THE TRUTH ABOUT GAS LEAKAGE COMPLAINTS AND GAS VALVES

INTRODUCTION

Complaints of gas leakage through regulator vent openings have become increasingly common in the last few years. This rise in complaints is not the fault of gas valve manufacturers, rather the problem is more commonly the result of modern furnace design and a *trace leakage* phenomenon that can be found in all gas valves. Because these factors are not widely understood and the wrong tools are often used to diagnose gas leakage, gas valves are being replaced unnecessarily.

This paper briefly explains how modern furnace design contributes to leakage complaints, presents the results of laboratory testing done by Honeywell to confirm valve integrity, and suggests a more reliable method of verifying actual leakage than is currently being used.

MODERN FURNACE DESIGN AND LEAKAGE COMPLAINTS

The recent rise in the number of gas leakage complaints involving gas controls appears to be caused primarily by how newer furnaces are vented.

Since January 1992 all furnaces are made with induced draft blowers and all boilers are made with vent dampers or induced draft blowers. The result of this design is that any gas remaining in the burner is trapped when the gas valve shuts off, since it cannot easily move up a vent tube to the outside air.

This residual gas tends to slowly dissipate in the space around the appliance, and, depending on the location of the appliance, is sometimes noticeable to the occupants who become concerned about the gas valve as the source of the gas odor.

When the service technician arrives, testing is commonly performed using an electronic gas detector. If the detector senses gas at the valve, the conclusion is that the valve is defective.

LABORATORY TESTING REVEALS TRACE LEAKAGE PHENOMENON

Most of the valves returned to Honeywell for testing related to this phenomenon were the result of a technician using an electronic gas detector. Gas valves returned to Honeywell as the result of leakage complaints were tested as follows.

Returned gas valves were tested for leakage on air at 21 in. wc test pressure using a Bubble-O-Meter[1] flow meter with a sensitivity of less than 5 cc/hr. There was usually no indication of leakage on the flow meter, and it was concluded that any leakages were therefore less than 5 cc/hr.

Following this flow meter test, gas valves were set up on a gas burner and cycled with natural gas. After cycling on and off, a TIF 8800A Gas Detector was used to *sniff* for gas leakage. The gas detector consistently indicated the presence of gas at the regulator vent cap and the main burner orifice. This indication was still evident as long as one hour after the gas control was shut off.

To further verify that no significant gas was leaking through the regulator vent cap, the cap was removed and a thin film of liquid soap solution was formed across the vent opening. The valve was again cycled on and off. As the valve cycled, the soap film expanded and contracted slightly, but did not grow or break.

THE SOURCE

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The presence of gas as detected by electronic gas detectors was reproducible on other Honeywell valves and competitors' valves and can only be attributed to gas leaking through the valve diaphragms.

This *trace leakage* phenomenon (less than 5 cc/hr) has been reproduced on Honeywell VR8200 and VR8300 Valves as well as valves manufactured by White Rodgers and Robertshaw that use various rubber compounds and fillers for the valve diaphragms.

Although the permeability values for gases through rubber diaphragms is extremely small (approximately 0.56 cc/hr) and almost negligible when compared to the 200 cc/hr maximum allowed by ANSI (ANSI allows 200 cc/hr for outerwall gas leakage and 235 cc/hr for valve gas leakage), it appears this is enough to explain an instantaneous indication of gas from a sensitive electronic gas *sniffer* detector.

Responding to Gas Leakage Complaints

To respond effectively to gas leakage complaints, service technicians need to take a two-step approach before identifying the gas valve as the problem:

First, they must identify the presence of gas by using a reliable gas detector. And second, they must verify that the flow of gas coming from the valve is unacceptable by using a reliable flow meter.

If gas is present in low concentrations as the result of furnace design and the *trace leakage* phenomenon, replacing a gas valve will not solve the problem. They must educate the appliance owner about the source of the gas odor and assure them that it is both safe and *normal* for that appliance.

Summary

Gas appliance manufacturers are aware of the problem of residual gas venting into the area surrounding the furnace and are working to reduce it. There are tradeoffs, however, in allowing more venting. With current test procedures, more venting after shutoff tends to reduce the efficiency of an appliance.

Honeywell encourages manufacturers to select newer designs to reduce the presence of unburned gas around the appliance and thereby reduce the number of leakage complaints.

Until a solution is found for venting this residual gas, it is important that service technicians know how to correctly identify and test for gas valve leaks and that they be able to educate the consumer about the presence of gas odors. While a gas sniffer is useful for detecting the presence of gas, it is not a measurement device for actual gas flow.

[1] Bubble-O-Meter is available from:
Bubble-O-Meter
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LaVerne, CA 91750
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