Heat Production, Retention and Energy Efficiency Performance Comparison in North American 55 Gallon Drum Heater Jackets

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Abstract

There are many options available for warming the contents contained within 55gal drum or barrel containers. One of the most popular and efficient ways is to use a drum heater jacket. As proprietary jacket and heating technology varies between manufacturers selling within the North American market, it is important to understand the difference in performance associated with each design. The jackets investigated within this study are the **WarmPro** (WP-500-DV 500W drum heater jacket), the [redacted] 960W drum heater w/ adjustable thermostat, and the [redacted] 770W full coverage drum heater (for poly).

Warming cycle performance was the most optimal in the WarmPro 500W drum heater, producing a more constant and steady heat curve compared to the 960W and 770W models. This allows the WarmPro jacket to heat temperature sensitive or delicate materials more effectively as the risk of scorching and burning is reduced in this model. The WarmPro model also produced the highest temperature change of +50.3°C meaning that overall heat production is not sacrificed to produce a gentler heating process.

Heat retention was also greatest in the WarmPro drum heater jacket. This allows the drum contents heated and insulated using the WarmPro jacket to remain warm for a significantly longer period of time (40% heat retention over 72hrs) compared to those that used the 960W (17% heat retention over 72 hrs) or 770W (29% heat retention over 72hrs) models.

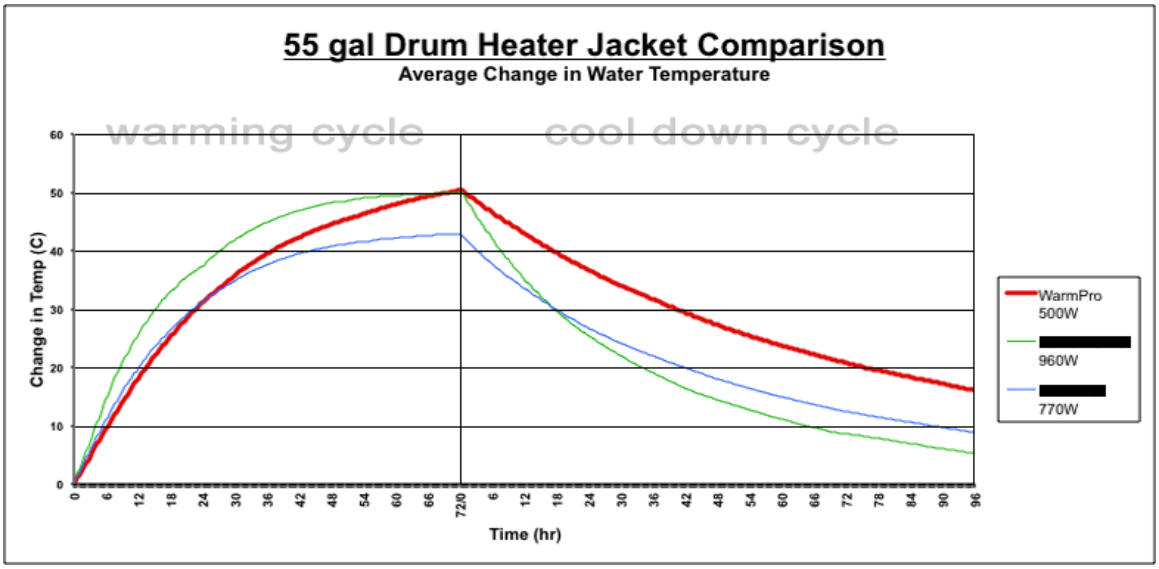

fig 1.1 Changes in temperature in C° between manufacturers during warming and cool down cycles

°C	WarmPro Warming Cycle		[redacted] 960W Warming Cycle		[redacted] 770W Warming Cycle	
Sample Time (hr)	Average Rise in Temp	% of Total Heat Generated	Average Rise in Temp	% of Total Heat Generated	Average Rise in Temp	% of Total Heat Generated
0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%
6.0	9.3	18.6%	14.3	28.6%	11.0	25.6%
12.0	18.0	35.9%	25.6	51.0%	19.8	46.2%
18.0	25.2	50.0%	32.9	65.5%	26.4	61.6%
24.0	31.0	65.7%	37.3	74.3%	31.2	72.8%
30.0	35.7	71.0%	41.8	83.3%	34.8	81.2%
36.0	39.4	78.3%	44.8	89.3%	37.6	87.6%
42.0	42.3	84.1%	46.9	93.4%	39.5	92.1%
48.0	44.5	88.5%	48.2	95.9%	40.7	94.9%
54.0	46.3	92.0%	49.0	97.7%	41.6	96.9%
60.0	48.0	95.4%	49.5	98.5%	42.2	98.4%
66.0	49.3	98.0%	49.7	98.9%	42.6	99.2%
72.0	50.3	100.0%	50.2	100.0%	42.9	100.0%

fig 1.2 Change in temperature in C° between manufacturers during warming cycles

°C	WarmPro Cool Down Cycle		[redacted] 960W Cool Down Cycle		[redacted] 770W Cool Down Cycle	
Sample Time (hr)	Average Change in Temp	% of Max Temp Retained	Average Change in Temp	% of Max Temp Retained	Average Change in Temp	% of Max Temp Retained
0.0	50.3	100.0%	50.2	100.0%	42.9	100.0%
6.0	46.6	92.6%	42.1	83.8%	37.8	88.2%
12.0	42.9	85.4%	35.1	70.0%	33.6	78.2%
18.0	39.6	78.8%	29.7	59.1%	29.9	69.8%
24.0	36.6	72.8%	25.4	50.5%	26.7	62.2%
30.0	34.0	67.6%	21.9	43.7%	24.2	56.4%
36.0	31.6	62.9%	19.0	37.9%	22.0	51.2%
42.0	29.4	58.4%	16.4	32.7%	20.0	46.5%
48.0	27.3	54.2%	14.3	28.6%	18.0	42.0%
54.0	25.4	50.5%	12.7	25.3%	16.4	38.2%
60.0	23.7	47.2%	11.1	22.1%	14.9	34.7%
66.0	22.2	44.1%	9.6	19.2%	13.6	31.7%
72.0	20.7	41.2%	8.6	17.1%	12.4	29.0%
78.0	19.5	38.7%	7.8	15.5%	11.5	26.8%
84.0	18.3	36.4%	6.9	13.7%	10.6	24.7%
90.0	17.1	34.1%	6.0	12.0%	9.7	22.6%
96.0	16.0	31.8%	5.3	10.5%	8.8	20.5%

fig 1.3 Change in temperature in C° between manufacturers during cool down (heat retention) cycles

When investigating energy efficiency, it was once again the WarmPro jacket that excelled, displaying the greatest efficiency (energy used / °C increase) of all the jackets tested. The WarmPro model used 12% and 93% less energy than the 770W and 960W heater jackets respectively despite the previous claims of superior efficiency and 'green technology' from each.

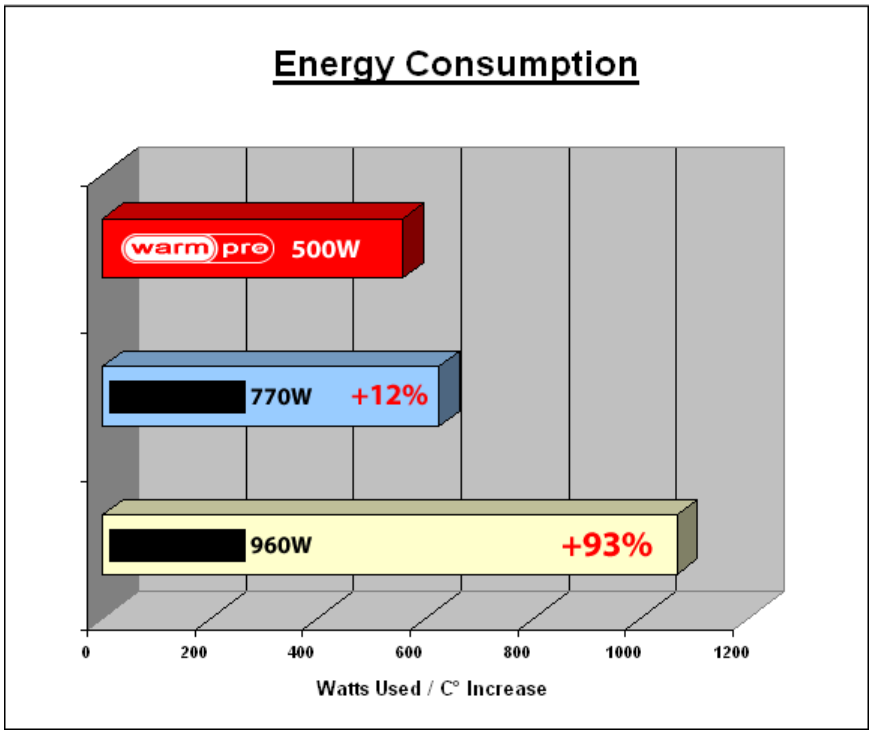

fig 1.4 Energy used to raise contents one degree celcius

We conclude that, when looking at each factor (heat generation, heat retention, energy efficiency) it is clear that the WarmPro WP-500-DV 500W drum heater jacket out performs the equivalent drum heater jacket models offered by [redacted] and [redacted] in the North American market.