

PILLARD NANOxFLAM®

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Abstract :

Samsung Electronics is a 100% subsidiary of Samsung Group which operates on several markets such as mobile phones, digital media or semi-conductors.

Samsung Electronics owns 8 production plants in South Korea.

In 2015, Fives Pillard provided 1 PILLARD NANOxFLAM[®] natural gas burner of 15 MW to fit a 20 t/h Han Shin water tube boiler in Samsung Electronics Onyang plant in South Korea.

The main target of this new project was to match with the environmental South Korean regulation, especially NOx (< 25 ppm@4%O2 corresponding to 54 mg/Nm3@3%O2) and CO (< 120 ppm@4%O2 corresponding to 159 mg/Nm3@3%O2)

The commissioning results are :

NOx = 17,7 ppm@4%O2 (eq. 38 mg/Nm3@3%O2) CO = 9,7 ppm@4%O2 (eq. 13 mg/Nm3@3%O2)

Technology:

The PILLARD NANOxFLAM[®] burner is new generation of Ultra low-NOx burners based on a lean premix combustion and dedicated to boiler applications. NOx emissions of a lean premix combustion burner (before fuel staging injection) in a gas boiler depend on the excess air levels and on the quality of the mix between air and gaseous fuel. NOx emissions are very sensitive to excess air levels. An excess air level of 40–80% is needed in order to achieve very low NOx emissions (less than 20 mg/Nm3@3%O2). Below this threshold of 40%, NOx emissions promptly increase and reach usual NOx values. Above 80%, the flame temperature is very low and the stability of the lean premix combustion may be affected. NOx levels below 50 mg/Nm3@3%O2 are generally achieved with this technique.





Fives Pillard Patent N°WO2014162074



Results :



Emissions				Boiler
Natural gas	NOx	CO	O ₂	Load
	$(mg/Nm^3@3\%O_2 dry basis)$		(%)	%
Guaranted	54	159	≤ 3	100
Measured	38	13	3,0	

The PILLARD NANOxFLAM[®] burner enable to achieve 35% NOx reduction compared to the PILLARD LONOxFLAM[®] G2, measured on two similar boilers in the same plant.

Development status :

The PILLARD NANOxFLAM[®] burner is a new technology which is already applied on boilers in France, Germany and South Korea.

- 2012 : experimental development through a 5 MW prototype mounted on a water-tube boiler in our Research and Tests Center
- 2013 : experimental development through a 5 MW prototype mounted on a fire-tube boiler in our Research and Tests Center
- 2014 : 11 MW burner achievement «first industry» on a water-tube boiler through an industrial partnership in France (NOx < 50 mg/Nm3@3%O2)
- 2015 : launch on the market
- 2015 2017: last design including 5% NOx reduction and cost effectiveness

Between 2012 and 2014, the innovative PILLARD NANOxFLAM[®] development has received a funding and has been supported by the French Environment and Energy Management Agency (ADEME).



Applicability :

This technology can be used on water-tube and fire-tube boilers with natural gas.

Economics :

The use of PILLARD NANOxFLAM[®] technology has shown that the NOx value of 50 mg/Nm3@3%O2 is achievable without external flue-gas recirculation, avoiding the expense of higher capex and opex.