Energy Thief

Hassan Younes – 2015
Climate Control - Middle East

Leaky ductwork is an energy hog that is hidden from view – or at least that's how Max Sherman, a Senior Scientist at Lawrence Berkeley National Laboratory, in the United States, describes the problem in his article, "Billions in Lost Energy Leaking Out of Home Heating & Cooling Ducts", which the laboratory published in March 20011.

Focusing his attention on California, Sherman states in his article that ducting systems typically leak 20% to 40% of the state's heating and cooling energy, before going on to claim: "Statewide, the potential savings from improving ducts is between 1 and 2 gigawatts (GW) of electricity alone. No single efficiency improvement has equivalent savings potential." Quantifying his claim, he says: "The potential savings from sealing residential ducts in California adds up to USD 1 to 2 billion per year."

Sherman's article was published 14 years ago. However, the problem he examined persists, not only in California but in all of the United States, with the US EPA estimating that in an average American home, "about 20 per cent of the air that moves through the duct system is lost due to leaks and poorly sealed connections".

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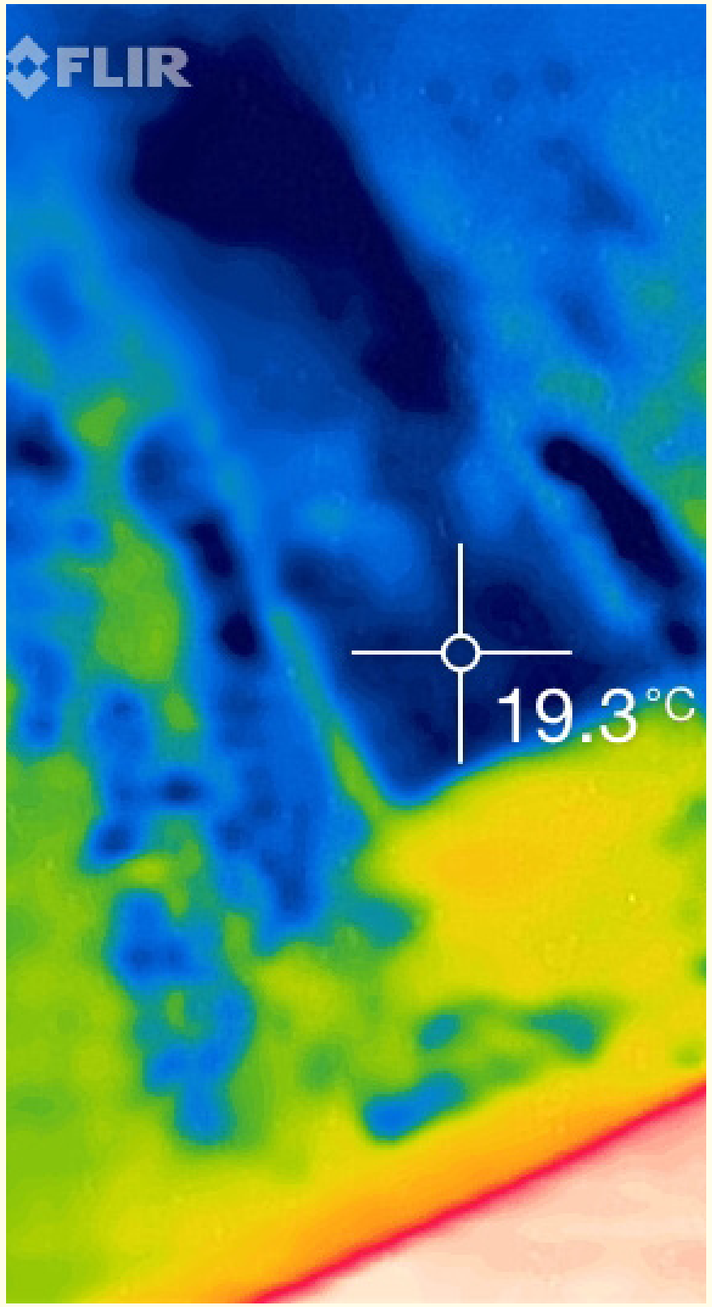
But is it an issue that concerns only American homeowners?

GRFN's Say:

Mediocre workmanship is partly to blame for the region's defective HVAC ducting systems. A big factor is poor installation practices. Normally, duct leakages occur on transverse joints, longitudinal seams and duct penetrations. Poor facilities management (FM) is also a main contributor. In some cases, we have observed unqualified maintenance personnel using ducts as walkways, leaving testing holes and smoke dampers open and not checking holes that have developed due to rust.



Up To Standard

Hassan Younes – 2016
MEP Magazine ME

*True as of July 2016

ASHRAE ventilation standards 62.1 and 62.2 have been for many years the standards followed in many parts of the world for acceptable indoor air quality in the built-environment.

The purpose of ASHRAE 62.1, the most referred to ASHRAE standard in the UAE, is:

- To specify minimum ventilation rates and other measures intended to provide indoor air quality that is acceptable to human occupants and that minimizes adverse health effects.
- A regulatory application to new buildings, additions to existing buildings, and those changes to existing buildings that are identified in the body of the standard.
- To guide the improvement of indoor air quality in existing buildings.

Both Dubai and Abu Dhabi's municipality require compliance with ASHRAE ventilation standards for all new buildings.

Historically and until 2015, the scope of Standard 62.1; entitled "The Ventilation for Indoor Air Quality Standard"; was all commercial and residential buildings except low rise residential (3 stories and below). Standard 62.2 was the Ventilation and Acceptable Indoor Air Quality for Low-Rise Residential Buildings.

In the 2016th edition this has been changed. Residential buildings have been completely removed from 62.1's scope. Standard 62.2 will be the reference used for all residential buildings whether low-rise or high rise.

This change will impact the ventilation calculations that were used for high-rise residential buildings. For instance, toilets' continuous exhaust used to be 25 CFM and now, since 62.2 now applies to high-rise residential buildings, 20 CFM is the new norm.

Kitchen ventilation used to be 50 CFM as per 62.1 2013 and now, as per 62.2 2016, a continuous airflow of 5 ACH should be exhausted from the kitchen. A 4 m by 3 m kitchen would require a continuous exhaust of almost 100 CFM, double the amount required in ASHRAE 62.1 2013. The bigger the kitchen the higher the required continuous exhaust will be. Note that outside air requirements for residential buildings are normally driven by the exhaust flow, since most of the time the calculated exhaust value as per 62.2/62.1 is higher than the calculated outside air value. To keep the building under pressurisation to combat infiltration, designers normally provide 10% extra outside air to the calculated exhaust flow. So generally, in residential buildings, outside air, or fresh air as commonly known in the UAE, is calculated at 110% of the exhaust value that is in turn calculated to the standard requirement.

This will increase the ventilation system energy consumption especially in a climate like Dubai's and Abu Dhabi's. Buildings that have more studios and one bedrooms will be affected the most, compared to buildings where the majority of apartments are 3 bedrooms or more.

Other changes in ASHRAE 62.1 2016 include the following:

- The definition of environmental tobacco smoke has been revised to include emissions from electronic smoking devices
- Ventilation is allowed to be reduced to Zero through the use of occupancy sensors (not through contaminant of CO_2 sensors) for spaces of selected occupancy types provided that the ventilation is restored to the standard required value whenever occupancy is detected

Currently none of the UAE municipalities have adopted the 2016 version of the standards. The 2007 versions of both 62.1 and 62.2 are the currently referred-to ventilation standards in the UAE building regulations.

We will yet have to see if the new version will be adopted and the effects that it would have on the construction industry once implemented.

Update - Dubai Municipality now adopts the latest ASHRAE ventilation standards.