

Case Study: April, 2017



Synopsis

In 2016, Karamay Heating in the Xin Jiang Province of China expanded their plant with the addition of a new 70 MW natural gas fired D type hot water boiler. They were faced with ever tightening stack emission restrictions, even though this plant is located in the extreme North Western part of China, far removed from the air pollution that has plagued other parts of China from coal firing, such as Beijing. They partnered with Shanghai XinYe Boiler Company for this new large boiler and with NTFB Shanghai for a complete low NOx burner system.

NTFB's equipment scope included a windbox burner with multiple gas spud elements, packaged natural gas main fuel and pilot trains, burner management (bms), combustion controls (ccs) and a remote forced draft combustion air fan. The NTFB low NOx burner system also induced flue gas recirculation (FGR) to help attain <15 ppm NOx stack emissions.

The Technical Challenge

What's unusual about this installation is the level of NOx emissions required by local authorities. Not only did <15 ppm NOx have to be attained under

Automatic modulating controls, but the boiler efficiency also had to be maximized per specification requirements with the addition of both a boiler outlet economizer and a combustion air preheater. In spite of the high heat input requirement of 307 million btu/hr heat input, NTFB's customer wanted a single burner solution to meet this tough <15 ppm NOx requirement while keeping CO emission levels at <50 ppm. For this installation, the use of preheated combustion air, while only ~175 Degrees F. in theory added slightly to thermal NOx levels.

The Solution

NTFB used a single burner approach with their streamlined style GS Low NOx gas burner along with induced FGR to meet <15 ppm NOx and <50 ppm CO boiler stack emissions.

With NTFB's single low NOx burner solution, emission levels could be attained over a 8:1 boiler turndown range under automatic control. Parallel positioning combustion controls were housed in a remotely located freestanding panel along with burner management controls and accessories.



Karamay Heating Supply Co. Xin Jiang Province, China

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NTFB has met their customer's plant expansion needs while adhering to the tough NOx emission levels specified for natural gas fuel at this installation. This use of an NTFB low NOx burner along with a reasonable level of induced flue gas recirculation (FGR) rates for this strict NOx emission level of <15 ppm meets an important milestone that others can follow by example.

NTFB has helped an important customer set the challenge for other industrial and commercial facilities to also significantly reduce NOx emission levels as they likewise expand their operations in the many provinces of China.

Burners, Combustion Controls, Burner Management, Gas Piping

- Low NOx Burners* – NTFB Model GS
- Burner Windboxes* – NTFB Model AO5
- Gas Fuel Piping* – NTFB per NFPA 85
- Controls (CCS)* – Parallel Positioning / VFD Motor Control
- Burner Management* – NTFB / Fireye Scanners

Boiler and Burner Performance at Maximum Boiler Load (MCR)

Boiler Capacity – 70 MW
Burner Max Heat Output – 81 MW
Heat Release Rate – 307 MM Btu/hr
at MCR
Inside Furnace Dimensions:
- 12.4' Wide x 17' High x 34.7' Deep
Water Outlet Temperature - 265 Deg. F
Combustion Air Temp - 175 Deg F
Ambient Air Temp - 15 Deg F
Plant Elevation – ~1300 ft.
NOx at MCR - < 15 PPM
CO at MCR - < 50 ppm
Induced FGR Level - 26%
O2 Level at MCR - <3.5%
Main Fuel - 1000 BTU/CU FT Natural
Gas
Gas Supply Pressure – ~35 PSIG
Boiler Turndown on Auto Control: 8:1



Typical NTFB BMS/CCS Panel



Typical NTFB Windbox/Burner Arrangement