

Nodularisers

Nodularisers are mainly ferrosilicon alloys containing magnesium with or without rare-earth elements.

Magnesium is the main element in FeSiMg alloys responsible for creating the necessary conditions for the graphite phase to grow from the liquid into the required spheroidal form. The process of nodularisation aims to improve the mechanical properties of cast iron by ensuring the formation of graphite in the spheroidal or compacted form. The level of magnesium can be between 5 to 30%. Calcium is an element which decrease the rate of reaction of magnesium with the liquid iron and improves Mg recovery.

Rare-earth elements (Ce, La...) are required in order to oppose the harmful effect of certain trace elements on the iron graphite shape, notably Pb, Sb, and Bi.

Inoculants

In order to achieve the desired mechanical properties in iron castings, the liquid iron must have the correct composition. It must also contain suitable nuclei to induce the correct graphite structure to form on solidification.

Inoculants are alloys added in small amounts to liquid cast iron to induce eutectic graphite nucleation. Without the presence of suitable nuclei, liquid iron will undercool below the eutectic temperature. They are used to control matrix structure and avoid casting defects. Inoculants are mostly ferrosilicon based alloys. Pure ferrosilicon is not effective as an inoculant, it is the presence of minor elements that determine the effectiveness of the product.

Cored wire

Cored wire is a modern technology for adding metallurgical treatment products (nodularisers and inoculations) in to the molten metal. Filler is crushed to a fine size, filled in a strip of steel and roll-formed into a tube. The steel strip protects the alloy from oxidation and its fine size aids in the integration of the alloy into the molten metal.

The process requires the use of an injection device placed vertically or horizontally near the metallurgical treatment site. The treatment station consists of a coil of hollow mild steel tube filled with filler, a feeding machine, a guide tube and a ladle with cover.