



## The cutting edge

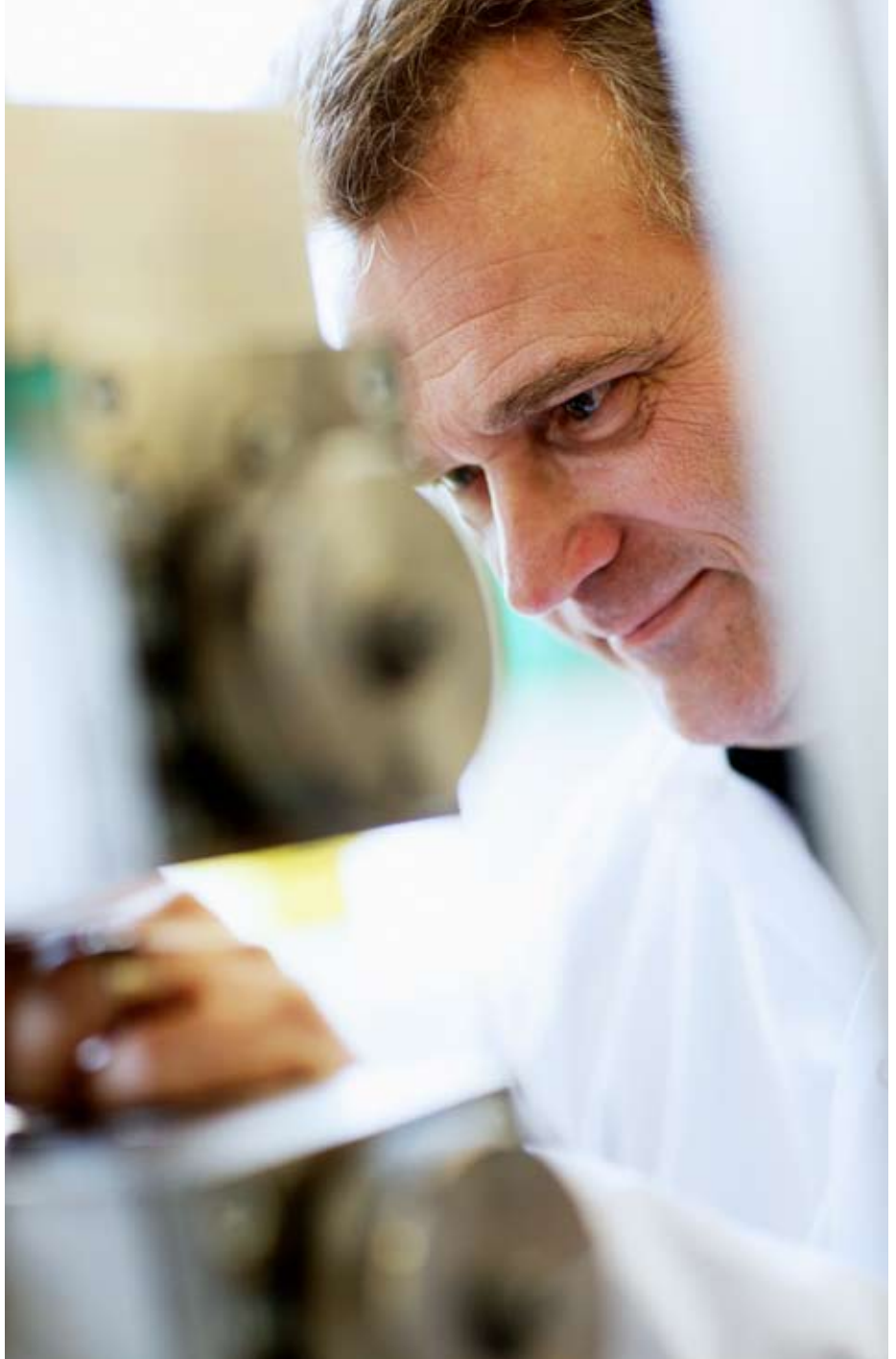
High-temperature brazing powder

### **High-temperature brazing: Creating strong bonds**

Brazing is a process that joins together two pieces of metal. The bonding material is a specially formulated metal powder called a brazing filler metal. High-temperature brazing, at above 900°C, takes place in a vacuum furnace or controlled atmosphere.

The brazing filler metal powder, usually applied as paste in predefined locations on the parts to be brazed, melts during brazing. This molten metal completely fills the narrow space between the parts to be brazed, which remain solid throughout the brazing process. After cooling, the result is a strong metallurgical bond.

The achievable bonding properties – high strength and good resistance to corrosion and oxidation – mean that high-temperature brazing has been widely adopted by component makers for complex-shaped stainless steel parts, such as heat exchangers.



# Application-driven innovation

## Join forces at the cutting edge

For Höganäs, every application project is an opportunity to find the best solution. We offer you a unique combination for innovation: commitment and knowledge.

Our starting point is always your specific application needs. We work in close cooperation with our customers at every stage, discussing and analyzing all aspects of the application requirements.

Once we have gained insight on your needs, we can apply our unique knowledge and resources to suggest an optimum solution with the desired properties.

## Why choose Höganäs?

With a partnership approach and unrivalled expertise, we are in a unique position to deliver cutting-edge solutions that match application requirements cost-effectively.

We are highly active in R&D, creating an ideal environment for developing new filler metals to meet changing market demands. As the global leader in metal powders, we have acquired in-depth knowledge on high-temperature brazing filler metals and how to fine-tune their properties.

Customer support is provided every step of the way. We are deeply involved with you prior to delivery, offering expert development advice to ensure an optimum solution. After delivery, we provide technical service to make sure the brazing filler metal and brazing process keep working in harmony to generate consistently good results.

And, as we have developed close relationships with selected leading paste suppliers, we always know the most suitable partner to turn to when it's time to turn the brazing filler metal into an optimum high-temperature brazing paste.



*Delivering innovative solutions based on specific market requirements.*



*Experience and expert knowledge are important components in high-temperature brazing filler metal design.*

## Formulations for success

### From brazing filler metal to brazing paste

Designing a high-temperature brazing solution is a process with many complex variables. Identifying and creating the right solution requires an innovative supplier with highly specialized expertise and an in-depth understanding of the application.

Höganäs is uniquely qualified to negotiate the complexities and formulate a successful solution with the required strength and properties.

The design of a solution for high-temperature brazing must take numerous parameters into consideration:

- What is the function of the final component?  
The material formulation needs to deliver the right mix of required strength and fatigue characteristics.
- What type of environment will the brazed component work in? Factors such as a high working temperature and conditions conducive to corrosion and oxidation influence material selection.
- What type of brazing conditions are available?  
The degree of temperature and atmosphere control in the brazing cycle have a considerable influence on the choice of filler metal.

- What is the most cost-effective solution? Properties may be achieved in several ways, but it takes experience and expertise to identify the solution with a cost advantage. Nickel, for instance, is effective in corrosion resistance, but expensive. Expert knowledge can keep costs down by ensuring no more nickel than necessary is used in your application.

In cooperation with you, our experts weigh up all the parameters to find a material that can deliver the right balance of characteristics cost-effectively.

We cooperate in a similarly close way with leading brazing paste manufacturers to ensure the brazing filler metal can be successfully combined in an optimum paste for the application.

A brazing paste is a mixture of the brazing filler metal powder (about 80-90%) and water or solvent-based binders. These binders are removed in the furnace during brazing. The formulation is adapted according to factors like furnace conditions and the paste application method.

We are not only involved in high-temperature filler metal design and brazing solutions, we also cooperate in the comprehensive testing of finished components.



### **Forming a successful partnership**

Our knowledge and expertise can be utilized to achieve application project goals:

- **Applied knowledge:** our application-driven approach and knowledge of existing brazing applications ensures a smooth route to the right brazing filler metal.
- **Material expertise:** a unique knowledge bank on metal powders and brazing materials means unrivalled ability to identify the optimum brazing material.
- **Cost-consciousness:** our long experience in production of cost-effective alloys helps assure economical use of more expensive alloy materials, such as nickel.
- **Continuous cooperation:** our active involvement in every stage of the project includes participation in formulation and testing of the brazing filler metal, the brazed joint and final component.

# The right filler metal for every application

BrazeLet™ encompasses an outstanding range of high-temperature brazing filler metals. These products are used as a base for solutions that perfectly match your specific application requirements.

We have divided our offering into three BrazeLet™ product groups:

## Meeting different needs

The BrazeLet™ Ni product group offers brazing filler metals that cover different brazing conditions, such as brazing temperatures and atmospheres, and answer different needs for properties including oxidation and corrosion resistance. For instance, BrazeLet™ Ni5 is normally used when high corrosion resistance is required, whereas BrazeLet™ Ni7 can be a cost-effective choice for lower corrosion resistance needs.

## Specifically for ERG coolers

BrazeLet™ Ni613 is a good example of a unique filler metal composition to meet specific requirements. This product was specially formulated for EGR (Exhaust Gas Recirculation) coolers, a type of heat exchanger used in diesel engines. It delivers exactly the right combination of properties – excellent wetting, high strength and corrosion resistance at high temperatures – for the application.

## For high end applications

The most recent addition to the range include our newly developed stainless filler metals - BrazeLet™ F300 and BrazeLet™ F302. These alloys have been designed for brazing of high-end stainless steel applications. Meeting different needs on wetting, strength and corrosion and oxidation resistance, these stainless filler metals offer cost-effective alternatives to nickel-based alloys in certain high-performance applications.



# The right supplier for every need

Höganäs not only supplies high-temperature brazing filler metals, we also supply the knowledge, passion and support for an enduring partnership.

We share our knowledge with you. We can channel vital material and property data into your projects from the unrivalled knowledge bank of the global leader in metal powders.

With a continuing passion for powder technology, we can ensure you meet your project challenges. Our experience of brazing filler metals stretches from the 1970s to the newly-launched cutting-edge products, BrazeLet™ F300 and BrazeLet™ F302.

Brazing is all about forming strong bonds. Joining forces with Höganäs in project partnerships will help take your business from strength to strength.

**“Working on R&D with Höganäs has been an enjoyable and very stimulating partnership going far beyond investigations of technological problems. It has been rewarding to work not simply with a company, but alongside painstakingly accumulated competence of the very highest order.”**

*Tomas Dahlberg,  
Innovation Manager,  
SWEPE International AB*

For more information, visit [www.hoganasbrazing.com](http://www.hoganasbrazing.com)



## Selected partnership credentials:

- Our roots as a successful business stretch back more than 200 years.
- Building on almost 100 years of experience in metallurgy, we have become the world's largest producer of metal powders.
- We have over 30 years of experience in manufacturing brazing filler metal powders.
- High-temperature brazing is a prioritized innovation area in a company that leads the way in metal powder R&D.

# Power of Powder

Metal powder offers entirely new possibilities to create more effective, lighter products with a reduced environmental impact. By combining the right alloy with a suitable morphology of the powder grains, new opportunities open up to match your challenges. Contact us and together we will release the power.

Metal powders are traditionally used to manufacture sintered components for vehicles. But there is a lot more to them. By fortifying food with elemental iron, anaemia can be reduced. By coating with nickel, glass bottle production life is prolonged with wear and temperature resistance. By employing new iron based powders, high temperature brazing of heat exchangers is possible. By utilising the three dimensional magnetic flux of encapsulated metal powders, smaller electrical motors can now be produced. And so on.

In fact, the possibilities of metal powder technology are almost endless. To take advantage of the inherent Power of Powder, please contact your nearest Höganäs office.



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