Log In

Understanding Draft

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In the oil heating industry, “draft” describes the vacuum, or suction, which exists inside most heating systems. The amount of vacuum is called draft intensity. Draft volume specifies the cubic feet of gas that a chimney can handle in a given time. Draft intensity is measured in “inches of water”. Just as a mercury barometer is used to measure atmospheric pressure in inches of mercury, a draft gauge is used to measure draft intensity (pressure) in inches of water.

Natural Draft is thermal draft. It occurs when heated gases expand. A given volume of hot gas will weigh less than an equal volume of the same gas at a cool temperature. Since hot combustion gases weigh less per volume than room air or outdoor air, they tend to rise. The rising is contained and increased by enclosing the gases in a tall chimney. The vacuum is then created throughout this column of hot gases.

Currential Draft occurs when high winds or air currents across the top of a chimney create a suction in the stack and draw gases up. “Induced draft” blowers can be used in the stack to supplement natural draft where necessary.

There are three factors which control chimney draft:

1. Chimney height — the higher the chimney, the greater the draft.
2. The weight per unit volume of the hot combustion products — the hotter the gases, the greater the draft.
3. The weight per unit volume of the air outside the home — the colder the outside air, the greater the draft.

Since the outside temperature and flue gas temperature can change, the draft will not be constant. When the heating unit starts up, the chimney will be filled with cool gases. After the heating unit has operated for a while, the gases and the chimney surface will be warmer, increasing draft. As outside air temperature drops, draft increases. To indicate the effect of these changes, the information in the chart on page 2 was determined for a 20 foot high chimney. You can see that the draft produced by this chimney could be expected to vary from .011 to .136 inches of water. The high draft is over 12 times more than the low draft. This large variation cannot be tolerated for the following reasons:

- Too little draft can reduce the combustion air delivery of the burner and can cause smoke.

the total force causing air to flow will be .50 inches of water. If the combustion chamber draft drops to .01 inches of water, the total pressure becomes .40 +.01, or .41 inches of water.

This is a reduction in draft of about 18% which will cause a reduction in the amount of air flowing into the combustion chamber. You know what happens when the excess air is not properly adjusted. The burner may very likely smoke as a result of this change. That is why proper draft must be obtained before the air adjustment is set.

Because there is little draft during a cold start-up, you cannot depend on the additional combustion air caused by draft. Be sure the burner does not depend on this air by setting the burner for smoke-free combustion with a low over-fire draft (.01 to .02 inches of water). A burner must produce good smoke-free combustion under low draft conditions. Using a high draft setting to obtain enough combustion air for clean burning can cause trouble. A burner which produces clean combustion only with high draft may cause smoke and soot any time the chimney is not producing high draft.

Condition	Outside Temperature °F	Chimney Temperature °F	Draft, "H_2O"
Winter start up	20	110	.050
Winter operation	20	400	.136
Fall start up	60	80	.011
Fall operation	60	400	.112

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