

HEATING, VENTILATION & AIR CONDITIONING RESTORATION GUIDE

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Restore Your Building with Confidence

With proper review and remediation strategies, building owners, facility managers and contractors can effectively restore a structure's appearance and performance. The Restoration Guide from the Tremco Construction Products Group (CPG) companies offers expert advice on how to address the most common building challenges.

Executing the best practices found in this document will help ensure the maximum life of your structure. Each section also includes links to relevant product web pages, application instructions and other complementary resources. For additional details or project-specific questions, please reach out to a Tremco CPG representative.

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INTRODUCTION

Heating, ventilation, and air conditioning (HVAC) systems are critical to a building's operation and the health, satisfaction and retention of its occupants. Despite the importance of HVAC systems, they can be notoriously difficult to maintain, especially across a large building portfolio.

WTI PureAir's HVAC Restoration Guide eases this process by giving building owners and facility managers helpful information to keep the mechanical equipment of their assets performing at their best, which reduces operational costs and improves a structure's energy efficiency.

This document walks through the common challenges and basic components of an HVAC system, indications it may need repairs or an upgrade, whether to replace or restore HVAC elements and cost-effective restoration and maintenance strategies.

COMMON HVAC CHALLENGES

On average, the HVAC equipment lifecycle is around 20 years, with rooftop system lifespans being a bit shorter due to their direct exposure to the elements. Therefore, most asset managers or facility directors proactively look to evaluate their HVAC systems every 10 to 15 years.

Even before that timeframe though, dirt, debris and moisture can contribute to normal wear and tear on HVAC elements, which inevitably lowers their operating efficiency. HVAC systems that have to run more frequently or at maximum capacity to compensate will increase utility bills and may experience a shorter service life. These challenges can compound and lead to premature damage or even mold growth, which left unmanaged, could circulate contaminated air through the building and threaten occupants' respiratory health.

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INTRODUCTION

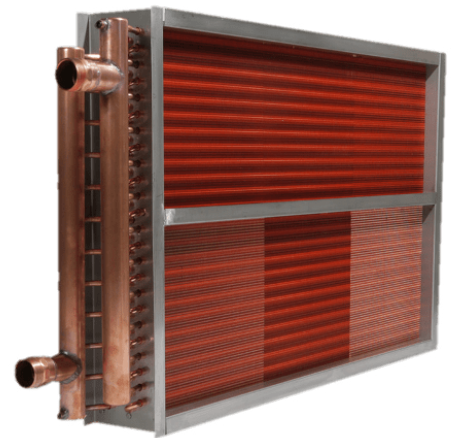
WHAT ARE THE ELEMENTS OF A COMMERCIAL HVAC SYSTEM?

Heating, ventilation and air conditioning systems rely on various elements, each playing a vital role in efficient operation and simultaneously being prone to natural aging and incidental damage. Here's an overview of these critical HVAC components and their functions:

- The air handler, or AHU, acts as the heart of the system. This is where outdoor air is drawn in, filtered, conditioned, mixed with return air and circulated.
- Diffusers are the devices that distribute conditioned air through supply ducts into occupied spaces, ensuring proper airflow and temperature distribution.
- Return ducts collect the air from the occupied spaces and return it to the HVAC system for reconditioning.
- Registers and grilles are the visible openings where air enters or exits the duct system and are usually located on walls, ceilings or floors.
- An HVAC system includes other important components including dampers, fans or blowers, heating and cooling coils, air filters, boilers or furnaces, compressors, ductwork and insulation.
- HVAC controls like thermostats, sensors and actuators help manage the distribution of air throughout a building.



Air Handler Unit



Heating and Cooling Coils

SIGNS YOU MAY NEED AN HVAC UPGRADE

Clear physical indicators may alert you that something is off with your HVAC system, but you should also keep in mind some less obvious signs that may point to a problem with your ductwork and other HVAC equipment:

- Unusual or unpleasant odors
- More than usual dust accumulation in the building
- Sudden or repeated reports of tenants experiencing respiratory symptoms such as allergies or asthma
- Difficulty maintaining interior temperatures and/or humidity levels
- HVAC system constantly running
- Spikes in heating and cooling costs, not associated with weather-related changes
- Unexplained noises emanating from HVAC equipment
- Visible rust and/or metal deterioration of any interior or exterior heating and cooling components



Maintain communication among building management staff to help catch any of these issues before they get worse. From there, you should bring in HVAC experts like WTI PureAir to diagnose and treat the problem.

While it may seem like the easiest route is to simply swap out the HVAC system, not all aging mechanical equipment needs to be replaced. Before opting for a full HVAC replacement, there are several cleaning, maintenance and restoration options that can save time, disruption and costs, which we'll discuss in the section "Elements of Commercial HVAC Restoration."

And even if you aren't experiencing any of these issues with your building, it is still recommended to regularly conduct a visual inspection of your HVAC equipment and have commercial ductwork inspected every two to five years and cleaned as necessary to prevent future problems.

WHY RESTORE VS REPLACE

Replacing entire HVAC systems requires substantial capital investment and building disruption, which can be a financial and logistical burden on building owners, facility managers and tenants.

Once the CAPEX has been approved, the HVAC replacement can begin. First, temporary heating or cooling systems must be implemented while the main system is shut down. Then the heavy HVAC equipment is carefully removed from the roof or mechanical room and the new equipment is reinstalled. This process can be noisy, force temporary evacuation of areas of the building and shift pedestrian traffic patterns, which is not always easy or feasible in settings like schools and hospitals.

In contrast, HVAC restoration can quickly take place outside of busy operating hours, such as at night or on weekends. In refurbishing an HVAC system, there is very little downtime, which is critical since time is money.

Thankfully, the majority of older HVAC units are great candidates for restoration. Here are some reasons to consider giving new life to your existing HVAC equipment:

- Reduced facility disruption
- Less downtime for your facility
- Financial savings: HVAC restoration can be done at 10% to 30% the cost of total AHU replacement.
- Extended equipment life
- Improved energy efficiency
- Increased air flow: Buildings can see an air flow velocity improvement of 15 to 25% post restoration.
- Fewer maintenance calls
- Tax benefits
- Increased building valuation
- Improved humidity and temperature control

While most failed components can be restored, an HVAC system may need replaced if the structural integrity of the unit housing the components is compromised, such as degradation due to extreme rust, corrosion or other extreme factors.



Before Restoration



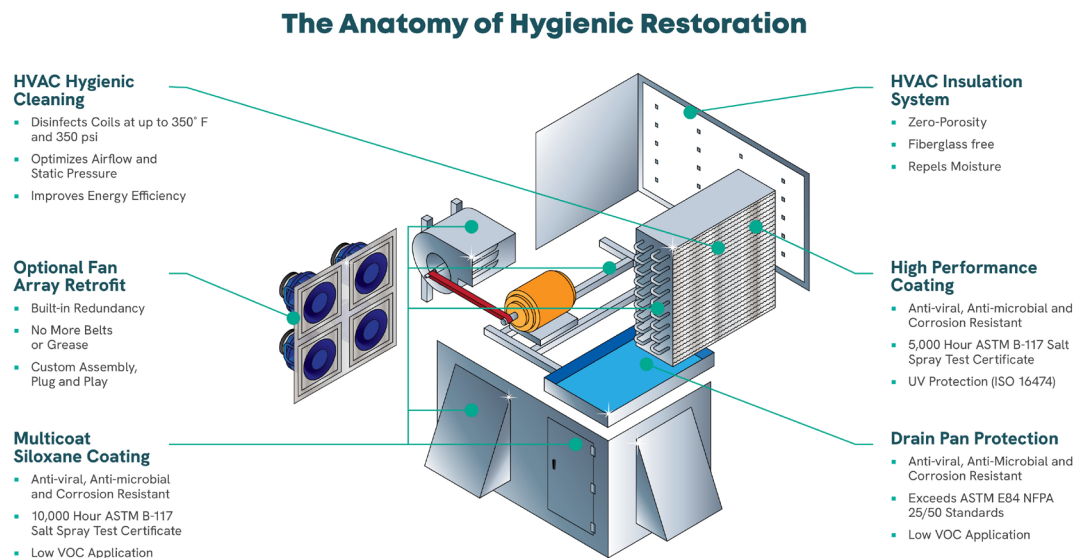
After Restoration

COMPONENTS OF COMMERCIAL HVAC RESTORATION

HVAC ASSESSMENT

To determine what steps are needed to remediate your HVAC system, WTI PureAir will visit your building and conduct both visual and performance assessments to review the following items:

- The interior and exterior metal of the AHU cabinet
- The fan blower, motor and evaporator coils
- Any exposed insulation in the AHU
- Closed or restricted air vents and dampers
- Improperly designed or sized ductwork
- Inadequate fan performance



For the performance assessment, the WTI PureAir technician will factor in age, cleanliness, design specs of the unit and its actual performance to understand how it is operating. They'll calculate the air flow velocity improvements and estimate the heating and cooling cost reductions that would result from an HVAC restoration. Based on this evaluation, a recommendation will be made for HVAC restoration or replacement.

HVAC REMEDIATION

There are numerous restoration tactics that can be employed to clean and refurbish an existing HVAC system, all of which can be done while "restoring in place" to reduce any operational downtime.

- Hygienic cleaning of the entire AHU
- Remove and replace any saturated or moldy insulation inside the unit
- Remove and replace any deteriorated gaskets
- Install a protective coating to the inside and outside of the AHU cabinet to protect from rust and corrosion
- Upgrade belt and blower systems to fan arrays and bulkhead walls
- Add fan array redundancy to distribute the workload across several fans

WHAT CAN I DO TO MAINTAIN MY HVAC SYSTEMS?

Regardless of the state of your mechanical inventory, here are some maintenance items that facility managers should do to optimize their HVAC performance:

- **Regular Inspections:** Schedule routine inspections to identify any signs of mold growth or water damage within the HVAC system. Address these issues promptly to prevent further spread.
- **Proper Ventilation:** Ensure that the HVAC system is properly designed to provide adequate ventilation to all areas of the building. Well-ventilated spaces are less likely to have moisture buildup that can lead to mold growth.
- **Humidity Control:** Implement humidity control measures, such as using dehumidifiers in areas prone to excessive moisture. Keeping humidity levels between 30 and 50% helps deter mold growth.
- **Air Filters:** Regularly replace and clean air filters within the HVAC system to prevent the circulation of mold spores. High-efficiency particulate air (HEPA) filters are recommended to capture smaller particles, including mold spores.
- **Prompt Repairs:** Address any HVAC system malfunctions or leaks promptly to prevent water accumulation, which can lead to mold growth.

If you need assistance with any of these steps or suspect that further HVAC remediation is necessary, WTI PureAir is here to help. We can assist with ongoing mechanical maintenance, investigation and restoration to ensure a long-lasting, energy-efficient and healthy building asset.



Before Restoration



After Restoration

ADDITIONAL INFORMATION

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1. [Blog Post: Enhancing HVAC Systems with Fan Array Redundancy](#)
2. [Case Study: Copley High School HVAC Restoration](#)
3. [WTI PureAir HVAC Resources](#)

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