

Powerblanket Drum Heater vs. Sanitized 4” Silicone Band Heater

This report details the procedure and results of a comparison test between a 720 (nominal) watt Powerblanket drum heater and a 1200 (nominal) watt [REDACTED] model [REDACTED] 4” silicone band heater. Each heater was used to heat a 55 gallon barrel filled to capacity with tap water. Beginning temperature prior to heating was 32°F. After a period of time, as discussed in more detail below, the power to each heater was removed and the temperature of each barrel was allowed to drop to the ambient temperature of 34°F.

Testing began at hour zero and ended at hour 303. The water temperature of each barrel was logged using a Fluke II 54 thermometer with type K thermocouples. Data was logged automatically one time every half-hour.

The results show the water heated with the [REDACTED] 4” silicone band heater reached a maximum temperature of 61°F above ambient temperature in approximately 42 hours. After removing electrical power from the heater, the water temperature fell to the ambient temperature of 34°F in approximately 33 hours.

The Powerblanket drum heater heated the water to 70°F above ambient temperature in approximately 22 hours. With an additional 72 hours the water reached a steady state temperature of approximately 110°F above the ambient temperature. After removing electrical power from the heater, the water temperature dropped to the ambient temperature of 34°F in approximately 164 hours. Table 1 shows a comparison of these findings.

Table 1

	Powerblanket drum heater	[REDACTED] band heater
Max Temperature above ambient	110°F	61°F
Time for water to fall to ambient temperature (unpowered heaters)	164 hours	33 hours
Time to reach 70°F above ambient temperature	24 hours	Not capable

Summary Conclusions

1. The Powerblanket drum heater was 180% more effective than the [REDACTED] 4" silicone band heater (110°F vs. 61°F) in achieving maximum water temperature.
2. The Powerblanket drum heater was 25% more efficient in power usage (660 Watts vs. 880 Watts) than the [REDACTED] 4" silicone band heater .
3. The Powerblanket barrel heater was 497% more effective than the [REDACTED] 4" silicone band heater in preventing freezing from maximum achieved temperature if power is cut off (164 hours vs. 33 hours).

Preparation

Two 55 gallon barrels were filled to capacity with tap water. Both drums were placed inside a refrigerator with an average ambient temperature of 32°F. The barrels were left undisturbed until the water reached the ambient temperature. The 1200 watt [REDACTED] drum heater was then placed on one barrel and a 720 watt Powerblanket drum heater was placed on the remaining barrel. A K-type thermocouple was placed in each barrel at a depth of two inches from the surface of the water. The thermocouples were connected to a Fluke II 54 thermometer set to record temperatures every 30 minutes. Figure 1 shows this test configuration.



Figure 1. Test configuration ([REDACTED] heater on left, Powerblanket on right)

Testing:

Testing was conducted over a period of 303 hours. At hour zero, the heaters were connected to a 120VAC mains power supply. A Sperry DSA-500 DMM in a clamp configuration was used to record the initial current draw for each blanket. Currents of 7.3 Amperes and 5.5 Amperes were recorded for the [REDACTED] 4" silicone band heater and Powerblanket drum heater respectively. This indicates a respective heating power of 880 watts and 660 watts. Although each product is advertised to utilize 1200 and 720 Watts, respectively, the actual watts produced by each heater was based on amperage draw from the same 120V outlet at 880 watts and 660 watts.

The thermostat controlling the refrigerator temperature was set to 32°F. The barrels were then left undisturbed for the duration of the warm-up phase. The heaters were supplied with electricity until a perceivable steady state (maximum temperature) was reached by both barrels.

Once both barrels achieved a steady state water temperature, the drum heaters were disconnected from electrical power. The barrels were left undisturbed until the water contained in each barrel reached the ambient temperature. It should be noted, that in order to keep the water from freezing, the ambient temperature was increased to 33°F after the first barrel ([REDACTED]) reached the ambient temperature.

Results:

After achieving an ambient water temperature in both barrels the test was complete. The recorded temperatures were manually entered from the Fluke II 54 into an Excel spreadsheet. This was then converted to a tab delimited text file. A Matlab program was created to further analyze the recorded data.

Figure 2 on the following page shows a temperature vs. time plot using the captured data.

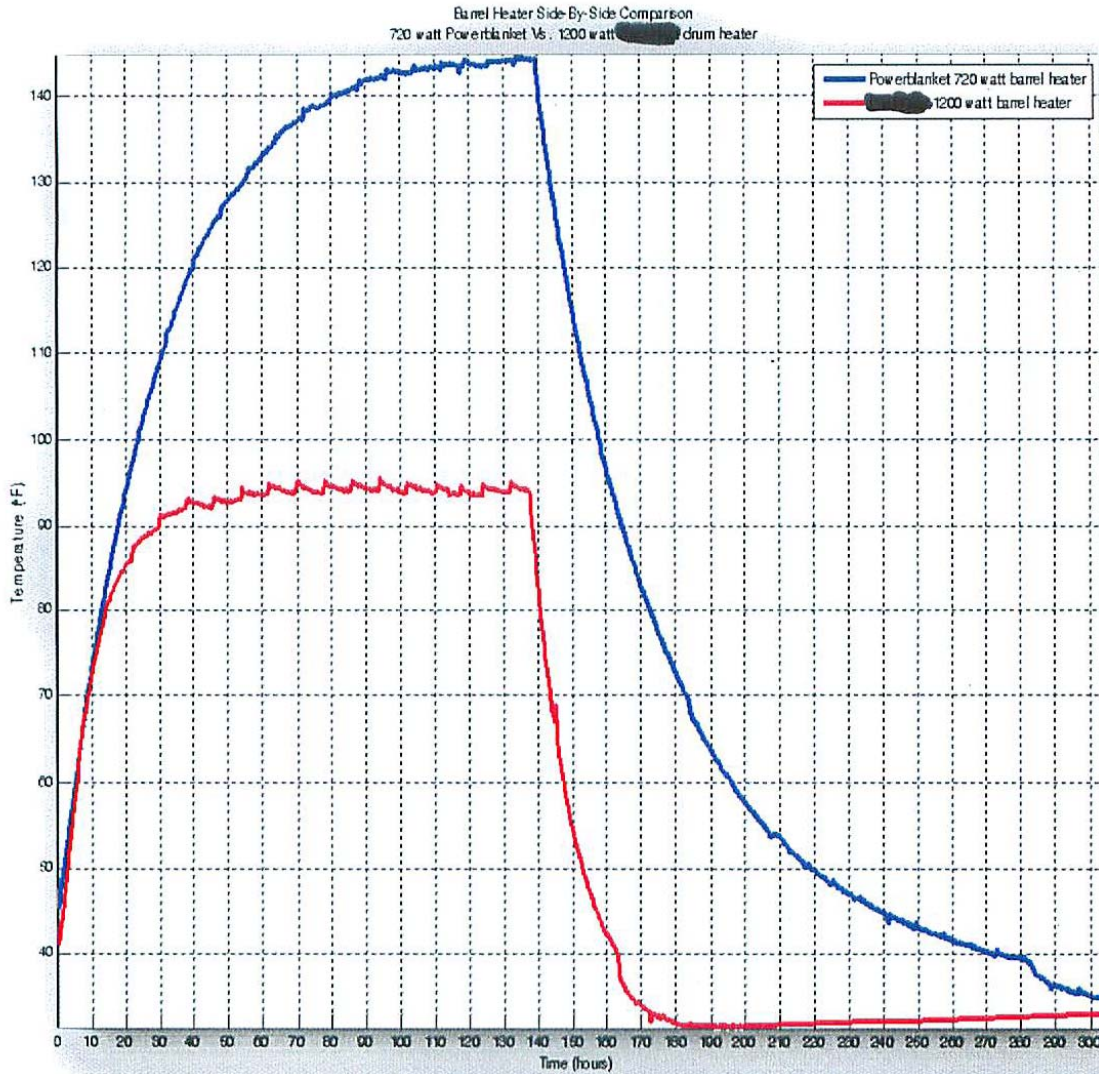


Figure 2. Temperature Vs. Time

It is evident from figure 2 that even with the increase in power the [redacted] band heater lacks the ability to quickly heat, obtain sufficient temperatures, and maintain temperatures while unpowered. It can be seen that a maximum temperature of only 61°F above the ambient was achieved.

The Powerblanket heater, drawing substantially less power, is capable of heating the contents of the barrel to 110°F above the ambient temperature.

It can reliably maintain temperatures above 30°F over the ambient temperature for 53 hours while unpowered; and it maintained temperatures above ambient for 163 hours while unpowered.