

Burner Ignition Systems



BURNERS

FLARES

THERMAL OXIDIZERS

VAPOR CONTROL

RENTALS

AFTERMARKET



Zeeco Ignition Systems

➤ Topics to Cover

- What is an Igniter?
- Igniter Classes / Types
- Failure Modes
- General Maintenance and Service
- Igniter Controls
- Questions



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What is an Igniter?

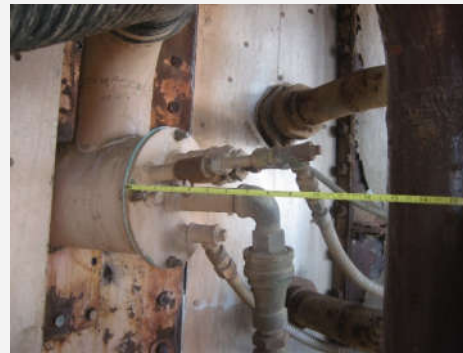
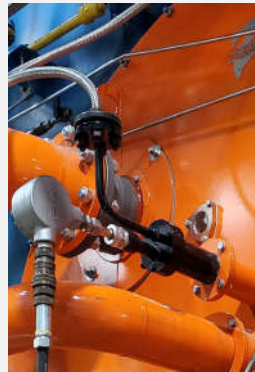
Definition:

A permanently installed device that provides proven ignition energy to light off main burner.



What is an Igniter?

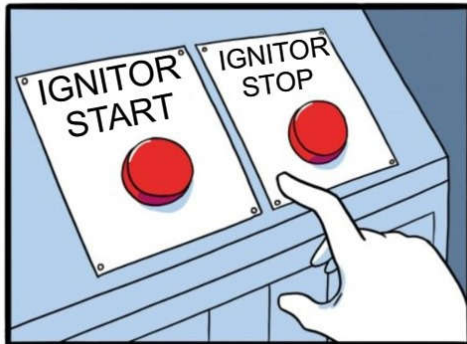
Igniter: A permanently installed device that provides proven ignition energy to light off main burner.



What is an Igniter?

Safety... Reliability... Safety... Reliability...

“I don’t want to have to babysit my Igniter during every boiler startup. I need an Igniter that works first time... Every time.”
~Power Boiler Equipment Owner



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What is an Igniter?

- NFPA 85 Class: 1, 2, 3, and Class 3 Special
(Boiler and Combustion Systems Hazards Code)
- 100kBtu – 40+ MMBtu
- Raw Gas, premix air/gas, raw liquid fuel
- High Tension (6 to 10kVA)
- High Energy (4 to 12 joule)
 - 1-4 Sparks / Second – Gas
 - 12-20 Sparks / Second – Oil
- Flame Rod Option / Scanner Proven
- Retract or Non-Retract



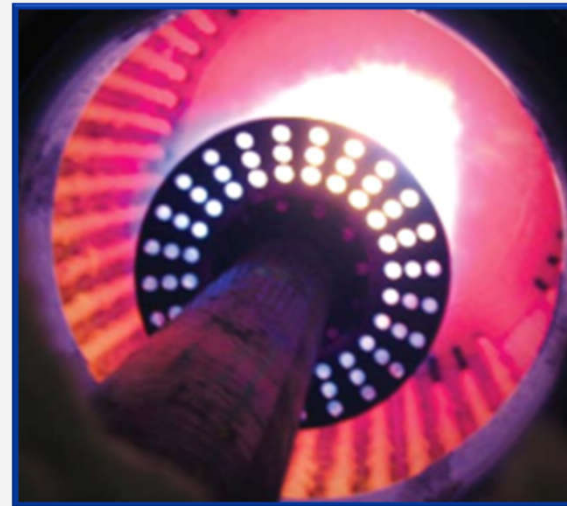
NFPA Classes Defined



- **3.3.73.1 Class 1 Igniter:** *An igniter that is applied to ignite the fuel input through the burner and to support ignition under any burner light-off or operating conditions. Its location and capacity are such that it will provide sufficient ignition energy, generally in excess of 10 percent of full load burner input, at its associated burner to raise any credible combination of burner inputs of both fuel and air above the minimum ignition temperature.*



Class 1 - Oil

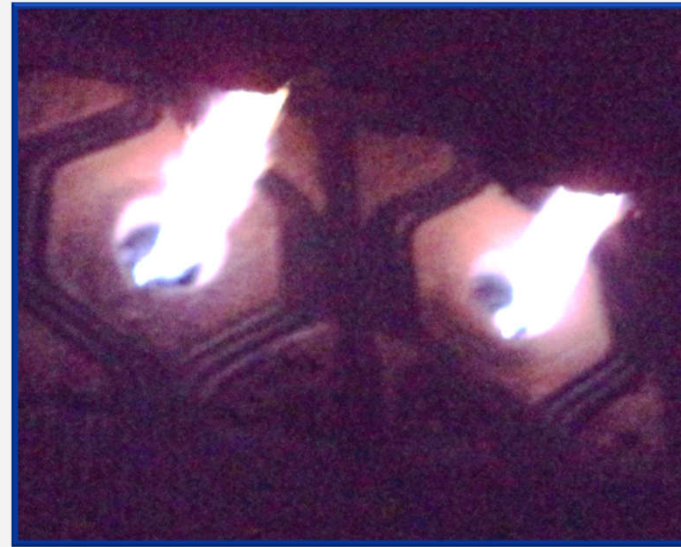


Class 1 - Gas

NFPA Classes Defined



- **3.3.73.2 Class 2 Igniter:** *An igniter that is applied to ignite the fuel input through the burner under prescribed light-off conditions. It is also used to support ignition under low load or certain adverse operating conditions. The range of capacity of such igniters is generally 4 percent to 10 percent of full load burner fuel input.*



Class 2

Class 1 & 2



- Service
 - Class 1: > 10% Heat Capacity
 - Class 2: ~4-10% Heat Capacity
- Zeeco Model
 - AR/GS-2 Premix (1.5-5 MMBtu)
 - ZHENG (1-9 MMBtu)
 - ZERG (1-40 MMBtu)
- Application
 - Main Burner Ignition Source
 - Warmup / Hot Standby
 - Burner Stability
- Installation
 - 2.5"+ Carrier Tube
 - Face Plate Mounted
 - Side Mount for T-Fired W.B.
 - Adjacent S.U./Load Burner
- Fuel Pressure Range
 - Natural Gas: 5-15 PSIG (1k – 40k SCFH)
- Components
 - High Energy Spark Rod - 7J Capacitive Discharge
 - Gas/Air Mixing Chamber
 - Bluff Body Flame Anchor
 - Separate Scanner for Class 1 or 2 Operation
 - Mounting Carrier Assembly through Windbox



NFPA Classes Defined



- **3.3.73.3 Class 3 Igniter:** *A small igniter applied particularly to fuel gas and fuel oil burners to ignite the fuel input to the burner under prescribed light-off conditions. The capacity of such igniters generally does not exceed 4 percent of the full load burner fuel input.*



Class 3

Class 3



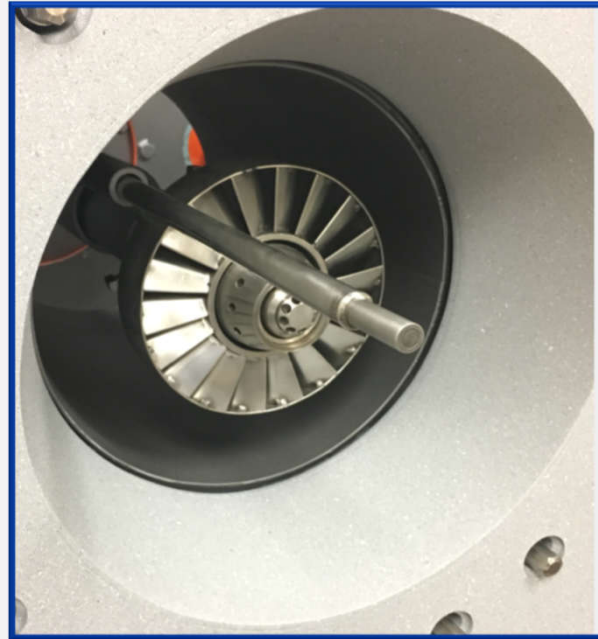
- Service
 - Class 3: <4% Heat Capacity
- Zeeco Model
 - AR/GS-1 Premix 150kBtu/hr
 - ZA2 – 340kBtu/hr
- Application
 - Main Burner Ign Source
 - Duct Burners
- Types of Igniter
 - Raw Gas
 - Premix Igniter
- Fuel
 - Natural Gas
 - Propane
- Pressure Range
 - Air: 5-10 PSIG - 1,609 SCFH (i.e. AR/GS-1)
 - Natural Gas: 1-15 PSIG (150-5,000 SCFH)
 - Propane: 1-15 PSIG (75-2,500 SCFH)
- Components:
 - High Energy Spark Rod - 7J Capacitive Discharge
 - Gas/Air Mixing Chamber
 - Bluff Body Flame Anchor
 - Scanner required for Class 3 (with Time Trial)
 - Mounting Carrier Assembly through Windbox



NFPA Classes Defined



- **3.3.73.4 Class 3 Special Igniter:** *A special Class 3 high energy electrical igniter capable of directly igniting the main burner fuel*



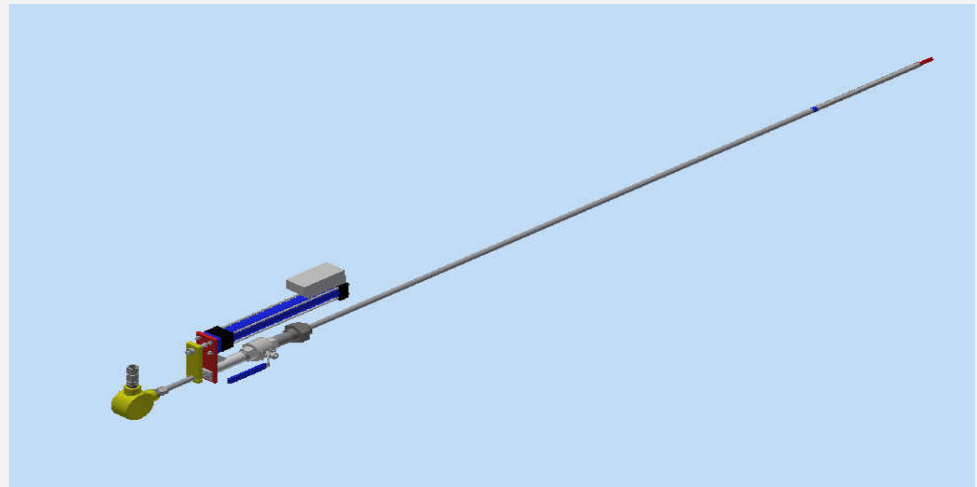
Class 3 Special

Class 3 Special



- Service:
 - Class 3 Special: No Fuel Firing
- Zeeco Model
 - Retractable HEI Direct Spark
- Application
 - Direct Ignition of Main Burner
- Main Burner Fuel Types:
 - Light Oil
 - Heavy Oil
 - Natural Gas
 - Propane
- Fuel
 - NA

- Components:
 - High Energy Spark Rod
 - High Energy Exciter – Sized for the Application
 - Pneumatic Retractor Assembly – Insert/Retract
 - Limit Switches
 - Isolation Valve
 - No Flame Scanner
 - Carrier Tube



Common Igniter Reliability Issues



What's Wrong?:

- Igniter Fails to Light?
- No Flame Proven Signal
- Bad Combustion
- Intermittent Trips
- Good Flame in Wrong Place
- High Consumable Use



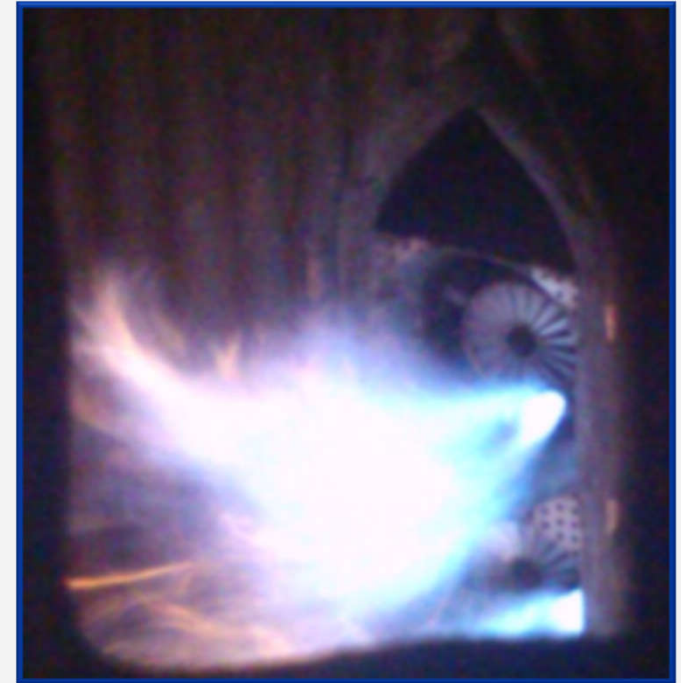
Igniters Need to be kept within OEM specifications for Optimum Performance and Reliability

Common Igniter Reliability Issues



Ignition and light off instability can be due to:

- HEI Retract Assembly is Stuck in Position
- Wrong gas / oil tip
- Older spark plug technology
- Unsuitable scanner location
- Improper placement to main fuel source
- Moisture (FGR issues with condensation)
- Improper technology/material for application
- Worn out or lack of maintenance



Common Igniter Reliability Issues



- Worn out or lack of maintenance
 - Spark Tips Shorted
 - Overheating of Components
 - Plugged Nozzles / Worn Nozzles
 - Incorrect Fuel / Air Pressures
 - Ash / Oil Residue Buildup
 - Valves / Instruments not operating correctly
 - Kinks in Flex Hoses
 - Electrical Module Failures
 - Grounding / Bonding Issues



Common Igniter Reliability Issues



- Coal Main Burner:
 - Harsh Environment
 - Coal Slag / Ash Buildup
 - Difficult to Ignite with poor igniter performance.
- Fuel Oil Burner
 - Oil Residue Buildup
 - Overheating
 - Insertion Depth/Igniter Geometry Critical
 - Atomizing Media Preferred
- Natural Gas / Propane Burner
 - Simple Regular Maintenance, replacement of consumables as needed.
 - Sighting and Alignment Problems



Common Igniter Reliability Issues



Noticeable Difference



Common Igniter Reliability Issues



VERY NOTICEABLE DIFFERENCE!!!



Maintenance



- Preventative Maintenance Schedule
- **Interval 1:**
 - Check Fuel Pressures at the Igniter
 - Remove/Inspect/Clean/Replace Nozzles
 - Test Fire Spark Rods (when SAFE!)
 - Confirm Flame Proven with visually good flame / No Flame Proven with degraded flame
 - Confirm correct Airflow
- **Interval 2: Replacement of Consumables:**
 - Nozzles / Spark Tips
 - Flame Rods / Scanner Optics
 - Spark Modules / Wire Harnesses
- **Interval 3: Check OEM Technology Upgrades (preferably ZEECO!) for better Igniter Solutions to optimize Burner and Boiler Performance**



Ignitor Controls

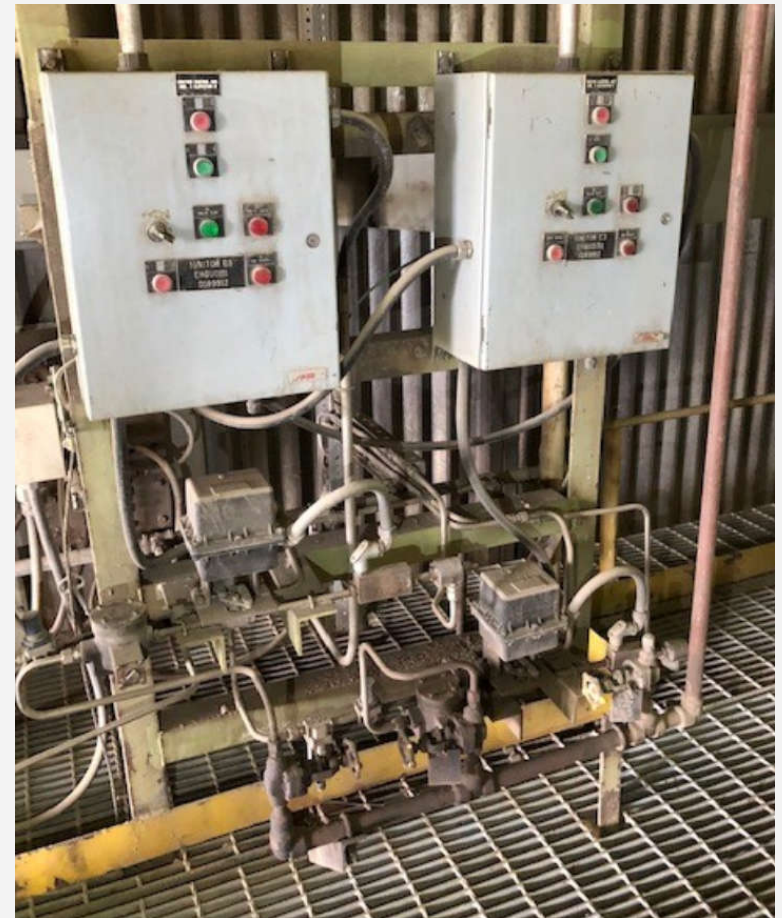


Fuel Delivery Instruments:

- Valve Train Components
 - Safety Shutoff Valves
 - Flow Control Devices
 - Pressure/Flow Switches & Indication

Electrical Cabinets / BMS Logic Control

- Safety System Hardwired Relay Logic
- Local / Remote Start-Stop-Test Function
- Convenient Wiring Termination





What Did I Just Learn?

- Igniters are essential equipment providing the first spark to light-off a Boiler, Big or Small.
- NFPA classifies Igniters by Heat Capacity relative to the Main Burner they're intended to Light.
- Igniters range from 150kBtu up to 40MMBtu, or directly light main burners.
- Igniters work great when New and Setup to OEM Specs...
- Igniters need a Preventative Maintenance Program
 - Inspect Replace – Nozzles, Spark Tip and Rods, etc.
 - Check Geometry, Sighting, Alignment, Airflow Paths.
- No matter what Igniter you need Parts or Service for.... CALL ZEECO!



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