

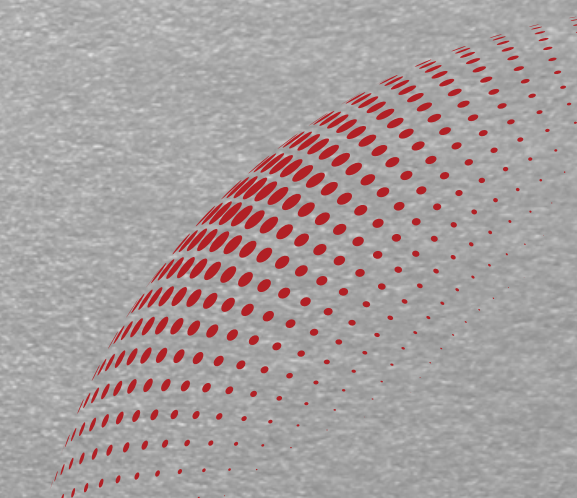
**Airflow**

**IAQ**

**Energy**

# Healthy Air, Healthy Learning

Balancing HVAC Performance, Indoor Air  
Quality, Students and Staff Well -Being





The HVAC Inspection, Cleaning and Restoration Association

- The non-profit authority for HVAC inspection, cleaning, and restoration
- Established in 1989
- Members work across schools, healthcare, government, and commercial buildings



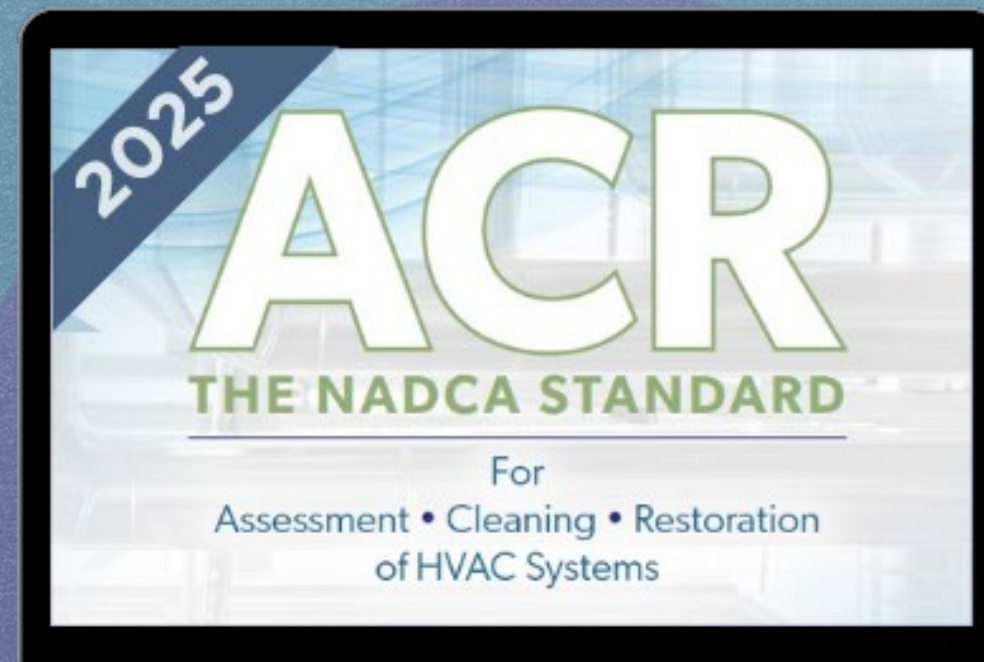
ASCS

Trained to clean HVAC systems safely and effectively



CVI

Trained to assess system condition and determine when cleaning is needed



ACR, The NADCA Standard

- The globally recognized standard for inspecting, cleaning, and verifying HVAC systems
- Designed for **occupied buildings**, including schools

# Inspection Comes First. Then Cleaning Is Done Right



“Inspections are an important component of any HVAC cleaning and restoration project. HVAC inspections *shall* be performed to determine the need for cleaning. HVAC inspections *shall* also be performed to determine the scope of work, engineering controls, safety measures and tools and equipment necessary to perform a cleaning and restoration project.” (ACR, The NADCA Standard – 2025 Edition, Section 1.0 Overview)

**Table 1**  
**HVAC Cleanliness Inspection Schedule**  
**(Recommended Intervals)**

<b>Building Use Classification</b>	<b>Air-handling Unit</b>	<b>Supply Duct</b>	<b>Return Duct / Exhaust Duct</b>
Residential	1 year	2 years	2 years
Commercial	1 year	1 year	1 year
Industrial	1 year	1 year	1 year
Healthcare	1 year	1 year	1 year
Marine	1 year	2 years	2 years

**4.7 Air Duct Cleaning:** Air ducts *shall* be cleaned to remove all non-adhered substances and *shall* be capable of passing NADCA cleanliness verification tests.

**4.7.1** Air ducts *shall* be accessed through service openings in the system that are large enough to accommodate mechanical cleaning procedures and allow for cleanliness verification.

**4.7.2** Air ducts *shall* be cleaned using mechanical agitation methods to remove particulate, debris, and surface contamination.

**4.7.3** Dislodged substances *shall* be captured with a vacuum collection device.

**4.7.4** Cleaning activities *shall* not damage any HVAC components.”

(ACR, The NADCA Standard – 2025 Edition)

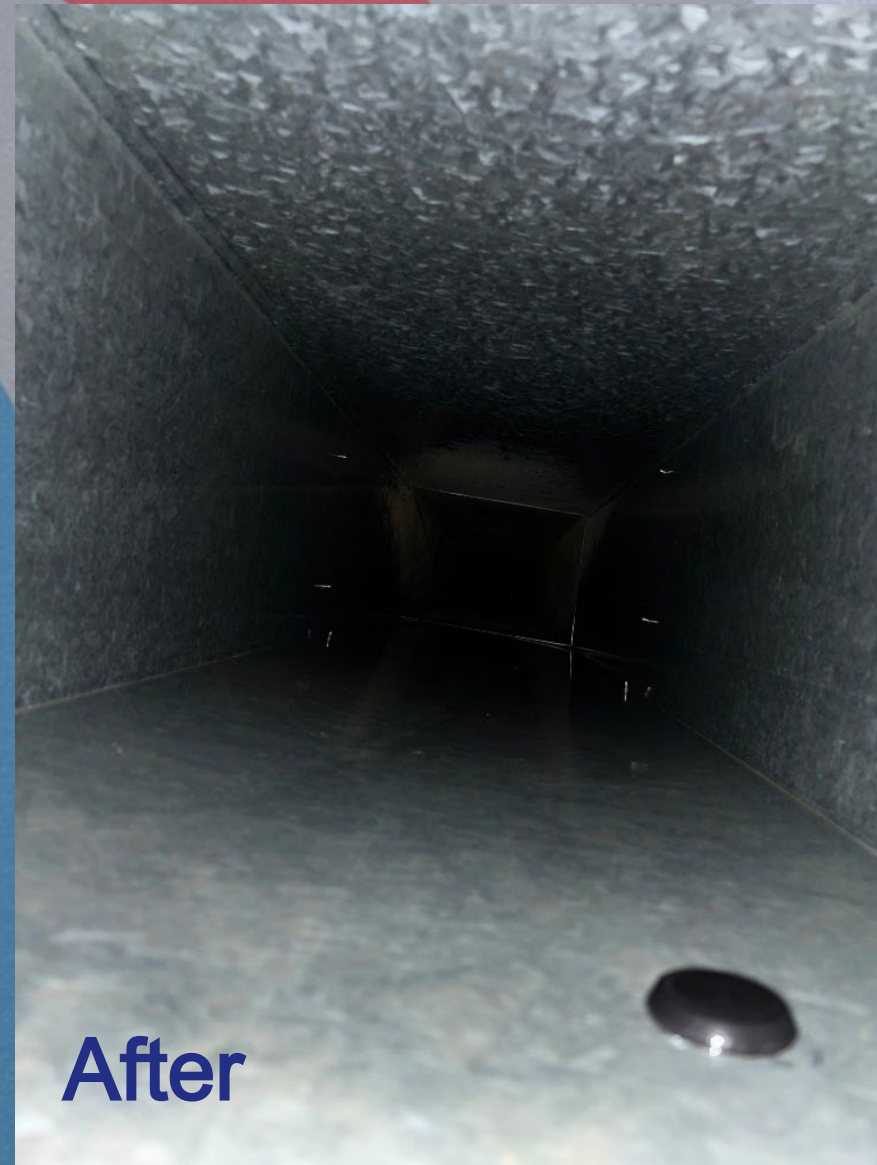
# LOOK FAMILIAR?



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and Restoration Association



Before



After



Before



After



Before



After



Before



After

# Why it matters in schools



- Learning environments are continuously occupied.
- Students, educators, and staff include sensitive populations.
- Schools are used beyond the school day by families and the community.
- HVAC work must protect air quality during occupied hours.

**The  
result:**

- Safer HVAC work in occupied buildings
- More stable indoor air quality
- Reliable ventilation for learning, teaching, and community use

# The Challenge Schools Must Balance

**Operational Efficiency**

**Indoor Air Quality**

**Learning Comfort**



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**Students spend more than 1000 hours each year in learning environments.**



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**Indoor conditions in schools shape comfort, focus, and daily experience.**



## What the Research Tested (Across Multiple Climates)

**Impacts of HVAC cleaning on energy consumption and supply airflow:**  
*A multi-climate evaluation*



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# HOW WE PUT IT TO THE TEST

## Real Buildings, Not Labs

four real  
facilities

four different  
climates

## Two Identical Systems at Each Site

one  
professionally  
cleaned

one untouched  
as control

## Smart Monitoring and Data Collection

IoT sensors

continuous data  
logging

## Measurable, Peer-Reviewed Results

tracked before &  
after cleaning

verified and  
published



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# GAMIE CHANGER!

41-60%

Fan Energy Savings

10-46%

Improved Airflow

174%

Boost in airflow after  
discovering *hidden blockage*



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# WHAT THAT MEANS FOR SCHOOLS!



**Lower  
Operating  
Costs**



**Fewer  
comfort  
complaints**



**Longer  
Equipment  
Life**



**Reliable  
School-Day  
Performance**

# Fire Dampers: Safety Systems That Must Work When It Matters



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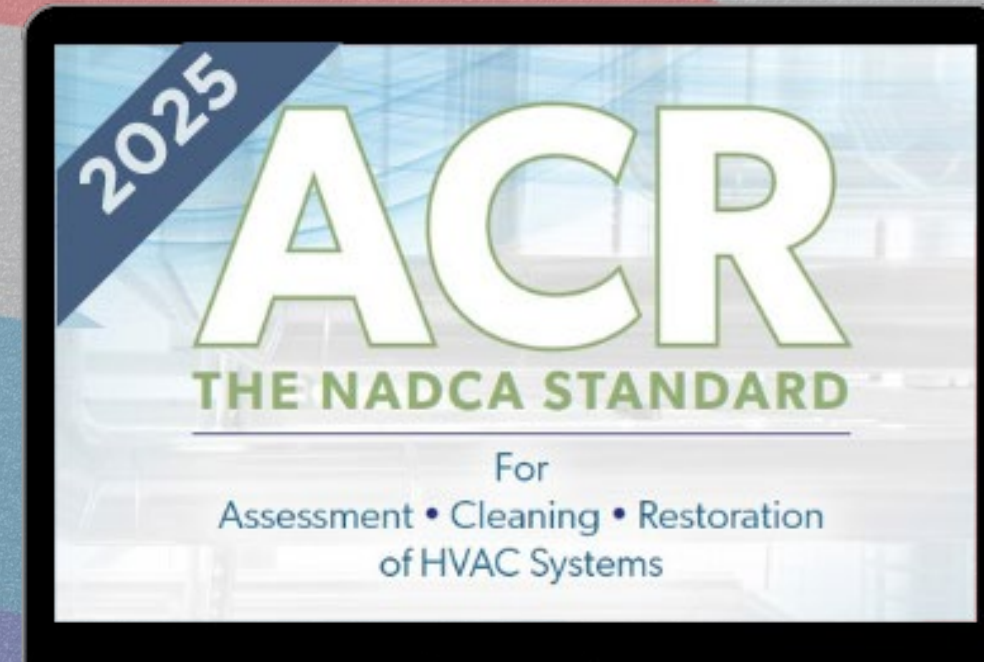


- Designed to stop fire from spreading through ductwork
- Activated only during a fire
- Must be accessible, unobstructed, and functional

# HEALTHY AIR SUPPORTS LEARNING

- **Classrooms are occupied for long periods, every day**
- **HVAC systems must perform consistently during occupied hours**

# WHY STANDARDS MATTER IN SCHOOLS



- HVAC work in schools happens around students and staff
- Improper cleaning can disrupt airflow or release contaminants
- ACR, The NADCA Standard provides a consistent, verified framework

# CLEANER SYSTEMS.

# HEALTHIER LEARNING ENVIRONMENTS.



**Clean HVAC System**



**More Consistent Airflow**



**Healthier, More Comfortable Classrooms**



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# EDUCATION-FOCUSED RESEARCH IS ONGOING

- NADCA is currently supporting a Colorado public schools' study
- Focused on HVAC systems in active K –12 environments
- Designed to build on peer -reviewed research with education -  
specific insights

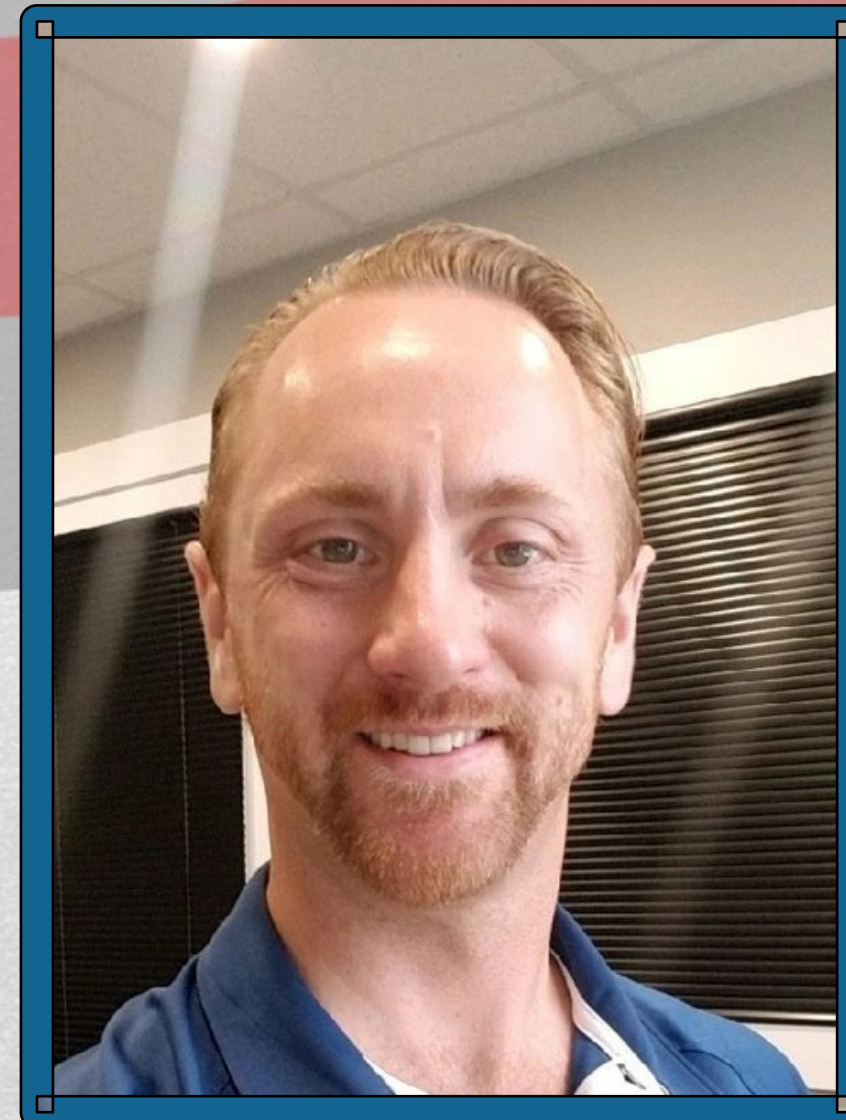
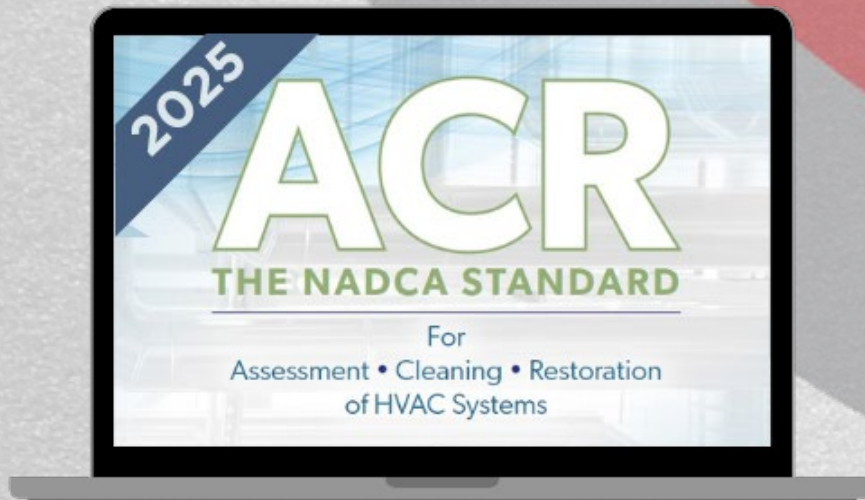


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# NEXT STEPS...

## SPEAKER



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