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High temperature heat exchangers

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The Bosal Group

Bosal is a leading manufacturer of:

- ✓ Complete emission control systems for passenger cars, trucks and industrial applications
- ✓ Catalytic converters
- ✓ Towbar systems, roofbars and roof racks
- ✓ Jacks and toolkits
- ✓ Precision steel tubing
- ✓ Vehicle cabins
- ✓ Heat exchangers and energy conversion components

The annual turnover in 2009 was in excess of € 590 million. The Bosal Group employs over 5,400 people in 41 manufacturing plants and 12 distribution Centres. Bosal's customer base includes all major car manufacturers worldwide as well as a variety of leading industrial conglomerates.

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High temperature plate heat exchangers

HEX P700 series

The HEX P700 is a plate heat exchanger, for heat recovery at gas temperatures up to 700 C. It can handle pressurised gas: the operating pressure of both gas flows is allowed to differ by as much as 5 bar.

HEX P1000 series

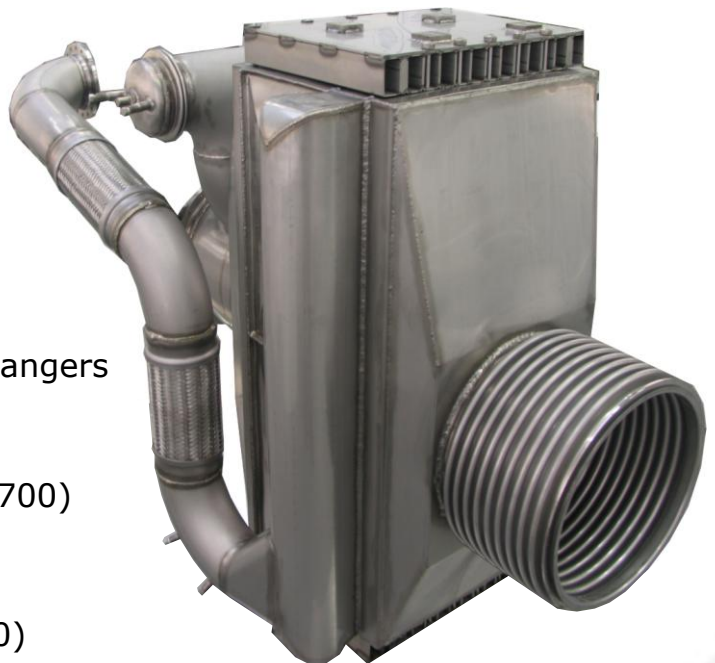
The HEX P1000 is based on the P700 design. It is rated for gas temperatures up to 1000 C, at atmospheric conditions.

Applications

- ✓ SOFC
- ✓ Stirling engines
- ✓ Micro gasturbines
- ✓ Internal combustion engines

Features

- ✓ Fully welded plate heat exchangers
- ✓ Serial production since 2007
- ✓ Working temperature up to 1000 C (P1000) or 700 C (P700)
- ✓ Modulary built
- ✓ Power range:
 - ✓ 0.5 – 300 kWth (P1000)
 - ✓ 10 – 300 kWth (P700)
- ✓ Compact design
- ✓ Pressure drop as low as 5 mbar
- ✓ Effectiveness up to 90%
- ✓ Maximum allowable pressure difference between gas flows up to 500 mbar (P1000) or 5 bar (P700)
- ✓ Customised interface design, including component integration
- ✓ Cr VI inhibitive coating optional





High temperature plate heat exchangers

Construction

The HEX P1000 and HEX P700 heat exchangers are fully welded, using the manufacturing techniques for Bosal's line of automotive high temperature components. They are available in three footprints, reflecting three validated plate designs.

The surface can be catalytically coated, so that the reaction heat (exotherm or endotherm) is exchanged.

The units are modularly built: the plate number is calculated for each application, so that pressure drop and exchanged heat meets the requirements supplied by the customer.



Interfacing

The interfacing is tailor-made to satisfy customer requirements on routing, connection system, mounting and support.

Additional components can be integrated in the interfacing (burners, probes, gas processing units, bellows).

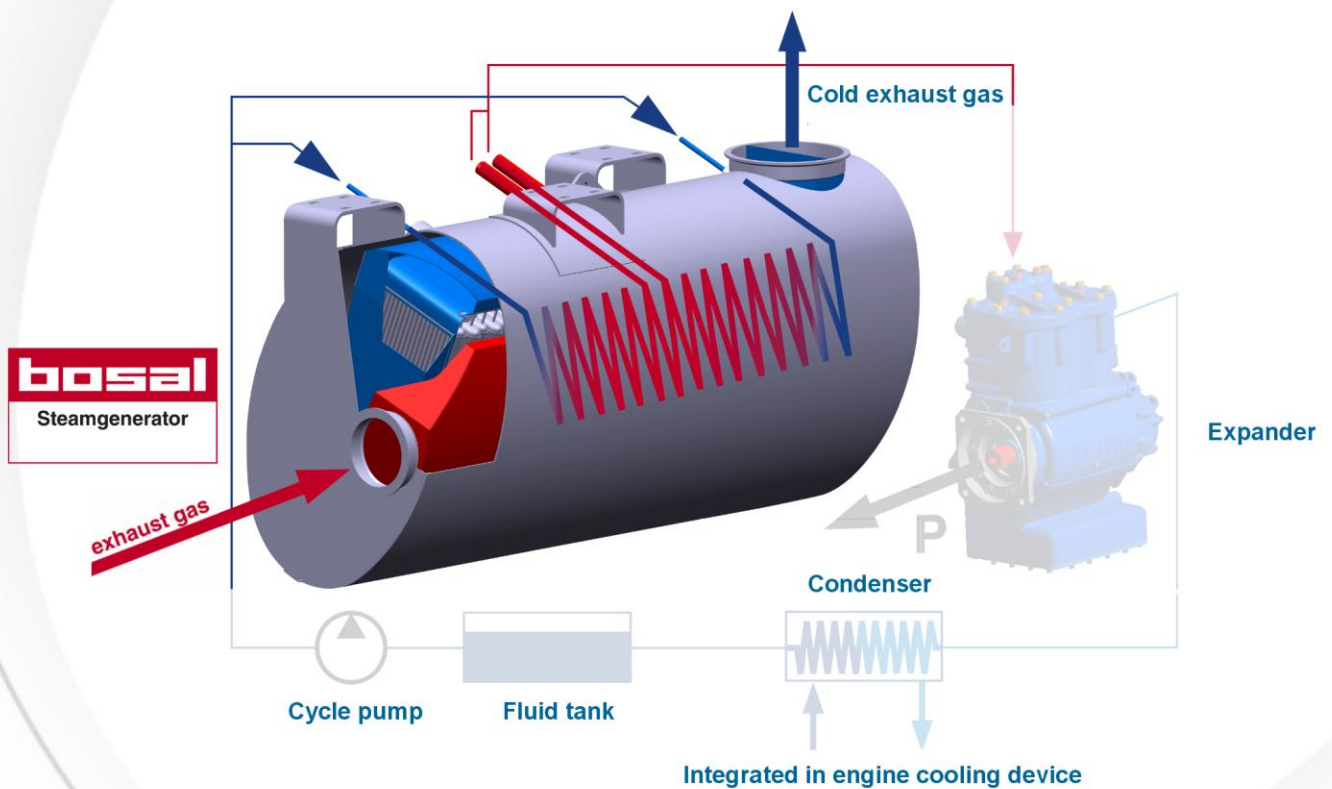




Tubular heat exchangers

Bosal SG T500

The Bosal SG500 is a tubular heat exchanger, designed to continuously generate overheated, pressurised steam. Typical units exchange 50 – 200 kW between a hot gas flow, and incoming water at 40 – 60 bar. The outcoming steam can be used for generating electrical or mechanical power.





Research and development

Numerical simulation

Numerical simulation tools are developed, capable of rapid modelling the impact of interface modifications on the overall performance of the heat exchangers.

Product testing

The performance of the heat exchangers is tested at Bosal's testlabs in Lummen, Belgium. The test infrastructure was initially developed for high throughput automotive testing.

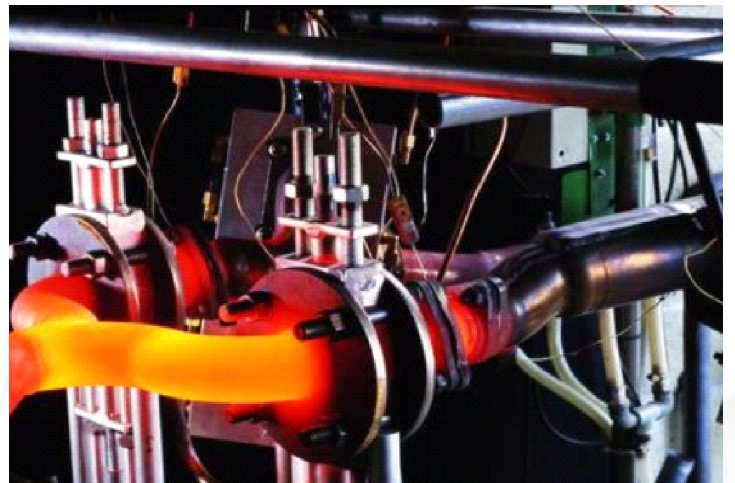
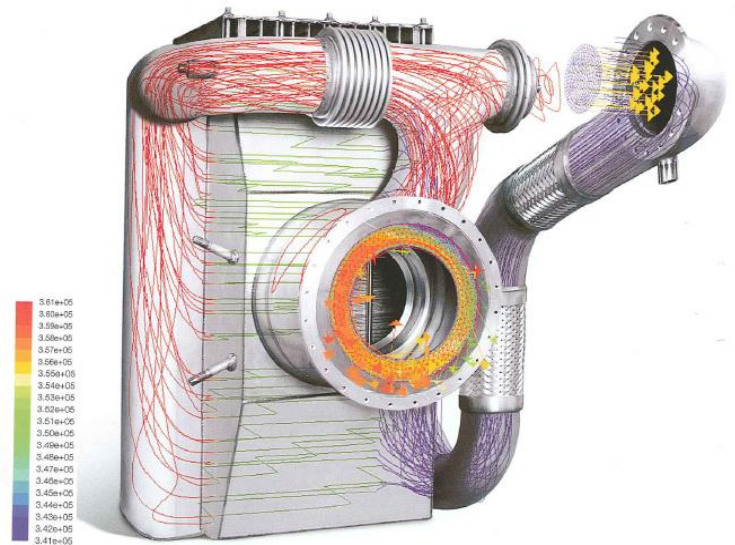
Test capabilities include:

- ✓ Performance testing (exchanged heat, pressure drop) at the intended operation points
- ✓ Tightness testing
- ✓ Endurance testing

Quality

Bosal has been certified according to

- ✓ ISO 9001
- ✓ ISO/TS 16949
- ✓ ISO 14001
- ✓ ASME H-stamp
- ✓ UIC 566
- ✓ DIN EN15085
- ✓ Pressure Equipment Directive 97/23/EG.



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Bosal Research NV

Dellestraat 20, B-3560 Lummen-Belgium • Tel. +32 13 530 820

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