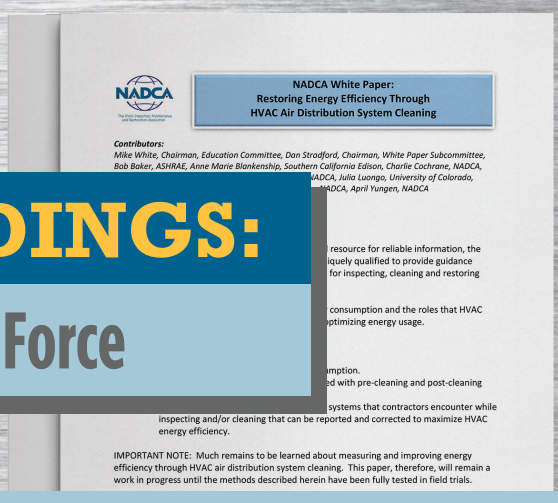
NADCA White Paper:
Restoring Energy Efficiency Through
HVAC Air Distribution System Cleaning

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...resource for reliable information, the ...iquely qualified to provide guidance ...for inspecting, cleaning and restoring

...consumption and the roles that HVAC ...optimizing energy usage.

...mption.
...d with pre-cleaning and post-cleaning

...systems that contractors encounter while inspecting and/or cleaning that can be reported and corrected to maximize HVAC energy efficiency.

IMPORTANT NOTE: Much remains to be learned about measuring and improving energy efficiency through HVAC air distribution system cleaning. This paper, therefore, will remain a work in progress until the methods described herein have been fully tested in field trials.

SUMMARY OF FINDINGS:

NADCA Energy Field Trials Task Force

In March 2016 NADCA released the white paper "Restoring Energy Efficiency Through HVAC Air Distribution System Cleaning," which demonstrated how to measure improvements in HVAC energy performance after HVAC cleaning. A task force of NADCA members was then formed to take measurements in the field before and after HVAC cleaning jobs to determine the effect cleaning has on energy performance.

The testing was done in regions across the United States and in Canada, testing many types of HVAC systems, commercial and residential. Tests were done before and after cleaning. These were done measuring temperature, and in many cases humidity, before and after the evaporator (cooling) coil. Airflow, measured as cubic feet per minute (CFM) moving through the system, was also tested.

The measurements were then inserted into the formulas for measuring energy performance that are given in the white paper. These formulas measure energy output in British Thermal Units (BTUs).

FINDINGS

It is important to note that we are reporting AVERAGE findings. In truth, improvements varied dramatically, depending on a number of factors, including how dirty the system was, accessibility for cleaning, geographical area, etc. However, there was no question that cleaning made significant improvements in the vast majority of jobs and in some cases extraordinary improvements.

MEASUREMENTS TAKEN

Temperature Drop

The "temperature drop" at the cooling coil is the change in temperature of the air from when it enters the cooling coil on the return side to when it exits the coil on the supply side. This is also referred to as "temperature change" or Delta T (or ΔT).

RESIDENTIAL

The average temperature drop (or Delta T) at the cooling coil BEFORE cleaning was **9.6°**

The average temperature drop at the cooling coil AFTER cleaning was **15.5°**

This is an improvement of **5.9°** or **61%**

COMMERCIAL

The average temperature drop (or Delta T) at the cooling coil BEFORE cleaning was **13.6°**

The average temperature drop at the cooling coil AFTER cleaning was **19.0°**

This is an improvement of **5.4°** or **40%**

CFM

Cleaning removes obstructions from the coil, ducts, turning vanes, registers, etc., thus increasing the CFM or volume of air moving through the system. Change in CFM was typically measured at a return register, though other sites may have been used when a return register was not available.

RESIDENTIAL

The average improvement of CFM was **11%**

COMMERCIAL

The average improvement of CFM was **54%**

Cooling Capacity

We refer to BTU output as "cooling capacity." It can also be called "heat transfer rate." BTU output was calculated before cleaning and after cleaning, using the formulas in the NADCA White Paper. It is important to note that the field trial measurements are not exact but give a reasonable estimate of BTU output. Also, BTU output is not a direct reflection of energy cost. For example, doubling the BTU output does not mean the consumer has cut his HVAC energy cost in half. Determining actual energy savings requires monitoring before and after power usage.

RESIDENTIAL

The average improvement in cooling capacity, per the White Paper formula, was **150%**

COMMERCIAL

The average improvement in cooling capacity, per the White Paper formula, was **225%**

Improvement from Duct Cleaning Alone

Although it was not the primary focus of the task force, we found evidence that duct cleaning alone – without cleaning the air handler or coil – improved CFM. On nine residential jobs the air handler was not cleaned because it was new or the CFM was measured after cleaning the air handler, then after cleaning the ductwork. This gave us nine measurements of the change in CFM after cleaning the ductwork alone.

The average improvement in CFM was **6.9%**

SUMMARY

It has long been known that cleaning HVAC cooling coils saves energy (See *ASHRAE Journal,* Nov. 2006, "Study Verifies Coil Cleaning Saves Energy"). Since cleaning HVAC systems typically involves cleaning the coils, it is clear that HVAC cleaning is also an energy-savings measure, giving improvements not only at the coil but at numerous other points of potential air restriction in the HVAC system.

The results of the NADCA Energy Field Trials task force show that pronounced improvements in cooling capacity and airflow are a typical result of HVAC cleaning. HVAC cleaning should be considered as part of any program seeking to improve a building's energy efficiency.

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