

Very little is known in our industry about thermal expansion properties of fluids and how to resolve it. The effects are well known however, as we see them in our day-to-day working environments.

**They can appear as:**

- Leaking pipe joints, swivel leaks, automatic nozzle leaks on meters, ruptured pipe and component failures.
- Stiff and hard to pull triggers on hand held meters.
- Blistered hose on reels and installations eventually resulting in bursts or leaks.
- Pump stalling.
- Excessive oil splash-back from velocity of oil coming through the meter when starting a dispense.
- Retraction problem on reels.

**Why do meters, reels, swivels, pipe and hose leak at certain times of the year?**

As a rule you will see more problems with thermal expansion during the fall and spring months. Typically when you have cold mornings and hot afternoons. You will also see more of a thermal expansion problem in low volume shops more so than larger volume shops. In your larger volume shops the system is being used frequently and this use relieves the built up pressure. Another common cause is when a bulk oil storage is outside a building and you are pumping inside the building into a completely different temperature environment.

**What is thermal expansion?**

Thermal expansion is caused in a sealed lubrication system by the expansion of the fluid due to increased temperature of the fluid. The temperature changes of the fluid are typically affected as the product is pumped from cooler outside sources, basement, floor levels or where doors may be opened frequently. The fluid product at cooler temperatures may pass a heater or go from one area of the building to the next causing an increase in temperature. This temperature change causes the fluid product to expand and the result is significantly increased pressure in the pipe and any component in the fluid system. Thermal expansion of the fluid can happen quickly ... literally in minutes!

It was determined that thermal expansion will increase the pressure at a rate of 43.7 psi per degree Fahrenheit increase in a typical ½" hose oil reel.

To put this into perspective in your own shop, imagine using your 5:1 Panther pump with 70 psi air to the pump. The stall pressure of the system is 350 psi. If you add a 30 degree Fahrenheit temperature increase to the oil in the system, the fluid pressure would increase (30 x 43.7 = 1311 psi) to 1661 psi.

**What fluids are affected?**

All fluids being pumped in your shop are subject to thermal expansion at varying levels. Motor oil, ATF, gear oil, hydraulic oil, anti-freeze, windshield washer solvent

## How can the problems be significantly reduced?

There are four ways to reduce the effects of high pressures caused by thermal expansion.

### They are as follows:

**1)** Use components (pipe, fittings, hose) that are pressure rated for at least four times the working pressure of the pump. (i.e. 2000 psi for a 500 psi application) all Balcrank medium pressure ball-valves (3230-002) are rated for this requirement.

**2)** Install a thermal relief valve at the pump outlet that has a pre-determined setting to bleed the fluid back into the tank or container when thermal expansion of the fluid occurs. Balcrank manufacture's various models of these for each product family or group.

They are as follows:

<b>Product Family</b>	<b>Thermal Expansion Kit #</b>
10:1 Giant Jet	3120-025
5:1 Tiger	3220-019
5:1 Panther	3120-020
3:1 Panther	3120-019
3:1 Bobcat	3120-019
½" Air Operated Diaphragm Pumps	3120-023
1" Air Operated Diaphragm Pumps	3120-024

**3)** Keep installed fluid pipe and system components away from direct heat sources.

**4)** Store fluids at room temperature, if possible.

Thermal expansion kits are relatively inexpensive to purchase and install. For pricing or information on these kits contact your local distributor. I hope this information helps you in running a cleaner and trouble free working environment.

Please call your local Balcrank distributor for further information or contact me at [www.dsmith@balcrank.com](mailto:www.dsmith@balcrank.com) for further details.

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