Ferroglobe

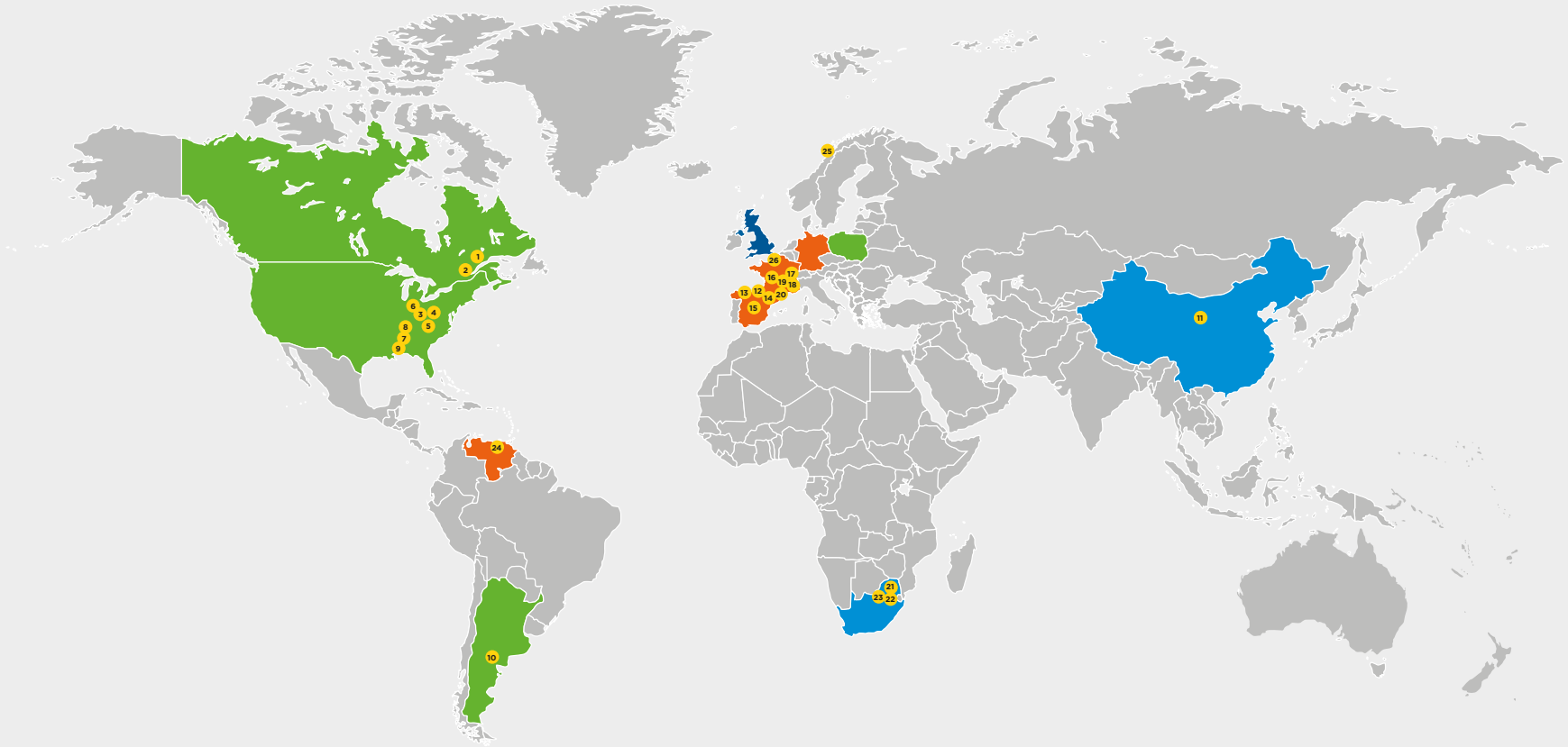
Advancing Materials Innovation

Innovative Foundry Products

Ferroglobe

Ferroglobe PLC was born on December 23, 2015, out of the combination of the privately-owned Spanish company Grupo Ferroatlántica and the publicly listed US company Globe Specialty Metals (NASDAQ: GSM). Despite having a short history as Ferroglobe, our assets and workforce and culture centered on excellence and continuous improvement have a long and rich history.

With more than 25 facilities in 9 countries Ferroglobe is the world's largest western silicon metal and silicon alloys producer. A global production base to supply our customers with the most efficient logistics and just-in-time deliveries.



Headquarter
London, UK

Ferroglobe Operations

1 Bécancour, QC, Canada
2 La Malbaie, QC, Canada
3 Beverly, OH, USA
4 Alloy, WV, USA
5 Corbin, KY, USA
6 Aurora, IN, USA
7 Billingsley, AL, USA
8 Bridgeport, AL, USA
9 Selma, AL, USA
10 Mendoza, Argentina
11 Shizuishan, China
12 Sabón, Spain
13 Boo, Spain
14 Monzón, Spain
15 Serrabal, Sonia, Conchitina, Esmeralda, Spain
16 Pierrefitte, France
17 Anglefort, France
18 Les Clavaux, France
19 Montricher, France
20 Laudun, France
21 Polokwane, South Africa
22 Emalahleni, South Africa
23 Delmas, South Africa
24 Puerto Ordaz, Venezuela
25 Mo i Rana, Norway
26 Dunkerque, France

Typical applications

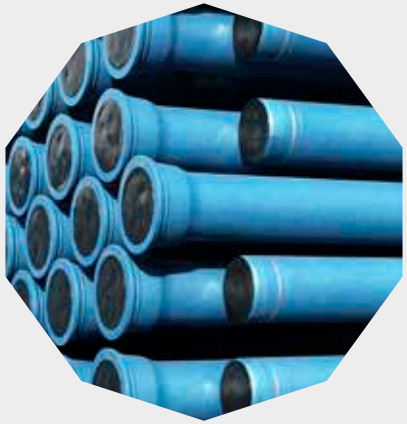
Specific applications need custom made solutions

Automotive

Sophisticated ferrous metal treatment leads to better metallurgical performance

The automotive industry requires castings with higher mechanical properties along with weight reduction. In addition, more complex casting design is a challenge for automotive foundries and needs individual solutions for the ferrous metal treatment. Our products are developed not only to meet those requirements, but also to optimize the processes and production costs of our customers. Hand in hand with the foundry industry worldwide, our R & D and technical team develop custom made solutions to optimize our customers' competitiveness in the casting market.

Cast Pipe



Inopipe - the key to produce high quality ductile iron pipes

The ductile iron pipe industry is challenged by increasing competition from more inexpensive nonferrous options. In order to compete, the trend has been to thin down the pipe wall thickness, increasing the propensity for rejection. As the leading worldwide supplier of mould powders to the ductile iron pipe industry, we have taken this challenge head on; designing Inopipe compositions that provide better surface quality and microstructure in critical conditions. Furthermore, the high thermal insulating effect of Inopipe leads to longer mould life.

Typical applications

Specific applications need custom made solutions

Engineering

Engineered casting – needs individual solutions

Engineered castings do not tolerate flaws. In order to achieve a high success rate, avoiding casting defects like Chunky Graphite, Inverse Chill etc., Ferroglobe offers a wide range of inoculants and nodularizers to enable foundries to produce economically sound castings.

Wind Turbines

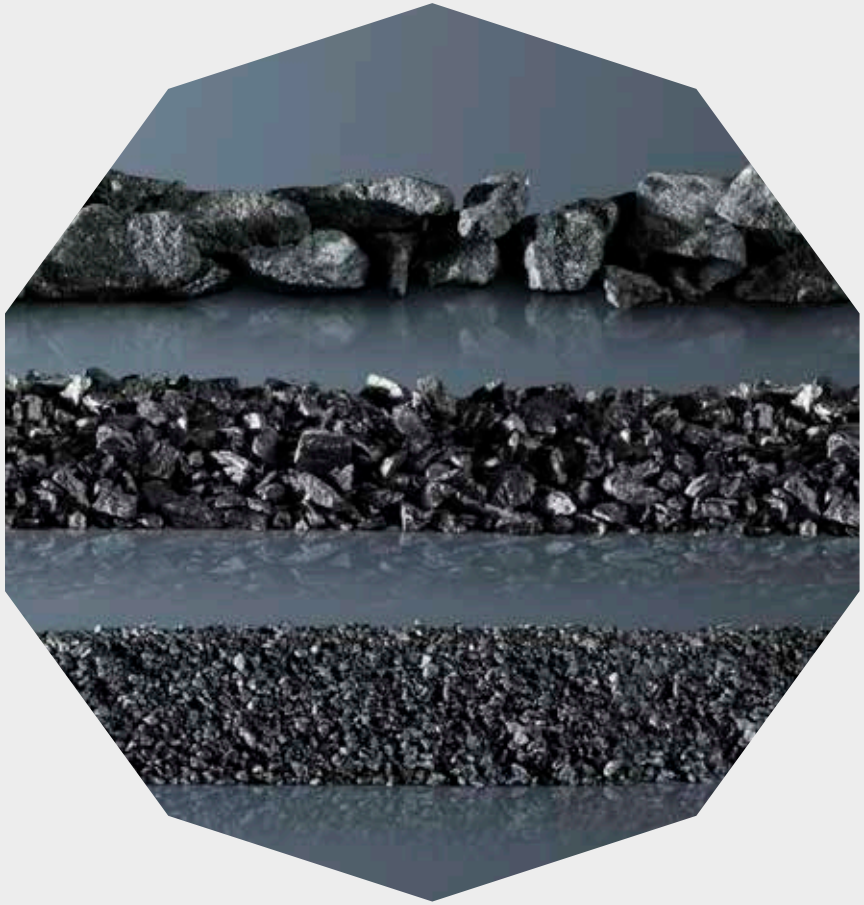
Renewable energy is in our focus

Wind turbines – especially those used in offshore wind farms – are exposed to extremely rough and often rapidly changing weather conditions. Corrosion resistance and low temperature performance are key factors for wind energy castings. Very often an optimized combination of inoculation and magnesium treatment is necessary to obtain the requested casting specification. Ferroglobe provides special metallurgical solutions for heavy section castings.

Inoculants

Effectiveness without side effects

Product	Active Element	Features
LMC® **INOCAST® 175**	Ba	Universal inoculants for general use
ZL 80® **INOCAST® 125** **ZIRCOGRAF®** **ZIRCOBAR®**	Zr	Universal inoculants, fade resistant, appreciated for medium and heavy sections
INOCARB®	Graphite	Avoids chill in grey iron castings, re-activating nucleation
INOCAST® 100	Al	Avoids chill
SPHERIX®	Bi + RE	High nodule count, reduces chill in thin wall castings, reduces chunky graphite in heavy sections
SPHERIX® Plus	Sb + RE	High nodule count, reduces chunky graphite in heavy sections
AMERINOC®	Bi + RE	High nodule count, reduces chill in thin wall castings, reduces chunky graphite in heavy sections
INOSEL	Se + S	Self-feeding ability, long lasting graphite expansion, reduces micro porosity
CERINOC®	Ce	Minimizes the risk of shrinkage, improves nodularity, recommended for compacted graphite iron
FESILA®	La	Against micro shrinkage
WIN 4®	Bi + La	High nodule count, reduces micro shrinkage



All our inoculants are available in the standard sizes 2-7 mm, 0,5-2 mm, 0,2-0,7 mm.

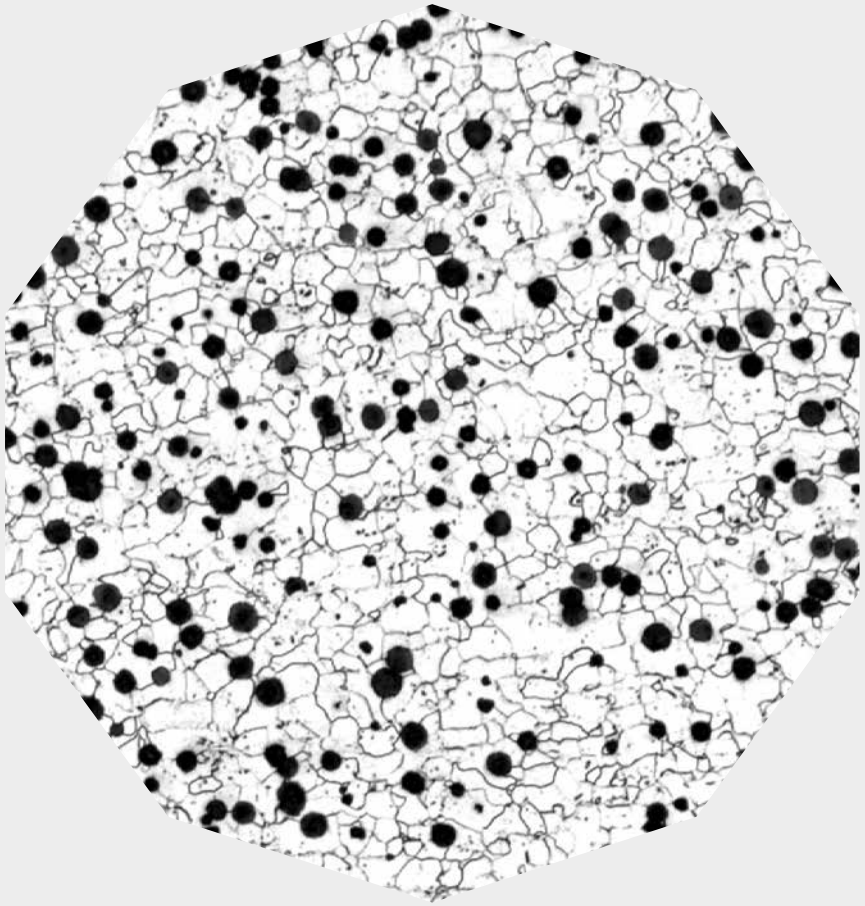
Other sizes are available upon request.

Packing: Big bag, drum, paper bag

Effects and behavior

Typical effects of Ferroglobe inoculants

Product	Grey Iron	Ductile Iron	Universal	Thin Wall	Heavy Section	Various Sections	Against Chill	Nodule Count	Against Shrinkage	Fading Time	Preconditioning	High Dissolution	Porosities N
GRAFIDIN®		•	•			•	•	•		•	•	•	
INOBAR®	•	•	•		••	•	•••	••	••	•••	•••		
INOSTRONG®	•••	•	•			•	•••	••	••	••			
INOSTRONG® 50	•••	•	•				••	•					
LMC®	•	•	•••		•			•					
INOCAST® 175	•	•	•••		•			•				••	
ZL 80®	•	•	••			•••	•	••		•			••
INOCAST® 125	•	•	•••		•	•		•				•	••
ZIRCOGRAF®	•	•	•			•	•	•		•		••	•••
ZIRCOBAR®	•	•	•			•		•		•			•
INOCARB®	•						•••	•••			••	•	
INOCAST® 100	•	•	••		•			••				•	
SPHERIX®		•••		••	•••	•	•••	•••					
SPHERIX® Plus		•••			•••	•	•••	•••					
AMERINOC®		•••		••	••		•••	••					
INOSEL		•••				••		••	•••				
CERINOC®	•	•	•••					•	•••	•			
FESILA®		•							•••	•			
WIN 4®		•••		••	•		••	••	•				

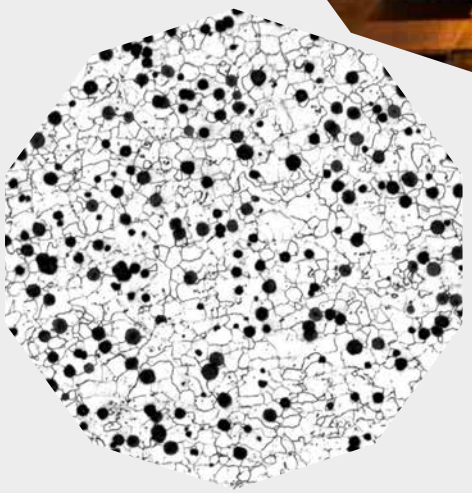


Nodularizers

Changing microstructures – improving mechanical properties

Ferroglobe produces a wide range of nodularizers in 2 different plants (Beverly, USA and Mendoza, Argentina) to give our customers safety in supply and quality. Below we have listed some standard grades. We use thin casting technology, avoiding segregation, improving the FeSiMg microstructure and performance. Furthermore we take pride in working one on one with customers designing nodularizer compositions to optimize individual foundry operations. Our quick just-in-time manufacturing allows for rapid composition changes thereby rapidly reducing foundry scrap and optimizing treatment and overall process.

Reference	Mg	Si	Ca	Al	RE
FeSiMg 411	4	45	1	1	0,7
FeSiMg 511	5	45	1	1	0,7
FeSiMg 522	5	45	2	< 0,8	2
FeSiMg 610	6	45	1	< 0,8	< 0,25
FeSiMg 611	6	45	1	< 0,8	0,5
FeSiMg 611A	6	45	1	< 0,8	1
FeSiMg 731	6,5	45	3	< 0,8	0,5
FeSiMg 731A	6,5	45	3	< 0,8	1
FeSiMg 931	9	47	3	< 0,8	1
FeSiMg + La	6	45	1	< 0,8	0,4 (La)



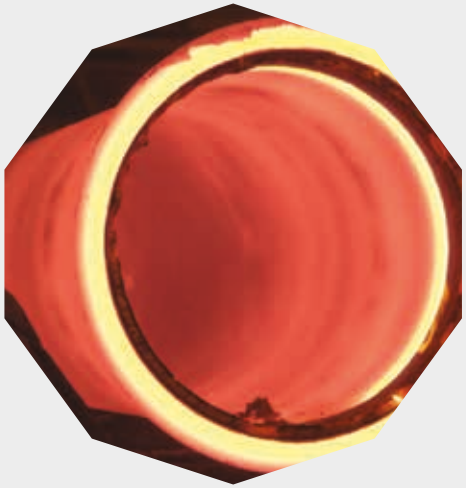
Furthermore, we take pride in working one on one with customers designing nodularizer compositions and sizing to optimize individual foundry...

Available sizing: 1-4 mm (inmould sizing), 2 - 10 mm, 5 - 25 mm;

Packing: Big Bag, drum, paper bag

Inopipe® mould powders and trough inoculants

For the production of cast iron pipes



Our mould powders and trough inoculants were specially designed for centrifugal casting machines using water cooled molds.

Combined use of mould powders and trough inoculants provide:

- Protection of the steel mold against thermal shock (increased mould-life)
- Sound and pinhole-free pipes
- Improved pipe stripping
- Reduction of surface defects
- Reduction of Carbides
- Optimization of the thermal treatment

Cored wires

Sophisticated metal treatment for process control

Composed for your special needs
For magnesium treatment and inoculation

Our FILCAST® guarantees a treatment with very high reliability.
All wires are made according to customer specification or designed to solve specific technical problems at our clients. The quality of our wires is ensured by continuous monitored process control.

Ferroglobe's R & D

Innovation, expertise and advice

Increasing complexity in casting geometries along with higher mechanical property requirements, Intensify the need for custom made solutions at individual foundries to meet these growing challenges.

Ferroglobe's technical sales team, consisting of foundry metallurgical engineers with extensive foundry technical, operational, and managerial experience and supported by our renown R & D department, stands ready to assist our customers with unique and creative solutions to meet current and future challenges.

Our state-of-the-art laboratory technology and high precision analytical equipment enables us to analyze almost all quality relevant active elements and investigate all types of complicated casting defects. Our goal is to offer you the best technical solution along with cost efficiency and process improvement.

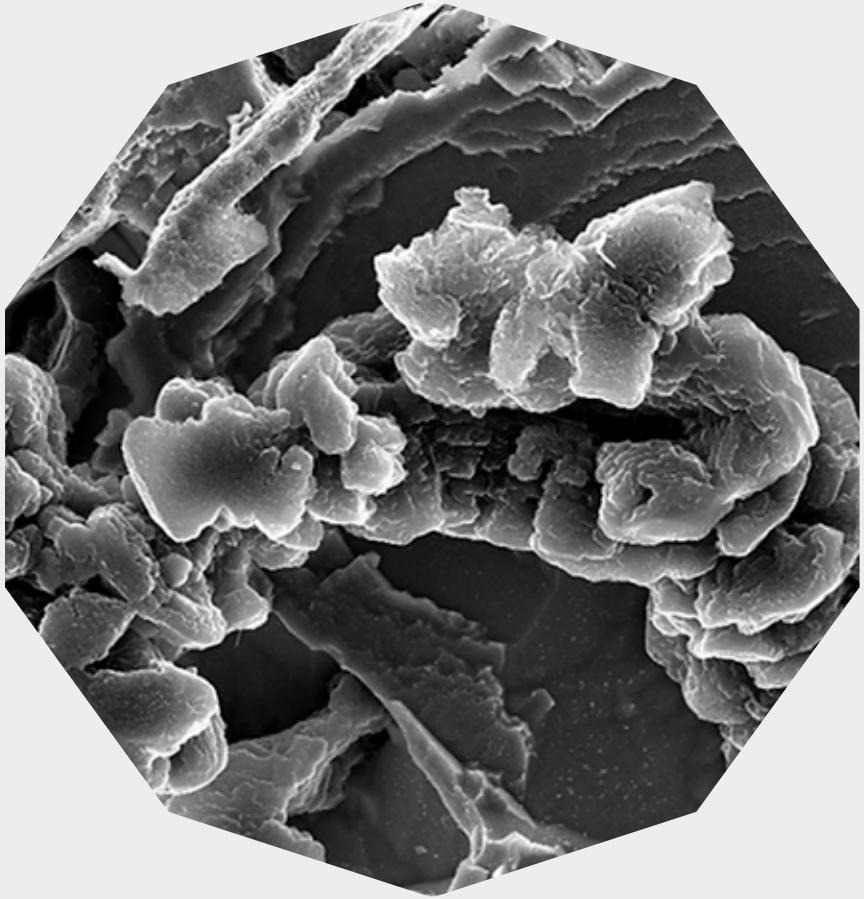
This is only the beginning, we do not stop here, we fully understand that the foundry industry will continue to need even more innovative products as newer and even more challenging requirements will have to be met in the future.

Accordingly, our R & D is closely involved in new product developments leveraging our capabilities to produce Inoculants and nodularizers, of varying composition and sizes, on a laboratory scale for rapid testing.

Furthermore, as a leading manufacturer of mould powders for the ductile iron pipe industry, we are not only able to rapidly produce test quantities in our lab, but also to fully test and evaluate them before presenting to customers.

Close cooperations with universities and external R & D facilities ensure that we stay at the cutting edge of foundry technology and pave the way for a bright future for our customers and for Ferroglobe.

Your satisfaction is our responsibility!



Worldwide contacts

Close to our customers

Ferroglobe France
517 Avenue de la Boisse
73025 Chambéry
FRANCE

Ferroglobe Argentina
Pico 1641 Piso 8 „A“ (C1429DWA)
Buenos Aires
ARGENTINA

Ferroglobe USA
Beverly Plant
P.O. Box 157
County Road 32
Beverly, Ohio 45715
U.S.A.

Ferroglobe South Africa
Voortrekker Road, PO Box 214,
Emalahleni 1035,
SOUTH AFRICA

Contact: foundry@ferroglobe.com
Web: www.ferroglobe.com