



CEC Combustion Services Group

The Fuel-Fired Equipment Experts

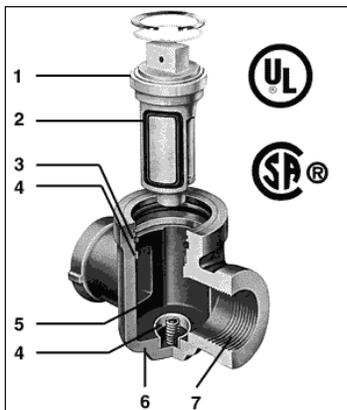
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Safety Bulletin #1020

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Gas Plug Valve Issue

Oil Fired Boiler Issue



Resilient Seal Plug Valve



Typical Oil Regulator Firing Rate Control Block

URGENT SAFETY NOTICE 9/08/08 (2 Cases Presented)

CEC Combustion Services group (CEC) is the largest independent fuel train safety testing company in the world, inspecting over 1,000 fuel trains annually in more than 20 countries. You cannot get the kind of information we are presenting in this bulletin from any other source. No one, not code authorities, contractors, or component manufacturers have access to the specific failure and incident information from as many sources as we do.

CEC wants you to be aware of two recent safety related incidents. Both incidents had the potential to become catastrophic. In each case we are not identifying the client, nor are we suggesting that the products involved were unsafe or defective. We simply want you to understand how and why things happened so that you can consider being more diligent regarding similar applications or products you might have.

Case 1: A resilient seal plug valve came apart while in service

Consequence: Uncontrolled flow of gas into plant at 20 psig from a 2" line.

An operator reached for the handle of a plug valve when the entire plug fell out as he tried to move the handle. This released 20 psig gas from a 2" line into the facility in an uncontrolled manner for some time. The site has adjacent furnaces that could have acted as potential ignition sources. Fortunately, plant personnel quickly responded and closed an upstream valve avoiding a potential catastrophe.

The valve involved in this incident was a resilient seal plug valve. In this design the plug is held in the body by the use of a snap ring. This type of valve is serviceable and can be rebuilt. Many studies in industries where reliability is crucial, like the nuclear industry, have shown that re-assembly operations are a significant error trap. The valve had been rebuilt. The rebuild kit contained a retaining snap ring that was not compatible with the older valve body. As a result the retaining snap ring was not able to seat properly.

What to do:

If you have these types of valves make sure the correct rebuild kits are used and that the retaining rings are securely installed after maintenance or service occurs. Also, consider replacement rather than repair. If replacement is an option; think about other technologies such as lubricated plug valves or ball valves rated for natural gas service. If you replace with lubricated plug valves remember that they need to be tested and inspected at least annually, and serviced as needed with the proper sealant for them to work correctly. Remember too that OSHA requires manual valves used for isolation to be leak free. Make sure to follow the requirements identified in NFPA 54 when conducting gas piping repairs. (www.nfpa.org) These include potential pre-repair and post repair purging with nitrogen and pressure hold tests post-repair. It is a good idea to review your piping to make sure that flanges, blanks, caps and testing access are available for proper isolation and testing.

Case 2: Dual fuel boiler had fuel oil leaking into the atomizing air line.

Consequence: Two (2) boiler fireside explosions. High temperature hot water boiler (375°F water), with a firing rate of 40,000,000 BTU/HR.

A large central utility plant experienced two firebox explosions caused by fuel oil that had accumulated in the atomizing air line. This fuel oil leaked through a failed regulator diaphragm into the atomizing air pressure sensing line. This sensing line back loads the oil pressure regulator diaphragm with the atomizing air pressure signal.

The explosions occurred as the operator switched fuels from gas to oil. The boiler in both cases was operating on gas for some time. It was then shut off and the fuel selector switch moved to oil. When the start button was hit the atomizing air compressor and purge air fan came on simultaneously. This discharged nearly a gallon of fuel oil from the atomizing air line into the hot firebox. This fuel oil immediately vaporized in the hot firebox and then combined with the purge air to make for an explosive mixture. The hot refractory in the firebox was well above the fuel oil ignition temperature.

What to do:

The defect that occurred is not easily detectable. A small leak in the regulator diaphragm would not normally be noticed. The small ¼" sensing line gave the leaked oil a place to go. If you have a similar system, consider the following:

1. Always keep manual valves closed on oil lines serving dual fuel burners when operating on gas. Do not risk valves pressurizing things like regulator diaphragms. Keeping pressure on components always creates a leakage risk.
2. Create a start-up procedure where atomizing air lines are checked for oil by disconnecting prior to start-up. Consider adding a manual drain that can be left open when operating on gas, closed when oil is used, and used to purge the air line prior to starting on oil.

If you have questions on this and/or any other fuel system or combustion equipment safety issue call John Puskar, P.E. at 216-749-2992. Our staff has hundreds of years of combined burner and combustion system experience including licensed professional engineers, burner technicians, and combustion controls experts.