous running when the system is being used.



Typical installation for Pressurised Vessels



Sizing Guide for Pressurised Vessels

The sizing of potable expansion vessels can be calculated using the following formula:

$$V = K \times Amax \times \frac{(Pmax+1) \times (Pmin+1)}{(Pmax-Pmin) \times (Pprec+1)}$$

V = The total volume or nominal size of the expansion vessel. It is not the acceptance volume

K = working efficiency of pump (see table)

Amax = average flow (litre/min)

Pmax = Maximum working pressure of the pump (bar)

Pmin = Minimum working pressure of the pump (bar)

Pprec = Pre-charge pressure of the expansion vessel

Please note – Always set the precharge air pressure of the vessel 0.2bar less than the pump pressure

Power of Pump (HP)	Efficiency (K)
1 - 2	0.25
2.5 - 4	0.375
5 - 8	0.625
9 - 12	0.875

Potable Expansion Vessels

Our expansion vessels for potable hot water are manufactured to comply with UK water regulations and are tested and certified by WRAS.

All Reliance expansion vessels are supplied with a replaceable membrane, which separates the water and air, to prevent contamination of the water system, corrosion of the pressure vessel or pressure loss in the water system.

The main purpose of an expansion vessel is to compensate for the increase in volume of water due to the varying water temperatures in hot water systems. When water is heated it expands and as water is not compressible this increased volume will create a rise in pressure within the system. As an example: water being heated from 0°C-100°C will increase by approx 4.5%.

The expansion vessel allows for this extra space, as when water temperature increases the membrane inside the vessel expands to allow the water to fill the vessel. The membrane will continue to expand until the system reaches its maximum temperature.

Once this has been reached the membrane will be fully expanded and takes up the capacity of the vessel shell. Gradually the temperature will drop, which will in turn decrease the volume of water. Due to the pressure from the pressurised air surrounding the membrane water will start to exit the vessel until the membrane is contracted (see diagrams on page 2).

Sizing Guide for Potable Expansion Vessels

For sizing of a Potable Expansion vessel please use the following formula:

$$V = \frac{eC}{1 - \frac{p1}{p2}}$$

V The total volume or nominal size of the expansion vessel. It is not the acceptance volume.

C The total volume of water in the system (litres).

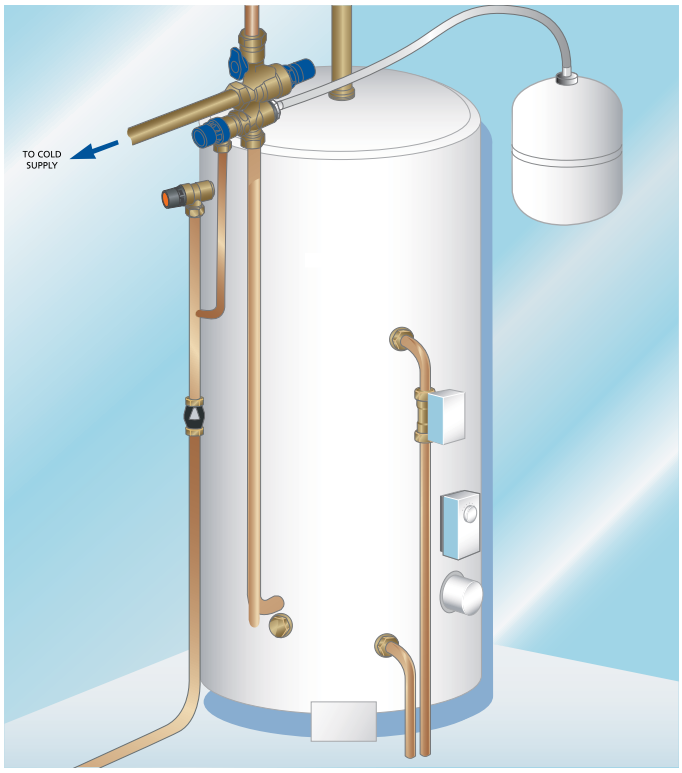
P1 The fill pressure of the system in Bars absolute (atmospheric or gauge pressure plus one Bar).

P2 The setting of the expansion/pressure relief valve in Bars absolute (atmospheric or gauge pressure plus one Bar).

e The expansion factor that relates to the maximum system requirements.

Expansion factor 'e'	Temperature °C
0.0324	85
0.0359	90
0.0396	95
0.0434	100

Typical installation for a Potable Vessel



Product Range

Specifications

Maximum temperature	99°C
Minimum temperature	-10°C
Maximum working pressure	10bar

Materials

Shell	Epoxy coated stainless steel
Membrane	EPDM
Bolted Flange	Stainless Steel

Approvals & Standards

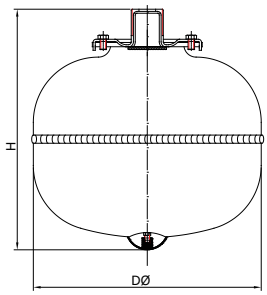
WRAS Approved

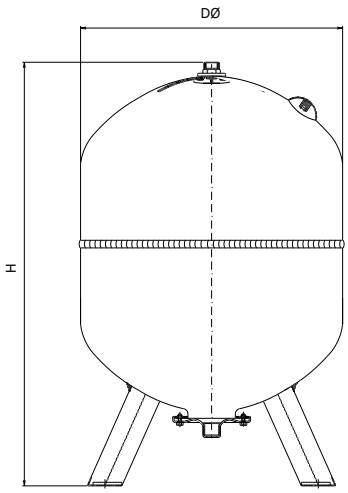
CE marked according to Directive PED 97/23/CE

TUV Certified

Dimensions

Capacity (Ltr)	Pre-set Pressure (Bar)	Water Connection	H-Height (mm)	DØ-Diameter (mm)	Colour	Line Drawing
2	3.0	¾"mbsp	265	110	White	
5	3.0	¾"mbsp	296	160	White	
8	3.0	¾"mbsp	310	200	White	
12	3.0	¾"mbsp	295	280	White	
18	3.0	¾"mbsp	465	280	White	
24	3.0	¾"mbsp	492	280	White	
35	3.0	¾"mbsp	440	365	White	
50	3.0	¾"mbsp	656	365	Blue	
60	3.5	1"mbsp	761	635	Blue	
80	3.5	1"mbsp	790	410	Blue	
100	3.5	1"mbsp	774	495	Blue	
150	3.5	1"mbsp	927	550	Blue	
200	3.5	1¼"mbsp	1020	600	Blue	
300	3.5	1¼"mbsp	1243	650	Blue	
500	3.5	1¼" mbsp	1493	750	Blue	
750	4.0	2"mbsp	1820	800	Red	
1000	4.0	2"mbsp	2250	800	Red	
1500	4.0	2"mbsp	2400	960	Red	
2000	4.0	2"mbsp	2500	1100	Red	
3000	4.0	DN65	2750	1200	Red	
4000	4.0	DN80	3220	1450	Red	
5000	4.0	DN80	3620	1450	Red	





Product Range

XVES 050 010	2Ltr potable expansion vessel
XVES 050 020	5Ltr potable expansion vessel
XVES 050 030	8Ltr potable expansion vessel
XVES 050 040	12Ltr potable expansion vessel
XVES 050 050	18Ltr potable expansion vessel
XVES 050 060	24Ltr potable expansion vessel
XVES 050 070	35Ltr potable expansion vessel

XVES 050 080	50Ltr potable expansion vessel
XVES 050 090	60Ltr potable expansion vessel
XVES 050 100	80Ltr potable expansion vessel
XVES 050 110	100Ltr potable expansion vessel
XVES 050 120	150Ltr potable expansion vessel
XVES 050 130	200Ltr potable expansion vessel
XVES 050 140	300Ltr potable expansion vessel
XVES 050 150	500Ltr potable expansion vessel

XVES 050 160	750Ltr potable expansion vessel
XVES 050 170	1000Ltr potable expansion vessel
XVES 050 180	1500Ltr potable expansion vessel
XVES 050 190	2000Ltr potable expansion vessel
XVES 050 200	3000Ltr potable expansion vessel
XVES 050 210	4000Ltr potable expansion vessel
XVES 050 220	5000Ltr potable expansion vessel

Potable Water Shock Arrestor

Potable water shock arrestors are designed to prevent water hammer.

Water hammer is caused by shock waves running through the water system which create noise or in severe cases pipe movement within a system, reverberations are a series of shock waves in quick succession. The pressure wave in such circumstances can be up to three times greater than the standing pressure. Water hammer occurs when the flow rate is suddenly changed, eg when a valve is quickly closed; quarter turn lever operated taps or solenoid valves are two of the main culprits. Reverberations occur when system components have moving parts, which respond to an initial shock wave by trying to open or close; an example of this is if there is a loose jumper on a stop tap.

The solution is to fit a shock arrestor directly before the affected fitting. Our shock arrestor is a mini expansion vessel, which works by absorbing the shock wave from the fitting so it does not travel through the system and cause a noise, the closer the shock arrestor is installed to the fitting the better.

Specifications

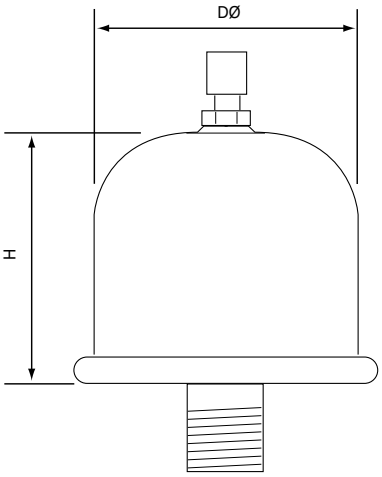
Maximum temperature	99°C
Minimum temperature	-10°C
Maximum working pressure	5.0bar

Materials

Shell	Epoxy coated stainless steel
Membrane	EPDM
Clenched Flange	Stainless Steel

Approvals & Standards

WRAS Approved



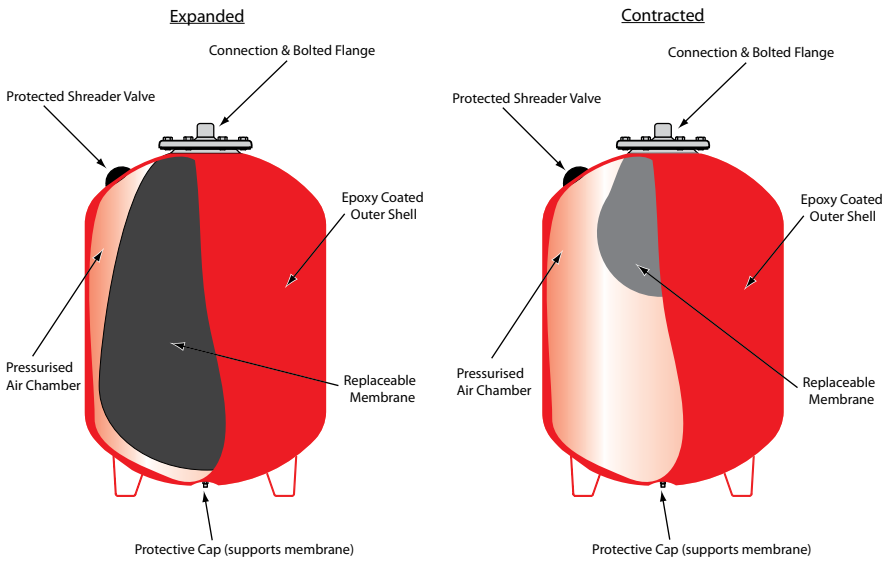
Dimensions

Capacity (Ltr)	Pre-set Pressure (Bar)	Water Connection	H-Height (mm)	DØ-Diameter (mm)	Colour
0.16	1.5	½"mbsp	104mm	66mm	White

Product Range

XVES 600 005	0.16Ltr potable shock arrestor

Heating Vessels



Expansion vessels are required within heating systems to allow for the expansion that occurs when the water is heated; as water is not compressible this increased volume will create a rise in pressure within the system. As an example, water being heated from 0°C-100°C will increase by approx 4.5% in volume. The expansion vessel allows for this extra space, as when water temperature increases the membrane inside the vessel expands to allow the water to fill the vessel. The membrane will continue to expand until the system reaches its maximum temperature.

In smaller systems (up to 56Kw) an Easifit® Sealed System Kit can be used, which incorporates all the basic control functions required for a sealed system. For larger heating systems the vessel will need to be sized against the system volume, temperatures and pressures (please see our sizing guide on page 10 for further details).

Specifications

Maximum temperature	99°C
Minimum temperature	-10°C
Maximum working pressure (except 750 &1000Ltr - 10.0bar)	5.0bar
Colour	Red

Materials

Shell	Epoxy coated stainless steel
Membrane	EPDM
Bolted Flange	Stainless Steel

Standards

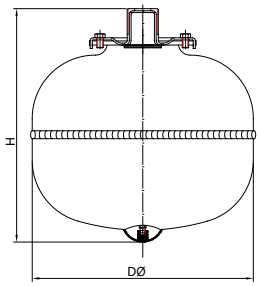
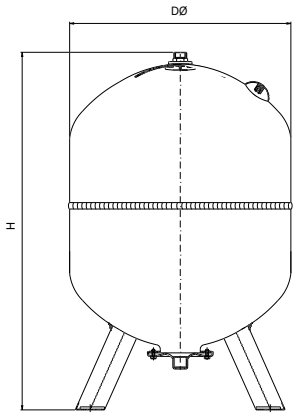
CE marked according to Directive PED 97/23/CE

TUV Certified

Product Range

XVES 100 010	2Ltr heating expansion vessel
XVES 100 020	5Ltr heating expansion vessel
XVES 100 030	8Ltr heating expansion vessel
XVES 100 040	12Ltr heating expansion vessel
XVES 100 050	18Ltr heating expansion vessel
XVES 100 060	24Ltr heating expansion vessel
XVES 100 070	35Ltr heating expansion vessel
XVES 100 080	50Ltr heating expansion vessel
XVES 100 090	60Ltr heating expansion vessel
XVES 100 100	80Ltr heating expansion vessel
XVES 100 110	100Ltr heating expansion vessel
XVES 100 120	150Ltr heating expansion vessel
XVES 100 130	200Ltr heating expansion vessel
XVES 100 140	300Ltr heating expansion vessel
XVES 100 150	500Ltr heating expansion vessel
XVES 100 160	750Ltr heating expansion vessel
XVES 100 170	1000Ltr heating expansion vessel

Dimensions

Capacity (Ltr)	Pre-set Pressure (Bar)	Water Connection	H-Height (mm)	DØ-Diameter (mm)	Line Drawing
2	1.0	¾"mbsp	189	160	
5	1.0	¾"mbsp	296	160	
8	1.0	¾"mbsp	310	200	
12	1.0	¾"mbsp	295	280	
18	1.5	¾"mbsp	465	280	
24	1.5	¾"mbsp	492	280	
35	1.5	¾"mbsp	415	365	
					
50	1.5	¾"mbsp	545	365	
80	1.5	1"mbsp	687	410	
100	1.5	1"mbsp	663	495	
150	1.5	1"mbsp	795	550	
200	1.5	1"mbsp	1020	600	
250	1.5	1"mbsp	986	650	
300	1.5	1"mbsp	1168	650	
500	1.5	1¼"mbsp	1347	750	
750	1.5	2"mbsp	1820	800	
1000	1.5	2"mbsp	2250	800	

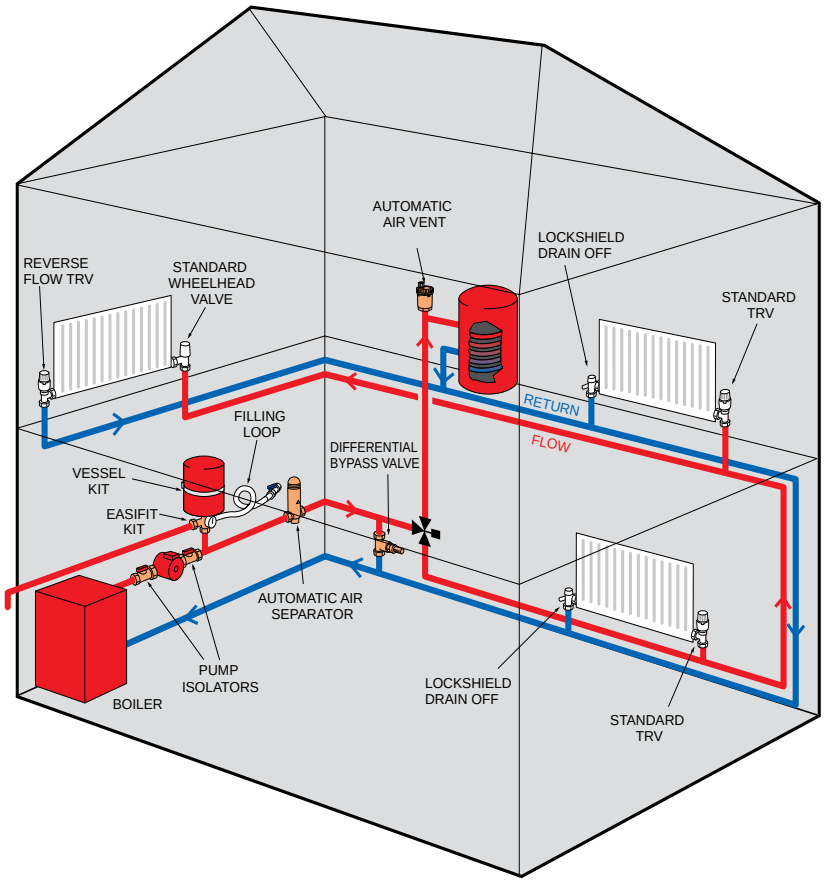
Easifit® Sealed System Kit

Our Easifit® Sealed System Kit uses a multibloc system, utilising proven technology in a modular easy to use format. It is designed to make the initial installation process of a sealed system or conversion of a conventional vented heating sytem to a sealed system as easy as possible.

The Easifit® Sealed System Kit contains all the basic control functions required for a sealed system of up to 56kW:

- Filling loop including double check valve, flexible hose and isolator
- Pressure Gauge
- Pressure Relief Valve
- Manifold Connection
- Expansion Vessel
- Mounting Bracket

Typical installation for an Easifit Sealed System Kit



Specifications

Maximum temperature	99°C
Minimum temperature	-10°C
Maximum working pressure	5.0bar
Colour	Red
Pressure relief pre-set pressure	3.0bar

Materials

Shell	Epoxy coated stainless steel
Membrane	EPDM
Bolted Flange	Stainless Steel

Standards

CE marked according to Directive PED 97/23/CE

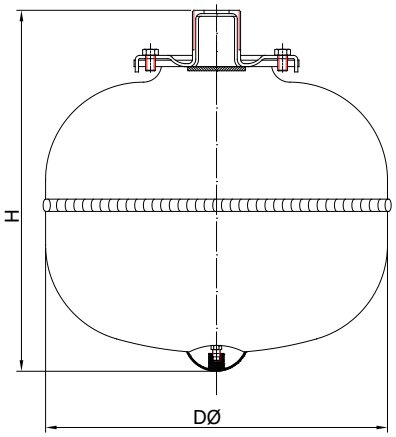
TUV Certified

Product Range

VESK 209 049	5Ltr Easifit Sealed System Kit
VESK 209 050	8Ltr Easifit Sealed System Kit
VESK 209 051	12Ltr Easifit Sealed System Kit
VESK 209 052	18Ltr Easifit Sealed Sytem Kit
VESK 209 053	24Ltr Easifit Sealed System Kit
VESK 209 054	35Ltr Easifit Sealed System Kit

Dimensions

Capacity (Ltr)	Pre-set Pressure (Bar)	Water Connection	H-Height (mm)	DØ-Diameter (mm)
5	1.0	¾"mbsp	296	160
8	1.0	¾"mbsp	310	200
12	1.0	¾"mbsp	295	280
18	1.5	¾"mbsp	465	280
24	1.5	¾"mbsp	492	280
35	1.5	¾"mbsp	415	365



Heating Vessel Sizing Guide

For sizing of a Heating Expansion vessel, or one of our Easifit Sealed System Kits please use the following chart or formula:

Vessel Size (litres)	Static Head (metres)	Boiler Rating kW	BTU
5	5	8.90	30,366
	10	7.18	22,559
8	5	14.33	45,024
	10	11.50	36,133
12	5	21.58	67,804
	10	17.25	54,199
18	5	32.50	102,115
	10	25.83	81,157
	15	19.25	60,483
24	5	43.07	135,321
	10	34.48	108,331
	15	25.90	81,356
35	5	63.00	197,925
	10	50.30	158,020
	15	37.50	117,716
50	5	90.16	283,241
	10	71.80	225,550
	15	53.65	168,350
80	5	143.70	451,505
	10	115.00	361,330
	15	86.10	270,526
100	5	179.60	564,303
	10	143.70	541,505
	15	107.70	338,393

If the system volume is known, expansion vessels can be sized with the formula:

$$V = \frac{eC}{1 - \frac{p1}{p2}}$$

V The total volume or nominal size of the expansion vessel. It is not the acceptance volume.

C The total volume of water in the system (litres).

P1 The fill pressure of the system in Bars absolute (atmospheric or gauge pressure plus one Bar).

P2 The setting of the expansion/pressure relief valve in Bars absolute (atmospheric or gauge pressure plus one Bar).

e The expansion factor that relates to the maximum system requirements.

Expansion factor 'e'	Temperature °C
0.0324	85
0.0359	90
0.0396	95
0.0434	100

The above guide has been prepared as an aid to size correctly a sealed heating system expansion vessel, for further information please contact the Reliance Technical Department on +44 (0)1386 712400.

Solar Vessels

Product Range

XVES 120 200	12Ltr solar expansion vessel
XVES 120 210	18Ltr solar expansion vessel
XVES 120 220	24Ltr solar expansion vessel
XVES 120 230	35Ltr solar expansion vessel
XVES 120 240	50Ltr solar expansion vessel
XVES 120 250	80Ltr solar expansion vessel

Mounting Brackets

Product Range

BRKT 240 021	5Ltr Wall mounting bracket - 160mm
BRKT 240 022	8Ltr Wall mounting bracket - 200mm
BRKT 240 050	12Ltr, 18Ltr & 24Ltr Wall mounting bracket - 280mm
BRKT 240 055	35Ltr & 50Ltr Wall mounting bracket - 365mm

Replacement Membranes

Product Range

Potable Membranes

MEMB 100 000	2Ltr Potable EPDM Membrane
MEMB 100 010	5Ltr Potable EPDM Membrane
MEMB 100 020	8-12Ltr Potable EPDM Membrane
MEMB 100 030	18Ltr Potable EPDM Membrane
MEMB 100 040	24Ltr Potable EPDM Membrane
MEMB 100 050	35-50Ltr Potable EPDM Membrane
MEMB 100 060	60-80Ltr Potable EPDM Membrane
MEMB 100 070	100Ltr Potable EPDM Membrane
MEMB 100 080	150Ltr Potable EPDM Membrane
MEMB 100 090	200Ltr Potable EPDM Membrane
MEMB 100 100	300Ltr Potable EPDM Membrane
MEMB 100 110	500Ltr Potable EPDM Membrane
MEMB 100 120	750-1000Ltr Potable EPDM Membrane
MEMB 100 130	1500-2000Ltr Potable EPDM Membrane
MEMB 100 140	3000-4000Ltr Potable EPDM Membrane

Heating Membranes

MEMB 200 000	2Ltr Heating EPDM Membrane
MEMB 200 010	5Ltr Heating EPDM Membrane
MEMB 200 020	8-12Ltr Heating EPDM Membrane
MEMB 200 030	18Ltr Heating EPDM Membrane
MEMB 200 040	24Ltr Heating EPDM Membrane
MEMB 200 050	35-50Ltr Heating EPDM Membrane
MEMB 200 060	60-80Ltr Heating EPDM Membrane
MEMB 200 070	100-150Ltr Heating EPDM Membrane
MEMB 200 080	200-300Ltr Heating EPDM Membrane
MEMB 200 090	500Ltr Heating EPDM Membrane
MEMB 200 100	600Ltr Heating EPDM Membrane
MEMB 200 110	750-1000Ltr Heating EPDM Membrane
MEMB 200 120	7500-2000Ltr Heating EPDM Membrane
MEMB 200 130	3000-4000Ltr Heating EPDM Membrane

EXPANSION VESSELS

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XVES-001-03/09

Reliance™
WATER CONTROLS

The Safety Valve Specialist