MUNCH'S SUPPLY
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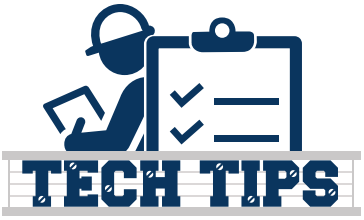
MAIN AND HIGH-LIMIT TRIPS



'Tis the season for heating! What are some of the battles you have with furnace operation when out in the field? There are many scenarios that may come about when troubleshooting a furnace—but today, let's focus on high-limit trips.

High limits (or safety limits) related to furnaces are there to protect the equipment and the home or building where the furnace is located. Unfortunately, these can be a nuisance at times, but at the end of the day, there is a reason this safety is opening. Whether the gas pressure is too high, airflow is set too low, static pressures too high or (fingers crossed) there's a dirty filter. Let's cover some scenarios and what to look for.

If you are encountering a high-limit trip, the easiest test you can perform is a "delta T" or "heat rise" test. You simply need to take your supply air temperature rather close to the furnace (not in a random supply vent) and a temperature reading in the return duct near the furnace inlet (again, not in a random bedroom or thermostat reading.) This reading is important as it tells us whether this furnace is running "hot or not."

Why do we read the air temps close to the unit? Humidifier bypass, zoning bypass and basement return vs. main level return can all affect your readings, and we see this daily.

The allowable "heat rise" will be posted in the furnace and the service literature of the unit, and we must remain within these requirements. This is not a suggestion... it is a requirement!

What Else Can Affect High-Temperature Limits?

Gas Pressure/Overfiring

Natural Gas Pressures

1. 1.75" outlet pressure for a low-fire or first-stage call (W1)
2. 3.5" for a single stage unit or high fire (W2 call)

Propane/LP

1. 5.5-6" on "low fire or first stage" (W1)
2. 10.5-11" on "high fire or second stage" (W2)

Important Note: Always refer to the data tag inside the unit or the service guide of the unit you are working with, as not every furnace or heating source will be the exact same.

Do You Have High Return Air Temps?

This is important as it can certainly be a factor in many situations:

1. Is there a bypass into your return from your supply? Whether it is a humidifier or zoning bypass, you may be dumping hot supply air right back into your return. This will skew your readings. If you have an 80° return air temp and have a 60° heat rise, we may have a 140° supply air temp and more than likely be flirting with your high-limit!
    a. We've taken calls where residential furnaces are installed in a hot yoga studio with return air temps near 100°. You almost never win.

Static and Airflow

We all know static and airflow are related to the operating performance of every HVAC unit on the planet. We must make sure the unit is seeing a static pressure that falls in line with the service/installation guides of the units. We must also be sure that the provided airflow is proper to keep our heat rise within the factory's specifications.

If your heat rise is too high (above the rated specification of the unit,) you first must check your gas pressure. If your gas pressure is set to standards and your heat rise is still too high, you have airflow problems. Items to check are:

1. Is the filter clean?
2. Is the filter too restrictive?
3. Are there supply or return grills/vents closed or covered?
4. Tight duct? Let's face it, static is a daily struggle.
5. Are the airflow settings in the furnace matching the static/airflow charts in the service facts?Trane/American Standard furnace literature has heat rise and static/airflow charts.

There is a simple formula to confirm your CFM of air:

CFM = (Input BTU x Thermal Efficiency) / (1.08 x Delta T)

Example:
100,000 BTU furnace
95% efficient
56° heat rise or Delta T
100,000 x .95 = 95,000
1.08 x 56 = 60.48
95,000/60.48 = 1,570 CFM

Is this matching your static/heat rise charts in the installation/service guides per the heating CFM selections in the furnace IFC? If not, you have an airflow problem.