

# SERVICE AND APPLICATION NOTES

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H-04-9

## Gas Furnace Primary Limit Operational Check Procedure

We have received several inquiries from field service technicians asking what procedure Lennox recommends to check a gas furnace primary limit. The primary gas limit is a safety switch that will open when excessive heat is sensed in the heat exchanger. Once the limit opens, the furnace control energizes the supply air blower and de-energizes the gas valve. The limit automatically resets when the temperature returns to normal. Technicians are using several methods.

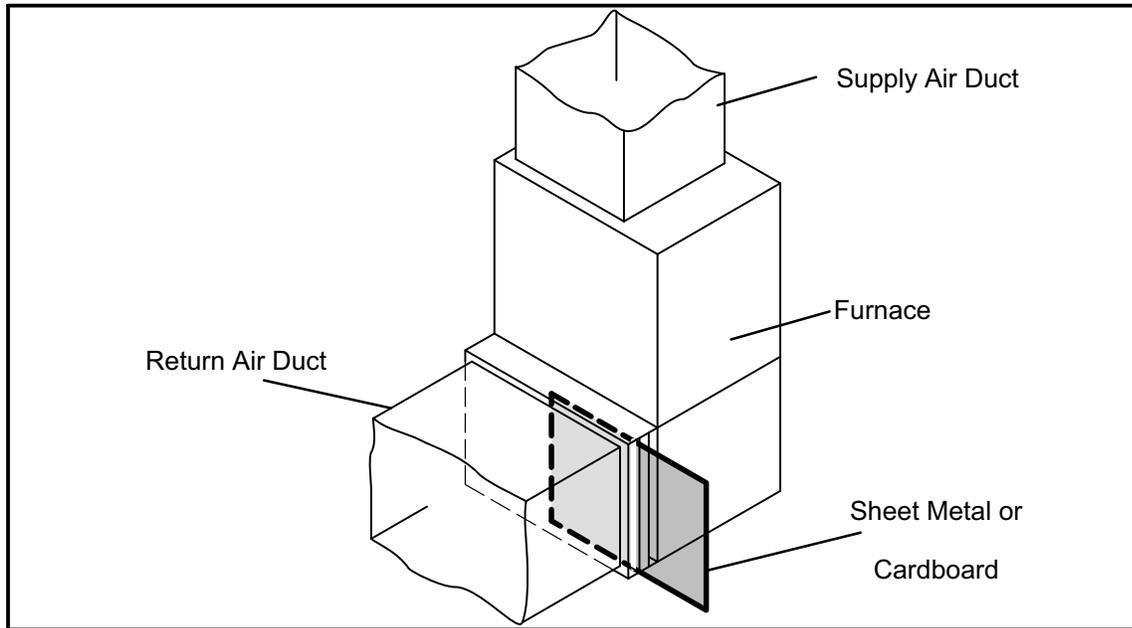
The most effective method is to restrict the airflow across the heat exchanger . This method will correctly check the primary limit in all applications (up flow, down flow or horizontal). The restricted airflow method is used for agency approval (CSA formerly AGA test to ANSI Z21.47 dated 2012, section 2.25). The restricted airflow method can be used on 80% and 90% AFUE furnaces with PSC motors, variable speed motors or inverter driven motors. This procedure does not apply to furnaces equipped with variable speed motors working with communicating thermostats.

**NOTE** - See Service and Application Note H-15-06 for furnaces equipped with a variable speed motor working with a communicating control such as the iComfort Wi-Fi<sup>®</sup> or iComfort<sup>®</sup> S30 communicating thermostats.

When checking the primary limit operation, restrict the airflow across the heat exchanger using the following procedure:

- 1 - Restrict the airflow by inserting a piece of sheet metal or cardboard into the inlet side of the return air filter. The airflow should be restricted approximately 75%. On variable speed and inverter motors the restriction may need to be increased to 90%. DO NOT RESTRICT THE AIR FLOW 100%.
- 2 - Start the furnace in the heating mode. In approximately 2 to 3 minutes the primary limit should open. If the outlet air temperature during the operational check exceeds the maximum allowed air stated on the unit nameplate for more than one minute, dis-continue test and verify unit construction and setup before repeating. When measuring the outlet air temperature, locate thermocouple in the supply duct "out of sight" of the heat exchanger to reduce radiant heat effects.
- 3 - Once the primary limit opens, remove the air restriction and allow the heat exchanger and primary limit to cool.
- 4 - After the primary limit has reset, verify that the furnace will operate properly in the heating mode.





Depending on the installation, type of furnace and application, other methods used in the field to check the primary limit operation are not as complete and thorough.

Disconnecting the fan motor is a popular method. While this will cause the furnace to cycle off on the limit, it may not always be the primary limit. If the furnace is installed in a horizontal or downflow position, the furnace will usually cycle on one of the secondary limits. On a 90% efficient furnace, it may cycle on the secondary limit located on the combustion air inducer (CAI). The CAI secondary limit is designed to prevent abnormally high flue gas temperatures that may damage the PVC vent pipe. A furnace installed in the up flow position, with no airflow, could take twice as long for the primary limit to open than at restricted airflow.

Removing the primary limit from its mounting position and using an external heat source (heat gun, cigarette lighter, match, etc.) will check the limit. However, this method does not check the limit operation while it is installed in the furnace and can cause damage to the limit due to intense heat produced from such source.

Removing the wire from the primary limit will only check the circuit and ignition control operation. It does not check the limit under high heat conditions.

Restricting the airflow across the heat exchanger is the recommended procedure to check the operation of the primary limit. Depending on the type of furnace, installation position and application, other methods may not be checking the primary limit operation.