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STUDY UNIVERSITY OF CLUJ-NAPOCA ON SUPER CATALYZER VOSGES FOR GAS

TRANSLATION FROM THE RUMENIAN ORIGINAL

Stage II - research contract nr. 6288

2009

The tests aimed on Super Catalyzer had as purpose the observation of the influence of the magnetic field of economic and energy parameters of the boiler.

EFFECT ON MAGNETIC FIELD ON FUEL

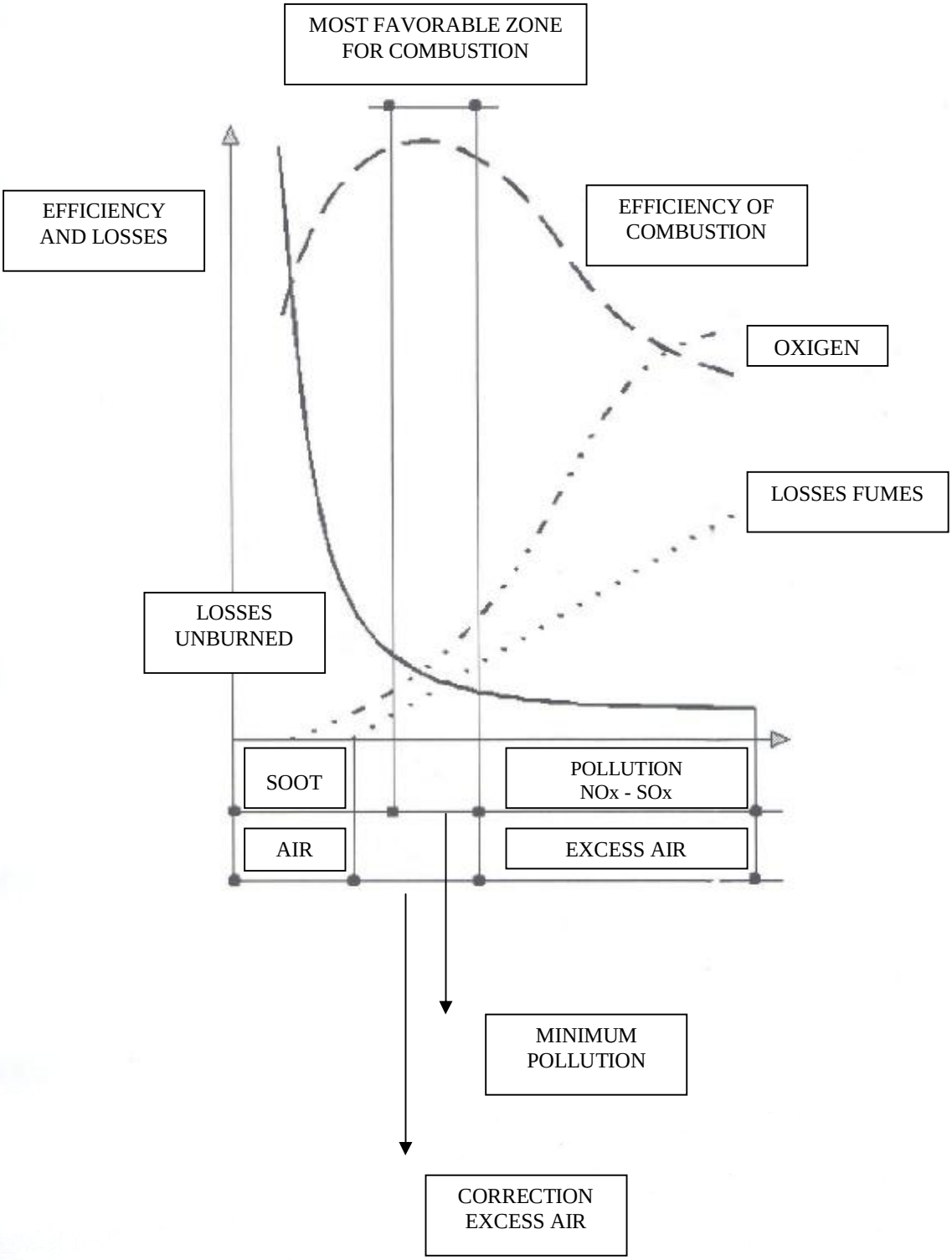
SCIENTIFIC PRINCIPLE

Before the process of combustion, the effect of the magnetic field is manifested by a reduction of the bond energy between atoms of carbon and hydrogen. This reduction leads to a greater availability of these atoms in a particular reagent, which is defined as “radical” (free radicals). During the combustion process with the oxigen present in the air are formed intermediate compounds, "peroxides", which subsequently reach with the unburnt fuel and bring a different energy system with a speed of growth of the rate of deflagration. This deflagration is decisive to determine the lenght of the flame (increase in speed, flame shorter).

NOTE

Since the value of the temperature of the flame will be more close to the theoretical maximum temperature, the effect of the flame supplied will be more concentrated.

DIAGRAM OF COMBUSTION



PRACTICAL EFFECTS EXPECTED

As a result of this change (speed of deflagration) were obtained the following benefits :

- reduction of flame lenght
- modification in the emission properties
- oxidation of any unburnt gases
- recovery of chemical energy still available in the unburnt gas
- combustion process with an excess of lower air
- emanations containing more unburned gases that influencing the content of CO (carbon monoxide)
- the same for the emanations of nitrogen oxide (NOx) in some burners
- increased efficency of combustion and the work.

PARAMETERS CONTROLLED DURING THE TESTS

COMBUSTION

- appearance of the gas flame
- ambient temperature
- temperature of exhaust gas
- percentage of residual O2
- percentage of CO2
- value of excess air
- CO levels in ppm (parts per million) and in mg/mc
- NOx levels in ppm (parts per million) and in mg/mc
- loss of fuel
- combustion efficiency

MEASUREMENT AND CONTROL EQUIPMENT

Trials and tests are done with a electronic computer of combustion type Maxilyzer.

Portable gas analyzer type Maxilyzer

Professional computer for special applications, extremely robust, resistant to mechanical shocks, with the closing completed sealed. Is used to find the components of exhaust gases from furnaces and boilers or condensating with nominal medium and large power. Is particularly recommended for solid fuel and for the combustion of long term monitoring (range 48 hours of continuos operation). MAXILYZER is certified EN 50379-2!

Measures

Dimension	Measuring range	Maximum values in according with ISCIR PTA1	Precision	Resolution
O2	0……..20,9%		±0,2% max. value	0,1%
CO (compens. H2)	0……..4000 ppm	cca. 80 ppm (100 mg / Nm^3)	**±5 ppm up to 150 ppm** ±5% max. value > 150 ppm	1 ppm
NO (No_x)	0……..2000 ppm	cca. 170 ppm (350 mg / Nm^3)	**±5 ppm up to 150 ppm** ±5% max.value >150 ppm	1 ppm
SO2	0……..2000 ppm	cca. 12 ppm (35 mg / Nm^3)	**±5 ppm up to 150 ppm** ±5% max.value>150 ppm	1 ppm
Flue gas temperature	0……1000°C		±0,5% max. value	1°C
Temperature air combustion	-20°C +100°C		±3°C+1digit (-20,0..... 0,0°C) - ±1°C+1digit (+0,1…..+100,0°C)	0,1°C
Diffusion /pressure to cart	-2,00 +2,00hPa		±0,02 hPa + 1 digit	0,01hPa
Δp interior	±2,01 ±20,00hPa		±1% max. value	0,01hPa
Δp elevated	±20,01 ±150hPa		±3% max. value	0,1hPa

Other available sensors : sensors CO range 10000 ppm / 20000 ppm / 40000 ppm.

Calculated dimensions

- CO_2, CO undiluted, NO_X, NO undiluted, SO_2 undiluted
- Dew point temperature
- Coefficient of excess air λ
- Losses, combustion efficency η
- Performance of the condensing boiler η_{BW}

Figure 6.3 Analyzer for flue gas

TECHNICAL DATA OF THE BOILER

Wall boiler of the heating system 24,6 KW - fig.2.

Type	UM	
Useful heat output	KW	8,5-24.6
Fuel	Gas methane	
Efficiency	%	90-92.5
Temperature range of heating water	˚C	35-85
Min/max operating water heating	KPa	60/300
Volume expansion tank	l	7
Min/max sanitary hot water pression	KPa	50/600
Sanitary hot water flow	l/min	13,6
Inizial time of heating (from 15° to 60°)	min	10
Discharge of unburnt gas		Forced draft

TECHNICAL SPECIFICATIONS OF SUPER CATALYZER TESTED

* dimensions : mm Ø 32 x 81 connection 1/2" M/F;
* **Super Catalyzer** has no sense of installation;
* is installed on the supply pipe of the gas after the stabilizing valves;
* is suitable for gas burner up to 30.000 K/cal (in general domestic boiler) or the gas lance with singular power up to 30.000 K/cal.

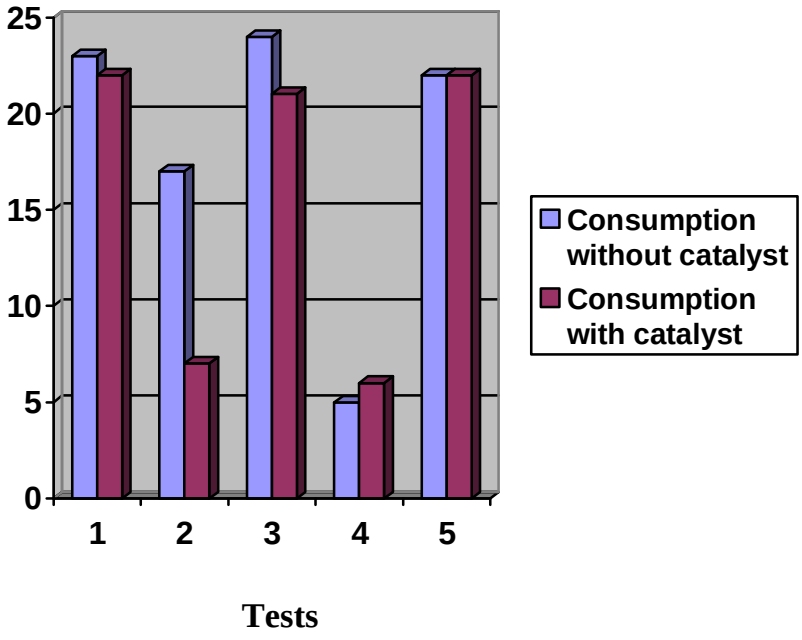
RESULTS OF COMBUSTION TESTS ON BOILER WALL

Number measurements	Without catalyst		With catalyst	
	meter reading per minute	consumption per minute	meter reading per minute	consumption per minute
	0.816		0.867	
1	0.839	0.023	0.889	0.022
2	0.856	0.017	0.896	0.007
3	0.88	0.024	0.917	0.021
4	0.885	0.005	0.923	0.006
5	0.907	0.022	0.945	0.022
Average consumption per minute		0.0182		0.0156

Observation :

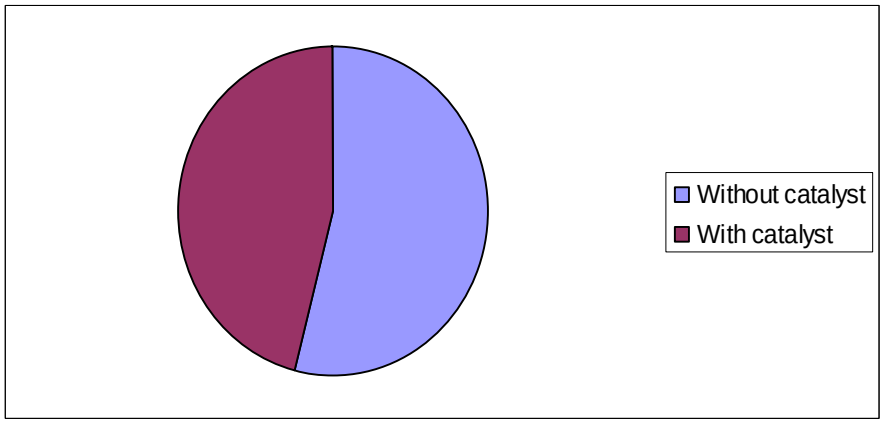
There are an 8% reduction in consumption. It should be noted that the measurements were made in the first hour after the installation of the catalyst on the boiler under study. Taking into account the recommendations of the manufacturer, that all samples and analyzes are carried out after a period of operation at least 50 hours to give the boiler a chance to adapt the new conditions created by installing the Super Catalyzer, consider the eloquent evidence.

Gas consumption in one minute



Tests

Gas consumption



Without catalyst 54%
With catalyst 46%

RESULTS OBTAINED AFTER THE TEST
USING A BULB BUNSEN



CONDUCT OF THE TEST

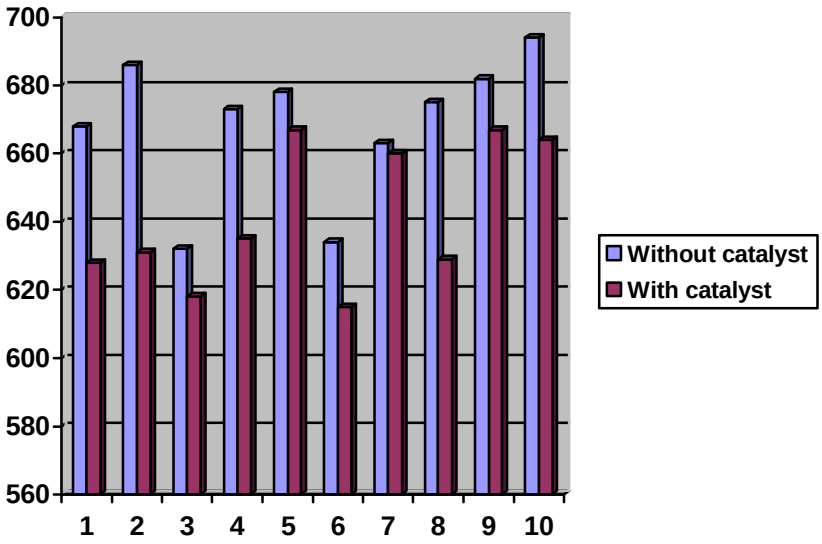
Attempts have been made to head a quantity of 2 liters of water from 30°C to 97°C.

The experiment was conducted in two phases, once without catalyst and a second time with the catalyst. The results are reported on the table below.

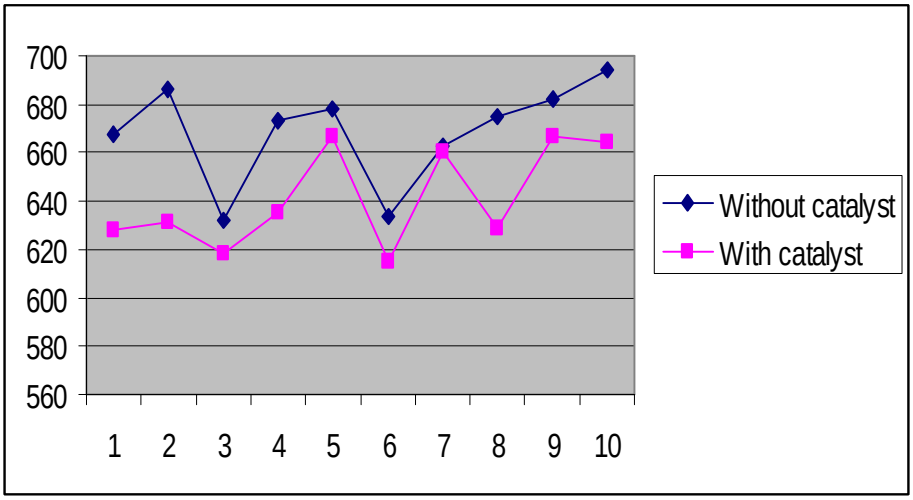
Initial temperature t [^{0}C]	Final temperature t [^{0}C]	Time without Catalist [sec]	Time with Catalist [sec]	
30	97	668.4	628.2	
30	97	686.4	631.8	
30	97	632.4	618.0	
30	97	673.8	635.4	
30	97	678.6	667.2	
30	97	634.8	615.6	
30	97	663.6	660.6	
30	97	675.0	629.4	
30	97	682.8	667.8	
30	97	694.8	664.2	sec. dif.
		6690.6	6418.2	272.4

After the experiments made it was found heating water faster with the catalyst, these performances can be seen in the graphs below :

Number of tests in seconds



Number of tests in seconds



CONCLUSIONS :

It can be said with certainty in this study, as stated by the manufacturer, that the technical performance through its technical documents are confirmed. The installation of Super Catalyzer on a wall boiler presents no risk, but it increases performance and protects the environment through the reduction of pollutants emitted into the air.

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