Injection Alloys: Technical Document

Product Introduction: *Hi – CaFe ®*

1. Introduction

Hi – CaFe ® is a new product in the ***Hi – Core ®*** family designed to be used in steel that requires pure calcium. The technology allows for higher and more stable levels of calcium to be achieved with optimal and reduced consumption. Overall a reduction in consumption, fuming and splashing can be expected.

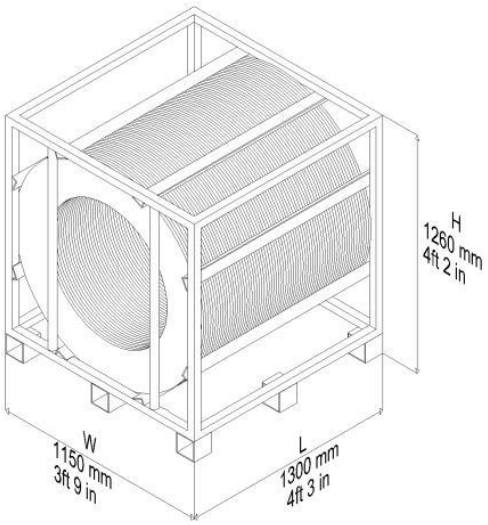
Hi – CaFe ® is unique in the fact that pure calcium and pure iron powder is encased in our unique and patented welded seam sheath.

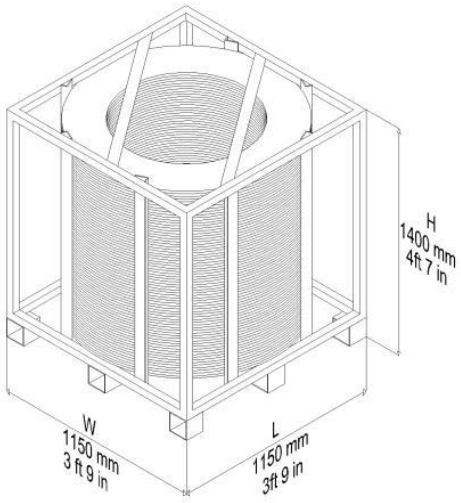
2. Technical specification

Chemical Analysis:

Calcium	28 – 30%
Iron	68 – 72%

	Metric	Imperial
Wire diameter	13 mm	0.551 in
Powder weight	300 g/m	0.202 lb./ft.
Wire weight	630 g/m	0.423 lb./ft.
Net powder weight	1140 kg	2513 lb.
Coil gross weight	2394 kg	5278 lb.





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3. Previous results

Case Study 1

The facility produces slabs and flat products via the blast iron production process, after conversion the steel is processed using ladle furnace treatment station. Calcium is used for castability and inclusion modification. The facility was investigating cost savings, safety aspects and recovery in the production process. Point of control is at the tundish.

Hi – CaFe ® was introduced and optimized for the specific requirements of the facility. Below is a comparison of other Calcium products vs ***Hi – CaFe ®*** at this facility, for this facility the results were split for high Sulphur and low Sulphur grades:

High Sulphur grades	**Calcium**	***Hi – CaFe ®***
Average amount Ca injected per treatment	56 kg	40.5 kg
Average amount of wire injected	800 m	450 m
Average ppm Ca achieved	Not available	31 ppm
Average recovery	Not available	19.35 %
Amount of Ca per liquid ton treated	0.248 kg/ton	0.179 kg/ton

Low Sulphur grades	**Calcium**	***Hi – CaFe ®***
Average amount Ca injected per treatment	42 kg	31.5 kg
Average amount of wire injected	600 m	350 m
Average ppm Ca achieved	Not available	25 ppm
Average recovery	Not available	18.05 %
Amount of Ca per liquid ton treated	0.186 kg/ton	0.139 kg/ton

Overall amount of material required was decreased, thus decreasing inventory required, reducing freight cost, reducing treatment time. There was a reduction in splashing and fuming as well as an increased reliably of the product.

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Case Study 2

The facility produces billets and rounds via the DRI production process, after smelting the steel is processed using ladle furnace treatment stations. Calcium is used for castability and inclusion modification. The facility was investigating recovery fluctuation and splashing in the production process. Point of control is at the ladle furnace

	Hi – CaFe ®
Average amount Ca injected per treatment	14.1 kg
Average amount of wire injected	167 m
Average ppm Ca achieved	22 ppm
Average recovery	22.7 %
Amount of Ca per liquid ton treated	0.106 kg/ton

There was a reduction in splashing and fuming as well as an increased reliably of the product.

Case Study 3

The facility produces slabs via the EAF production process, after smelting the steel is processed using ladle furnace treatment station. Calcium is used for castability and inclusion modification. The facility was investigating cost savings and recovery in the production process. Point of control is at the ladle furnace.

	Hi – CaFe ®
Average amount Ca injected per treatment	8.3 kg
Average amount of wire injected	98 m
Average ppm Ca achieved	17 ppm
Average recovery	30.4 %
Amount of Ca per liquid ton treated	0.055 kg/ton

Overall the recovery of the calcium was increased with an increase in ppm achieved. The instances of clogging and wire breakages was markedly decreased.

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Case Study 4

The facility produces slabs via the blast iron production process, after conversion the steel is processed using CAS-OB treatment station. Calcium is used for castability and inclusion modification. The facility was investigating cost savings, safety aspects and recovery in the production process. Point of control is at the tundish

	FeCa CCW	*Hi – CaFe ®*
Average amount Ca injected per treatment	99 kg	37.8 kg
Average amount of wire injected	1 100 m	450 m
Average ppm Ca achieved	Not available	51 ppm
Average recovery	Not available	42.0 %
Amount of Ca per liquid ton treated	Not available	0.121 kg/ton

Overall the recovery of the calcium was increased with an increase in ppm achieved. The instances of clogging was markedly reduced.