

FROM THE INSIDE OUT

A technical educational paper for engineers and contractors in the air movement and control industry.

Save Time and Money on Fan Installations

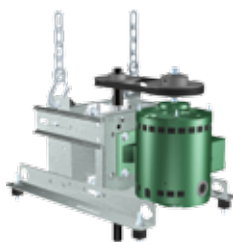
Contractors have three hot buttons when it comes to installing fans - 1) Where can I save money? 2) Where can I save time? and 3) How can I reduce problems after the equipment has been installed? There is nothing worse than hearing "You are short on air because you installed it wrong".

Saving time on the job site is critical in making a project successful. The old saying, "time is money", is true. Contractors often look for the lowest fan bid, however, that bid does not always equate to the lowest installed cost. Greenheck Fan Corporation has been leading the industry with timesaving features and accessories on their products that result in money savings for contractors. In reality, the contractor provides the equipment, the labor to install the fan, and all required components. If the manufacturer of the equipment can provide an option, accessory, or feature already installed, the contractor's overall cost will be reduced.

The following tips for installing fans properly can save you time and money.

Top 12 Time Savers

1. Lifting points. Equipment with lifting points is essential for any fan that cannot be lifted by one person or will not fit through a normal doorway.



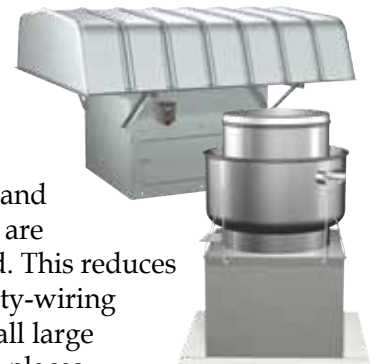
2. Factory supplied isolators and/or isolation bases for Utility Fans, Blowers, and Inline fan applications. When supplied by the manufacturer, the isolators and isolation bases will be properly sized for the specific

fan's weight and fan type. This eliminates the coordination between the fan manufacturer and the isolator manufacturer.

3. Hinged base assembly. For roof mounted installations that require access to the ductwork, damper, damper actuator, or underside of the fan, use a hinged base assembly. A hinged base is a factory-assembled hinge that does not require any additional installation time and helps ensure it will be installed properly.
4. Mounted and pre-wired motors. For all equipment with motors, make sure the motors are mounted and pre-wired to specified voltage. To prevent electrical problems such as a motor being wired wrong, a bad motor, and fan assembly issues, fans should also be factory tested before they are shipped.
5. Disconnects should be sized, supplied, and mounted



by the factory to save installation time. We strongly recommend that specialty switches, such as water tight and explosion resistant, are mounted and wired. This reduces the need for specialty-wiring components to install large disconnects in tight places.



6. In high wind situations, use a fan that does not need to be tied-down. Greenheck Fan recently introduced a line of spun aluminum roof exhaust fans to withstand 150-mph wind without additional tie downs. Eliminating tie-downs reduces the roof penetrations and removes the need for a structural engineer to review the fan installation. Installation time and potential leakage problems are also reduced.

7. For sidewall propeller applications, an assembled wall housing or wall sleeve should be supplied. A factory supplied wall housing or wall sleeve will save installation time because it is typically fully assembled and guarantees compatibility with the other required components in the system such as dampers, guards, and weatherhoods. And, proper spacing between the propeller and damper guarantees good fan performance and reduces vibration issues.



8. Wiring. For applications where roof top propeller fans are typically used, have the damper and all associated wiring including the damper actuator, end switch, and disconnect switch installed in the fan base – maybe even add a nine-foot wiring pigtail. This will save a considerable amount of time for the electrician.

9. If the motorized damper is factory installed in the fan, have the motor and damper actuator wiring brought to one location. This eliminates the need to guess where to run the wiring, and properly sizes and locates the disconnect switch. This is typically called one-point wiring.

10. For bathroom fan applications, use a grille mounted motion detector. Grille mounted motion detectors are typically less expensive than a wall mounted motion detector. It is also pre-wired, eliminating the need for the switch and wiring. This results in lower up-front costs and



reduced installation costs. Reduced operational costs and bathroom orders are another benefit.

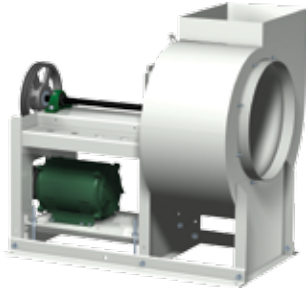
11. A roof curb with a damper tray can do two things. First, damper installation is quicker. Second, it allows for the duct size to be different from the damper size, preventing a duct transition.
12. System balancing. Adjustable drives are designed for final system balancing. These drives can typically adjust the fan's performance +/-10%.

Top 14 installation problems to avoid:

Affecting Airflow

1. Obstructions. An obstruction placed close to the inlet or outlet of the fan, for example a damper, elbow, duct transition, guard, etc. Typically, allow 2.5 duct diameters (approx. 2.5 wheel diameters) away from both ends of the fan.
2. A damper too close to the inlet or outlet. This will cause an uneven flow of air.
3. Extra guarding. Adding extra guarding can restrict the airflow through the fan. Avoid expanded metal guards; use thin wire guards if possible.
4. Avoid damper actuators that block 25% or more of the free area. They can add up to a 1/2 inch of static pressure. Typically large damper actuators can be mounted outside the duct.
5. Avoid elbows and transitions directly after inline fans. A good solution for commercial inline fans is to use a side discharge option. The fan acts as the elbow - the air discharges out the side of the fan preventing poor outlet conditions.
6. Placing a damper too close to the propeller of a sidewall propeller fan will cause vibration. As a general rule of thumb, have at least one half of a propeller diameter between the damper and the propeller.
7. Be certain the wheel is rotating in the correct direction. An exhaust fan with a backward inclined wheel will exhaust air, even if it's

rotating backwards. Remember, you have a 50/50 chance of wiring a three-phase motor correctly the first time. To change the rotation, reverse any two of three leads.



8. Elbows on the outlet of utility sets should be avoided. Utility sets are designed so the fan's discharge can be rotated, eliminating the need for an elbow at the outlet. Performance will be greatly reduced if 2.5 duct diameters of straight outlet ductwork are not used.
9. For fans with no inlet duct, the distance between the fan's inlet and a wall or housing must be at least one inlet diameter to ensure proper performance.
10. When wiring the fan motor and the damper actuator, confirm that the wiring is properly run so it does not get caught in the damper preventing proper operation.

Affecting Vibration/Sound

11. Prevent excessive belt tension. There is a delicate balance between too much and too little belt tension. Not enough tension results in belt squeal while too much tension results in vibration problems. If the belt is too tight it will stretch everywhere but at the seam, resulting in vibration. For fans with adjustable motor pulleys, sometimes the air-balancer may close the pulley without adjusting the belt tension, resulting in excessive belt tension.
12. Upblast propeller fans with butterfly dampers can create "banging sounds". In warehouses with dock doors facing the wind, positive building pressure can result in the butterfly dampers opening to relieve the pressure then slamming closed after the positive pressure is relieved. Add magnetic latches to hold the dampers down; the fan can overcome the magnets when powered on.

13. Speed controllers can cause a motor "hum". Only two types of single-phase motors can be used with speed controllers, shaded pole and permanent split capacitor (PSC) motors. All other motors will burn out if used with a speed controller. If the speed controller is turned down too far, it becomes so inefficient that a hum will develop. Also if the fan is restarted, it may not have enough voltage to restart and the thermal overload will trip.
14. Uneven air flow into a fan. If an elbow is placed too close to the inlet of a fan, the air coming into the fan may load the wheel unevenly resulting in vibration.

When comparing fans, look for features that can save installation time, not just the lowest cost product. From a performance perspective, remember that the fans were originally tested under ideal conditions. If the fan is not installed the way it was tested, it will not perform as specified. If you encounter a job-site problem one of these time-saving installation tips may help you quickly resolve the issue.

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