

## Air Kit Fans with CE Mark

Air Kit Fans with CE Mark shall follow the general Installation, Operation & Maintenance instructions in *Fans with CE Mark (ES-2-06)*. The below provides supplementary assembly instructions specific to Air Kit assembly. General requirements in ES-2-06 shall be followed to assure all local requirements for safety and disposal are followed.

## Kit Concept

Air kits (or fan kits) are sold as sets of components such as impellers, housings, shafts, bearings, shaft coolers, cooler guards, recess cones, straightening vanes and shaft seals. Kits are installed and assembled by the purchaser in a plenum or oven. The impeller (or impellers) are supported on a shaft between two bearings.

The term “twin” is used to designate two impellers on a common shaft. Spacing of the housings and impellers in the plenum is done so that the inlet restriction is the same on all inlets. More information about performance and configuration specifics may be found in Catalog 150.

## Support Structure

Air kits are normally installed as part of another structure. These structures must be designed to withstand both static and dynamic loading. The structural design should follow the same guidelines for foundations and supporting structures as found in IM-995 or ES-2-06. Proper design of supports and supporting structures

are the responsibility of the purchaser.

Housing stiffeners or frame should provide rigidity and support to the housing. Adequate rigidity can be provided by positioning bracing as shown in Figure 1. Additional support may also be required. Supports should not block the inlet or discharge of the fan. For oven type applications the supports must be designed so that the housing inlets will be centered with the impeller when hot. Connecting ductwork should have independent supports and have expansion joints or other allowance for thermal expansion.

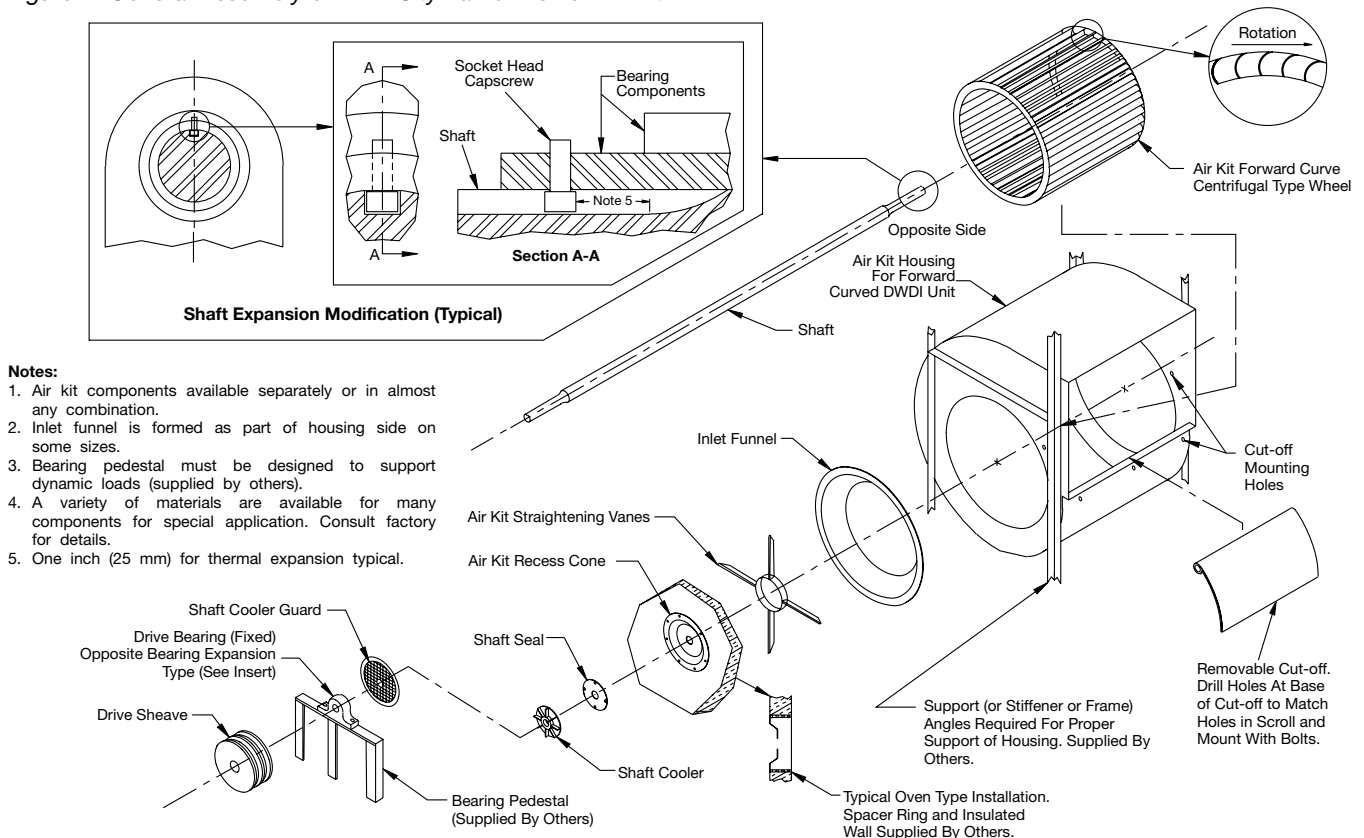
Bearing supports should be rigid enough to support static and dynamic loads caused by belt pull and vibration. The bearing mounting surface should be flat and square with the shaft axis centerline so that the bearings are not subjected to loads from mounting misalignment. The supports should be free from thermal effects which can cause misalignment of bearings and designed so that the bearing is not heated by conduction through the pedestal or convection through the airstream. When recess cones are combined with shafts having turndowns, the bearing supports should be removable to allow for installation of the recess cone.

## Air Kit Assembly and Installation

Components are assembled in order shown in Figure 1.

Since requirements vary, the purchaser assumes responsibility for the proper installation and operation of the unit.

Figure 1. General Assembly of Twin City Fan & Blower Air Kit



### Notes:

1. Air kit components available separately or in almost any combination.
2. Inlet funnel is formed as part of housing side on some sizes.
3. Bearing pedestal must be designed to support dynamic loads (supplied by others).
4. A variety of materials are available for many components for special application. Consult factory for details.
5. One inch (25 mm) for thermal expansion typical.

## Assembly Preparation

Housings are mounted so that the inlets are equally constricted. For twin fans, this means one-quarter of the total clearance is at the outer fan inlets and one-half of the total clearance is in the middle. Bearing pedestals are installed so that the bearings can be shimmed for proper centerline height.

Provide for passage of shaft through the wall of the oven. Relief must be provided for recess cone mounting and shaft seal (see Figure 1). Installation of a recess cone may also require the use of a cylindrical section to restrain insulation and maintain proper depth of oven wall.

Clean the impeller bore with solvent and check for burrs, rust paint or other obstruction. Use 80 grit emery cloth by hand to remove foreign particles. Flush any grit remaining and wipe clean. Place an even film of oil in the impeller bore.

Extra care should be taken with shafting. Shafts for air kits tend to be quite long and heavy and can be easily damaged. Clean the shaft with solvent and check for nicks, scratches and burrs. Remove rough spots with emery cloth and clean again. Cover the shaft with a light film of oil.

## Assembly

Fan housing and bearing supports are installed as previously described. Inlet funnels, which may have been supplied separately, should be mounted to the housing at this time.

1. Place impeller into housing through discharge of housing. Check impeller for proper impeller rotation before proceeding (see Figure 1). Block impeller so that impeller inlets are centered with housing inlets.
2. Insert the shaft through housing inlet and impeller bore. Kits that have the shaft extension modification will have keyways at both ends of the shaft. Identify the drive end from fan drawings to insure proper shaft orientation. Temporarily support the shaft and impeller assembly on blocks across the full length of impeller. Do not support on housing sides, inlet funnels, impeller end rings or accessories.
3. The optional accessories are installed in this order onto the shaft: recess cone, shaft seal, shaft cooler and cooler guard. These parts are installed outside the oven wall except the recess cone, which becomes part of the wall. All fasteners should remain loose until bearing mounting is complete.
4. Slip the bearings onto the shaft and pedestal and secure, making sure the following instructions are followed:
  - a. Mounting expansion bearings — no shaft expansion modification.
    1. Place bearing onto the shaft with bearing collar facing away from impeller.
    2. Adjust expansion capability of bearing so that the bearing is toward the impeller in the bearing housing. (When the shaft expands from heat, the bearing will be pushed away from impeller in the bearing housing.)
    3. With bearing properly aligned and shaft at the required centerline height, bolt bearing to the pedestal. Go to step 4c.
  - b. Mounting bearing with shaft expansion modification:
    1. Slide bearing onto shaft with bearing collar

pointed away from the impeller and toward the end of the shaft. The head of the inverted socket head capscrew will fit in the short keyway. Make sure that the shaft can expand without the end of the keyway hitting the screw head.

2. With shaft at the proper centerline height and bearing square with the shaft, bolt bearing into position.
- c. Tighten all set screws remaining in bearings. (If shaft expansion modification was used, do not use any other set screws on expansion side bearing other than the inverted screw provided.)
5. Position impeller in housing so that it will be centered when hot. Shaft expansion must be allowed for high temperature applications. The impeller will move away from the drive (or fixed) bearing by an amount equal to the distance to the impeller from the drive bearing times the temperature rise times the coefficient of thermal expansion — about 0.000067°F/inch (0.00012°C/mm) for steel. Tighten Allen-head set screws. (Allen-head set screws are normally provided.)
6. Accessories may now be permanently mounted and bolted into position (recess cone, shaft seal, shaft cooler and cooler guard). Rotate shaft manually to insure adequate clearance.
7. Assemble drives as listed in IM-995 or ES-2-06.
8. Install cut-off in discharge of housing with bolts through sides and base of cut-off.
9. Check and tighten all screws, nuts and bolts.
10. The installer may need to fine-tune balance the final assembly. (All impellers are factory balanced. Low speed FC units will generally not require a final balance.)

## Maintenance of Kit Fan

See IM-995 or ES-2-06 for normal maintenance instructions for bearings, drives, etc. High temperature applications should avoid heat soaking of shaft. Stationary (non-rotating) shafting should never be exposed to elevated temperatures or bending may occur. Shaft should always be rotating in an elevated temperature environment.

On high-temperature applications, check all fasteners (nuts, bolts, screws and rivets) for tightness. Cyclic heating and cooling can loosen fasteners from thermal expansion and contraction. Check after the first few cycles of thermal change or 48 hours, whichever comes first. Then check on a monthly basis.

## Performance Troubleshooting

See troubleshooting section of IM-995 or ES-2-06 to identify causes of problems normally encountered. In addition to those mentioned, on kit type installations check for:

1. Vibration — Bent shaft caused by exposure of shaft to high temperatures while not rotating.
2. Fan will not start or motor trips out after start-up — Motor was not sized for  $WR^2$  required. Motor horsepower too low for cold start.



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