

## ***How the Dual Flame burner works***

The Noritz burner utilizes an air staging, low-Nox, two stage combustion process. This technique is referred to as Furnace over-fire air (OFA) technology. Combustion air is separated into primary and secondary air flow sections. The primary air (between 70-90%) is mixed with the fuel from the manifold, producing a relatively low temperature, oxygen deficient, fuel-rich zone. This zone will have low amounts of NOx formation, but if released, would generally have high CO levels (in addition to being relatively inefficient). The secondary (10-30%) flow of combustion air is injected above the combustion zone through a special set of ports mounted above the primary burners. This combustion, conducted at relatively low volume and temperature, is able to complete the combustion with low NOx production. This style of burner favors the formation of N<sub>2</sub>, which is inert, instead of NOx, and has no detrimental effects on the environment.

This technology is actually very well developed. It has been around since the early 1970's, utilized mainly in fossil fuel power plant applications (i.e. coal/natural gas). It has further been incorporated into higher end furnaces/boilers. Noritz, however, is the first and only tankless water heater manufacturer to incorporate this technology into their water heaters.

## ***Why use a dual flame burner?***

A regular flat burner is limited in its ability to fully mix air and gas together to get complete burn. This requires a non-ideal mixture of gas and air to be used to obtain complete combustion. With this non-ideal mixture, the presence of combustion byproducts becomes an issue. By starving the process of air (oxygen deficient), the combustion is fuel "rich", will burn very hot, and have large amounts of unburned gas (represented by carbon monoxide, CO in exhaust). On the flipside, by adding too much combustion air, the flame is then considered oxygen rich and "lean" on fuel. This flame will burn with high amounts of excess air, which becomes oxidized (NOx in the flue gas).

## ***Did you know?***

\*NOx in the atmosphere contributes strongly to ground level smog and acid rain.

\*CO is generally not harmful to environment in concentrations normally found in combustion products, however it is extremely poisonous, even in low concentrations to humans.