

When a Bucket Trap Just Won't Do!

Inverted bucket traps—or “bucket traps”—have been around a long time in the steam trapping business. They are rugged in design and can withstand demanding applications, but are sometimes used in applications that just aren't “friendly” for this style trap. A bucket trap likes to operate with a constant load, and doesn't operate well under fluctuating loads.

All steam traps must be capable of performing the following functions:

- ❶ Vent air from the space so that steam can enter.
- ❷ Hold steam in the space until all of the latent heat has been removed from the steam.
- ❸ Remove all the condensate that forms in the space when the steam condenses.

Bucket traps are good at performing two of these functions: numbers 2 and 3. A bucket trap does not vent air from the steam space quickly, and does not work well under varying loads—it prefers to “see” a constant load. What is a varying load? A typical heating system which cycles on and off by a thermostat or outdoor reset control is an example of a varying load. When the system turns on, the load is great because the pipes and radiators have to warm up. Once they have warmed up, the load is reduced. This fluctuating load creates fluctuating condensate loads. Bucket traps aren't the best choice to handle these changing loads. Every time the system turns off and the steam condenses, air rushes back into the system, breaking the vacuum. On the next call for heat, this air must be vented before steam can enter. Unfortunately, the bucket trap can't vent this air quickly.

Steam heat exchangers and steam make-up air coils incorporating modulating control valves are also modulating loads. When the control valve modulates the steam supply, it is responding to a change in the load. It also changes the pressure in

the steam space, which affects the pressure differential across the trap. As the differential changes, the capacity of the trap is affected. These conditions work against the bucket trap's operation.

Because a bucket trap cycles open and closed, a bucket trap works best when there is a constant, steady load which rarely fluctuates. The bucket, which is actually upside down (inverted) in the trap, has a specific weight to it. This bucket is attached to the trap's cover by a lever. At the other end of the lever is a plug, which is driven into the seat of the trap when it closes. The trap is normally open because the weight of the bucket pulls the plug off its seat. When steam arrives at the trap, it is directed through a passageway into the open end of the bucket. As more steam enters the bucket, it becomes buoyant and begins to float, closing the trap. The steam eventually condenses, the bucket loses its buoyancy and falls, pulling the plug away from its seat. Re-opened, the condensate is allowed to drain into the return piping. To work properly, the trap body needs to be primed with condensate. If the trap loses its prime, when the steam enters the trap, it will by-pass the inverted bucket and flow into the return.

What causes a bucket trap to lose its prime? A trap in an application with a modulating load can lose its prime. Under the light load, the steam that enters the



Hoffman F&T Series I trap

trap will actually re-evaporate the condensate in the trap body to steam. Now, without any condensate in the trap, steam will pass through the trap and into the return.

What type of trap should be installed in a modulating application? A float & thermostatic (F&T) trap is best for this application because as the name implies, it consists

of a float and a thermostatic element. The thermostatic element is designed to handle a large volume of air, and the float can handle modulating condensate loads. These two conditions occur in every steam heating system and in every modulating control valve application.

Hoffman Specialty offers an Inline Float & Thermostatic trap. The benefit of this style trap is the inlet and outlet connections are on the same plane, just like a standard bucket trap. So if you encounter an existing application using a bucket trap and the system is experiencing some of the problems outlined here, you can upgrade the installation with minimal piping changes to an Inline F&T trap.

For more information on steam traps or answers to any steam heating questions, contact your local McDonnell & Miller/Hoffman Specialty Steam Team representative, or visit our websites at www.hoffmanspecialty.com or www.mcdonnellmiller.com.

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