

## Types of Ignition Systems

The three basic types of ignition systems used to start up a furnace are:

**Standing Pilot**

**Direct Spark**

**Hot Surface Igniter**

For many years, the most commonly used system was the Standing Pilot (also known as Pilot Light). In this system, a pilot assembly and thermocouple was needed. The pilot light remained on constantly, even when the thermostat was not calling for heat. Because of our awareness that fuel resources are being diminished as well as the safety issue, most of the Standing Pilot systems have been replaced by more efficient and safer system. Today, gas furnaces commonly use a "Direct Spark" type or "Hot Surface" type ignition system

The Direct Spark ignition system is widely used today. In this system, a spark is created to ignite the gas-air mixture. These systems are produced by several manufacturers, and their operations have some similarities. Direct Spark ignition systems include a spark electrode/flame sensor, gas valve, and ignition control. It generates a spark to ignite the burner.

Most manufacturers use a Hot Surface Ignition system. The Hot Surface Ignition system includes a combination gas valve, a Hot Surface Igniter, and control module. The heat produced by the igniter lights the main gas flow through the burner. Hot Surface Ignition makes use of a silicon carbide igniter that is heated to a red-hot condition. This silicon carbide element then lights the main burner. As in Direct Spark ignition, there is no remaining pilot once the thermostat has been satisfied.

## How The System Operates

The operational sequence of the hot surface igniter ignition system is as follows.

1. When there is a need for heat, the thermostat contacts close, sending a signal to the control module. The control module is a self-diagnostic device. It immediately starts to perform a self-check. If the module senses a problem externally or internally, it responds by flashing an indicator light. The control module will check for closed limit contacts on the pressure switch
2. The induced draft blower will then start and purge the system for 30 seconds.
3. After the pre-purge, the hot surface igniter becomes energized. This occurs for about 17 seconds before the gas valve opens.
4. When the gas valve is energized, the gas flows to the burner and the heated igniter. The gas is ignited.
5. During normal operation, the igniter becomes de-energized approximately 4 seconds after the gas valve is energized.
6. Through the flame sensor, the control module must detect main burner operation within 4-7 seconds. If it does not, the gas valve will become de-energized. After burning flames have been sensed, the fan blower motor is energized. This is accomplished through a time delay within the control module.

## How The System Operates cont.

7. When the thermostat becomes satisfied, the gas valve is de-energized, along with the inducer blower. The adjustable time delay-to fan-off sequence begins to de-energize the fan blower.

## Types of Hot Surface Igniters

Flat silicon carbide is the most common and most cost effective igniter on the market. Unfortunately, these are very fragile and have to be handled with great care. Contrary to popular belief, the heating element of silicon carbide igniters can be touched. However, any debris that may be left behind will cause hot spots and premature failure.

Round silicon carbide igniters are stronger than flat silicon carbide igniters. Although they are shaped differently than flat igniters, round silicon carbide igniters can actually be used in place of flat ones. Their durability makes them an attractive alternative to flat igniters.

Silicon nitride igniters are the most durable igniters available. These igniters can be readily handled and typically dropped without any adverse effects. Their technology is borrowed from the glow plug of the diesel engine...also silicon nitride. Silicon nitride igniters are now available in full 120V designs that do not require the use of an expensive control voltage reducing control module.

## The MARS Offering

MARS has the broadest offering of HSI in the industry: flat/round silicon carbide and silicon nitride. In addition, MARS provides a full range of appliance igniters as well as a specialty Honeywell Smart Valve replacement igniter. MARS is the ONLY one stop shop for all wholesaler HSI needs.

In 2007, MARS introduced the first ever Good/Better/Best HSI program called The Hot Zone. This program has an igniter for every need.

- **Good:** Flat silicon carbide. The most economical solution.
- **Better:** Round silicon carbide. Replaces flat igniters and is more durable and can be readily handled.
- **Best:** Silicon nitride (flat and round): The newest technology is virtually indestructible.
- All silicon carbide MARS igniters are packaged in brown corrugate boxes. The flaps close tightly and the boxes do not bulge. As a result, MARS igniters stack very nicely.
- Inside, the fragile igniters are sandwiched between 2 interlocking pieces of egg crate foam. The igniter is literally locked in place and cannot slide inside the box. The contractor can rest assured MARS has done everything to ensure the igniter arrives at the jobsite in perfect condition.
- The part number and the industry recognized equivalent part number (for easy on the spot cross reference) is clearly marked on the end panel of each MARS package.
- MARS offers the Hot Zone full color laminated cross reference and contractor trifold brochures to all its HSI customers. The laminated piece features numerical and pictorial cross references for all MARS Good/Better/Best igniters. The trifold cross reference brochure can go with the contractor for job site cross referencing.