List of products

Heneken Alloys & Minerals SA (Pty) Ltd, 5 Atomic Street Vulcania BRAKPAN, 1554 DALVIEW, 1544 SOUTH AFRICA
Office +27 11 740 1034 | Fax +27 11 740 9051 | info@heneken.com | www.heneken.com

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Aluminum powders and granules

AVAILABLE IN TWO SIZES

Smaller size

0 – 3 mm
Packed in big bags

Bigger size:

5 – 20 mm
Packed in big bags

POTENTIAL USAGE

- Can stock production
- Deoxidant for steel mills
- Aluminum scrap for secondary aluminum
- Raw material for FeMo, FeV, FeNb

Chemical composition in %	
Al	96,50 %
Si	0,213 %
Fe	0,475 %
Cu	0,172 %
Mn	0,865 %
Mg	1,580 %
Cr	0,019 %
Ni	0,002 %
Zn	0,045 %
Ti	0,027 %
Pb	0,016 %
Ca	0,010 %
Na	0,023 %
Sn	0,025 %
V	0,025 %
P	0,016 %
C	0,190 %
S	0,005 %

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Fluorspar
Briquettes Metallurgical Grade

Chemical Composition	Element %
CaF_2	75 - 90 %
Fe	6,0 % max
P_2O_5	0,5 % max
S	0,05 % max
$CaCO_3$	1 % max
SiO_2	12 % max

Application

- Fluorspar is used as a fluxing agent in Metallurgical Slags used in the Manufacture of Steel, Stainless Steel and Ferro Alloy Production.

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High Energy Briquettes

The growing global trend is towards the use of more environmentally friendly products and production processes as well as minimizing the Carbon Footprint of the value chain of these products and the raw materials used to produce them. It is our strategy to procure industrial waste materials which contain valuable energy-containing components.

These waste materials consist of slags, dust, slurries, dross and recyclable disposed of metal wastes which contain Aluminium, Silicon, FeSi, SiC, and Carbon. We incorporate these waste materials into our production processes, such as the Alumino Thermic ULCFeMn Process. We prepare briquettes and slags for use in various industrial metallurgical operations.

The High Energy Briquette (HEB) is designed to contain a gross energy of over 5.5 MWh/t HEB. This energy is the exothermic energy derived when the various metallic components in the HEB either oxidize or reduce components in the metallurgical system they are added to, for example:

$3MnO + 2Al = 3Mn + Al_2O_3$ $\Delta H = -0.695$ kWh/kg MnO
$2MnO + Si = 2Mn + SiO_2$ $\Delta H = -0.253$ kWh/kg MnO

The HEB can be custom designed to meet a client’s requirements in terms of energy components and the resulting reacted slag components. The energy released by the HEB reactions significantly decreases the electrical process energy requirements. This decreases cost and/or increases the processing capacity.

This can be compared to the conventional carbon reduction process:

$MnO + C = Mn + CO$ $\Delta H = +1.065$ kWh/kg MnO

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High Energy Briquettes

Apart from the obvious energy savings realized by utilizing the HEB, there are further significant environmental benefits in terms of decreased CO/CO2 production when the HEB is used. In the MnO reduction reaction example, 0.62t of CO2 is produced for every 1.0t of MnO reduced. Using HEB there is no CO2 produced.

There are also CO2 footprint benefits inherent in the production of the HEB. As most of the raw materials used to produce the HEB are recovered/recycled materials they are zero-rated in terms of prior CO2 footprint.

One of the uses for the HEB is to replace FeSi in BOF steel making. The Carbon Footprint of FeSi production is compared to that of HEB production.

Carbon Footprint of FeSi vs HEB Production

The typical analyses of FeSi and HEB are:

Typical Analysis		FeSi75	HEB
Si	%	75.00	45.5
Fe	%	24.00	6.0
Al	%	0.90	10.6
C	%	0.04	6.9
SiO2	%		22.2
CaO	%		4.7
Al2O3	%		0.7
MgO	%		0.2
Energy	MWh/t	-3.60	-5.77

The Energy quoted in the table above is generated when the material is oxidised in the BOF.

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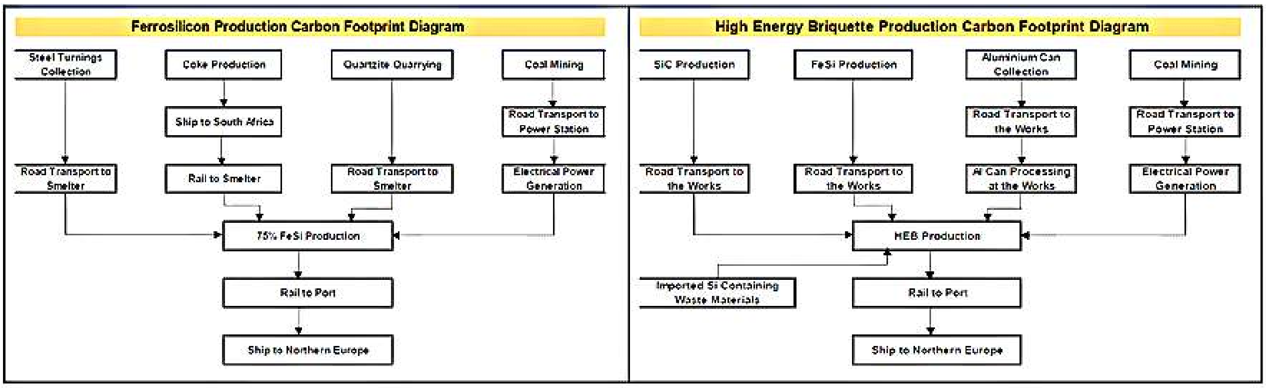
High Energy Briquettes

The Basic Value Chains depicting CO2-producing steps are shown below:



Comparison of the estimated **carbon footprint** of FeSi production compared to HEB production.

FeSi Production		CO2 t
Quartz Mining	Quartz	0.13
Coke Production	Coke	1.75
FeSi Production	FeSi	19.50
	10% Contingency for items not included	2.14
Delivered in South Africa From China	TOTAL	23.52
		t CO2/t FeSi
	t CO2/t FeSi	23.52
	t C/t FeSi	7.06
Typical Contained Energy :	-3.60	MWh/t FeSi75
C :	1.96	t/MWh Contained Energy

HEB Production		CO2 t
FeSi	FeSi	1.76
SiC	SiC	1.17
Imported Raw Materials	Si Raws	0.83
HEB Production	HEB	0.38
	12% Contingency for items not included	0.50
Delivered in South Africa GFE-MIR	TOTAL	4.62
		t CO2/t HEB
	t CO2/t HEB	4.62
	t C/t HEB	1.39
Typical Contained Energy :	-5.77	MWh/t HEB
C :	0.24	t/MWh Contained Energy

HEB Production produces only 12 % of the Carbon Footprint of FeSi75 Production.

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Chrome Flour 45 Micron

Chemical Composition	Cr2O3	Fe0	Al2O3	SiO2	MgO
Element %	34 - 53 %	20-28 %	12-15 %	2-5 %	8-11 %

APPLICATION:

- Chrome Oxide Flour is used in the glass industry as colourant for manufacture of Green Glass Bottles
- Chrome Oxide Flour is used in the Ceramic Industry
- Chrome Oxide is a Refractory product and used in certain Refractory Products

SIZING and PACKING

- minus 45 omicron 95 %
- minus 75 omicron 95 %

Big bags, 25kg bags, on pallets or on request.

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Iron Oxide 45 Micron

Chemical Composition	TiO2	Fe	Al2O3	SiO2	Fe2O3	MgO
Element %	0.3% max	67% min	4% max	4% max	93% min	0.3% max

APPLICATION:

- Iron Oxide Flour is used in the Glass Industry as colourant
- Iron Oxide Flour is used in the Ceramic Industry as colourant

SIZING and PACKING

- minus 45 micron 95%
- minus 75 micron 95%

Big bags, 25kg bags, on pallets or on request.

Iron Oxide 45 Micron

Chemical Composition	TiO_2	Fe	Al_2O_3	SiO_2	Fe_2O_3	Fe_3O_4	MgO
Element % Red	0.3 % max	65 % min	2 % max	4 % max	90 % min		0.3 % max
Element % Grey	0.3 % max	68 % min	3 % max	3 % max		93.5 % min	0.3 % max

APPLICATION:

- Iron Oxide Flour is used in the Glass Industry as colourant
- Iron Oxide Flour is used in the Ceramic Industry as colourant

SIZING and PACKING

- minus 45 micron 95 %
- minus 75 micron 95 %

Big bags, 25kg bags, on pallets or on request.

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Manganese Di-Oxide 45 Micron

Chemical Composition	MnO2	Fe0	Al2O3	SiO2	MgO	K2O	BaO
Element %	75 - 85 %	1 - 4 %	1 - 3 %	3 - 8 %	8 - 11 %	1 - 3 %	2 - 4 %

APPLICATION:

- Manganese Di-Oxide Flour is used in the glass industry as de-colourant for manufacture of clear glass
- Flour is used in the Ceramic Industry to impart brown / red colouration on bricks, roof tiles and pavers

SIZING and PACKING

- minus 45 omicron 95 %
- minus 30 omicron 65 %

Big bags, 25kg bags, on pallets or on request.

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Manganese Oxide Braunite 45 Micron

Chemical Composition	Mn	Fe0	SiO2	Mn2O3
Element %	42 - 46 %	8 - 14 %	3 - 8 %	+/- 65 %

APPLICATION:

- Manganese Oxide Flour is used in the Ceramic Industry to impart brown / red colouration on bricks, roof tiles and pavers

SIZING and PACKING

- minus 45 omicron 95 %
- minus 30 omicron 65 %

Big bags, 25kg bags, on pallets or on request.

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Manganese Tri-Oxide 45
CALMAN Z

Chemical Composition	Mn3O4	Fe304	Al2O3	SiO2	MgO	K2O	BaO
Element %	75 - 85%	1 - 4 %	1 - 3 %	3 - 8 %	8 - 11 %	1 - 3 %	2 - 4 %

APPLICATION:

- CALMAN Z Flour is used in the Ceramic Industry to impart brown / red colouration on bricks, roof tiles and pavers.

SIZING and PACKING

- minus 45 omicron 95 %
- minus 30 omicron 65 %

Big bags, 25kg bags, on pallets or on request.

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SlagConditioners I CALAL Range

Sizing

- 5 x 30mm
- 5 x 50mm

Packing

- Big Bags or loose in bulk

Chemical Composition	C	SiO2	Al2O3	CaO	S	Fe
CALAL45	0,04 % max	2,5 %	45 - 50 %	35 - 40 %	0,04 % max	2 % max
CALAL65	0,06 % max	1,5 % max	60 -70 %	12 - 18 %	0,05 % max	2 % max
CALAL70B	0,1 % max	6 % max	60 -70 %	20 - 30 %	0,05 % max	2 % max

Application

- The product is used as a SlagConditioner to form SteelMaking Slag with a specific Al_2O_3 / SiO_2 ratio to maximise efficiency of the steel refinement process
- Reduces steel impurities like Sulphur and other non-metallic impurities
- CALAL 45 AND 65 ARE produced from molten liquid Calcium Aluminate
- CALAL has a low melting temperature around 1300 o C Density 2.80 grams / cm3 Bulk Density 1.5 - 1.7 grams / cm3
- CALAL70B are briquettes produced with blends of CALAL45 and CALAL65 and enriched with further addictions of Al_2O_3

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Ultra-Low Carbon FeMn

Ultra-Low Carbon FeMn (ULCFeMn) is produced in South Africa. To achieve the required very low carbon levels, Alumino-Thermic Process is used. Waste Aluminium recovered from Recycled Aluminium Beverage Cans is used as the reductant in the process. Furthermore, to ensure a very low carbon footprint, “Red Dust”, a waste product recovered from the LCFeMn Converter Process, is used as the Manganese Oxide source.

The two raw materials, together with a suitable flux, are reacted auto thermally in a vessel to produce the ULC FeMn and a Slag which is sold into a separate market.

The result is a high-quality, Selenium Free, product:

Mn	**85 - 94 %**
C	**0.08 - 0.25 %**
Si	**max 2 %**
P	**max 0.07 %**
S	**max 0.02 %**

The goal is to minimize the negative environmental impacts that waste products from various metallurgical and industrial processes would cause if they were landfilled, by recovering these waste products as raw materials in the production of our various products, including the production of our ULCFeMn. We will consume 2.0 t of these recovered/recycled waste materials to produce 1.0 t of ULCFeMn and 1.4 t of salable slag.

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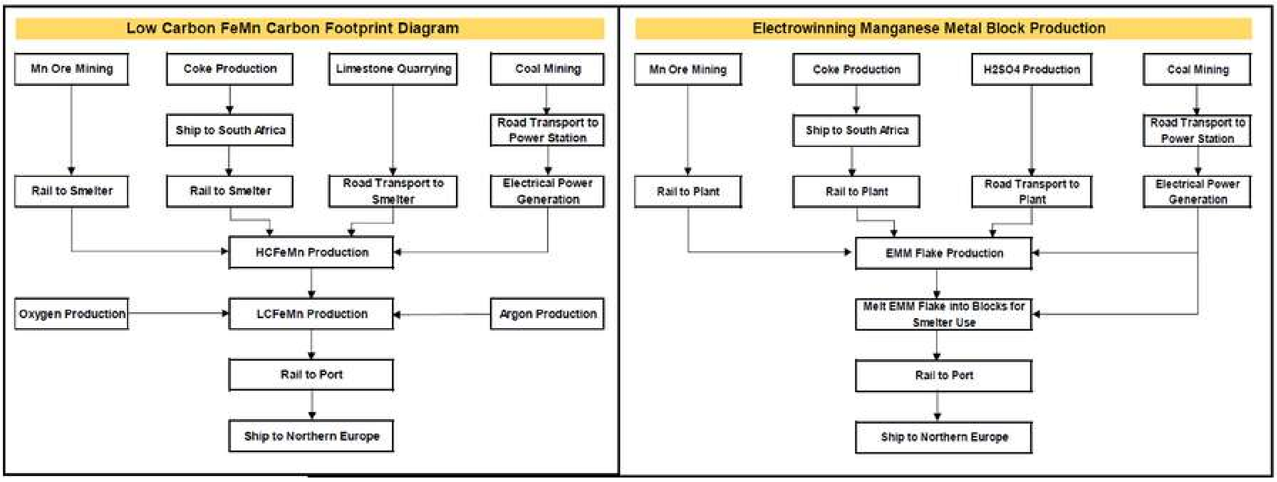
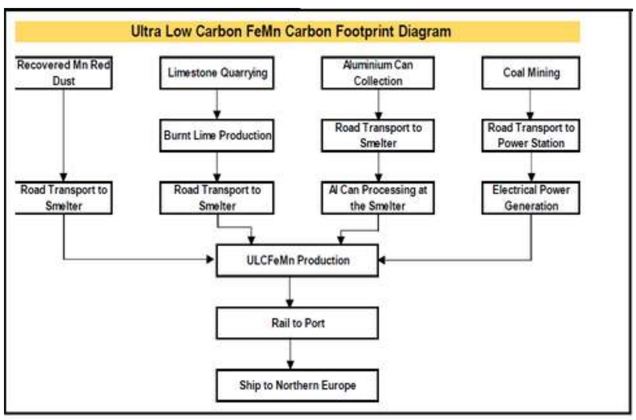
Ultra-Low Carbon FeMn

The further advantage of this choice of raw materials is our ULCFeMn having a very low Carbon Footprint, compared to competitive Manganese products, because the Aluminium converts to Alumina with no CO2 emissions. This is advantageous to our clients in their drive to minimize their own Carbon Footprint.

Manganese Carbon Footprint Comparison

Manganese Carbon Footprint Comparison When determining the Carbon Footprint of a Manganese product the Value Chain leading to the production of that product needs to be investigated. What follows is a high-level analysis (main CO2 producers only) of the Value Chains of three competing Manganese products.





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Ultra-Low Carbon FeMn

COMPARISON OF THE ESTIMATED CARBON FOOTPRINT of VARIOUS Mn PRODUCTS DELIVERED TO NORTHERN EUROPE

LCFeMn Production via CLU		CO_2 t
Mn Ore Mining	Mn Ore	4.11
Coke Production	Coke	1.62
HCFeMn Production	HCFeMn	11.71
LCFeMn Production	LCFeMn	2.77
10% Contingency for items not included		2.02
Delivered Northern Europe From South Africa	TOTAL	22.23
		t CO2/t LCFeMn
	t CO2/t Mn	29.25
	t C/t Mn	8.78

Typical Product Analysis:		Min	Max
Mn	%	76.00	80.00
Fe	%	15.00	20.00
C	%		0.50
Si	%	0.07	0.80
S	%	0.005	0.018
P	%	0.08	0.130
Se	%		0.00

EMM Production		CO_2 t
Mn Ore Mining	Mn Ore	5.34
Coke Production	Coke	0.18
Electrowinning Mn Metal Production	EMM	24.35
Melt & Cast EMM into Blocks for Smelter Use	EMM Blocks	1.90
10% Contingency for items not included		3.18
Delivered Northern Europe From China	TOTAL	34.96
		t CO2/t EMM
	t CO2/t Mn	35.06
	t C/t Mn	10.53

Typical Product Analysis:		Min	Max
Mn	%	99.70	99.90
Fe	%		0.03
C	%		0.04
Si	%		
S	%		0.040
P	%		0.040
Se	%		0.15

ULCFeMn Production		CO_2 t
Waste Mn Oxide "Red Dust"	Mn Oxide	0.01
Al Recycle Collection & Processing	Al Recycle	0.17
ULCFeMn Production	ULCFeMn	1.24
10% Contingency for items not included		0.14
Delivered Northern Europe From South Africa	TOTAL	1.56
		t CO2/t ULCFeMn
	t CO2/t Mn	1.64
	t C/t Mn	0.49

Typical Product Analysis:		Min	Max
Mn	%	95.00	96.00
Fe	%	3.30	3.80
C	%		0.20
Si	%		0.15
S	%		0.020
P	%		0.020
Se	%		0.00
Al	%		0.80

The advantageous very low Carbon Footprint of the ULCFeMn is quite clear.

Package and size of producs

Medium size

0 – 5 mm

Bigger size:

5 – 50 mm

All products are packed in **1mt Big Bags or Bulk.**

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Well Filler - WF 73

PARTICLE SIZE DISTRIBUTION: PERCENTAGE RETAINED			
SCREEN	MINIMUM	MAXIMUM	TYPICAL
-1.0 mm to +0.6 mm	20 %	40 %	30 %
-0.6 mm to +0.212 mm	50 %	70 %	57 %
-0.212 mm to -0.106 mm	7 %	20 %	13 %

CHEMICAL ANALYSIS:			
CHEMICAL COMPOSITION	MINIMUM	MAXIMUM	THEORETICAL
SiO 2	25 %	33 %	30 %
Cr 2O 3	30 %	35 %	32 %
FeO	18 %	22 %	19 %
Al 2O 3	8 %	13 %	11 %
MgO	5 %	9 %	6.7 %
C	0.4 %	0,9 %	0,7 %

Physical Properties

SPECIFIC GRAVITY 3.8 g/cm3
BULK DENSITY 2.40 g/cm3 (±0.05 g/cm3)
MELTING POINT 1 800 °C

PACKAGING - 1MT BULK BAGS, 10, 15, 20KG BAGS OR AS PER BUYER'S REQUIREMENT.

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Well Filler - WF 73

Guide to using Wellblock Sands

Well filler is a cost-effective granular material, designed to prevent the freezing of molten steel in the Well Block and nozzles of sliding gates.

It ensures that molten steel starts teeming from the ladle as soon as the ladle has swung into position and the sliding gate has opened.

The main component of Well Filler is Cr2O3, which sinters on its surface, creating a crust and preventing the material underneath from being washed away.

When the slide gate is opened, ferro static pressure breaks the crust, allowing the steel to flow freely through the nozzle.

Tips for improved opening rates.

1. Ensure that the sliding gate functions properly and remove any slag or foreign matter before filling with the Well Filler.
2. Fill the gate with the Well Filler shortly before the furnace is tapped, with twice the amount of the volume of the inner sleeve.
3. Add more Well Filler so that it forms a mound over the nozzle block.
4. Avoid the tapping metal stream from hitting the nozzle block and sleeve fill.