JOHN ZINK HAMWORTHY COMBUSTION

DEEP*star*® Burner

Design

Heat Release

+ Natural draft heat release from 1.5 to 4.5 MW (5.1 to 15.4 MMBTU/hr)
+ Higher heat release of up to 8 MW (27.3 MMBTU/hr) available for forced draft

Design Features

+ When firing gas, the DEEP*star* burner combines fuel staging and flue gas recirculation entrainment to reduce the formation of NOx
+ When firing oil, the DEEP*star* burner combines air staging and flue gas entrainment with our proprietary process for fuel NOx reduction
+ The MKI version offers a very compact burner design that allows retrofit of many conventional burners with little to no modifications
+ The MKII version offers an improved design to provide the lowest NOx emissions
+ Features the HERO® oil gun, a patented phased-atomization technology that deliver a strategically sized and distributed oil spray to the burner system to control NOx and particulates while reducing the steam consumption

Ease of Operation

+ Operation on oil only, gas only or combination firing
+ Independent control of primary and staged air allows optimal settings for mode of operation
+ Damper access can be located to allow operation from grade
+ All gas tips individually removable

Adaptable Design Platform

+ Natural or forced draft
+ Up-fired and horizontal
+ Common plenum or individual

Typical Applications

+ Crude and Vacuum heaters
+ Horizontally fired platformers
+ Hot oil heaters, charge heaters, etc.

Global industry looks to John Zink Hamworthy Combustion to develop advanced, clean combustion systems that are renowned for reliable, cost-efficient operation.

Now, the experts at John Zink Hamworthy Combustion have engineered the DEEP*star* burner, a patented, revolutionary burner designed to reduce steam consumption, reduce NOx emissions, reduce particulate emissions, and create compact flame patterns. The DEEP*star* burner is designed for a full range of industrial process furnace applications and can operate under natural, forced or induced draft without sacrificing burner performance.

The DEEP*star* burner's breakthrough zone-controlled combustion employs a proprietary NOx-control strategy to minimize emissions where they form.

INNOVATION LIKE NO OTHER.

More than 1,100 Patents Earned.

At John Zink Hamworthy Combustion, our first priority is meeting our customers' needs. Sometimes, that means creating a better solution than what currently exists. And with unrivaled design, engineering and testing expertise in-house, we're able to do exactly that. *Let us put our innovation to work for you.*

Performance

Emissions

+ Gas NOx levels as low as 40 ppm
+ Oil NOx emissions as low as 150 ppm (based on 0.1% Fuel Bound Nitrogen)
+ Minimal particulate emissions
+ Noise controlled as low as 72 dB(A)

Reliability and Efficiency

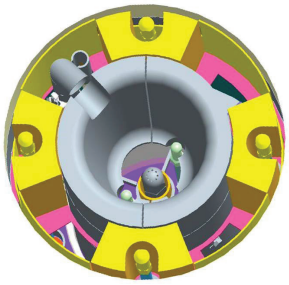
+ 30% reduction in steam consumption compared to traditional oil guns
+ Minimal excess air operation due to optimized air staging and independent damper control
+ Very stable over a wide range of fuels and furnace operating conditions

Turndown

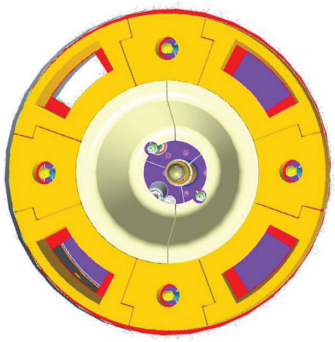
+ 5:1 turndown and higher based on application when firing gas
+ 3:1 turndown when firing oil

MKI Burner Full Oil Firing

MKII Burner Full Oil Firing



MKI Burner Tiles



MKII Burner Tiles

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