

# Training: A Code Requirement and Key to Safety

## Safety Note

### A Trending Problem

Are you experiencing extended downtimes due to the inability of your personnel to troubleshoot combustion systems? Are new technologies resulting in increased outsourced service calls because your people are not aware of how to address them? You are not alone; this is a common trend among many industrial manufacturers. So, how are these issues to be remedied? The answer is simple and stated directly within the national and international standards: training. Training is a regular component of any business; you have gone through job training, equipment operation training, process training and more. It is how we learn to function within our working lives. For industrial settings, training is imperative to safety, success and daily efficiency. It's so imperative that U.S. and International Codes and Standards such as NFPA 86 (Standard for Ovens and Furnaces) and EN 746 (European Standard for Industrial Thermoprocessing Equipment), list requirements to be met on an annual basis regarding employee education. As codes are developed to outline the minimum standards required by law, it's obvious that authorities recognize that training is not just fundamental for knowing how to do your job; it's an ongoing effort that must be enforced to ensure you are performing your job duties safely.

NFPA 86 applies to ovens, dryers, furnaces, thermal oxidizers and any other heated enclosure used for processing materials. This includes equipment utilizing fuel gases such as natural gas or petroleum, liquid fuels, oxy-fuel and many others. NFPA 86 specifically states [Figure 1] that personnel who operate, maintain or supervise the oven or furnace shall be thoroughly instructed and trained in their job functions, demonstrate an understanding of safe operation procedures, be kept current with changes in the equipment and operating procedures, and receive regular refresher training. EN 746-1, Section 6.4.9 [Figure 2] also states that "personnel operating the equipment shall be trained and competent in the operation of the equipment and in the hazards associated with the process, and their prevention." Based on these legal requirements, the question now remains: Are you receiving and/or conducting proper training?

**NFPA 86:  
Standard for Ovens and Furnaces**

- 7.2.1** - Personnel who operate, maintain, or supervise the furnace shall be thoroughly instructed and trained in their respective job functions under the direction of a **qualified person(s)**.
- 7.2.2** - Personnel who operate, maintain, or supervise the furnace shall be required to **demonstrate an understanding** of the equipment, its operation, **and practice of safe operating procedures** in their respective job functions.
- 7.2.3** - Personnel who operate, maintain, or supervise the furnace shall receive **regularly scheduled** refresher training and shall demonstrate understanding of the equipment, its operation, and practice of safe operating procedures in their respective job functions.
- 7.2.4** - The training program shall cover **startup, shutdown, and lockout procedures** in detail.
- 7.2.5** - The training program shall be **kept current with changes** in the equipment and operating procedures, and the training materials shall be available for reference.

Fig. 1: Training Requirements as outlined by NFPA 86: Standard for Ovens and Furnaces, 2011.

**EN 746-1**

- 6.4.9** - Instruction that the personnel operating the equipment shall be trained and competent in the operation of the equipment and in the hazards associated with the process, and their prevention.

Fig. 2: Training Requirements as outlined by EN 746-1.

It's quite common within corporations and at individual facilities to overlook training. Do you remember the last time you or your colleagues received instruction related to combustion or the equipment? Production and daily responsibilities take priority, budgets are limited and new hire onboarding is often thought to be sufficient. Since it's required for your OEMs to provide training on the new oven, furnace or boiler when installed, that information is also thought to be adequate preparation for its operation. This information may not be accurate, though, as it can be diluted during employee training if not preserved in a formal program or document. Since many OEMs don't return to installation sites to educate on any changes in the National Codes and Standards or equipment either, the initial training may not meet current standards or address recent changes in national and international regulations. As stated by the National Board of Boiler and Pressure Vessel Inspectors in the 2002 Bulletin, Volume 57, Number 2, "of the 23,338 accidents recorded over the past ten years, 83 percent were a direct result of human oversight or lack of knowledge." So the majority of industrial accidents include human error as the root cause.

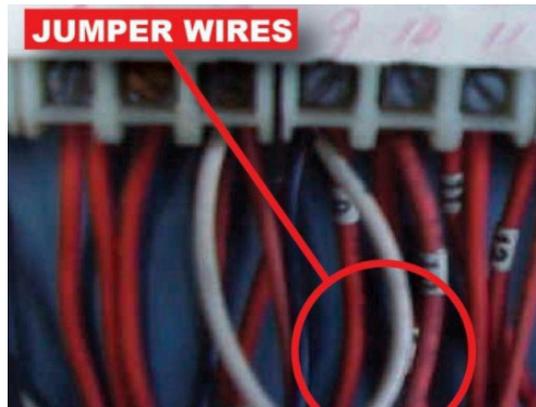
## What We Find

Some of the most commonly overlooked hidden hazards that Honeywell Combustion Safety's auditors have found after conducting thousands of inspections a year on all different types of fuel-fired equipment are:

- Jumper wires
- Lubricated plug valves that are not being maintained
- Incorrect venting
- Lack of safety interlock and valve tightness testing
- Emergency shut off valves that are not labeled
- Bent or broken safety relief handles
- Disconnected or crimped sensing lines for safety devices

These hazards present an immediate risk. They are usually found on more than one piece of equipment within a facility, but are frequently ignored even though they have a direct correlation to the operation and safety of equipment and staff.

These are samples of the hidden dangers that go unnoticed on a daily basis because maintenance personnel, managers and other employees do not know what to look for:



Jumper wires can bypass safety devices or system requirements for efficient operation, allowing for unburned fuel to accumulate, which could result in a fire or explosion.



Lubricated plug valves seal by virtue of the sealant that is within them, if they aren't being maintained or lubricated with the correct sealant, gas may leak past the valve seat downstream into the fuel train piping or through the stem into the atmosphere.



Incorrectly vented gas train components including vent valves, regulators, pressure switches, and relief devices also may allow for a release of gas into the workplace atmosphere.

## ABOUT US

Honeywell Combustion Safety is a part of Honeywell Thermal Solutions, an industry leader in commercial and industrial combustion solutions. Honeywell Combustion Safety, formerly known as CEC Combustion Safety, has been in business since 1984. With engineers and staff members that sit on Code committees such as NFPA 56, NFPA 85, NFPA 86, and NFPA 87, our inside expertise is integrated within all of our practices, and our global reach ensures that customers around the world are kept safe. Honeywell offers testing and inspections, engineering & upgrades/retrofits, gas hazards management, training, and field services for all industrial facilities and different types of fuel fired equipment. By assisting organizations and their personnel with the safe maintenance and operation of their combustion equipment, Honeywell aims to save lives and prevent explosions while increasing efficiency and reliability of combustion equipment.

## Training Programs

Moreover, many organizations don't have regular or sufficient training programs. The programs that are in place may not be executed by qualified instructors and the material may not be accurate or targeted to be relevant. Additionally, with high turnover rates, new hires are being expedited through processes and are commonly not provided with information considered to be comprehensive according to the Codes and Standards. A major requirement by Codes and Standards of training programs is that they be documented. It has also been found that the majority of organizations with a program in place have little to no documentation for the program itself or those who have completed it.

Documentation is not considered a basic outline of the program, either. Program records must be detailed, as the regulation to verify all standard training procedures is an NFPA requirement. This requirement is enforced by any authorities having jurisdiction (AHJ), ISO 14001, the standard for environmental management systems, and OHSAS 18001. OHSAS 18001 is a safety assessment series above the OSHA standard developed to establish criteria against which programs are to be certified and assessed in order to control occupational safety and health risks. On a more personal level, certifications must also be upheld throughout the years, and 80% of the requirements to retain them are based on training.



Combustion Workshop Open Course at Eclipse, Inc. in Rockford, IL.

This means that program proof must be supplied and must specify the processes involved, annual frequency, course instructor identification, method of material delivery, documentation processes and the continuation of a program for a five-year minimum to sustain compliance.

## Corrective Action

Meeting NFPA 86 and other standards requirements can seem overwhelming, but it is necessary, and quick corrective action can be taken to become compliant. There are many avenues that can be approached for providing combustion system training, including:

- Attendance of professional programs like open courses or combustion workshops can start you on the path towards compliance and provide you and your staff with the documentation needed to supply proof of completion. There are a variety of organizations that conduct equipment specific operator training. Others can come to your site to provide customized training for your facility and its fuel fired equipment.
- Online programs are available that are accessible 24/7 and all personnel can engage at their convenience from any computer with an internet connection.
- Ensure that your OEMs are providing the required training upon installation of new ovens, furnaces and boilers, as well. The key is to find a credible vendor that has in-depth knowledge of the codes, standards, combustion equipment and its operation.
- Develop your own program and consult the experts before assuming it meets NFPA 86 or EN 746 requirements. Be certain that the curriculum encompasses general safety knowledge, equipment operation and code protocols, and that personnel receive training at least annually.

Reinforcement is a necessity and should be incorporated into preventative maintenance programs, within startup systems or through refresher courses carried out annually.

Beyond the lawful requirement, the benefits of a strong training program are long lasting and invaluable. Thorough training reduces the risk of a combustion related accident, enhances safety and can cut costs and save energy.

Rather than hiring outside contractors, in-house personnel who are already familiar with the equipment can be trusted with identifying hazards and performing regular maintenance.

Problems can be diagnosed and repaired faster, and reduced maintenance time and recognized defects lead to better fuel efficiency and operations. As more personnel receive training, sites experience reductions in interruptions, outages and downtime. And, they remain compliant with National Codes and Standards while people and equipment are better protected.

Training isn't a responsibility to be taken lightly; it's a legal requirement for any industrial company. An effective and compliant program requires time, research, continuous improvement and participation by dedicated team members and participants. The importance of proper training can't be discounted, as it's not just knowledge that is at risk; it's the safety of the facility and the personnel that serve them. Verify your organization's training platform, investigate the curriculum and research what courses outside vendors may offer to help you satisfy your annual responsibility. Allocate time and money for a training program, and you will receive a much greater return on your investment.

#### **For more information**

Learn more about Honeywell Combustion Safety, contact [info@combustionsafety.com](mailto:info@combustionsafety.com), visit [www.combustionsafety.com](http://www.combustionsafety.com) or contact your Honeywell Sales Engineer.

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