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June 14th Flag Day

The national flag which we see these days has been effective since July 4, 1960. This was following the inclusion of Hawaii in the United States of America. And this flag was nothing new, but is a descendant of an original flag. The Flag that was born within a year of American Independence. And its birthday is not regarded as the day it was created, but on June 14, 1777, when it was given the official recognition of the Continental Congress as the national flag of the United States of America. And it was for the first time the republic wiped out the presence of the British empire from its national flag.

With the date of recognition hogging the historic limelight, the event of the creation of the flag itself lost the focus. So the different versions of the story those has been trickled down to us is based more on legends than on historic facts. It is known that the first Independence Day was celebrated with a different flag, called the Grand Union Flag. It was the same flag that was hoisted outside Boston probably at Prospect Hill in Somerville but perhaps at Cambridge on Jan 1, 1776. And it carried the British Union flag, the predecessor to the Union Jack, in the place of the canton that now houses the constellation of stars. Although the need for a new flag was felt, the design was not made until 1777.

On Jan. 1, 1776; it was hoisted, it appears, at the behest of General George Washington,

The design of the Stars and Stripes with a diamond-shaped field of 13 stars is attributed to magistrate, John Hulbert. While the Stars and Stripes with a circle of 13 stars is attributed to Betsy Ross. However, both attributions are questionable.

According to one story, it was resolved that the flag of the thirteen United States would be:

"of thirteen stripes alternate red and white;

that the Union be thirteen stars, white in a blue field, representing a new constellation."

And it was Betsy Ross who was entrusted with the designing of the would be flag based on the guidelines of the Resolution. Betsy Ross was a young widow of John Ross, a patriot who had died in the service of his country. She was supporting herself by continuing the upholstery business of her late husband. She was known for her exquisite needlework, and was engaged in the flag-making business.

So, within the guidelines, she was free to design the flag as she wished. She chose the size of the stripes, the arrangement of the stars, and the overall proportions of the flag. It is said that Betsy introduced the design of the five point stars to replace the six point one that was prevalent at that time. Sometime after its completion it was presented to Congress, and the committee had the pleasure of informing Betsy Ross that her flag was accepted as the Nation's standard.

According to yet another story, it was John Hulbert, then a magistrate, who designed the first Flag. And it was the Stars and Stripes with a diamond-shaped field of 13 stars.

However, historical proofs point out that apart from the stripes, the first Flag had the stars arranged in five rows with each having two or three stars. And the layout of these stars was left undefined. So, several patterns came up on the same ground.

Flag day is a special day when you should thank our veterans and fly your country flag high.

ASOPE-BOD

Boiler Inspection, Maintenance, Safety

By Stephen Kleva
March 31, 2009

Regardless of their size and type, boilers can be dangerous, causing loss of life and significant property damage, if not inspected and maintained properly.

While there are safety devices to prevent dangerous boiler operating conditions from turning into disasters, only proper maintenance can prevent dangerous boiler operating conditions from occurring. The only way one can be confident control or safety devices are functioning properly is to perform required maintenance, testing, and inspection regularly.

Regular inspection of boilers is the law--most often, governed by states, but in some cases, governed by municipalities and cities. Boilers must be examined by certified inspectors according to a mandated schedule. The day-to-day maintenance and servicing of boilers is the responsibility of building engineers, plant- and facility-maintenance managers, and/or building managers. It is important to note that most problems do not occur suddenly; instead, they develop slowly over a long period of time--so slowly, in fact, they often go unnoticed by maintenance personnel.

In addition to safety, regular boiler inspections are important to optimal function and energy efficiency. Boilers are high energy users--typically, second only to air-conditioning systems in annual energy use. Inefficient operation means wasted energy and increased costs.

Regular inspections also can extend the life of a boiler.

Inspection laws getting stricter. Boiler-inspection laws are getting stricter nationwide. For example, New York City now requires owners of low-pressure boilers to have a licensed boiler-repair contractor correct defects found during an inspection and provide written confirmation of the corrections within 45 days. A boiler then must be re-examined by an approved inspector to verify the defects have been corrected. Once the re-inspection is complete, the owner must submit an affirmation of correction signed by the approved inspector attesting to the compliance of the boiler. Failure to comply with these requirements can mean fines of up to \$1,000 per boiler per year. Previously, there essentially was no penalty for failure to correct deficiencies; there only were penalties for not having an inspection.

Overdue inspections mounting nationwide. The problem of overdue boiler inspections is fairly widespread and growing. For example, during fall 2008, it was reported that Washington, D.C.'s Department of Consumer and Regulatory Affairs (DCRA) had failed to inspect and certify thousands of boilers in District buildings and that the District fire department had responded to 119 boiler incidents during the previous two years.

The DCRA, which was understaffed, had certified as safe some commercial boilers with problems cited by insurance inspectors, such as leaking relief valves, significant mineral buildup, and inoperative safety valves.

The commercial-inspections section of the DCRA performs its boiler work through in-person examinations or the certification of insurance-company inspections. With a shortage of boiler inspectors, the agency focused on schools, firehouses, police stations, and libraries, leaving many commercial boilers unchecked and private inspections unverified.

KEY BOILER-SAFETY FEATURES

Boilers have a variety of features designed to prevent accidents and keep them functioning at optimal efficiency:

- *Safety valves.* Safety valves are the primary safety feature on a boiler. Safety valves are designed to relieve all of the pressure generated within a boiler if other systems fail. Every steam and hot-water heating boiler must have at least one safety or safety relief valve of sufficient relieving capacity to meet or exceed maximum burner output.

The ability of a safety valve to perform its intended function can be affected by several factors, including internal corrosion and restricted flow.

Internal corrosion typically is the most common cause of "freezing" or binding of safety relief valves. This generally is caused by slight leaking or "simmering" attributed to improper seating of a valve disk and is a condition that must be corrected immediately. A boiler never should be operated too close to a valve setting because the set pressure will cause the valve to leak slightly, resulting in internal corrosion buildup that eventually will prevent

the valve from operating.

- *Water-level control and low-water fuel cutoff.* These two devices perform two separate functions, but sometimes are combined into one unit. It is important to ensure piping is open and free of scale or sludge buildup at all times. Cross tees allow piping to be cleaned and inspected easily. Low-water fuel cutoffs should be checked periodically for proper operation. Because this requires boiler water to be lowered to the minimum safe operating level, extreme caution should be used.

In addition to periodic tests of a low-water device, the float chamber on a water-level control and/or a low-water fuel cutoff should be flushed thoroughly to remove accumulated sediment. At least once a year, water-level controls and low-water fuel-cutoff devices should be disassembled, cleaned, and checked.

- *Water gauge glass.* A water gauge glass enables an operator to observe and verify the actual level of water in a steam boiler. If not properly cleaned and maintained, a gauge glass can appear to show a sufficient level of water when a boiler actually is operating in a low-water condition. A stain or coating sometimes develops on the inside of a gauge glass, where the gauge glass is in contact with boiling water. This stain can give the appearance of water in the boiler, especially when the gauge glass is completely full or empty of water.

If necessary, replace a gauge glass, even if the boiler must be shut down. That inconvenience is nothing compared with the damage that can result from a boiler being operated without a functioning gauge glass. The connection lines to a gauge glass can become clogged and show normal water levels when water is low; thus, the piping connecting a gauge glass to a boiler should be cleaned and inspected regularly to ensure it is clear.

A boiler's fuel system, particularly the burner, requires periodic cleaning and routine maintenance. Failure to maintain equipment in good working order can result in high fuel costs, the loss of heat transfer, or a boiler explosion.

Boiler logs may be the best method of ensuring boilers are maintained properly. Because a boiler's operating conditions change slowly over time, a log is the best way to detect significant changes that otherwise may go unnoticed. Maintenance and testing should be performed and recorded in a log on a regular basis.

BOILER-EFFICIENCY AND PERFORMANCE TIPS

A boiler consumes a large amount of a facility's energy budget. Even a small decrease in a boiler's efficiency can cause a sharp increase in energy costs. To improve the efficiency of boiler heat generation:

- *Optimize air-to-fuel ratio.* A boiler requires just the right amount of oxygen to ensure an appropriate air-to-fuel ratio. Air consumes energy as it is heated. Thus, excess air/oxygen wastes energy, as heated air is released up the stack. If air/oxygen is insufficient, not all fuel will burn. The unburned fuel will move through the system, leaving behind soot. Additionally, too little air may cause a buildup of carbon monoxide and

smoke.

By analyzing flue gas, one can measure oxygen and stack gas temperature and calculate boiler efficiency. Adjustments then can be made to optimize the level of excess air and the temperature of incoming air.

To optimize air-to-fuel ratio, one can use a computer-based distributed control system, which automatically controls a fuel burner to reduce oxygen levels as needed.

- *Optimize water treatment.* Before being pumped into a boiler, feedwater is treated to remove dissolved oxygen and other impurities that might cause corrosion or buildup of sediment, both of which reduce boiler efficiency. These impurities waste energy, as they necessitate routine boiler blowdowns. The cleaner the water going into a unit, the fewer boiler blowdowns that will be necessary.
- *Clean heat-transfer surfaces.* Soot buildup on boiler heat-transfer surfaces acts like an insulator and diminishes the efficiency of heat transfer between combustion gas and steam generation.
- *Minimize heat loss.* To recover waste heat from a stack, install an economizer. Heat then can be directed to boiler feedwater for preheating. Before installing an economizer, be sure a boiler system is cleaned and tuned so that an accurate measurement of stack gas temperature can be taken. Additional heat can be extracted from flue gas (below 300 F) using a condensing economizer. When a condensing economizer is used, caution must be exercised because a reduction in flue gas below the dew point will cause condensation, which can contain sulfuric or hydrochloric acid because of the sulphur, hydrogen, and chlorine in the fuel. These acids can significantly corrode the surfaces with which they come in contact.
- *Install a stack-temperature gauge.* A stack-temperature gauge indicates the temperature of flue gas leaving a boiler. The lower the temperature of flue gas, the more efficient the system. A high stack temperature indicates soot or scale may be building up in tubes or the baffling inside of the boiler may have deteriorated or burned through, allowing gases to bypass heat-transfer surfaces. These conditions generally develop slowly and unbeknownst to operators. Approximately 1 percent in boiler thermal efficiency is lost per 40 F increase in stack temperature.
- *Recover condensate.* Condensate drained from steam traps can be collected and used as boiler feedwater. This reduces boiler operating costs and usually is more cost-effective than using fresh utility water. Recovered condensate takes less fuel to convert into steam than fresh utility water does. The temperature of recovered condensate is 160 F to 200 F, while the temperature of fresh utility water usually does not exceed 80 F. The proper maintenance of steam traps throughout a distribution system can maximize the amount of condensate returned to a boiler, minimizing energy waste associated with feedwater heating.

Sidebar: General Tips for Optimal Safety

- Test the functioning of all boiler controls.



- Test all drains and blow-offs to ensure they are functioning properly.
- Check the fuel system for leaks, and ensure all fuel filters and strainers are replaced regularly.
- Ensure all shut-off valves are leak-tight.
- Ensure all valves in instrument lines are functioning properly.
- Open the boiler vent valve or top tri-cock to vent air, and fill the boiler to the proper level with treated water. Check that the expansion tank is filled properly and the air-cushion volume is correct.
- Verify that the vent valve on gas-fired boilers is operating as required and the vent is not clogged.
- Verify that the flame scanner or sensors are connected and functioning properly.
- Check the settings of all instruments and safety devices. Ensure the water-pressure regulator functions as required.
- Ensure the recirculation pump works as required.
- Confirm there are no signs of overheating, corrosion, or erosion.
- Ensure all heating-system isolation valves are functioning properly.
- Verify there are no leaks from any part of a boiler or piping external to the boiler. Have any cracked surfaces repaired by a qualified repair company immediately.
- Test safety valves regularly. Replace leaking safety valves.
- Verify the low-water fuel cutoff works as required. Inspect it for proper sequencing.

Stephen Kleva is president of Insparisk (www.insparisk.com), a national safety-inspection company and the parent company of City Spec Inc. City Spec inspects low-pressure boilers in New York City.

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What assistance should the owner or operating engineer give the jurisdictional boiler inspector during inspections?

It is the responsibility of the owner to prepare the boiler for the required legal internal inspection. The boiler needs to be shut down, cooled down and isolated in accordance with lock out/tag out requirements. All access and inspection openings must be opened. All scale and mud must be removed so metal surfaces are exposed for inspection. Fire sides must be cleaned of soot and slag so tubes can be inspected for corrosion, thinning, erosion, and evidence of overheating. Ash pits should be clear of ash residue.

The inspector must be given all the help she or he needs. Have a knowledgeable person accompany the inspector to assist and identify any

known defects. Ensure required test requirements regarding boiler repairs and safety valve testing are documented and available if requested.

When internal boiler entry is to be made, follow confined space entry procedures. If the boiler is in battery with others and internal entry is to be made, make sure that all common steam, water, and blowoff lines are double valved or blocked shut and locked and tagged. If the inspector deems a hydrostatic test, it is advisable to make provisions to perform the test in a complete and safe manner. In general, assist in every way to make the examination thorough and complete.

Correct and complete all safety related deficiencies and recommendations that may be offered so that the Certificate of Operation issued by the jurisdiction can be quickly processed as a result of the jurisdictional inspection.

By: Larry Tarvin and Dale Miller

Cause of Boiler Accidents

Boiler systems are designed for safety and efficiency. The boiler operator is the key to safe boiler operations. Having knowledge about boiler systems and maintenance can ensure years of safe, reliable service.

History has shown that without proper operation and maintenance, boiler conditions and safety deteriorate causing potential hazards due to neglect and misunderstanding. Routine maintenance is well within the ability of most boiler operators. Boiler tune up and repairs, however, are best left to trained professionals. Understanding when to turn to qualified professionals for assistance is one of the operator's responsibilities and can save time and money. Some of the areas where trained professionals are needed are:

- Leaking safety and or safety relief valves
- Feed water to boiler
- Steam leaks (steam systems)
- High stack temperatures (excess of 350°F)
- Insufficient heat for building
- Condensate dripping down stack or out the front of the boiler
- Constantly resetting of controllers and safety devices

Boiler accidents can occur when the boiler is allowed to operate without adequate water in the boiler. Proper functioning low water cutoffs are essential to prevent these types of accidents. Boiler damage can run from severe buckling and deforming of the boiler to complete meltdown or potential boiler explosions.

Another type of boiler accident and the most lethal is excessive pressure. These accidents occur when the boiler can no longer contain the excessive pressure allowed to build in the boiler. Excessive pressure accidents, even in small boilers, have been known to completely destroy a building.

Fuel related accidents usually occur when there is a failure to purge combustible

gases from the firebox before ignition is attempted. Leaking fuel valves can also be the cause of these accidents. If the operator notices any gas odor, the boiler should be shut down and the fuel supplier notified immediately.

“Never bypass safety devices with jumper wires to restart your boiler. Unintended ignition of unburned combustion gases in the fire box is possible.”

ASOPE™ Cross Word Puzzle 3

Visit the link below for new ASOPE™ Cross Word Puzzle Fun.

To work online use the following link:

<http://asope.org/Crossword3.html>

Answers will be posted in next month's newsletter.

Answers to ASOPE™ Cross Word Puzzle 2a (May 2009 Newsletter)

ASOPE1,10x10,14words Crossword Puzzle 2a

¹ W	A	R	² P	I	N	³ G		⁴ F	
			I			⁵ A	C	I	D
⁶ S	⁷ E	T	T	I	N	G		N	
	N		C				⁸ P		
	T		H		⁹ S		E		¹⁰ A
	H			¹¹ L	I	N	T	E	L
	A		¹² B		L		C		G
¹³ A	L	K	A	L	I		O		A
	P		G		¹⁴ C	Y	C	L	E
	Y				A		K		

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