Ferro Alloys

FERRO ALUMINIUM

Melting Range 1225-1275°C
SPECIFIC GRAVITY 5.1

Used as a deoxidant in steel making and available in the form of pyramids packed to suit customers’ requirements. The alloy is typically Al 35-40%, C 0.02%max, Si 0.5% max, Mn 0.6% max, Cu 0.2% max, 40% & 50% Al grades are available on request.

FERRO BORON

Melting Range 1450-1550°C
SPECIFIC GRAVITY 6.6

Used by steel makers and malleable iron founders to improve hard enability and to control the micro structure of flat rolled HSLA steels. William Rowland Ltd offers a full range of sizes including those specified by cored wire producers together with any number of packing options. The boron content is determined by individual customer requirements and can range from B 15% to in excess of 20%.
FERRO CHROMIUM

Melting Range
1575-1675°C (Low Carbon)
1350-1450°C (High Carbon)

SPECIFIC GRAVITY
7.35 (Low Carbon)
7.20 (High Carbon)

We supply Ferro Chromium to various specifications, Chromium is a vital alloying element in iron and steel. It promotes corrosion and oxidation resistance and aids high temperature strength. Ferro Chromium not only finds application in stainless steel production but also as an additive in a range of constructional and tool steels. High Carbon Ferro Chromium is added to a range of cast irons to impart strength and wear resistance.

FERRO MANGANESE

Melting Range
1060-1225°C (Low Carbon)
1140-1200°C (High Carbon)

SPECIFIC GRAVITY
7.3 (Low Carbon)
7.2 (High Carbon)

Available as a high carbon grade and complemented by a range of low and medium carbon alloys together with a special nitried ferro manganese providing the steel maker with the ability to add nitrogen in controlled amounts. Specification for the high carbon grade is typically Mn 75-80%, C 6-8%, Si 1.0% max, P 0.2% max (Lower Phos’ levels of 0.1% max are available). For the medium and low carbon grades the manganese ranges between 78-98%, with carbon options of 1.5% max, 1.0% max and 0.1% max with variety of sizes and packing to suit customer requirements.
FERRO MOLYBDENUM/MOLYBDIC OXIDE

Melting Range  (FeMo) 1665-1715°C
SPECIFIC GRAVITY (FeMo) 9.4

Ferro Molybdenum

More commonly referred to in the trade as “ferro moly” it is an extremely versatile alloy used mainly in HSLA (high strength low alloy) and stainless steels, however, its numerous properties mean that is equally at home in cast irons, certain high speed tool steels, nickel based and superalloy applications.

The properties which ferro molybdenum imparts vary depending on the grade of steel or iron being produced. Additions of ferro moly can lead to improvements in weldability, corrosion and wear resistance while also serving to increase ferrite strength. Ferro moly is produced by thermit reduction of technical oxide in the presence of iron.

William Rowland Ltd is the UK distributor for The Kennecott Molybdenum Company supplying western grade ferro molybdenum produced by European conversion plants.

We are able to offer a range of sizes suitable for a wide range of addition practices.

The typical specification of 5 x 30mm ferro molybdenum offered by The Kennecott Molybdenum Company is as follows:

Mo 67%min, Cu 0.50%max, Si 1.5%max, P 0.05%max, S 0.10%max, C 0.10%max, Pb 0.01%max.
Molybdic Oxide

Known throughout the trade as Moly Oxide it is primarily available for arc and AOD furnace additions. It comes packed in a variety of ways most commonly in the UK in cans containing 10kgs of Oxide which in turn are stacked onto pallets (600kg of Oxide per pallet) these are then shrink wrapped to ensure safe handling and transportation to the customers works. Other options include drums containing 400kgs of Oxide and bottom pouring big bags containing 1000kg of Oxide both on pallets for ease of handling.

If required moly oxide can be made available in the form of carbon free briquettes.

A typical specification would be: Mo 57%min, Cu 0.50%max, Pb 0.05%max, P 0.05%max, S 0.10%max, C 0.10%max.

FERRO NIOBium

Melting Range 1500-1550°C
SPECIFIC GRAVITY 8.2

Also called Columbium and used by steel makers as a grain refiner in HSLA steels and as a carbide former in austenitic stainless steels. The alloy is available packed in drums or bags sized 0 x 2mm, 3 x 10mm and 5 x 30mm. The specification is typically Nb 65%min, Ta 1%max, C 0.3%max, Si 0.3%max, Al 0.2%max, S 0.1%max, P 0.1%max.

Reactor grade ferro niobium is also available for effective control of residual element levels and is particularly useful in superalloy production.

FERRO PHosPHORUS

Melting Range 1250-1350°C
SPECIFIC GRAVITY 6.4

Used in the production of phosphoric irons and certain free cutting steels, supplied in lumpy or crushed form, typically 25% P with controlled Si contents 1% and 2% max.
FERRO SELENIUM

Melting Range 480-940ºC
SPECIFIC GRAVITY 6.35

Available as the 50/50 alloy, normally in the lumpy or crushed form. Used in the production of free cutting stainless steel.

FERRO SILICON

Melting Range
- 1225-1325ºC (75% grade)
- 1230-1300ºC (45% grade)
SPECIFIC GRAVITY
- 3.75 (75% grade)
- 5.3 (45% grade)

Ferro silicon is available as 75% Si and 45% Si grades in the standard and high purity versions. We also supply a range of ferro silicon based inoculants especially for the ironfounder, including INOC ZR and INOC SR

FERRO SILICO MANGANESE

Melting Range 1130-1230ºC
SPECIFIC GRAVITY 6.35

Used mainly in low carbon grades of steel due to the low carbon content of the alloy, nominally C 1.5%-2.0%, or where specific alloying characteristics are required. It is the preferred method of introducing manganese into steel where the silicon is not deleterious and has the extra benefit of introducing lower levels of phosphorus and aluminium to the melt compared with making individual additions of ferro silicon and ferro manganese. The alloy is available packed in either drums or big bags sized 20 x 80mm with a typical specification being Mn 65% min, Si 16-18%, C 1.5- 1.8%, P 0.15% max, S 0.03% max.
FERRO SILICON MAGNESIUM

Melting Range  1210-1250°C
SPECIFIC GRAVITY 4.9

We can supply ferro silicon magnesium for ductile iron production with various Mg contents from 3-9% with cerium or rare earth additions. Material is available in various size ranges and is packed to customers specific requirements.

FERRO SILICON ZIRCONIUM

Melting Range  1250-1340°C
SPECIFIC GRAVITY 3.5

Ferro silicon zirconium is available in a range of sizes to suit customer requirements. Typical analysis is 50% Si, 35% Zr. Used as deoxidant in steel castings or in certain steels where a low residual aluminium is required.

FERROUS SULPHIDE

Melting Range  1150-1200°C
SPECIFIC GRAVITY 6.10

We can supply the material in the form of 100 mm lumps or specially sized pieces down to 3 mm. Contains min. 30% sulphur. Available in drums, sacks or pre-weighed bags down to 5 kgs. Used for accurate charge and trim additions in certain forms to improve the inoculation process. Also used in the production of free cutting steels, or in certain cases where hydrogen embrittlement in steel is a problem.
**FERRO TITANIUM**

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<td>Melting Range</td>
<td>1070-1130°C (70% grade)</td>
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<td>1330-1480°C (40% grade)</td>
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<td>SPECIFIC GRAVITY</td>
<td>5.4 (70% grade)</td>
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<td>5.9 (40% grade)</td>
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William Rowland Ltd has both 40% and 70% Ti grades available through our association with Butler & Clarke who are also able to produce low nitrogen and low aluminium grades on request. Of the two grades, 70% ferro titanium is the more popular and is typically Ti 68-72%, Al 5.0% max, V 3.0% max, Si 0.8% max, C 0.15% max, P 0.02% max, S 0.015% max, N2 0.4% max. Available in various packing options and sized to suit customer specifications whether they are for cored wire applications, ladle or furnace additions.

**FERRO VANADIUM**

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<td>Melting Range</td>
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<td>SPECIFIC GRAVITY</td>
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Used to promote fine grain size, to increase hardenability and offer improvements in wear resistance. Vanadium is used largely in HSLA steels and a variety of constructional and engineering steels. Both 80% and 50% grades are available in crushed and walnut sizes packed in steel drums or bags. The MMTA norms for 1st grade 80% alloy is stated as V 78% min, Al 1.5% max, Si 1.5% max, C 0.25% max, S 0.05% max, P 0.06% max. William Rowland Ltd have 80% ferro vanadium available with lower Si and Al levels for vacuum melting aerospace applications.
FERRO TUNGSTEN

Melting Range 1650-2100°C
SPECIFIC GRAVITY 15.4

This alloy is mainly used in high speed and tool steels. Owing to its high melting point the alloy is almost always added to the furnace rather than to the ladle. The major source of ferro tungsten is China and the MMTA norm for Chinese ferro tungsten is W 75% min, C 0.40%, S 0.08%, Mn 0.50% max, As 0.10%, Si 0.70% max, Cu 0.15% max, Sb 0.05% max, P 0.05% max. Sizes available are 25mm x down, 10 x 50mm and 10 x 100mm packed in either drums or bags.

IRON

Melting Range 1536°C
SPECIFIC GRAVITY 7.86

Available in 3 basic forms:

a) Electrolytic flake typically 99.91% Fe for many metallurgical and non-metallurgical applications where purity is critical. We are distributors for North American Hoganas High Alloys LLC.

b) Low carbon, low sulphur melting base in billet form, normally 75 mm square and custom cut to length. C 0.015% max., S 0.020%. For charge additions in stainless steels and magnet alloys.

c) Low carbon iron cuttings with controlled residuals, for economic charge and trim additions on less critical stainless steels and magnet alloys.
CALCIUM SILICON MANGANESE

Melting Range 1000-1120°C
SPECIFIC GRAVITY 2.5

Calcium Silicon Manganese behaves in a similar manner to Calcium Silicon, however its lower Calcium content tends to reduce its volatility. It still performs well as a desulphuriser, deoxidiser and as a means of controlling inclusion size, shape and distribution. Typical analysis is Si 60%, Ca 16%, Mn 16%, C 1% max, Al 1% max and Fe balance. Size available include 2 x 7 mm and 5 x 60 mm, packing is normally steel drums or bulk bags.

CALCIUM SILICON

Melting Range 975-1250°C
SPECIFIC GRAVITY 2.5

Elemental Calcium is difficult and dangerous to add to liquid steel, we therefore supply metal in its more stable form as Calcium Silicon. The product is used for refining, desulphurisation, deoxidisation and inclusion control. The standard analysis is typically Ca 30%, Si 60%, C 1% max, Al 1% max and Fe balance, sizes available include 2 x 7 mm, 10 x 60 mm and powder for injection purposes. Material is packed in steel drums or bulk bags.