

Premium marathon® combustion systems in world wide operation...

Information

NO_x emissions caused by combustion plants

Example detail of a marathon® LOW-NO_x gas flame with internal exhaust gas recirculation



Example of a LOW-NO_x gas flame as premix burner

“Wer misst, misst Mist“ is a German saying in the field of metrology for „who measures, measures rubbish“. At national, European and international level, the maximum allowable NO_x emissions limits will be tightened. Therefore it is important that all parties “speak the same language“, because the European Directives IED „Industrial Emissions Directive“ and MCPD „Medium Combustion Plant Directive“ pretend indeed NO_x limits for fuels and combustion plants, but they do not give precise instructions to carry out the measurement itself. This should be left to local law.

In Germany, the legislator is working on an adaption of the TA Luft with new emission limits and specific statements for referencing and calculation of NO_x emissions. Also in the European standards EN 676 „Automatic forced draught burners for gaseous fuels“ and EN 267 „Automatic forced draught burners for liquid fuels“, there are already significant information about units, conversions, measurement uncertainties and reference conditions at the NO_x measurement.

Comparable can be found in the international standards ISO 22967 „Forced draught gas burners“ and ISO 22968 „Forced draught oil burners“.

Moreover, in other countries, extremely low NO_x requirements are planned with different investigation, evaluation and referencing or have already been implemented.

Thus, in some European countries it is e.g. sufficient, to adhere to the NO_x emission only in one single load point between 60% and 80% of the heat input with respect to the measurement uncertainty.

In Germany, the measurement uncertainty shall be kept in the range of TA Luft until now: measuring value + measuring uncertainty < limit value. Other rules and standards tolerate averages over the entire load range of a burner or even allow for the weighting of emission values at reduced load levels, whereas installations with continuous emission monitoring shall comply with half hourly or daily averages.



Information sheet NO_x
A 1357E



To this topic we have summarized all important information for you. Our information sheet „NO_x emissions caused by combustion plants – formation, reduction technologies and measurement“ includes current NO_x emission limit values for combustion plants in Germany and Europe, existing directives, information on measurement and standardization, as well as influence possibilities of the boiler/burner technology on NO_x emissions. Are you interested? We can send you our information sheet on request.

Order form see last page →

Dates

08th/09th June 2016
28th/29th September 2016
Technology seminars
Spaichingen

19th /20th/21st April 2016
13th GESTRA Symposium 2016
Nürtingen/München/Nürnberg

Imprint

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Installation example from the Netherlands

LOW-NO_x power plant with 40 MW

In December 2015, the cogeneration plant Waalsprong was put into operation in Lent in the Netherlands. Two hedging and peak load boiler with a total capacity of 40 MW guarantee the heat supply, especially in winter with very cold conditions. So maximum availability of heat is ensured. The power plant supplies about 14.000 households in the region with heat.

In the middle of last year dreizler® delivered 4 x LOW-NO_x burners in DUObloc version with a combustion capacity of each 10,7 MW to the company Bosch Industriekessel GmbH.

Two high-pressure hot water boilers in double flame tube construction of the type UT-HZ 22750x16 were installed by Bosch with two gas burners **marathon®** M 10003.3 ARZ. Natural gas L with an input pressure of 8 bar is used as fuel. The **marathon®** burners are equipped with internal flue gas recirculation dreizler® **ARZ** and additionally with external exhaust gas recirculation dreizler® **ARF**. By the use of oxygen control **oxygen** and speed control **frequency** an economic burner operation is ensured.

The commissioning was done by the experienced service engineers of Bosch Industriekessel GmbH from Germany together with their Dutch colleagues.



In all four burners, the set NO_x values are well below 50 mg/Nm³ at 3 Vol% O₂ over the entire load range.

For this reason the CHP Waalsprong is certainly one of the cleanest plants of this construction type in Europe.



Installation example from the Netherlands



marathon®

Technical data

Total capacity of the installation → 40 MW

Burner

4 x Gas burners
marathon® M 10003.3 ARZ
 in DUObloc version
 Burner capacity → 4 x ca. 10,7 MW

Version LOW-NO_x with
 internal flue gas recirculation **ARZ** and
 external exhaust gas recirculation **ARF**

oxygen control **oxygen**
 speed control **frequency**
 NO_x ≤ 50 mg/Nm³ at 3 Vol% O₂

Boiler

Bosch Industriekessel GmbH
 2 x Double flame tube boiler
 UT-HZ 22750x16



We thank you for the excellent project implementation and for the confidence in the dreizler **marathon®** burner technology.



For especially low NO_x emissions
 Internal and external flue gas recirculation **ARZ** and **ARF**

The recirculation of completely burned exhaust gases with low oxygen and a comparatively high CO₂ concentration in the combustion, is referred to as exhaust gas recirculation or EGR. Both methods have in common that even minor amounts of inert exhaust gases in the combustion cause a lowering of the thermal NO formation.

In the external exhaust gas recirculation, exhaust gases are led outside of the heat generator by matched lines and with the aid of the combustion air fan or by addition of auxiliary fans back into the mixing unit.

In the internal flue gas recirculation pressure differences in the mixing unit and the combustion chamber are used to return exhaust gas directly from the combustion

chamber to the burner mixing device and back again into the flame. The internal flue gas recirculation and external exhaust gas recirculation can be combined to achieve particularly low NO_x emissions.



Information sheet ARZ/ARF
 A 1338E

For a detailed description please refer to our information sheet A 1338E „Emission reduction by internal flue gas recirculation dreizler® ARZ and external exhaust gas recirculation dreizler® ARF“. Contact us for details.



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Installation example

Efficiency optimization by oxygen control

At the end of 2015, the GETEC heat & power AG has constructed a new gas turbine cogeneration plant for the traditional chemical company DHW Deutsche Hydrierwerke GmbH Rodleben. The new cogeneration plant simultaneously generates steam and electricity for production.

For steam generation two ASTEBO shell boilers were installed in combination with modern dreizler® burner technology.

The oxygen-regulated gas burners marathon® M 10001.4 ARZ oxygen in LOW-NO_x version with internal flue gas recirculation ARZ ensure continuously for efficient operation.

The oxygen control oxygen measures the O₂ content in the flue gas and optimizes the amount of air. Thus, the burners always operate at maximum combustion efficiency. This type of O₂ optimization can be applied to almost all liquid and gaseous fuels.



Depending on the size of the plant, this investment will pay for itself within a few months.

Technical data

Burner

2 x Gas burners
marathon® M 10001.4 ARZ
in version MONObloc
Burner capacity → each ca. 12,5 MW

Version LOW-NO_x with internal flue gas recirculation ARZ
oxygen control oxygen

Boiler

Steam boiler astebo THD-I
1 x Heat recovery shell boiler
1 x Shell boiler
Steam output → each 16,0 t/h

” Thanks to GETEC heat & power AG and the plant operator for the use of marathon® burner technology.

GETEC | heat & power
Aktiengesellschaft

Installation example Sweden

Conversion of water tube boiler according to Directive 2010/75/EU Industrial Emissions

In April 2015, we provided reliable and efficient burner technology to our customer COMPAB AB in Sweden.

Two gas burners marathon® M 10003.2 ARZ in version DUObloc were installed to an existing water tube boiler. The special characteristics of marathon® burners perfectly match the typical geometry of the combustion chambers of the water tube boilers. The flue gas recirculation ARZ integrated in the burner head enables extremely low-emission combustion. The operator benefits from low emission. The competently performed commissioning took place within a short time by the team of COMPAB AB.



Numerous well-known companies benefit from our experience with different types of water tube boilers and our professional project management.

We support you when planning your combustion installation and look forward to your inquiry.

Technical data

Burner

2 x Gas burners
marathon® M 10003.2 ARZ
in version DUObloc
Burner capacity → each ca. 8 MW

Version LOW-NO_x with internal flue gas recirculation ARZ

Boiler

Water tube boiler

” Thank you for the reliable and very good cooperation.

 compab

Gas analysis

Emission measurement in vehicles

In view of the current discussion about the actual emissions of vehicles in regular road, the idea came spontaneously to the dreizler® team to make also control measurements on vehicles with our own measurement technology.



We have measured a total of 16 vehicles. The measurement was carried out always by the same pattern. Within a specified measurement round of 14 km in length, five measuring points with typical load values and identical speeds were made with each vehicle. From the measured vehicles were 13 diesel passenger cars of different designs, one petrol and two hybrid models.

Of course, our selected measurement points are not the same as a standard cycle and they are also not directly comparable with the corresponding inspections of specialized measurement institutes. Nevertheless, it showed a clear trend and repeat accuracy of the measurements was very good.

Depending on the measuring point and diesel vehicle the measurement results show NO_x concentrations in exhaust gas of 100 ppm - 1500 ppm. As an average over all 5 measuring points there were mean concentrations of

- ➔ 500 ppm – 1800 ppm (0 Vol%)
- ➔ Converted into g/km:
0,95 g/km – 3,45 g/km

If we compare these emissions of the vehicles with the prescribed NO_x emissions for LOW-NO_x oil burners according to TA Luft, so we measured for diesel vehicles by up to 18-fold higher concentrations of NO_x in the exhaust gas as compared to typical marathon® LOW-NO_x oil burners.

Against this background, we note that modern LOW-NO_x burner/boiler combinations deal very responsibly with the energy resources of natural gas and heating oil Extra Light, due to their efficiency and low exhaust emissions.

Very good examples for this are marathon® LOW NO_x burners. They make optimum use of energy in the fuel: reliable, efficient and clean. Because of the possibility of additional supply of renewable fuels such as biogas or pyrolysis, further optimization potentials arise for saving natural gas or heating oil and to reduce CO₂ emissions.

The most effective contribution to the reduction of emissions would therefore also be the exchange of the partially greatly outmoded installations and an investment in modern and advanced combustion technology.

The brochure „Energy efficiency in heating systems in industry and production“ of BDH Bundesindustrieverband Deutschland e.V. in cooperation with Deutsche Energie-Agentur dena, informs companies and plant operators on potential to reduce emissions and to increase efficiency in the German installations.

Download:
www.bdh-koeln.de/industrie/publikationen.html

Pilot plant

Development of a burner for combustion pyrolysis steam

The process of pyrolysis of waste apart from e.g. organic waste or sewage sludge is also suitable for plastic waste. The Company NGR is a manufacturer of plastics recycling systems in Feldkirchen, Austria and built a pilot plant for the pyrolysis of waste plastics at the University JKU in Linz. In the pyrolysis reactor, the waste plastics are heated under exclusion of air. By thermo-chemical processes solid hydrocarbons are converted in vaporous and

gaseous hydrocarbons, which are in turn supplied to the burner and are burned in the combustion chamber. One challenge is the behavior of the pyrolysis vapor, which can condense and which can lead to malfunctions in valves or clogging.

The power plant consists of the pyrolysis reactor, a burner with combustion chamber, a thermal oil heat exchanger and the flue gas filter.

dreizler® supplies the combustion chamber and the propane/pyrolysis vapor swirl burner. The plant will go into operation soon.



Spaichingen

Successful training completion

A good and quality training is the foundation for a secure future. After 3 1/2 years training period and successful completion of the exam Florian Grünwald and John Zahn were honored to receive their professional training certificate in mechatronics.

In their varied and practical apprenticeship the prospective mechatronics were optimally trained and now they support our team as well trained burner technicians in the field of final assembly.

We are pleased and congratulate for passing the exam. All the best from the dreizler Team!



Dates

13th GESTRA Symposium 2016

For 12 years the GESTRA AG organized their annual successful symposia on the main theme "cost efficiency" in various cities across Germany. More than 7000 people have participated in more than 100 events.

„Economic utilization of primary energy and cost developments in the boiler house“ is the theme of this year’s 13th Symposium.

Interesting presentations of various speakers are provided in the program. With the informative presentation „Energy efficient burner technology – Clean combustion with minimal emissions“ dreizler® will again take part as a partner. The accompanying exhibition provides ample opportunity for technical discussions.

Dates



- 19th April 2016 Nürtingen
- 20th April 2016 München
- 21st April 2016 Nürnberg

Program and registration:

www.gestra.de/akademie/fachtagung.php

The events will start at 8:30 a.m. and last until approximately 15:00 p.m. Participation for free.

Technology seminars at dreizler®

In our seminars we inform about current challenges in the combustion technology and show you advanced solutions for your technical requirements:

- Current emissions laws, regulations and directives
- Reduction of NO_x, CO and CO₂ emissions
- Modern burner technology for energy efficiency

Informative and worth knowing presentations on these topics can be expected. A tour of the production and live demonstration of burner systems in our laboratory round off our seminar program. The technology seminar starts at 14:00 p.m. and ends on the following day to 12:00 p.m. Participation is free of charge. If you are interested, please contact us. You are welcome to receive an invitation.

We are pleased if you are participating.



Dates

- 08th/9th June 2016
- 28th /29th September 2016

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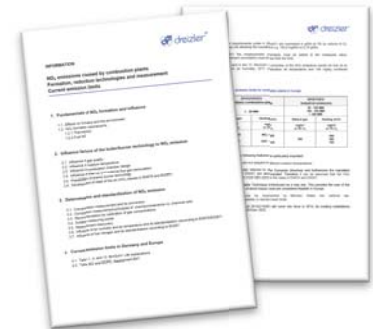
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Information sheet NO_x – A 1357E (to issue on page 1)

“NO_x emissions caused by combustion plants -
Formation, reduction technologies and measurement”



Information sheet ARZ/ARF – A 1338E (to issue on page 3)

“Emission reduction by the internal flue gas recirculation dreizler® ARZ
and the external exhaust gas recirculation dreizler® ARF



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