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Tigerloop™ Article

Tigerloop™ Article - As seen in Fuel Oil News Magazine

by Lindy Lindtveit

“Why, that looks just like R2D2 from Star Wars!”

That’s the typical reaction you hear from a burner tech that sees the new Tigerloop oil de-aerator for the first time. And while it’s not exactly a duplicate of that little robot (see picture), it does look quite different from the former Tigerloop. The new Model TN, introduced in early 2005 by Westwood Products, the US importer of Tigerloop, replaces the Model T60I, which, since its debut more than twenty-five years ago, has become the standard by which all oil de-aerators are judged worldwide. And while it might be said: “when you have a winner, stick with it…” the makers of Tigerloop saw the natural evolution of the product as meeting the challenges for better performance and the industry-wide emphasis on more environmentally friendly oil heat systems. Hence the new Model TN, an environmentally friendly package boasting 33% greater de-aeration capacity, dual chamber design for added safety, and easier mounting and installation. And like the former Tigerloop, the new Model TN is the only UL approved oil de-aerator available. Truly, oil de-aeration has reached a new level.

<u>De-Aeration</u>

But to fully appreciate the new Model TN Tigerloop and what it does, let’s get technical for a moment. What is an “oil de-aerator”, and what does it do? Simple put, an oil de-aerator removes the air, or more precisely the <u>bubbles</u>, from the fuel so that these bubbles don’t cause all kinds of mischief in the fuel system. Bubbles cause mischief? How can those soft little things that make bubble baths, champagne, and exotic dancers so much fun cause mischief? Well, in a fuel system they can. Remember, safe, reliable oil heat needs basically two things: (1) good equipment that is well maintained, and (2) clean fuel that is free of contamination. And by contamination we mean no dirt, water, or <u>bubbles</u>. So, let’s look at why, “Bubbles are Bad”.

<u>“Bubbles are Bad…”</u>

We find two kinds of bad bubbles in fuel systems: air and gases. If it’s air bubbles, it means either a leak in the system or the bubbles were delivered

with the oil. Leaks can be fixed if they can be found. Delivered air is another story. These bubbles are suspended in the oil when it arrives and is the result of the oil having been churned up during loading, transporting, and delivery. Take and fill an empty soft drink bottle with fuel oil and give it a shake to simulate the kind of treatment that fuel oil gets between the loading rack and its ultimate destination in the customer's tank. You'll see how long it takes to clear, and that's just the bubbles you can see with the naked eye. The really small bubbles you can't see, and those are the ones that can accumulate in even the tightest of systems. No job is immune; all systems have these bad bubbles.

So, what do these air bubbles do that makes them so bad? Take a look at Diagram 1.

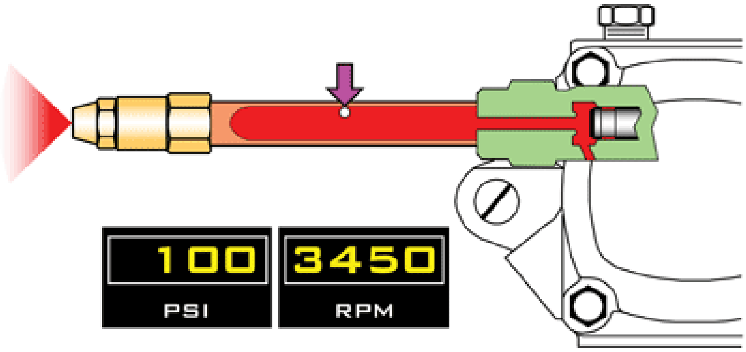

Diagram 1.

It's a cut-away diagram of a pump operating normally, except for the air bubble lodged in the nozzle line (see arrow). The bubble is deceivingly small, since its size has been compressed by the 100 psi pressure in the nozzle line. As long as the pump operates, the bubble will remain small and compressed, having no effect on burner operation.

But when the pump shuts down it's a different story. As the pump's rpm decreases, the piston will close against the nozzle seat cutting off the flow of oil from the pump, but not the flow of oil from the nozzle. The expanding bubble has taken over for the pump in supplying the pressure pushing oil out the nozzle (Diagram 2.).

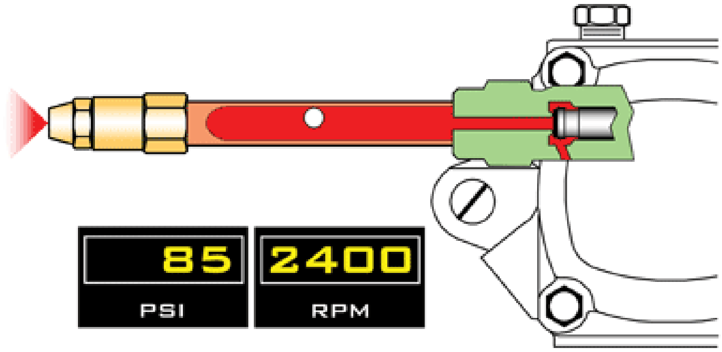

Diagram 2.

Oil flow does not cease until the bubble has expanded back to its original size and nozzle line pressure has dropped to zero (Diagram 3.).

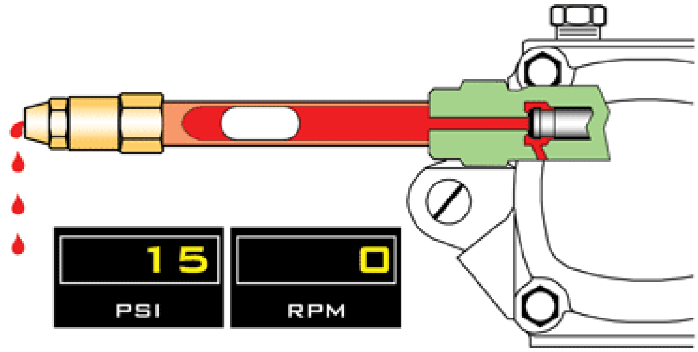

Diagram 3.

The result is virtually no cut-off, with a sooty, smoky shutdown. Ever heard of "nozzle coking"? It's a popular phrase nowadays. And a solenoid valve won't help this problem. It's strictly a bubble thing. But there's more...

Glance over at Diagram 4.

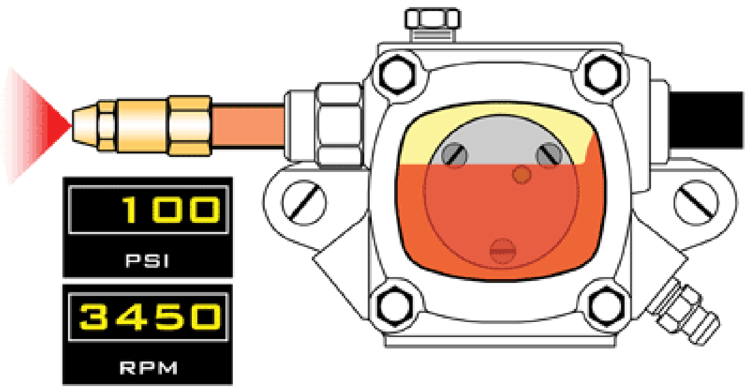

Diagram 4.

It's a cut-away of a pump's strainer chamber, with the pump operating normally. Note that the level of the oil does not fill the entire strainer chamber. This is normal because during bleeding the oil level only rises high enough to just cover the inlet to the gear set, about 2/3 of the way up the strainer chamber. But that's not bad because the air cushion at the top quiets the hydraulic whine of the gear set and doesn't affect pump operation. As long as the inlet to the gear set stays covered, all is well.

But, if air enters the pump it will immediately rise to the top pushing down the oil level in the strainer chamber and partially uncovering the inlet to the gear set (Diagram 5.).

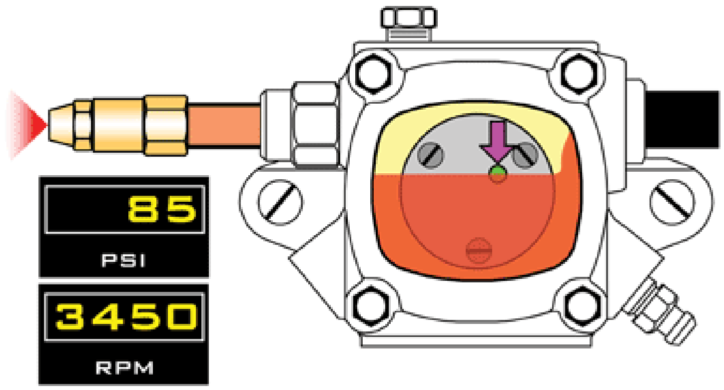

Diagram 5.

The gear set starts gulping air and oil and the pressure becomes unstable resulting in poor combustion, noise, rumbling, pulsation, etc. If enough air enters, the oil level drops completely below the inlet to the gear set (Diagram 6). Pressure is lost and the burner eventually locks-out.

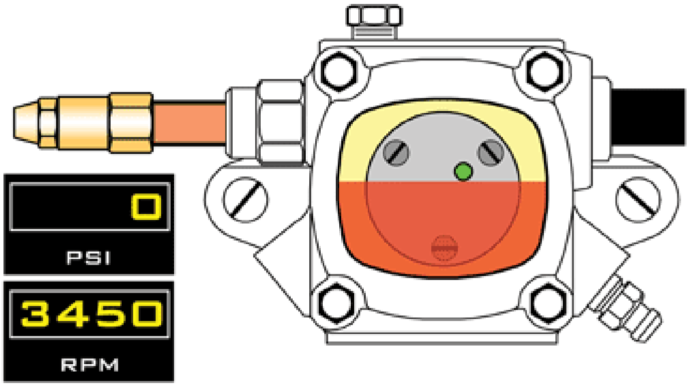

Diagram 6.

The second kind of bad bubbles are gases. These come from dissolved vapors and volatiles that are drawn out of the oil when it's exposed to vacuum. The higher the vacuum the more bubbles produced. Such things as high lift, long runs, undersized tubing, restricted lines, partially plugged filters, and sticky check valves are all major causes of high vacuum that can literally boil volatiles out of the oil creating bubbles. Diagram 7. shows the familiar story.

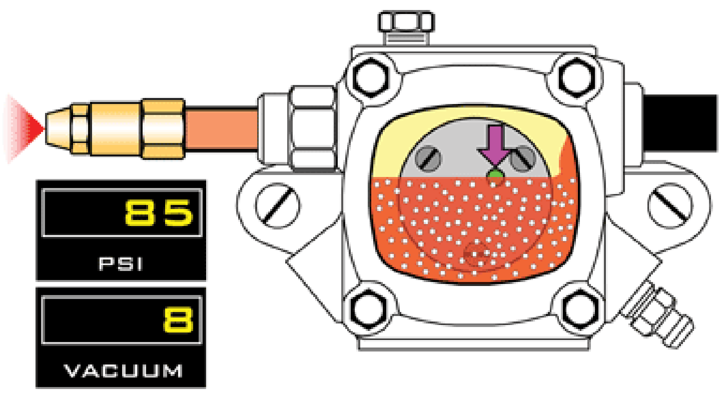

Diagram 7.

The bubbles drawn out of the oil rise to the top of the strainer chamber, the oil level falls, the gear set gulps foamy oil, pressure becomes unstable, and the burner eventually locks-out.

Certainly, safely handling the problem of bad bubbles is a major feature of the new Tigerloop. But, it's more than just a bad bubbles problem solver. All systems benefit from the use of a Tigerloop, as you will see when we continue exploring the new Tigerloop and its application and installation next time. (in Part 2)

PART 2

In Part 2. we pick up our discussion of the new Tigerloop Model TN oil de-aerator introduced in early 2005 by Tigerholm of Sweden and Westwood Products of the US. The new Model TN replaces the former Model T60I,

which is the original oil de-aerator and which is installed on millions of jobs worldwide. Boasting higher de-aeration capacity, better performance, easier installation, and some environmentally friendly features, the new Model TN is sure to maintain Tigerloop's 25 year long leadership position in the field. And, like its predecessor, the new Model TN is UL listed, which makes it the only UL approved oil de-aerator available in the US.

Last time we learned that "Bubbles are Bad" and discussed the two kinds of bad bubbles: Air and gasses. Both cause after drip and nozzle/combustion head coking problems, as well as burner lockouts, by pushing the oil level in the strainer chamber of the pump down below the inlet to the gear set. And whether bubbles enter the system via a leak, or are drawn out of the oil due to high vacuum makes no difference, they still have the same detrimental affect on the system. Therefore, to eliminate the problems you must eliminate the bubbles.

One-Pipe vs. Two-Pipe

Unfortunately, there is no piping arrangement that can, by itself, eliminate the bubbles. One-pipe systems are simple, use less material, prolong filter life by only passing the oil through the filter once, and pre-heat the oil because it moves through the piping slowly. But, they can't deal with those bad bubbles, either air or gases. Two-pipe systems can be used on higher lift jobs because they can deal with some of the bubble problems caused by higher vacuum, but they are harder to install, use more material, load up filters much faster, and constantly bring in cold oil to the pump. Moreover, the return line is a pressurized oil line that can be an environmental nightmare if it should develop a leak.

The Best of Both Worlds

What Tigerloop does is combine all the safety and simplicity of the one-pipe system with the added performance of the two-pipe system (Diagram 8.).

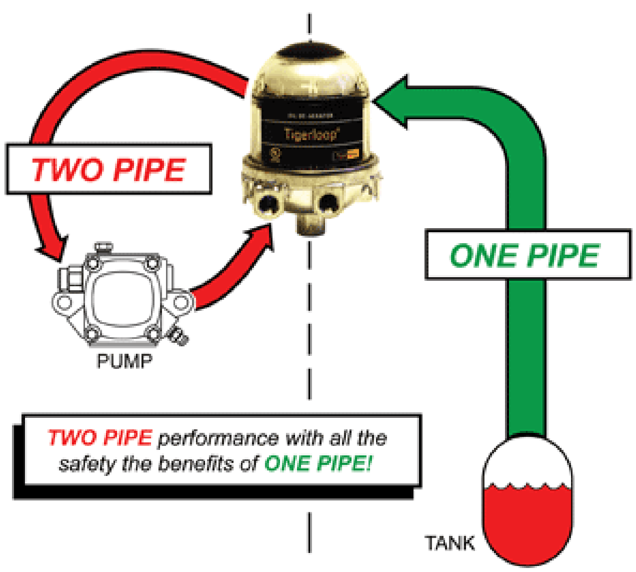

Diagram 8.

From the tank to the Tigerloop it's one-pipe, with no return line that can leak into the ground. The only oil moving up that inlet line is what's going out the nozzle so filters last longer and the oil has time to pre-heat to ambient temperature before reaching the pump. Between the Tigerloop and the pump it's two-pipe, with all the self-priming, bubble handling, high lift capabilities of a two-pipe system. Long, high lift jobs are possible because (1.) flow rate from the tank is low so vacuum is lower, and (2.) any bubbles (foam) developed due to vacuum are handled by the Tigerloop. So, while bubbles may be bad, they're not a problem.

Installation

IMPORTANT NOTE:

WARNING: INSTALLATION MUST BE PERFORMED BY A QUALIFIED TECHNICIAN FAMILIAR WITH OIL HEATING SYSTEMS, EQUIPPED WITH THE PROPER TOOLS AND EQUIPMENT, FAMILIAR WITH ALL GOVERNING CODES AND ORDINANCES, AND LICENSED BY THE PROPER AUTHORITY WHERE APPLICABLE. INSTALLATION BY AN UNQUALIFIED PERSON CAN RESULT IN HAZARDS TO THAT PERSON AND OTHERS. THESE HAZARDS MAY INCLUDE SPILLAGE OF FUEL OIL, FIRE, SEVERE BURNS, DAMAGE TO SYSTEM COMPONENTS, AND OTHER HAZARDS.

The following installation instructions are not complete. Complete Installation Instructions are packaged with the Tigerloop.

Installation of the new Model TN is even easier than the former model. It has a new detachable mounting bracket that allows the bracket to be mounted first and then the Tigerloop snapped into position. The Tigerloop should be vertically plumb, that is, mounted upright with the vent on top, inlet port on the bottom. That's important because there are floats inside that must be free to move up and down.

The fusible valve that comes packaged with the Tigerloop should be installed directly into the inlet port on the bottom. If the tank is above the Tigerloop, an oil line safety valve is recommended. A good line filter is a must on all jobs and should be installed between the tank and the Tigerloop. Do not install a filter, or anything else that could cause a restriction (i.e. a valve), in either line between the Tigerloop and the pump. This is very important, as any restriction in these lines may cause the pump seal to leak.

Each Tigerloop can handle one burner firing up to 20 GPH. If the burner fires more than 20 GPH, two or more Tigerloops can be connected in parallel to supply the required nozzle capacity. On jobs with more than one burner, a single oil line can be used to supply all the burners by using one Tigerloop for each burner. The Tigerloops are "teed" into the one line coming from the tank and the normal supply and return lines are run between each individual Tigerloop and it's corresponding burner. Just remember, each burner requires its own Tigerloop - no sharing Tigerloops!

The actual piping of the Tigerloop is straight forward and quite easy. Diagram 9. shows a simple one-pipe system, gravity fed, a great candidate for a Tigerloop.

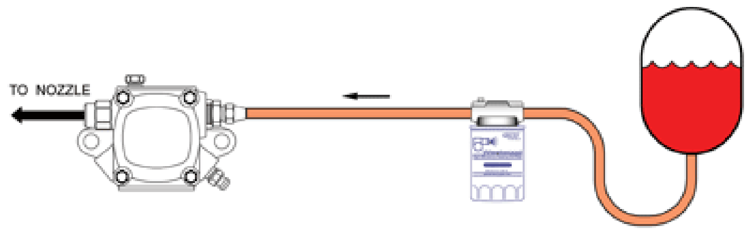

Diagram 9.

The first step is to mount the Tigerloop in a convenient place close to the burner. Flexible oil lines, available in 24" or 36" lengths, make the piping easy between the Tigerloop and the pump and are a real asset on swing-out door boilers. It's easiest to install the fusible valve and the fittings in the Tigerloop before snapping it into the wall bracket. Once mounted, attaching the inlet line from the tank and the flexible lines to the pump are easy. Just remember to install the by-pass plug in the pump before connecting the lines! When using a Tigerloop, the pump must always be set for two-pipe or the system will not work. Diagram 10. shows the completed piping. The former one-pipe system is now a Tigerloop system.

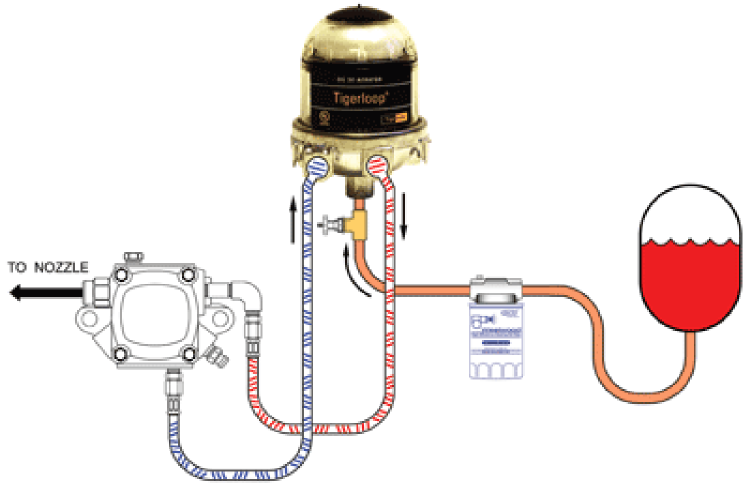

Diagram 10.

Diagram 11. shows a simple two-pipe system.

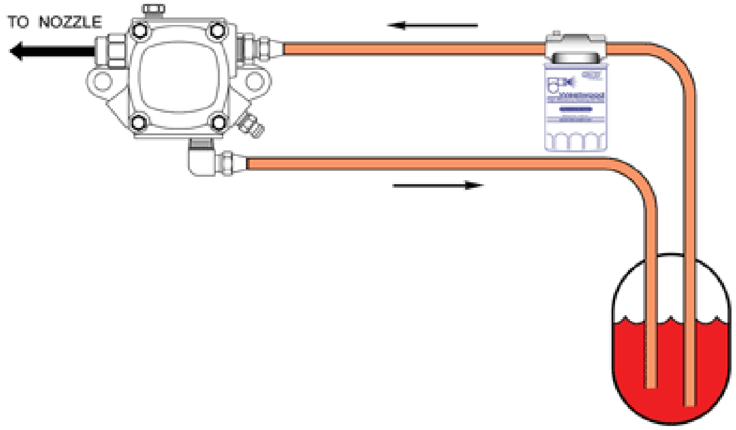

Diagram 11.

It can be converted to a Tigerloop system using the same basic steps outlined above for the one-pipe system. This time, however, you can ignore the step about installing the by-pass plug because it's already installed. Just make sure that the old return line that will no longer be used is capped off (sealed) leak tight. It would be a shame to have the next oil delivery's fast fill push oil up and out the old return line creating an "environmental incident". Diagram 12. shows the completed piping of the former two-pipe system.

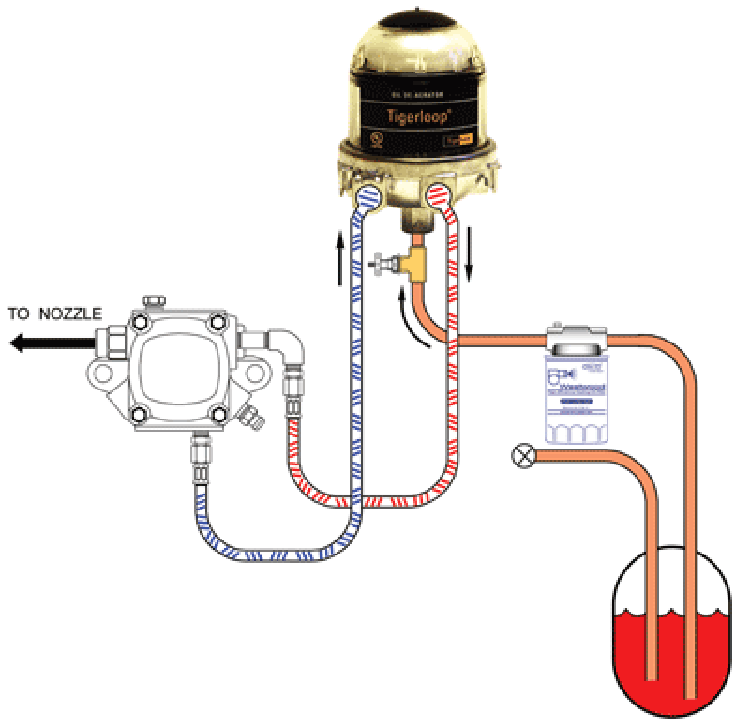

Diagram 12.

Perfecting the art...

We have all seen great advances in oil heating equipment in the years since the height of the "energy crisis". Today's burners are clean and efficient, and with the modern boiler or furnace make for unprecedented comfort and economy. But the technology of oil heating is still developing, and the new Tigerloop TN is part of that progress. It is truly another step in perfecting the art!

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