SUBJECT: Using the HydraRester™ as an Expansion Tank
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The Sioux Chief HydraRester™ water hammer arrester (656-E and 657-F) can safely be used as a thermal expansion tank for 6 gallon or smaller water heaters. Their function of water displacement is identical to common diaphragm expansion tanks. The installation requirements are also identical in that they can be installed at any angle, even upside down. The charts below show that a 656-E HydraRester™ can safely displace the thermal expansion of an 80 degree temperature rise (e.g., 50F to 130F). The larger 657-F HydraRester™ can safely displace the expansion of a 100 degree rise (e.g., 40F to 140F).

Expansion Tank Calculations for 656-E HydraRester™											
VOLUME EXPANSION PER TEMPERATURE CHANGE (F) OF 6 GALLONS OF WATER											
Delta T	0	10	20	30	40	50	60	70	80	90	100
Vdgal	0.00	0.0072	0.0144	0.0216	0.0288	0.0360	0.0432	0.0504	0.0576	0.0648	0.0720
Vdcu	0.00	1.66	3.33	4.99	6.65	8.32	9.98	11.64	13.31	14.97	16.63
V1	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
V2	29.00	27.34	25.67	24.01	22.35	20.68	19.02	17.36	15.69	14.03	12.37
P1	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
P2	60.00	64.54	69.68	75.52	82.24	90.03	99.19	110.10	123.33	139.69	160.45

Expansion Tank Calculations for 657-F HydraRester™											
VOLUME EXPANSION PER TEMPERATURE CHANGE (F) OF 6 GALLONS OF WATER											
Delta T	0	10	20	30	40	50	60	70	80	90	100
Vdgal	0.00	0.0072	0.0144	0.0216	0.0288	0.0360	0.0432	0.0504	0.0576	0.0648	0.0720
Vdcu	0.00	1.66	3.33	4.99	6.65	8.32	9.98	11.64	13.31	14.97	16.63
V1	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
V2	36.00	34.34	32.67	31.01	29.35	27.68	26.02	24.36	22.69	21.03	19.37
P1	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
P2	60.00	63.62	67.60	72.02	76.93	82.44	88.65	95.70	103.80	113.17	124.15

Where:

Delta T = temperature change (Fahrenheit)
Vdgal = expanded water volume to be displaced (gallons)
Vdcu = expanded water volume to be displaced (cubic inches)
V1 = initial air volume of HydraRester™ (cubic inches)
V2 = resultant air volume in arrester after water displacement (V1 – Vdcu)
P1 = initial pressure charge of arrester (60 psig)
P2 = resultant pressure in arrester and system after water displacement (psig)