

*Low NOx Burners*  
*Stork Thermeq*

## Why Stork Thermeq?

---



Stork Thermeq is an unrivalled specialist in the area of combustion systems. Our customers are refineries, power plants, industrial energy units and boiler manufacturers. Stork has over 60 years

experience in designing and supplying combustion installations for boilers with capacities between 10 and 2000 tonnes of steam per hour. Stork, as a designer of complete boiler installations for power stations and industrial boilers, ensures a thorough insight in the requirements of the combustion installation for each situation. Our engineers fit patented and proven concepts to your specific demands. For many decades Stork Thermeq has a successful track record as Original Equipment Manufacturer for combustion systems.



---

STORK THERMEQ

# Double Register & Low Calorific Gas Burner



## General

Stringent environmental standards for emission of nitrogen oxides (NOx) have led to the development of the Double Register Burner. Based on thorough knowledge of NOx formation and experiments at test plants, Stork Thermeq developed a burner that enables a substantial cut back in NOx emissions, linked with a high combustion efficiency.

A typical feature of this burner type is the staged supply of combustion air. Part of the air is fed to the centre of the burner throat while being in strong rotation, the rest of the air, skirting the flame like a peel. This type of air supply has the effect of falling flame temperature and oxygen concentration which decreases the formation of thermal and fuel NOx.

## Low Calorific gasses and waste streams

Besides the application of fuel oil and high calorific gasses, the Double Register concept can also be applied for all kind of Low Calorific Gasses and Waste streams, like for instance blast furnace gas, tail gas, coke oven gas and animal fat. The optimum results are obtained by a customer made design for each specific fuel or waste stream. Based on long term experience Stork ensures a reliable burner for all kind of fuels and various applications

## Application

- Power station boilers
- Industrial boilers
- Waste heat recovery boilers
- Retrofit to low NOx

## Emissions

Application of the Double Register Burner leads to considerable reduction of NOx emission at combustion with low excess air. Unburned losses and CO remain at a minimum.

### Technical data

Gas: natural gas  
refinery gas  
hydrogen gas  
process gas  
blast furnace gas  
tail gas  
vent gas

Oil: light oil  
heavy oil  
residual oil  
bitumen, pitch  
animal fat  
bio oil

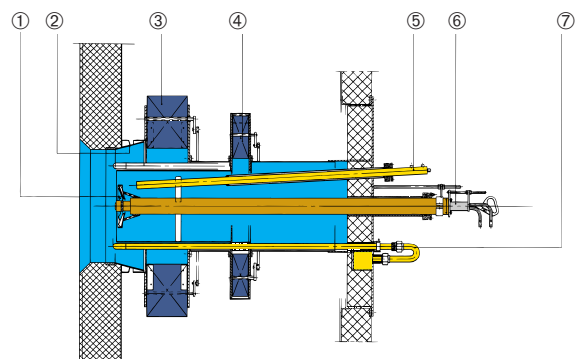
Heat input range: 5 - 100 MWth

Guaranteed turn down ratio

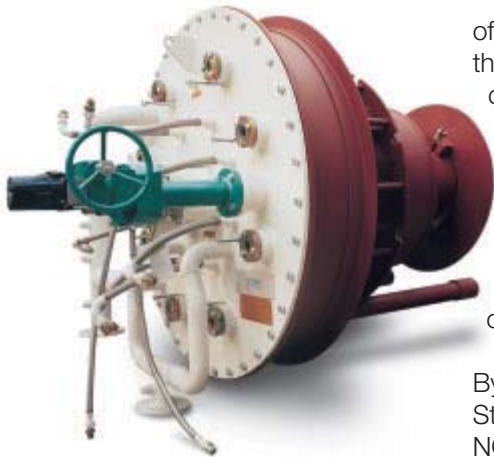
Gas: 1 : 5

Oil: 1 : 4

- ① STABILIZER
- ② BURNER THROAT
- ③ SEC. AIR REGISTER
- ④ PRIM. AIR REGISTER
- ⑤ IGNITION BURNER
- ⑥ OIL BURNER
- ⑦ GAS SPUD



# Impuls Ultra Low NOx Gas Burner



## General

To meet the most stringent NOx requirements the Impuls Gas Burner has been developed. Based on the experience with the Stork Double Register Burner and our thorough knowledge of the burning process and formation of NOx we have developed our third generation gas burner, the Impuls Gas Burner. NOx values below 70 mg/Nm<sup>3</sup> are possible.

## Combustion principle

The basic principle of the burner is the separated injection of air (1) and fuel (2) in the furnace. By means of this injection method flue gasses from the furnace (4) are aspirated into the air and gas flow prior to mixing the flows into a combustible mixture. The aspiration of flue gasses lowers the oxygen concentration and increases the mass flow in the flame, both limiting the formation

of NOx. An impeller is installed in the centre of the air supply. In order to create a stable ignition of the flame (zone A), part of the fuel gas is injected after this impeller (3). The completion of combustion takes place in zone B at low excess air and low flame temperature conditions.

By using this unique technique Stork has achieved maximum NOx reduction with high efficient combustion, complying with the most stringent requirements.

## Application

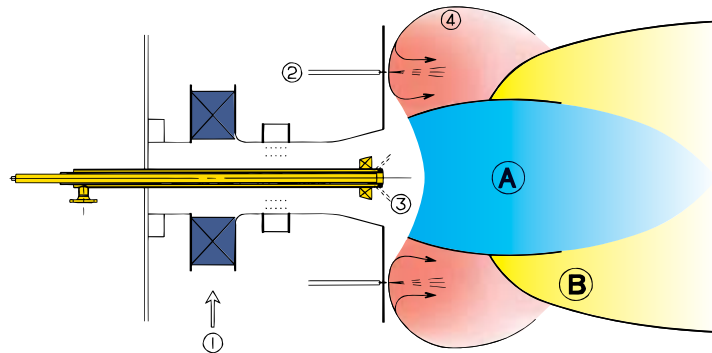
- Power Station boilers
- Industrial boilers
- Waste heat recovery boilers
- Retrofit to low NOx

## Emissions

The Impuls burner is able to meet the most stringent local and international NOx emission demands.

### Technical data

Fuel: Gas
Heat input range: 5 - 60 MWth
Guaranteed turn down ratio: 1 : 5



## Low NOx systems

Besides Low NOx burners, Stork Thermeq can offer Low NOx systems for new and retrofit installations like,

- two stage combustion
- flue gas re-circulation
- re-burning

The following Emission levels can be achieved:

Fuel	NOx level
Natural Gas	50 mg/Nm <sup>3</sup>
Heavy Fuel Oil	150 mg/Nm <sup>3</sup>
Hard Coal	200 mg/Nm <sup>3</sup>

# Process Control & Instrumentation

---

Our process control and instrumentation group consists of skilled and experienced personnel who are specialized in measurement, instrumentation, control, safe guarding and automation for a variety of burner and energy systems.

## Wide range of activities

### - Turnkey projects

Ranging from, instrumentation to complete automation. From project management, engineering, delivery, erection, start up and training Stork Thermeq can do the job.

### - Renovation and updating

Stork Thermeq can offer you a complete renovation and updating of the process and control equipment. The degree of automation can also be improved by the use of intelligent systems and modern field equipment, tailored to your specific requirements.

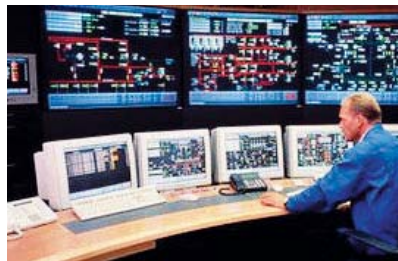
### - Energy audits / Consultancy

Our specialists and facilities can execute energy audits to investigate and review processes in existing energy systems and advise you on further improvements.

## A practical project oriented approach

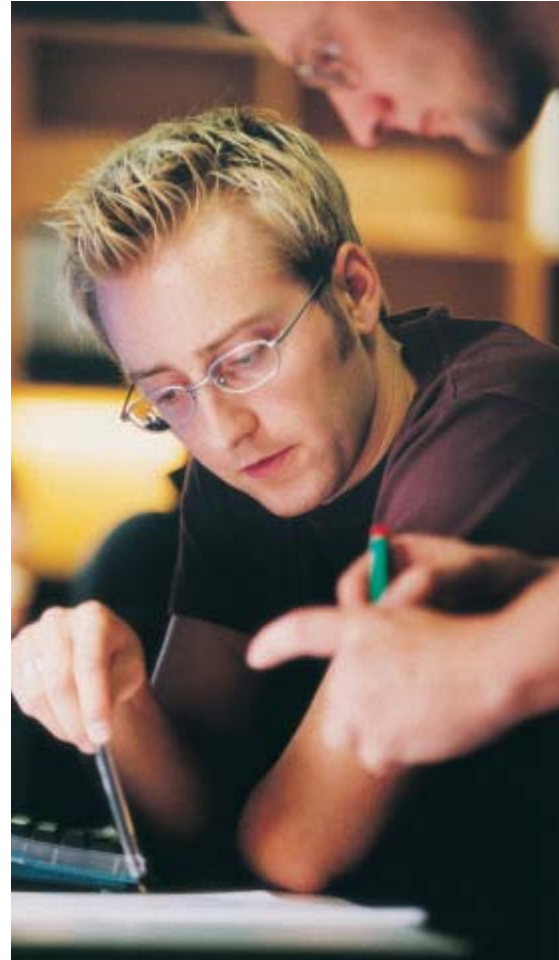
Projects and orders are carried out using a proven project approach. Unique is the combination of activities of the process and control & instrumentation group.

- Energy Audits
- Consultancy / Studies
- Basic and detail engineering
- BMS, DCS and & PLC /Scada systems
- Instrumentation and Emergency Shut Down (ESD) systems
- System verification / Factory Acceptance Test (FAT)
- Commissioning / Site acceptance Test (SAT)
- Training



## A strong service group

Stork Thermeq has a strong service group at its disposal which aims at maintaining the reliability of installations with a minimum possible operating cost. Five important factors contribute to this:



- Planned preventive maintenance and regular inspections
- Reconditioning and supply of spare parts
- Trouble shooting
- Training
- Emission and energy measurements

## Qualifications *The Stork Network*

Stork is certified according to ISO 9001 (2000).



Furthermore, Stork Thermeq is qualified for designing, manufacturing, servicing and testing boiler components and pressure vessels to the internationally recognised rules and requirements of:

- Dutch Rules for Pressure Vessels
- TÜV, AD-Merkblätter HP 0 and TRD 201



- ASME certificates and Code Stamps S and U
- European Pressure Equipment Directive



- UDT Office of Technical inspection, Poland
- Other Codes and standards as PD 5500, EN 13445, SVTI/ ASIT, IBR, CODAP, etc
- VCA\*\*

Welders and welding procedures are available for any possible steel type and procedure combinations, such as prescribed by Euronorm and ASME.

Stork Thermeq is an independent operating company of Stork Technical Services.

This is a network of companies, each having its own area of expertise that benefit the other companies. As a customer this means your account manager will not only serve you in relation to Stork Thermeq, but also in this network of companies.

Service and maintenance of turbines, compressors, gearboxes, etc, your account manager knows the way.

Stork Technical Services is part of Stork NV, the global technology based group of companies with 16,000 employees, realising an annual turnover of over € 2 billion.

*Stork Thermeq  
P.O. Box 33  
7550 AA Hengelo (Ov.)  
The Netherlands*

*Visiting address:  
Langelermatweg 12  
7553 JD Hengelo (Ov.)  
The Netherlands  
Tel: +31 (0)74 240 1724  
Fax: +31 (0)74 242 4790*

*e-mail: [info.thermeq@stork.com](mailto:info.thermeq@stork.com)  
website: [www.thermeq.nl](http://www.thermeq.nl)*

STORK THERMEQ

PENTOL - ENVIRO POLSKA Sp. z o.o.  
Osiedle Piastów 21B, 31-624 Kraków  
Tel. +48 12 686 36 86, fax +48 12 686 11 01  
[www.pentol.pl](http://www.pentol.pl), e-mail: [pentol@pentol.pl](mailto:pentol@pentol.pl)