tech overview

applicable building types
multifamily and commercial
implementation
anytime
fast facts
- improves comfort & satisfaction
- reduces noise
- improves indoor air quality
- improves heating system efficiency
- improves building envelope

tech primer

Air Sealing At Room Air Conditioners

Low-cost measures to increase cooling efficiency and improve the building envelope.

cost & benefits

GHG savings

Tenant Experience Improvements

Utility Savings

Capital Costs

Maintenance Requirements

*ratings are based on system end use, see back cover for details.

Getting to know room AC systems

Room air conditioners (ACs) are a common form of air conditioning. By adopting a small number of inexpensive maintenance routines, room ACs can improve comfort and save energy by providing efficient and effective cooling.

How do room ACs work?

Room ACs are compact electrical appliances that improve comfort by removing heat and moisture from indoor spaces. Room ACs work similar to the way refrigerators do, using a refrigerant to absorb heat from the indoors and eject it to the outdoors.

"Room ACs" is an umbrella term for any kind of packaged air conditioner that contains all cooling components within the unit. Room ACs are a common cooling technology found in multifamily buildings and are also found in some commercial spaces. While there are many different types of room AC units, this tech primer focuses on the three prevalent types: 1) window ACs, 2) through-wall ACs (also known as sleeve ACs), and 3) packaged terminal ACs (PTACs), units that can provide both heating and cooling.

Window units are installed within open window frames, while sleeve and PTAC units are installed in wall penetrations, typically located below windows. All three styles create gaps in the building envelope (the barrier between the inside and outside of a building) that provide pathways for air, heat and moisture to both infiltrate and exfiltrate the building, which negatively impacts comfort and energy performance.

This tech primer will outline simple, low-cost measures and maintenance practices to ensure gaps around ACs are well sealed in order to improve efficiency, reduce drafts and moisture buildup, and maintain a consistent indoor temperature.

Typical Window AC (exterior view)

Typical Sleeve AC (exterior view)

Typical PTAC (interior view)

Assess
Always consult a qualified service provider before undertaking any building upgrades.

Coordinate Retrofits With Regular Building Maintenance
Although room AC sealing can be conducted anytime, implementing room AC sealing in conjunction with regular maintenance work makes gaining access to individual apartments easier.

Staff should educate residents on efficient use of room ACs.

Training and Maintenance
Knowledgeable staff are fundamental to maintaining room AC efficiency. Trained staff should develop and maintain a building-wide AC checklist to identify and resolve proplems created by poorly installed ACs.

Energy savings can only be sustained with regular maintenance and end-user engagement.

How to upgrade room ACs

Sealing gaps around each AC unit as well as implementing a simple but consistent maintenance routine will improve room AC performance and reduce air and moisture infiltration.

Retrofit solutions

There are multiple steps to improving room ACs:

A **Conduct a Survey –** Any room AC retrofit must start with a tenant survey to collect information on the total number and types of air conditioners used throughout the building, the quality of the installations, condition of AC sleeves (where applicable), and whether or not residents require assistance for seasonal AC removal (where applicable).

B **Seal All AC Units –** Given the number of penetrations in the building envelope produced by room air conditioners, it is vital that gaps around these units be well sealed in order to minimize air and moisture leakage.

- Sleeve ACs and Packaged Terminal ACs (PTACs) are installed in frames (known as sleeves) penetrating the building envelope. Methods to seal gaps between the exterior and interior space include:
  - Ensure that the AC unit is appropriately sized for the sleeve.
  - Ensure that trim kits are properly installed and gasketed per the manufacturer's guidelines.
  - Seal all edges between the sleeve and the wall with caulk.
- Piping to PTACs often have penetrations through floors or walls. Seal all piping penetrations with fire-rated caulk.
- Improving the quality of window AC installations will reduce air, moisture, and heat infiltration. Sealing techniques include replacing the common plastic accordion panels (where most heat loss occurs) with rigid insulation boards, properly sealed in place, and installing weather-striping or closed cell spray foam.
- Sealing AC units will not only improve efficiency and reduce drafts, but also help reduce noise infiltration, improve indoor air quality by reducing pollutants and odor, and deter insects and other pests from entering.

C **Establish a Seasonal Maintenance Policy –** Even well sealed window and sleeve ACs can lead to serious air leaks and drafts, especially during the winter season when not in use. Mitigating these air leaks requires the implementation of a maintenance schedule and participation of all building tenants to ensure ACs are either removed or covered during winter.

- Implement a Winter Removal Policy for Window ACs: Typical accordion gates supplied by manufacturers do not provide a strong seal and are susceptible to damage and tears. In order to maintain a tight building seal, it is vital to remove window ACs during winter and for tenants to keep windows closed and locked. Seasonal storage for AC units should be provided in a basement or other area.
- Provide Insulated Covers for Sleeve ACs: In lieu of AC removal, insulated covers are proprietary products that fit over sleeve ACs to provide additional insulation and protection against drafts and air leaks during winter. The maintenance schedule should include seasonal installation of these covers.

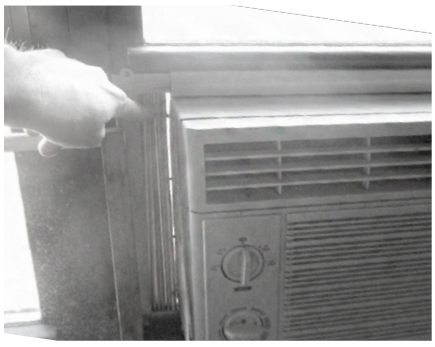

Photo: Steven Winter Associates

Window AC with air leak at accordion panel

D **Engage End Users –** Staff and management should educate residents on efficient use of room ACs by providing training that includes instructions to operate each type of AC unit. Knowledgeable staff can identify poorly installed ACs as well as improper AC use and take the appropriate steps to resolve the problem.

Costs and benefits of room AC retrofits*

Greenhouse Gas (GHG) Savings

A small amount of GHG savings can be achieved by sealing room ACs and implementing a maintenance routine. Savings are dependent on the type of fuel used for heating and cooling, as well as the overall quality of the building envelope.

Tenant Experience Improvements

Room AC installation improvements moderately increase tenant satisfaction. Residents will experience a more comfortable living space with less drafts, reduced noise infiltration, and improved interior air quality.

Utility Savings

A small amount of utility savings can be achieved by implementing a room AC optimization program that allows units to run more efficiently and effectively.

Capital Costs

The cost of sealing AC units is low but time consuming. It is important that work be coordinated in conjunction with planned apartment inspections or other apartment work in order to maximize efficiency.

Maintenance Requirements

Keeping room AC units performing at their best requires simple but consistent maintenance. Building staff should maintain and regularly update the room AC survey and carry out any sealing work during regularly scheduled maintenance visits or tenant turnovers.

Take Action

This document is one of more than a dozen High Performance Technology Primers prepared by the Building Performance Partnership (BPP) to introduce decision-makers to solutions that can help them save energy and improve comfort in their buildings.

For more information, contact The Building Energy Hub:
Email: info@buildinghub.energy

The Building Performance Partnership (BPP), created by Building Energy Exchange (BE-Ex) and the Institute for Market Transformation (IMT), supports the creation and operation of local high-performance building hubs that accelerate measurable, equitable, and sustainable action to improve the health, comfort, and performance of buildings. With support from both BE-Ex and IMT, partner hubs serve their respective regions with customized resources that cater to the needs of their communities while benefiting from the existing resources and expertise of our network.

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*The Costs & Benefits rating system is based on a qualitative 1 to 4 scale where 1 () is lowest and 4 () is highest. **Green** correlates to savings and improvements, **dark blue** correlates to costs and requirements. Ratings are determined by industry experts and calculated relative to the system end use, not the whole building.

Note: Assumes existing A/C installations are poorly installed.