

# Combustion Safety Issues Raised By Refractory Blast

## Safety Note

A primary metals producer in the United States recently experienced an explosion during the dry out of a new refractory material. While these kinds of blasts are rare, there are a number of safety issues to consider to reduce your risk during these types of procedures.

During the refractory dry out process, temporary gas burners are often installed and closely monitored to meet a dry out schedule specified by the refractory manufacturer. There are many things that can go wrong and make for explosion incidents during this process. These can be either combustion related or steam related.

Combustion related incidents can occur if flame safety devices or fuel/air ratios are not correct. While steam related explosions can occur because poured refractories contain water which must be released in a safe manner. If, for example, the top surface of the refractory material gets overheated and glazed, it could contain water. Water expands in volume 1,600 times when it changes from a liquid to a gas (steam). This happens quickly and with tremendous force.

The incident at the metals facility described above occurred as a contracted vendor was overseeing the dry out process. The dry out had been underway for several days when the blast occurred, sending a 25,000-pound lid over 40 feet into the air, along with a lot of debris. Two men were working within feet of the blast, though fortunately no one was injured. While the root cause of this incident has not been established, it may have been related to a steaming incident involving trapped moisture under the poured floor. The incident does bring to light a number of safety and combustion-related issues and other best practices that should be considered during this kind of work.



There are many things that can go wrong and make for explosion incidents during refractory dry out process.

### Planning the Dry-out

Make sure there are well-documented protocols for dry outs. Planning for the dry out should include protecting the existing burners so that the temporary firing does not flow back into them and cause damage. You should also identify procedures to follow if an incident were to occur; for example, knowing the process for shutting off the gas supply and understanding the line of communications during an emergency. The remote originating gas take off manual valve for the temporary process should be marked and have a sign on it in case responders must access it.

### Evaluate Contractor

Evaluate each contractor's dry out equipment to ensure that it meets the requirements of NFPA 86, Standard for Ovens and Furnaces. Contractors should also conduct safety device interlock testing witnessed by your personnel immediately prior to starting the processing.

This would include: High and low gas pressure switches, air flow proving switches, flame detectors, low fire start, proof of closure switches

### Minimize Personnel

Minimize the number of personnel in any area when the dry out process is occurring

### Measurement & Documentation

Dry outs should include continuous measurement and documentation of flue products – or at least frequent sampling – to indicate fuel-rich or lean conditions. Target limits and action steps should be established.

### Monitoring

Monitoring of steam exit points and flue gas moisture content should occur.

Honeywell Combustion Safety can help you to evaluate equipment for compliance with NFPA 86 requirements to include conducting annual safety interlock testing of fuel safety devices for melters, holders, furnaces and ovens. Our firm has service staff to troubleshoot equipment problems and an upgrade team to provide the latest in burner efficiency and control upgrades.

### 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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