

RSI's Exhaust Shaft Weatherization Retro-Fit Program

Kitchen & Bathroom Exhaust Shaft Retro-Fits For Multi-Family Mid to High-Rise Buildings

In the relatively new area of High Rise Multifamily Building Energy Auditing there is an even newer category, Central Exhaust Shaft Weatherization Retro-Fit. This very effective energy saving measure has an additional benefit to buildings that are qualified candidates for this improvement. While providing substantial energy savings, Central Exhaust Shaft Weatherization Retro-Fitting can actually improve the indoor air quality of a building.

The basic outline of Central Exhaust Shaft Retro-Fit is as follows:

- 1. Energy Auditor's Building Assessment:** Not All Buildings are good candidates for a Full Central Exhaust Shaft Retro-Fit. A building that is over ventilated can be a great candidate for the Full Retro-Fit Process. A building that is under ventilated may benefit from a partial Retro-Fit process known as Exhaust System Balancing. Part of an Energy Auditor's job is to qualify a building as a candidate for a full Retro-Fit, Partial Retrofit or disqualify the building all together. This is done by;
1) Taking into consideration the total CFM's of air currently being exhausted from a fully functional building vs. the CFM's that are required by code to be exhausted. (What we mean by fully functional is a building that has all fans are running as they were intended to be. If there are fans that are non functional they must be accounted for as if they were operational when calculating the total cfm of exhausted air for the audit) **2)** By sealing off all vents on an individual exhaust shaft, removing the rooftop fan and pressurizing the line from the roof to 50 Pascal's using a duct blaster. The volume of air it takes to maintain the pressure is measured and converted into CFM's of leakage.

Over ventilation of a building wastes energy and can cost building owners 10's of thousands of dollars per year in energy costs. Over ventilation simply stated means larger volumes of indoor "Conditioned Air" (heated or cooled) are being exhausted out of the building than building codes require. There is a very high probability that the system is also out of balance, meaning that 60-70% of the conditioned air is being exhausted from the upper floors, 20-30 % by the middle floors and 0-10% by the bottom floors. This unbalanced exhaust causes a strain on the heating & cooling system and the energy budget of the building by causing tenants on the mid to upper floors to increase their demands for heated or cooled air in their residence.

Conversely these same tenants can experience the natural phenomenon known as "Stack Effect" (heat's natural tendency to rise and cold air's natural tendency to fall). "Stack Effect" can positively pressurize the system at mid to upper levels and actually blow air from the exhaust vent into apartments causing uncomfortable living spaces. In essence residences experiencing "Stack Effect" are actually being exposed to the exhaust from other residential units being serviced by the same line. The resident response to this problem frequently is to either open windows or block off the exhaust vent thus mitigating unwanted exhaust air infiltration in their dwelling.

Over & Under Ventilated Buildings

Indoor Air Quality suffers as a result of an unbalanced and/or over or under ventilated building. The Central Exhaust System is designed to remove indoor air pollutants, odors and moisture. Without this being done effectively building occupants may be exposed to the effects of any or all the above listed-Indoor Air Quality issues.

- 2. After Conducting the initial audit of the exhaust shafts, it is prudent to obtain & Review Building Plans;** RSI does a thorough review of building plans when available, a necessary and extremely important step for both the Energy Auditor and bidding Contractor. **As a part of an Energy Audit this step should be included in the Qualifying of a Building.** It is imperative that the Auditor and bidding Contractor fully understand the system setup, as it was originally designed and to be knowledgeable enough to be able to identify complications and anomalies that can make a Full System Retro-Fit impractical. It is also essential to visually verify that what you see on the Building Plans are in fact consistent with what you actually see in the building. It has been **RSI's** experience that there are frequently undocumented changes made during the building construction which can have a costly impact on the price of the proposed scope of work in a bid. The buildings **fan schedule** is a quick easy way for an Energy Auditor and Contractor to determine the likelihood of a building being over ventilated according to the original design.
- 3. Develop a Project Plan & Schedules;** The Management at **RSI** believes strongly that communication is one of the main keys to the success of a project. Weeks prior to beginning any Retro-Fit work we reach out to Building Management, Owners and the Maintenance department & Energy Auditors to setup a meeting to go over all phases of the Retro-Fit Process and answer any questions they may have. **RSI** provides Building Management, Maintenance & Energy Auditors with schedules and notices detailing what we will be doing, what areas we will need access to and on what dates. When the work begins **RSI** communicates daily via E-Mail to all afore mentioned parties with progress reports and any access issues or problems we encountered during the previous days work. **RSI Management** is more than happy to attend resident meetings to explain the benefits of the work we are doing and the positive impact to resident comfort. **RSI** will also vary our normal weekday work schedule to include some evening and weekend appointments for Residents who will not allow access any other time.
- 4. Complete Video Inspection and Documentation;** **RSI** does a complete video inspection of all accessible components of the Central Exhaust System as the next step in the Retro-Fit process. We are able to identify problem areas such as obstructions, disconnects, large holes etc., thus enabling **RSI** to design a scope of work that will address areas of special concern. **RSI** provides copies of the pre-inspection video and observations to Auditors and Building Owners / Management as a part of our SOPs.
- 5. Register Cleaning, Register Cavity Sealing CAR II or CER-FEA II Installation;** ("CAR" is the acronym for Constant Air Regulator CER-FEA is a CAR w/ Fire Damper) **RSI** has a multi step process we follow to successfully install and seal every CAR there by maximizing its effectiveness. If these steps are not meticulously followed, the CAR will not perform as it is designed resulting in the loss of energy efficiency and system balancing. Upon completion of this step, **RSI** seals the outside of the vent with plastic to protect the dwelling from dust intrusion during the system cleaning and for the auditors post Retro-fit testing. This will minimize tenant inconvenience by reducing the number of times they have to allow access to their apartments. After the post retro-fit testing is complete the tenant will be notified and they can easily remove the plastic themselves or request help.
- 6. Central Exhaust Shaft Cleaning;** **RSI** ensures that we have vigorously cleaned the Central Exhaust System to minimize Static Pressure drop caused by dirt build up on shaft surfaces. The shaft surface must also be suitably clean to allow shaft sealant to be applied successfully thus minimizing system leakage. In order to accomplish this task we must 1st remove any large obstructions that either intentionally or unintentionally wound up down the shafts. This has been an issue in just about every building we have worked in.
- 7. Central Exhaust Shaft Sealing & Video Documentation;** **RSI** does Video documentation of the entire shaft sealing process and provides copies of the videos to Auditors and Building Owners / Management. This video documentation provides our clients with the quality assurance they deserve.

- 8. Exhaust Fan Curb Sealing & Fan Installation;** Prior to the installation of new, or the reinstallation of existing fans, **RSI** cleans and seals the entire area under the fan to ensure minimal leakage. This is a critical step since these areas often has large holes for conduit and usually have poorly sealed duct connections & curb systems.
- 9. Auditors Final Inspection & Report;** The final step in **RSI's** Central Exhaust Retro-Fit Program is to inform the Energy Auditor and Building Owners / Management when the work is complete so they can schedule their post retro-fit inspection and tests of the systems tightness. Since all vents have been sealed off by **RSI** after the installation of the CAR's all the Auditor has to do is remove the rooftop fan and pressurize the line from the roof to 50 Pascal's using a duct blaster. The volume of air it takes to maintain the pressure is measured and converted into CFM's of leakage. This is the measure of our success, a Report Card of sorts. Based on the results of this test the Auditor can estimate the energy savings a building will realize by comparing the pre Retro-Fit results with the post Retro-Fit results. The reduction of the volume of heated or cooled air that would be lost through over ventilation and /or improper system balancing results in the largest part of the Energy Savings. The remainder of the savings is realized when the over sized, inefficient rooftop fans are replaced with new energy efficient, appropriately sized fans which use much less electricity and require much less maintenance.

Note: It is RSI's position that all Energy Audits should factor in air conditioning as it costs more to cool air than it does to heat air. Even if a tenant uses a window air conditioner and has to pay the electric bill themselves, the RSI Exhaust Shaft Weatherization Retro-Fit Program still helps tenants reduce the buildings carbon footprint overall.

For information on how "RSI's Exhaust Shaft Weatherization Retro-Fit Program" improves Indoor Air Quality please go to the menu page and click the title below.

[□ Energy Savings that Improve Indoor Air Quality](#)