Energy Conservation; a Double-edged Sword for Firefighters

Have you ever heard the old cliché "leaks like a sieve"? You can probably come up with the same image in your mind that I came up in mind. Imagine water pouring into a sieve and watching it come out through the myriad of tiny little holes is probably a common observation many have made in their kitchens. But, have we ever used that cliché with a building?

For many years, buildings leaked like a sieve too. Why? The primary reason was that buildings were put together with various components that may or may not be insulated and in some cases there were gaps. I can recall visiting a home of an ancient relative in Oklahoma that was a log cabin that you could actually look between the logs to the outside of the building without any problem. The caulking had all disappeared. I can also recall early on in my career going to structure fires in which the smoke was seeping out from practically everywhere. It wasn't always the windows. It wasn't always the door. In some cases the buildings leaked like a sieve.

Those kinds of buildings are slowly but surely being removed from the marketplace. How do I know that, it is because people have been setting environmental standards for air leakage in buildings for a long time. It is all in the name of being energy efficient. I once wrote an article called Thermos Bottle buildings. In that, I alluded to the fact that buildings are designed to keep cool air in when it is hot outside and keep hot air in when it is cool outside. It is what gives us our comfort factor in our homes. The unfortunate part of that highly desirable state within our buildings is that when we have fires in those buildings it has an adverse effect on what are contemporary firefighting techniques.

And, I am not suggesting that this is a huge problem but I am suggesting that it is something to keep into consideration during size up. Another common phenomenon that we used to look for if we were responding a fire was smoke in the air. We usually knew if we had a header that the fire was rocking and rolling. It also meant that when we arrived in a building we could spend some of our precious time of size up analyzing what the smoke looked like, smelled like, and tasted like even. There is an entire course of instruction out there on reading smoke in order to determine the clues. But what if the smoke can't get out?

That is the nature of this discussion. Controlling air leaks in buildings is a LEED requirement. LEED stands for Leadership in Energy and Environmental Design. It is redefining the way we think about the places we work and live.

Are you familiar with the expression Pa? It stands for Pascal unit. The unit is named after Blaise Pascal, a French mathematician and physicist who was involved in the experimentation with a barometer, an instrument to measure air pressure. The term Pascal is a unit to measure pressure that is widely used

throughout the world and largely replaces the concept on pounds per square inch (psi) that is used here in this country.

We don't usually talk about PA in the field of fire service e ventilation but we certainly have to become familiar with it as a concept in terms of measuring air leakage.

The reason why is that it is part of the procedure that is intended to characterize the air tightness of any building enclosure or any part of that enclosure.

When then building was built, the architect or design engineer was responsible for defining the enclosures in that building and then supplying information on that enclosure area in terms of how much air will be leaking out of that area under ordinary conditions.

The air tightness of buildings is generally being measured at 50 pa or 0.2 inches of water. Where this is playing itself out is in the green area of discussing modern building construction. If you go to a document entitled resnetstandards; National Standard for Home Energy Audits you will find that the home energy audit process is aimed at some factors that we might not be aware of in terms of increasing our fire problem. The standard is intended to encourage people to actually tighten their buildings up tighter and tighter to produce any one of the following outcomes:

- Increase the energy efficiency of their homes
- Increase the comfort of their homes
- Increase the durability of their homes
- Reduce the risk and energy improvement recommendations will contribute to health safety and durability problems
- Reduce waste and pollution protecting the environment

The word fire doesn't appear in there anywhere.

The main objective of all of this scientific diagnosis is pretty simple. It is to stop buildings from leaking. It is to prevent leaks from around doors. It is to prevent leaks around windows. Of course we all know that there are buildings in which doors are left open, we know of buildings in which windows have been left open.

Where this might come into play in the future, is in following the work being done by NIST and specifically Dan Madrzykowski on ventilation driven fires. When we arrive at the scene of a dwelling fire and we see nothing showing we should **never** assume there is nothing going on. To the contrary, we now have to start thinking in terms of how we are going to penetrate that envelope in a manner in which we do not unduly affect the manner in which the fire itself will begin to spread. We don't want to

make it worse by what we do. And we certainly don't want to endanger a firefighter by doing the wrong thing either.

This is not something we should take for granted. I will readily admit that there are old buildings out there that are still leaking like the proverbial sieve we mentioned earlier. But if you are in a community that has housing that has been built in the last four to five years or more specifically housing that will be built over the next ten or fifteen years, as a fireground officer you had better be paying attention to the balance between energy conservation and fire behavior.

We in the fire service are really not much of an expert on "energy" in buildings. However, we should be the experts on heat inside of a building that is trying to get out because of a fire. We should be partnering up with organizations such as ASHRAE which is the American Society of Heating Refrigerating and Air Conditioning Engineers to learn more about the phenomena.

A recent article entitled "Controlling Air Leakage in Tall Buildings" was authored by Colin Genge which talks about these very same requirements going into high-rise buildings.

Now let's take that concept of energy conversation and place a higher stakes on the outcome. It doesn't take much research into actual fires to find incidents in which air movement in high-rise buildings has either been a threat to firefighters and occupants or it has been an asset in controlling the emergency.

Our challenge is to get on the other side of the curve. Can we afford to wait until another tragedy occurs in which someone misunderstood or underestimated what was going on inside of a building because of energy conservation that results in firefighters being endangered or losing their lives? At the risk of raising an issue that has not manifested itself on the fireground yet, I would suggest that we need to become a lot more knowledgeable about what is going on to make the home, or our businesses and even our educational and entertainment venues more air tight.