

Foundry Products Division

**SMZ<sup>®</sup>**  
**INOCULANT**



**QS-9000    ISO 9001    ISO 14001**

# SMZ® Inoculant

- *Effective ductile iron inoculant which may also be used in grey and compacted graphite irons*
- *Low melting point alloy to assist solution in very low temperature irons*
- *Ideally suited to late metal stream (MSI) applications*
- *Designed to flow smoothly through late stream application machines*
- *Narrow chemical and sizing limits for maximum consistency*
- *Effective for nitrogen control.*

**SMZ®** inoculant is perhaps the oldest trade name for an inoculant that is still in use today. Originally produced by Union Carbide the ferroalloy is now made at the Elkem Bremanger plant in Norway which is famous for the production of quality inoculants, such as Superseed® inoculant.

**SMZ®** inoculant finds wide application in the inoculation of ductile iron and three size grades are available;

**SMZ® 25** inoculant in 0.7-3 mm and 1-6 mm for ladle applications.

**SMZ® 90** inoculant is graded 0.2-0.5 mm for use as a late metal stream inoculant for low addition rates or more sensitive application machines.

**SMZ® 95** inoculant which is sized 0.2-0.7 mm and is used at higher in-stream application rates and in machines less prone to blockage problems.

SMZ® inoculant is produced to the following specifications:

|         |            | Typical |
|---------|------------|---------|
| Si:     | 62.0-69.0% | 65%     |
| Ca:     | 0.6-1.9%   | 1.4%    |
| Al:     | 0.55-1.3%  | 0.9%    |
| Mn:     | 2.8-4.5%   | 3.6%    |
| Zr:     | 3.0-5.0%   | 4.2%    |
| Ba:     | 0.3-0.7%   | 0.5%    |
| Balance | Iron.      |         |

The alloy is a carefully balanced combination of calcium and aluminium to give maximum chill control. Zirconium is added to promote a higher nodule number than standard ferrosilicons and the manganese is present to ensure that the alloy goes into solution, even at very low metal casting temperatures.

## Production of SMZ® inoculant

SMZ inoculant is produced at the Elkem Bremanger plant in Norway using special production techniques to ensure maximum

uniformity of product both in terms of composition and structure throughout the product. Examples of these features are

shown on the back cover of the brochure. Elkem Bremanger is certified to ISO 9001, ISO 14001 and QS 9000 standards.

**SMZ® is a registered trademark of Elkem ASA.**

## Effective phase in SMZ® inoculant

SMZ inoculant will effectively control chill in ductile irons, compacted graphite irons and grey irons of 0.04% base sulphur and above. It may be used as a ladle addition or as a late stream inoculant.

### (a) Ladle inoculation:

SMZ 25 inoculant is suited as a ladle inoculant for most common cast irons. As such, it is suited for foundries producing different combinations of iron (e.g. grey and ductile) where it may be desirable to have only one inoculant in the foundry.

The inoculant will dissolve quickly into cast irons even at the lowest of casting temperatures. This makes SMZ inoculant ideal for small pouring ladles being inoculated during transfer from bull ladles. Inoculating as late as possible and close to the mould is ideal to minimise inoculant fade. Typically, addition rates of 0.1-0.2% will be suited to grey irons, while ductile iron will normally use 0.3-0.7% of inoculant, depending on temperature, casting section thickness and fade time. Typical additions to a compacted graphite iron would be 0.1-0.2% depending on the production process,

section size and fade time.

### (b) Late Metal Stream inoculation:

The advantage of using SMZ 90 or 95 inoculants in late metal stream applications comes from the level of active elements (Ca, Al and Zr) combined in the alloy. This means that even at the low application rates associated with this type of inoculation, sufficient active elements are added to give the maximum inoculation effect and activation of the potential nuclei within the iron.

The size and shape of the alloy particles is critical to ensure both a consistent flow of alloy through the inoculating machine and a full solution of the alloy into the cast iron. Elkem produces two in-stream grades, SMZ 90 and SMZ 95 inoculants.

SMZ 90 inoculant is carefully screened to a 0.2-0.5mm sizing. This has been found, from many years experience, to give minimum "dusting" when the inoculant particles encounter hot thermals of air from the cast iron. Further, sizings below this 0.2

mm minimum tend to contain high levels of oxides which inevitably will be transferred into the casting to cause inclusions. These inclusions may be detrimental to mechanical properties and machinability. This particular sizing is also suited to low flow rates of inoculant through the most sensitive machines and generally, the application rate is only limited by the tolerance of the application machine.

SMZ 95 inoculant has the same lower limit on size to prevent dusting and introduction of oxides, but in this case, the top size is increased to 0.7mm. This is ideally suited to higher addition rate applications, the low melting point and good solubility ensuring complete solution in the iron. SMZ 95 is also designed for less sensitive application units such as gravity feed, vibratory feed or screw feed.

Typically, inoculant addition rates for in-stream inoculation will be 0.05-0.15% for grey and compacted graphite irons and 0.1-0.25% for ductile iron.

## Advantages of late metal stream inoculation

The high amounts of active elements make SMZ 90 and 95 inoculants ideally suited to late metal stream inoculation. By adding the inoculant to the stream of metal as it enters the mould, fading effects, normally associated with ladle inoculation, are virtually eliminated. As a result, only very small amounts of SMZ inoculant are needed

as previously described.

This leads to:

More consistency due to the automatic metering of the inoculant.

Greater process control.

Reduced costs as less inoculant is added.

The reduced silicon increment gives more

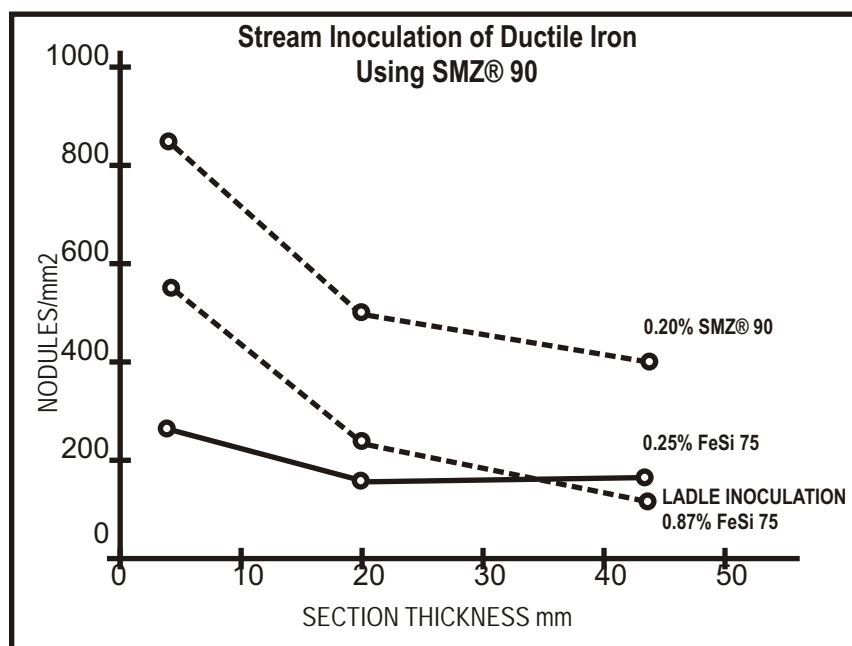
scope for higher returns.

Improved electric furnace lining life due to higher silicon in the base iron.

The small amounts of inoculant needed minimise the tendency to form dross. An example of the reduced inoculant addition required for in stream inoculation is given as

**Figure 1.**

**Figure 1.**





**Elkem ASA**

Foundry Products Division  
Hoffsveien 65B  
P.O. Box 5211  
Majorstua  
N-0303, Oslo, Norway

Telephone : +47 22 45 01 00  
Telefax : +47 22 45 01 52

[www.foundry.elkem.com](http://www.foundry.elkem.com)

Изключителен представител и  
вносител за България и Македония:

**“РЕМЕКО” ООД**

1407 София, бул. “Дж. Баучър”, 99-101  
тел.: +359 2 962 20 78, 962 47 36  
факс: +359 2 962 21 02  
e-mail: [remeko@remeko.com](mailto:remeko@remeko.com)