

Inducer Noise/Vibration/Burner Pulsation and Combustion Oscillation Checklist

If this is a downflow variable speed furnace, install the spacer kit, KGACC0125SPC.

Visually verify that the tab on the inducer shaft is set in the notch in the inducer housing.

If tab is out of position, use needle nose pliers to rotate the seal into the correct position.

If the tab is not set in the housing correctly, it may be necessary to remove the inducer assembly to re-install the seal properly.

Initiate component self-test to verify that the ECM motor cooling fan (Variable Speed 90% furnaces) is not rubbing on the motor cover.

On PSC inducer motors, initiate component self-test, then install the outer door, to verify that the inducer motor cooling fan is not hitting or rubbing against the outer door. If the outer door is bowed inward, it may rub on the cooling fan, or the motor may vibrate against it.

Note: There may be some slight vibration that disappears when the motor ramps up and down during self-test. This is normal, unless the vibration is very annoying or pronounced. It may be necessary to see if the noise transmission can be isolated. Verify that all gas piping, PVC vent pipes and electrical are not rigidly secured to the structure, isolate these items from the structure. Verify that the sheet metal supply and return ducts are not rigidly secured between the furnace and the structure. Sheet metal vibration eliminators are important in insuring vibration isolation.

Verify that the shaft seal does not squeak or squeal during component self test.

Verify that the inducer wheel does not rub on the housing during component self test.

Verify that in the ECM motor mounting bracket is not sagging down and contacting the screws that attach the mounting arm bracket to the inducer face plate.

To correct any mechanical noise issues noted during Component Self Test, check the following :

If the cooling fan on the ECM motor is rubbing, remove and re-install the cover to make sure the cover was not pushed on the motor too far.

If the cooling fan on PSC inducer motors was rubbing or hitting the outer door, see if the door can be bowed outward.

If the wheel is rubbing, make sure the vent pipe support or grommet (on newer models) is installed in the hole in the casing to support the vent pipe. Make sure the vent pipe is properly supported to prevent the weight of the pipe from "twisting" the inducer housing.

If the shaft seal is squealing, use a small drop of silicone oil or graphite on the inducer motor shaft to lubricate the inducer shaft seal

If necessary, remove the inducer housing to inspect the hub and wheel for cracks or loose set screws. Reposition the wheel, tighten the set screw. Replace the inducer if the wheel is damaged.

Note: There may be some slight "wobble" when the wheel is spun by hand. This is normal, since the wheel is balanced and should not be used to determine if an inducer is "good" or "bad".

If all tests are OK. Take the unit out of self-test.

Check the vent system for sags and trapped water.

Verify that the condensate trap drains freely and the secondary HX drains properly. No inverted trap in the flexible drain tube between the collector box and drain trap. Relief hose routed properly and not kinked or pinched behind inducer housing

Set the unit to call for heat

Does the inducer vibrate during burner operation?

Verify that the vibration is not being transmitted because the furnace is not set flat on the floor. Use carpenter's shims on upflow units to eliminate gaps between the casing and the floor.

Remove the burner box cover

Does the vibration/noise go away or reduce in intensity?

If yes, this may be related to firing rate or burner box issues. This may be burner pulsation or combustion oscillation.

Burner pulsation is the flame being disturbed by air leakage or other factors including reversed intake and exhaust terminations.

Check for air leakage around the ignitor on units where the ignitor is inserted into the burner box from the bottom. Air leakage between the ignitor mounting bracket and the porcelain of the ignitor due to a out of position gasket can create burner pulsations or light-off issues. It may be easier to remove the entire burner box to service the ignitor and gasket. Otherwise, seal the edge between the porcelain and the ignitor mounting bracket with a bead of high temperature RTV.

Combustion Oscillation is a noise created by the resonance frequency of the combustion process in the heat exchanger. In some cases, this can be accompanied by burner pulsation.

To correct Combustion Oscillation:

Is the vent system sized properly for the unit? It is best to pick the smallest size pipe allowed.

Set the firing rate in low and high fire.

Verify that there is at least one combustion air disk installed in the air intake box. This may or may not be able to be done with the furnace running with a call for heat.

Replace the cover

Terminate the call for heat and let the blower complete the off delay

Re-initiate the call for heat

If the vibration/pulsation does not go away, add a second combustion air disk.

Measure the heat exchanger pressure drop. Use an inclined manometer or differential magnehelic with a range from 0 to 4.0 IWC

On variable speed furnaces, the inducer stops ramping up when the pressure switch closes. The nominal pressure switch setting is 1.81 IWC in high fire. If the HXDP is significantly higher than 2.2 IWC, the pressure switches may be out of calibration, closing late.

On variable speed furnaces using HK42FZ022 controls, turn SW 1-3 ON. This is the low heat rise adjust switch. But this switch also increases the low heat inducer RPM 15%.

On PSC furnaces, HXDP varies with the vent length and inducer voltage. The pressure switch does not control the inducer RPM. HXDP can be as high as 4.0 IWC.

If the vibration/pulsation does not go away:

Add a second combustion air disk and re-test the unit.

If the vibration/pulsation does not go away:

Remove the complete burner box assembly. Remove the gas valve, HSI and flame sensor

Check the burner cross-over gap with a dime as a gap gage. The dime should slide across each burner cross-over from one burner to the next.

Water test the burner box and verify orifice alignment. Correct any mis-aligned orifices by rotating the orifice 1/8 to 1/4 turn and re-testing the manifold.

Shake the water out when complete and re-assemble the burner box.

Note: HSI position is critical. It may be necessary to use a small dab of silicone to keep the Norton style HSI gasket attached to the mounting bracket. It is easier to re-position the igniter with the burner box off the furnace.

If a replacement burner box gasket is not available, use the existing gasket and seal the edges with foil tape.

Re-test the unit.