



BOILER TECHNOLOGY

INOV8 International, Inc. manufactures the premiere line of waste oil burning equipment. Our patented burner combined with the world's top selling boiler provides an environmentally approved method of disposing of used oils, while solving the disposal and liability concerns. Waste oil boiler systems are rapidly growing in popularity due to the great flexibility and benefits they provide when used in a variety of applications where hot water is needed.

Burning used oils has been popular for nearly three decades but it hasn't been until recently that technology has advanced to allow the safe and clean burning of these oils. The detergency package inherent to lubricating oil along with the accumulated wear metals from the engines constitutes many non-burnables that end up as an ash through the combustion process. It is necessary and critical to have a boiler that has easy to access flue passages to accommodate the frequent cleaning. INOV8 has selected a high quality, high efficiency boiler that is also easy to clean. Simply remove two or three bolts and swing out the burner door to expose all of the passageways for cleaning with a brush and vacuum cleaner and allow the boiler to be placed back in service within fifteen minutes. Through our continued development work we have learned of many situations associated with the burning of waste oil in a boiler. INOV8 has included solutions in our standard boiler product line for all situations. In fact, we are so convinced of the necessity of these various solutions that we will not sell a boiler unless all recommended modifications are included in the installation. Even with these cost-adding modifications, the INOV8 boiler remains cost effective and very competitive.

Many waste oil burner manufacturers have attempted to arbitrarily use their burners with boilers without success or an understanding why they failed. Evidence of this can be seen in the constant changing of boilers selected by other waste oil burner manufacturers. None of the systems can match the quality, workmanship, warranty, flexibility, durability, efficiency and safety provided by the INOV8 tested waste vegetable and petroleum oil boiler systems. INOV8 selected several world leading boilers after extensive testing starting in 1992. We sponsored several field studies in which boiler systems were installed at customer sites that were monitored closely by INOV8. Through those experiences we learned of the importance of proper installation, proper boiler temperatures, proper cleaning procedures, necessary controls, required safety devices, and a series of modifications to both the boiler and burner to allow efficient and safe operation while burning used crankcase oils.

ADVANTAGES OF INOV8 SYSTEMS:

Boiler Quality - There are numerous boilers available but few that meet the stringent requirements for burning waste oils. *Cleanability is critical!* Though all boilers can be torn down for cleaning few are designed to accommodate the cleaning process. A few boilers specifically selected by INOV8 are designed for ease in cleaning by hinging the front panel that the burner mounts on. The boiler doors swing open to expose interior parts for vacuuming. A cleaning session takes only a few minutes and does not require a cold boiler so there is minimal heat loss. *Durability is desirable.* INOV8 has many years of experience with compactly designed cast iron section boilers and steel boilers that are rated some of the highest quality in the world. This provides longevity and few warranty claims. *Efficiency is important.* In this age of energy conservation it is important to have a boiler with a design that provides the highest efficiency possible. Efficiency ratings are higher than most oil furnaces, running between 85% and 88%.

Engineering - Through our continued development work and field experience we have learned that it is necessary to insulate the waste oil flame until all the fuel is consumed by fire. Waste oil flames are prone to having stray amounts of oil depart the flame envelope and thus accumulate at the cold walls. The walls of a boiler typically operate at 170°F or below wherein the flame is extinguished and unburned oil may accumulate. We modify the boiler and require that it be operated at higher temperatures to enhance the combustion zone. Return water is recommended at 180° F.

Qualifications: The INOV8 burners applied to boiler systems are listed by Intertek ETL-Semko to ANSI UL 296, Issue 1994/06/01, Ed:10 Rev:2006/02/24, Standard for Safety Oil Burners; and to CSA B140.0, Issue:2003/10/01, Ed:3, General Requirements for Oil Burning Equipment General Instruction No 21-4 (R1991). INOV8 burners were tested while burning many different waste oils as well as fuel oils as high as #6 fuel oil and found to have smoke stack cleanliness equivalent to or better than a residential type oil burner. Each boiler system is built in accordance with requirements of the ASME Boiler & Pressure Vessel Code and listed and certified by both AGA and CGA.

Flexibility: *Flexibility of fuels.* INOV8 boilers can effectively use as fuel crankcase oils, gear box oils (85 - 140 wt), up to #6 fuel oil, transmission & hydraulic oils, vegetable and synthetic oils without having to change oil or air pressure settings. We also have applications that are burning jet fuels, mineral spirit solvents and bio-fuels. *Flexibility of applications.* INOV8 boiler systems are being used in a variety of applications including: in-floor heat, air make-up units, domestic hot water, space heating in mine shaft, snow melt pads, grain drying furnaces, vehicle wash bays providing hot water, to provide heat and hot water in a restaurant, and providing hot water for showers at a truck stop. INOV8 engineers have the capability of assisting in the system design to maximize potential for unique applications and for system payback.

Safety: The Fireye Control is rated for industrial applications. This industrial control performs self-diagnostics upon start-up, continuously through operation, and during any shutdown to guarantee safety and performance. INOV8 was the first and remains the only waste oil equipment manufacturer to recognize the importance of using an industrial-rated control system using the ultra-violet flame monitoring. The ultra-violet sensor, an integral component of the Fireye Industrial control, constantly monitors the activity in the combustion chamber and will recognize an improper flame and shut off the oil supply within three seconds. The UV sensor will respond to the light of a match at a distance of four feet in open sunlight. Cadmium cell control cannot offer this safety feature. INOV8 recently upgraded the control to one that provides “Main Flame Trial for Ignition” which adds an additional six second safety check. In addition to the burner safety controls each boiler comes with load valves, a safety relief valve, and necessary gauges.