

# Inducer Vibration

This information covers inducer vibration **and how it inter-relates with burner pulsation and light-off in 90% furnaces.**

First, there are 3 things that cause **inducer vibration** that are not related to the inducer wheel or motor.

- 1) Burner Pulsation
- 2) Combustion Oscillation
- 3) Poor drainage through the inducer housing and collector box

Sometimes the first 2 are inter-related.

Before we get into this, make sure that the inducer grommets are all inserted properly in the inducer-mounting bracket. A grommet out of the mount will make the motor vibrate. Make sure the outer door is not bowed in and the motor or cooling fan of the motor is hitting the door. For variable speed furnaces, there is an inducer space kit used to eliminate motor sag and help support the motor in the down flow position. That kit is: KGACC0125SPC and there are 25 spacers to a kit.

Also, make sure the furnace is flat on the ground. If the floor is uneven, shim the furnace to reduce the potential for the furnace to vibrate excessively during operation.

## Questions

**Call TSI Tech Service department at:**

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**Burner pulsation** is typically noticeable by the burner flame pulsing on and off or moving back and forth across the burner. The worst-case scenario is the manifold and burner box are out of alignment. The out of alignment condition can occur due to the following incidents:

Mis-drilled orifice

Mis-drilled manifold

Cross-threaded orifice

**Burner box or manifold out of alignment**-This occurs when a back-up wrench is not used on the gas valve when the gas line is installed. The whole assembly is rotated down and the gas through the orifice does not pass through the flame retainer of the burner. The best way to check this is by doing a burner box water test. A PowerPoint presentation is available that shows how to do this. This is also an opportune time to verify that the cross-overs on the burners are aligned and have the proper gap. A dime can be used to verify the gap in the burner cross-overs.

## Tech Tips II – Inducer Vibration

**Combustion oscillation** is a pulsation that occurs in the middle of the heat exchanger. It is due to the resonance frequency of the combustion product moving through the heat exchanger. However, this can also cause pulsations at the burner box.

The first thing to do is remove the burner box cover. Does the pulsation go away? Does it light off normally? If it does, then typically it is due to some issue regarding the number of combustion air disks in the air intake box, vent size, length and manifold pressure setting. On older furnaces with the LH33ZS004 (Norton) igniter, an air leak from a poor igniter gasket seal around the ceramic base of the igniter can create an air curtain that disrupts burner ignition.

After removing the burner box cover, set the manifold pressure to the correct firing rate for the heat content of the gas. The manifold pressure settings are in the installation instructions.

There is cap used to close off the opposite side of the air intake box. There is a hollow plastic tip extending out from the bottom of the plug. Drill out the plug with a drill bit. I think a 3/16" drill will fit inside the plastic tip. This will equalize the pressure in the burner box. If this corrects the issue, install a drain hose from the plastic tip to the outside of the furnace casing to a drain. Put a loop in the hose outside the casing and secure it to the casing. This way, if any water gets into the air intake, it can drain away.

Verify that the vent is the proper size. If your choice of vent pipes was 2 1/2 inch or 3 inch and 3 inch was used, the vent,

while properly sized for that furnace may contribute to the resonance issue. If a largest size vent or a vent larger than what is called for in the vent tables was used, check the following:

Verify that there is at least 1 combustion air disk installed. If one is installed, install the spaced and the other disk in the air intake box.

Measure the heat exchanger pressure drop (hxdp). If the hxdp is high, say above 3.5 inches of water column, it may be necessary to add additional restriction to bring the hxdp down. On 2 pipe vent systems, a reducing bushing can be inserted into the 180 degree elbow of the air intake outside at the termination kit. Don't glue the elbow until you are certain that this will correct the issue. Or, you can wrap a strip of electrical tape across the center of the combustion air disk.

In worst-case scenarios, PVC ball valve may be used to balance the intake and exhaust air.

Remember, there is always some vibration on inducer start-up and shut down that causes the inducer to "shudder" a bit. This is normal.

**Poor drainage** is usually due to a lack of maintenance of the drainage system of the furnace. Make sure all hoses are connected and the drain trap is flushed out annually. Verify that all hoses routed to the drain do not have any inverted trap. Also, clean out the pressure switch ports on the collector box and burner box. Debris gets in the collector box port when the system does not drain properly.