

FERRO-ALLOYS



# Indian Minerals Yearbook 2012

(Part- II : Metals & Alloys)

51<sup>st</sup> Edition

**FERRO-ALLOYS**

(FINAL RELEASE)

**GOVERNMENT OF INDIA  
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INDIAN BUREAU OF MINES**

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# 6 Ferro-alloys

Ferro-alloys are one of the important inputs in the manufacture of alloys and special steel. Ferro-alloys impart special properties to steel. The alloys provide increased resistance to corrosion, improves hardness and tensile strength at high temperature, gives wear and abrasion resistance and increases creep strength etc. The growth of Ferro-alloys Industry is thus, linked with the development of the Iron and Steel Industry, Foundry Industry and to some extent Electrode Industry. The principal ferro-alloys are chromium, manganese and silicon. The product series consists mainly of ferro- manganese, silico-manganese, ferro-silicon and ferro-chrome.

Ferro-alloys are classified into two main categories viz, bulk ferro-alloys and noble ferro-alloys. Due to high cost of power, Ferro-alloys Industry has not been functioning to its full capacity. Ferro-alloys Industry spends 40 to 70% production cost on power consumption. The power consumption per tonne of ferro-alloys production in the country varied from 3,000 to 12,000 kWh.

At present, major portion of the ferro-alloys produced is exported. Ferro-manganese, silico-manganese, ferro-silicon, high carbon ferro-chrome and charge-chrome are exported after meeting the domestic requirements. India has sufficient raw materials of good quality, highly-skilled technical manpower and the latest equipment technology for production of ferro-alloys.

## INDUSTRY, PRODUCTION, DEVELOPMENT AND CONSUMPTION

As per Indian Ferro-Alloys Producers' Association (IFAPA), the total installed capacity of bulk ferro-alloys Industry in India is estimated at 5.15 million tonnes per annum and for noble ferro-alloys it is 50,000 tonnes per annum. The Industry is reported to be working at about 60-65% capacity utilisation. The details are given in Table-1.

**Table – 1 : Capacity of Ferro-alloys Industry in India**

(In tonnes per annum)	
Ferro-alloy	Installed capacity
<b>Total</b>	<b>5150000</b>
<b>Bulk Ferro-alloys:</b>	<b>5100000</b>
Manganese alloys	3160000
Chrome alloys	1690000
Ferro-silicon	250000
<b>Noble Ferro-alloys:</b>	<b>50000</b>

*Source: Indian Ferro-Alloys Producers' Association (IFAPA), Mumbai.*

The Ferro-alloys Industry was established as an ancillary industry to cater to the growing needs of the domestic Steel Industry and is spread all over the country. Most of the ferro-alloys units have been set up in Andhra Pradesh, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha and West Bengal because of availability of the raw material. Recently, the Industry has further spread to the North-Eastern Region of India. In Meghalaya, a number of small units producing ferro-silicon and ferro-silico-manganese have come up. The production of various ferro-alloys, as reported by IFAPA is given in Table-2.

The overall production in 2011-12 has increased substantially by 7.28% to 3.00 million tonnes from 2.80 million tonnes in 2010-11. The ferro-alloys units have incorporated the latest technology in order to use non-metallurgical grade ores, both lumps and fines, after necessary beneficiation and agglomeration. The units have also incorporated an effective pollution control measures in the form of gas cleaning, deoxidising and waste heat recovery.

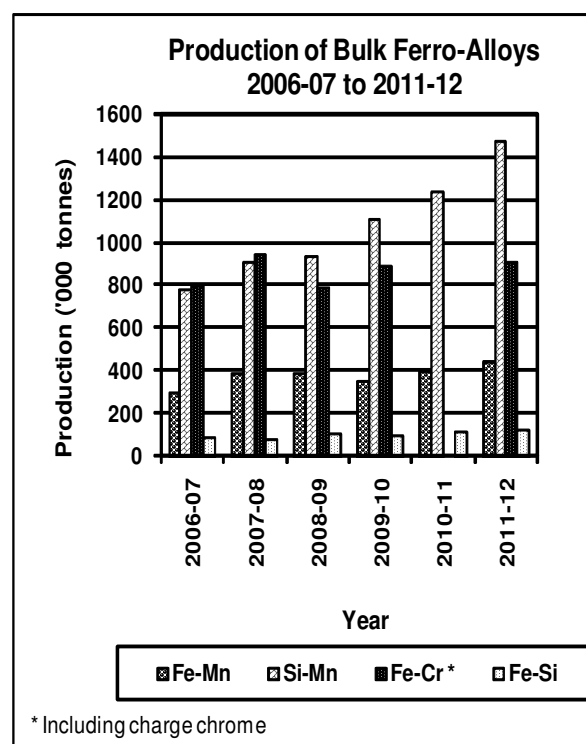
FERRO-ALLOYS

Table – 2 : Production of Ferro-alloys, 2009-10 to 2011-12

(In tonnes)

Ferro-alloy	2009-10	2010-11	2011-12
<b>Total (A) + (B)</b>	<b>2493633</b>	<b>2796913</b>	<b>3000397</b>
<b>A) Bulk Ferro-alloys</b>	<b>2462775</b>	<b>2762918</b>	<b>2958784</b>
HC Ferro-manganese	341883	388079	427415
MC Ferro-manganese	8222	7625	12386
LC Ferro-manganese	6018	6313	6932
Silico-manganese	1066485	1193874	1418844
MC Silico-manganese	24108	24068	33662
LC Silico-manganese	25454	24197	25897
Ferro-silicon	97682	115164	127092
HC Ferro-chrome/charge-chrome	890916	1001582	902840
LC Ferro-chrome	2007	2016	3716
<b>B) Noble Ferro-alloys</b>	<b>30858</b>	<b>33995</b>	<b>41613</b>
Ferro-molybdenum	2822	3090	4362
Ferro-vanadium	1389	1521	2459
Ferro-tungsten	150	150	225
Ferro-silico-magnesium	17132	19079	24452
Ferro-aluminium	7017	7538	7393
Ferro-silico-zirconium	120	118	130
Ferro-titanium	1929	2172	2217
Ferro-boron	90	90	103
Ferro-nickel-magnesium	209	237	272

Note: HC: High carbon MC: Medium carbon LC: Low carbon  
Source: Indian Ferro-Alloys Producers' Association (IFAPA), Mumbai.



**BULK FERRO-ALLOYS**

Bulk ferro-alloys consist of principal alloys, viz, ferro-manganese, silico-manganese, ferro-chrome, charge-chrome and ferro-silicon.

**Ferro-manganese/Silico-manganese**

Ferro manganese is produced as high carbon ferro-manganese with 72-82% Mn, 6-8% C and 1.5% Si, medium carbon ferro-manganese with 74-82% Mn, 1-3% C and 1.5% Si, and low carbon ferro-manganese with 80-85% Mn, 0.1-0.7% C and 1-2% Si. Manganese in the form of ferro-manganese is added for hardening and desulphurisation of steel. Nav Bharat Ferro Alloys Ltd, Paloncha, Andhra Pradesh; Chhattisgarh Electricity Co. Ltd, Raipur, Chhattisgarh; Indsil Energy & Electro Chemicals Ltd, Raipur, Chhattisgarh; Ispat Godavari, Raigarh, Chhattisgarh; Monet Ispat Ltd, Raipur, Chhattisgarh; Union Ferro, Raigarh, Chhattisgarh; Prakash Industries, Raigarh, Chhattisgarh;

Tirumala Balaji Alloys Pvt. Ltd, Raigarh, Chhattisgarh; Vandana Global Ltd, Raipur, Chhattisgarh; SAL Steels Ltd, Gandhidham, Gujarat; Anjaneya Ferro Alloys Ltd, Mihijam, Jharkhand; Gautam Ferro Alloys Ltd, Ramgarh, Jharkhand; Shivam Iron & Steel Co. Pvt. Ltd, Giridih, Jharkhand; Sandur Manganese & Iron Ores Ltd, Sandur, Karnataka; Indsil Electromelt Ltd, Palakkad, Kerala; Chandrapur Ferro Alloys Plant (formerly Maharashtra Electros melt Ltd), Chandrapur, Maharashtra; Nagpur Power Ind. Ltd, Kanhan, Maharashtra; Natural Sugar & Allied Ind. Ltd, Osmanabad, Maharashtra; Adhunik Meghalaya Steels Pvt. Ltd, Bymihat, Meghalaya; Meghalaya Sova Ispat Ltd, Meghalaya; Shayam Century Ltd, Meghalaya; Tata Steel Ltd, Joda, Odisha; Bhaskar Shraichi Alloys Ltd, Durgapur, West Bengal; Cosmic Ferro Alloys Pvt. Ltd, Bankura, West Bengal; Dayal Ferro Alloys Ltd, Ramgarh, West Bengal; Haldia Steels Ltd, Burdwan, West Bengal; Impex Ferro Tech Ltd, Burdwan, West Bengal; Maithan Alloys Ltd, Burdwan, West Bengal; Modern India Con-Cast Ltd, Birhampur, West Bengal; Sharp Ferro Alloys Ltd, Durgapur, West Bengal; Shri Gayatri Minerals Ltd, Bihampur, West Bengal; Shayam Ferro alloys Ltd, Burdwan, West Bengal; and Sova Ispat Ltd, Durgapur, West Bengal are the major producers of ferro-manganese/silico-manganese.

Silico-manganese, a combination of 60-70% manganese, 10-20% silicon and 20% carbon is used as substitute for low carbon ferro-manganese in the Steel Industry. It consumes around 4,750 to 5,250 kWh power per tonne of silico-manganese produced. Silico-manganese has emerged as a more important alloy than ferro-manganese. The country, thus, has emerged as a leading producer of silico-manganese. Silico-manganese was also produced by a number of small-scale ferro-alloy producers.

The total production of ferro-manganese in 2010-11 was about 402,017 tonnes which increased to about 446,733 tonnes in 2011-12. Consumption of ferro-manganese was reported at 125,600 tonnes in 2011-12.

The production of silico-manganese (including medium carbon & low carbon silico-manganese) which was about 1,242,139 tonnes in

2010-11 increased to 1,478,403 tonnes in 2011-12. In 2011-12, the total consumption of silico-manganese by all industries has been reported at 216,490 tonnes.

#### **Ferro-chrome/Charge-chrome**

Ferro-chrome when added to steel imparts hardness, strength and augments its stainless characteristics. Carbon content classifies the ferro-chrome alloy into high carbon (6-8%), medium carbon (3-4%) and low carbon (1.5-3%), although chromium content in all the three grades is around 60-70%. Around 2.5 tonnes chrome ore with an estimated power consumption of 4,500 kWh is required to produce one tonne of ferro-chrome.

FACOR Alloys Ltd, Garividi, Andhra Pradesh; GMR Technologies & Ind. Ltd, Srikakulam, Andhra Pradesh; Jindal Steel & Power Ltd, Raigarh, Chhattisgarh; Standard Chrome Ltd, Raigarh, Chhattisgarh; SAL Steel, Kachchh-Bhuj, Gujarat; Balasore Alloys Ltd, Balasore, Odisha; IDCOL Ferro Chrome Plant, Jajpur Road, Odisha; Indian Metals & Ferro Alloys Ltd, Therubali, Odisha; Jindal Stainless Ltd, Duburi, Odisha; Nava Bharat Ferro Alloys Ltd, Dhenkanal, Odisha; Utkal Manufacturing Services Ltd, Choudhwar, Odisha; Rawat Ferro Alloys, Cuttack, Odisha; Rohit Ferro Tech. P. Ltd, Bishnupur, West Bengal and Sri Vasavi Ind. Ltd, Bishnupur, West Bengal are the major ferro-chrome producers. A sizeable quantity is also produced by units in the small-scale sector.

Tata Steel Ltd, FACOR and Indian Metals & Ferro Alloys Ltd, (IMFA) the three major producers of charge-chrome in the country are 100% export-oriented, having a total capacity of 182,500 tpy. Tata Steel with its charge-chrome plant at Bannipal, Odisha, has a capacity of 55,000 tpy. FACOR has a capacity of 65,000 tpy charge-chrome at its Randia Plant, Bhadrak district, Odisha. Indian Metals & Ferro Alloys Ltd, (IMFA), Cuttack district, Odisha has an installed capacity of 62,500 tpy.

The production of high carbon ferro-chrome/charge-chrome which was 1,001,582 tonnes in 2010-11 decreased to 902,840 tonnes in 2011-12. The production of low carbon ferro-chrome which was 2,016 tonnes in 2010-11 increased to 3,716 tonnes in 2011-12. The consumption of ferro-chrome in 2011-12 was reported at 287,300 tonnes.

### **Ferro-silicon**

Ferro-silicon contains about 75-90% silicon and minor amounts of iron, carbon, etc. It is produced by using quartzite, iron ore, coke and electrode paste. Around 1.75 to 2 tonnes quartzite is required to produce one tonne of ferro-silicon. A very high consumption of power, i.e., 9,000 to 10,000 kWh is required to produce one tonne ferro-silicon. It is a powerful deoxidising agent and its major applications are in electrical steel used for transformers and dynamos, alloy steel for tools & automobile valves and in iron casting and mineral dressing.

Bharat Alloys & Energy Ltd, Kurnool, Andhra Pradesh; VBC Ferro Alloys, Medak, Andhra Pradesh; SMS Smelters Ltd, Lekhi, Arunachal Pradesh; Visvesvaraya Iron & Steel Plant, Bhadravati, Karnataka; Silical Metallurgic Pvt. Ltd, Palakkad, Kerala; Jayantia Alloys, Meghalaya and Indian Metals & Ferro Alloys Ltd, Therubali, Odisha are the major producers of ferro-silicon. Small-scale producers of ferro-silicon are also in operation in Kerala and Tamil Nadu. In Meghalaya, three units have sprung up that produce ferro-silicon.

The production of ferro-silicon which was around 115,164 tonnes in 2010-11 increased to 127,092 tonnes in 2011-12. The domestic consumption of ferro-silicon in the organised sector was 43,100 tonnes in 2011-12.

## **NOBLE FERRO-ALLOYS**

Noble ferro-alloys are one of the vital additive inputs required especially in production of alloy and special steel. Noble ferro-alloys also refer to alloys used in small quantities and are relatively expensive compared to bulk ferro-alloys. These are used in the production of steel as deoxidant and alloying agents.

These high temperature alloys impart strength, resistance and stability within a temperature range from 260 to 1200° C. These alloys are used generally in turbine engines, power plants, furnaces and all pollution control equipment. Noble ferro-alloys include ferro-vanadium, ferro-titanium, ferro-nickel, ferro-molybdenum, ferro-tungsten and ferro-niobium.

In India, noble ferro-alloys are mostly manufactured through aluminothermic process.

### **Ferro-nickel**

Production of ferro-nickel was not reported in the organised sector. However, production of 237 tonnes & 272 tonnes of ferro-nickel-magnesium was reported in 2010-11 and 2011-12, respectively.

The reported consumption of ferro-nickel in 2011-12 was 2,235 tonnes.

### **Ferro-molybdenum**

There were five important units, namely, Mehra Ferro-alloys, Electro Ferro-alloys Pvt. Ltd, India Thermit Corporation, Dandeli Steel & Ferro-alloys Ltd and Eastern Metals & Ferro-alloys Ltd. The all India production which was 3,090 tonnes in 2010-11 increased to 4,362 tonnes in 2011-12. The consumption reported in 2011-12 was 671 tonnes.

### **Ferro-tungsten**

Production of ferro-tungsten which was 150 tonnes in 2010-11 increased to 225 tonnes in 2011-12. The reported internal consumption was 18 tonnes for the year 2011-12.

### **Ferro-vanadium**

Production of ferro-vanadium in 2010-11 which was 1,521 tonnes increased to 2,459 tonnes in 2011-12. The reported consumption in 2011-12 was 1,171 tonnes.

### **Others**

Misra Dhatu Nigam Ltd (A Govt. of India Enterprise), Hyderabad, produced chiefly cobalt, molybdenum, titanium and tungsten-based super-alloys.

The production details of various types of bulk ferro-alloys and noble ferro-alloys in 2009-10 to 2011-12 are furnished in Table - 2.

Information on plantwise capacity of principal ferro-alloys in India together with general specifications of products is given in Table-3. Consumption of principal alloys by different industries is detailed in Table-4.

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**Table – 3 : Statewise, Plantwise Capacity and Specifications of Principal Ferro-alloys Produced in India**

Name & location of the plant	Product	Specifications	Installed capacity (tpy)
<b>Andhra Pradesh</b>			
Andhra Ferro-alloys Ltd Srinivasanagar, Distt. Vizianagaram	HC ferro-chrome	Cr: 60-65% max, Si: 2-4% max, C: 6-8% max, P: 0.040% max, S: 0.040% max	
	Silico-manganese	Mn: 60% min, C: 2.5% max, Si: 14% min, P 0.3 % max, S: 0.035% max	20,000
FACOR Alloys Ltd Shreeramnagar, Garividi Distt. Vizianagaram	HC ferro-manganese	Mn: 70-80%, C:6-8% Si: 1-5 % max P: 0.35% max S: 0.05% max Size: 25-150 mm +/- 10% Corresponding ISI specification: IS 1171-2011	72,500 (For all ferro-alloys)
	Ferro-chrome	Cr: 60-63%, Si: 3-4%, C: 6-8%, P: 0.03-0.05% (max), S: 0.03-0.05% (max)	
	Silico-manganese	Mn: 60-70%, Si: 16-20% C: 2.0% max, S: 0.03%, P: 0.3 %, Size: 10 - 150 mm +/- 10% Corresponding ISI specification: IS 1470-1990	
	Ferro-silicon	Si: 60-80%, C: 0.15% max, P: 0.05%, S: 0.05% max, Al : 1-15% max, Size: 25-150 mm +/- 10% Corresponding ISI specification: IS 1110-2011	
	Ferro- silicon- maganesium	Mg: 4-30%, Si: 44-55 %, Al: 1.00%, Ca: 1.0-4.0%,	
	Silico-chrome Other ferro-alloys	NA NA	
Deccan Ferro Alloys (P)Ltd Chintalapalem (PO), Pendurthi (SO) Vishakhapatnam	silico-manganese	NA	18,000
Jindal Stainless Ltd (Ferro Alloys Division) Jindal Nagar, Kothavalasa Distt. Vizianagaram .	HC ferro-chrome	Cr: 62%, Si: 2.5%, C: 7-8%, P: 0.040%,	40,000
GMR Technologies & Industries Ltd Village Ravivalasa Distt. Srikakulam.	LC ferro-manganese MC ferro-manganese HC ferro-manganese	Mn: 60%, Si: 16%, S: 0.05%, P: 0.5%	25,000 (Total)

(Contd.)

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Table - 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
	Silico-manganese	–	–
	Ferro-silicon	–	–
	LC ferro-chrome	Cr: 60-68%,	–
	HC ferro-chrome	Si: 2.0 to 4% , S: 0.05 (max) ,	–
	Silico-chrome	P: 0.03%, S: 0.05%	–
VBC Ferro Alloys Ltd Village Rudraram	Ferro-silicon	–	10,000
Patancheru Mandal	Ferro-chrome	–	27,000
Distt. Medak.	Silico-manganese/ Ferro-manganese	–	31,500
Nav Bharat Ferro-Alloys Ltd E.M.D., Paloncha, Kothagudem Distt. Khammam.	HC ferro-chrome	Cr: 60% (min), Si: 3-4% (max), C: 6-8%, P: 0.03% (max), S: 0.03% (max)	12,491
	Silico-manganese	Mn: 60-70%, Si: 15-16% (min), C: 2% (max), P: 0.03% (max), S: 0.03% (max)	9,581
	Ferro-silicon	Si: 40-45%/70-75%/75-80%, Al: 0.5% (max)/1.25% (max), C: 0.15% (max), P: 0.05% (max), S: 0.05% (max)	9,309
Sree Sarda Alloys Ltd Ravivalsa, Tekkali Mandal Distt. Srikakulam.	Ferro-chrome	NA	6,000
<b>Chhattisgarh</b>			
Hira Group of Industries Jain Carbides & Chemical Ltd			
(i) Unit 1, Urla, Distt. Raipur.	HC ferro-manganese	Mn: 70-75%, Si: 1.5% (max), C: 6-8% (max), P: 0.40% (max), S: 0.05% (max)	7,000
	Silico-manganese	Mn: 60-65%, Si: 13-17% (max), C: 2.5% (max), P: 0.35% (max), S: 0.03% (max)	20,000
(ii) Unit-2	HC ferro-manganese	Mn: 60-65%	14,000
	Silico-manganese		12,000
(iii) Hira Ferro Alloys Ltd Urla, Distt. Raipur.	HC ferro-manganese	Mn: 70-75%, Si: 1.50% max, C: 6-8 % , P: 0.30% max, S: 0.05% max	60,500
	Silico-manganese	Mn: 60-65%, Si: 14-17%, C: 2.0% max, P: 0.35% max, S: 0.05% max	
(iv) Alok Ferro-Alloys Ltd Raipur.	Silico-manganese	NA	18,000
INDSIL Energy & Electrochemical Ltd Raipur, Chhattisgarh	HC ferro-manganese	NA	25,000
	Silico-manganese	Mn: 55% (min), Si: 23-27%, C: 0.1 % (max)/0.2% (max)/0.3% (max), S: 0.02% (max), P:0.15% (max)	21,500
Sarda Energy & Minerals Ltd (Formerly Raipur Alloys & Steel Ltd.)	Ferro-manganese	–	66,000
	Silico-manganese	–	–

(Contd.)

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Table - 3 (Contd.)

Name & location of the plant	Product	Specifications	Installed capacity(tpy)
Chhattisgarh Electricity Co. Ltd Siltara, Raipur.	HC ferro-manganese	Mn: 70-75%, Si: 1.5-2.0%, C: 6.0-8.0%, P: 0.35-0.40%, S: 0.05 (max)	36,000
	Silico-manganese	Mn: 60-65% , Si: 15-20%, C: 2.0-2.5%, P : 0.3-0.35 % , S: 0.05% (max)	NA
Nav-chrome Ltd Urla Industrial Area Distt. Raipur.	HC ferro-manganese	NA	21,560
	Silico-manganese	NA	
	HC ferro-chrome	NA	14,700
Deepak Ferro Alloys Ltd Urla Industrial Area Raipur.	Ferro-manganese		5,000
	HC ferro-manganese	Std. Specified	
	MC ferro-manganese		
	LC ferro-manganese		
	Silico-manganese		5,000
	Ferro-Silicon	-	
	Ferro-chrome	5,000	
LC ferro-chrome	NA		
HC ferro-chrome	Cr: 60-70%, Si: 2 to 4%, S : 0.05%, C: 6 to 8%		
	Silico-chrome	-	-
	Others	-	-
Jindal Steel & Power Ltd Kharsia, Raigarh.	HC Ferro-chrome	Cr: 60-66%, C: 6 to 8%, Si: 4% (max), P: 0.050 (max), S: 0.050 (max).	36,000
	Silico-manganese	Mn: 60%, Si: 15%, P: 0.3% max	-
Sai Chemical Pvt Ltd , Tadesara, Rajnandgaon	Silico-manganese	NA	10,200
<b>Goa</b> Karthik Alloys Ltd	NA	NA	4,100
<b>Gujarat</b> Essel Mining & Industries Ltd Vapi, Distt. Valsad.	Ferro-vanadium	V: 50%, C: 0.1% (max), S and P: 0.05% each, Al: 1.5%	400
	Ferro-molybdenum	Mo: 60%, C: 0.1%, S: 0.08%, P: 0.06%, Al: 0.5%	1,200
	Ferro-titanium	NA	600
Electro Ferro-Alloys (Pvt.) Ltd Ahmedabad, Gujarat.	Ferro-molybdenum	NA	300
	Ferro-silico-zirconium		
Baroda Ferro-Alloys Distt. Panchmahals.	HC ferro-chrome	NA	3500
<b>Haryana</b> Haryana Ferro-Alloys Ltd	-	-	2,500
<b>Jammu and Kashmir</b> Shree Sitaram Industries Pvt. Ltd Phase II, SIDCO Complex, Bari Brahmana	Ferro Chrome	NA	3,325
<b>Jharkhand</b> Anjaney Ferro Alloys Ltd, Mihijam Dist. Dumka.	Ferro-silicon	NA	NA
	Silico-manganese	NA	NA
	Ferro-manganese	NA	NA

(Contd.)



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Table - 3 (Contd.)

Name & location of the plant	Product	Specifications	Installed capacity(tpy)
Bihar Foundary & Casting Ltd (Unit Gautam Ferro Alloys)	Silico-manganese	Si: 14%, Mn : 60%	34,000
Gautam Ferro-Alloys Ltd	–	–	5,500
<b>Karnataka</b>			
Sandur Manganese & Iron Ores Ltd Vyasankere, Distt. Bellary (Plant closed since 1.8.1998)	HC ferro-manganese	–	29,100
	Silico-manganese		20,000
	Ferro-silicon		24,000
Dandeli Steel & Ferro Alloys Ltd Dandeli, Distt. Uttar Kannada.	Ferro-manganese	Mn: 70-75%, C: 0.1%, Si: 2.4%, P : 0.15%, S: 0.05%, Size: 37 mm	6,000
	MC ferro-manganese	Mn: 70-75%, C: 1.5%, P: 0.25%, Si: 2%, S: 0.05%	
S.R. Chemicals & Ferro-alloys KIADB Honaga, Belgaum	LC Ferro-manganese	Mn: 70%, C: 0.1%, P: 0.12%	25
Thermit Alloys (Pvt.) Ltd N-7, Industrial Estate Shivamogga.	Ferro-manganese	NA	
	Silico-manganese	NA	
	Ferro-chrome	NA	1,200
	Ferro-silicon	NA	
	Silico-chrome	NA	
<b>Kerala</b>			
The Silical Metallurgic Ltd Wayalur, Distt. Palakkad.	Silico-manganese	Mn: 70-75%	3,600
INDSIL Electrosmelts Ltd Pallatheri, Distt. Palakkad.	Silico-manganese	NA	NA
	Ferro-silicon	NA	NA
INDSIL Hydro Power & Manganese Ltd Palakkad, Kerala	Silico-manganese	Mn: 55% (min), Si: 23-27%, C: 0.1 % (max)/0.2% (max)/0.5% (max), S: 0.02% (max), P: 0.15% (max)	14,400
Shri Laxmi Electro Smelters (Pvt.) Ltd. Industrial Development Area Erumathala, P.O. Aluva - 683 105.	Ferro-silicon	NA	NA
<b>Madhya Pradesh</b>			
MOIL Ltd (formerly Manganese Ore (India) Ltd) Ferro-manganese Plant Bharweli (Manjhara), Distt. Balaghat.	HC ferro-manganese	Mn: 78±1%,  P: 0.35% (max), C: 6.8%	10,000
Jalan Ispat Castings Ltd Industrial Area Meghnagar, Distt. Jhabua.	Silico-manganese	Mn: 60-65%, Si: 15-20%, C: 2% (max), P: 0.35%	12,000
Crescent Alloys Pvt. Ltd Seoni.	Ferro-silicon	N.A.	4,500
	Ferro-manganese	N.A.	(Total)
S.R Ferro Alloys , Jhabua	silico- manganese	NA	10,800
<b>Maharashtra</b>			
Chandrapur Ferro Alloy Plant,(erstwhile Maharashtra Electrosmelt Ltd) Chandrapur - 442 401.	HC ferro-manganese	Mn: 70-74 % and 74-78% , Si: 1.5% (max), C: 6.8%, P: 0.43%. (max)	50,000

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Table - 3 (Contd.)

Name & location of the plant	Product	Specifications	Installed capacity (tpy)
	MC ferro-manganese	Mn : 70-74% and 74-78% , Si: 2% max, C: 1 - 3% , P: 0.4% max	1,800
	LC ferro-manganese	Mn: 70-74% and 74-78% , Si: 2% (max), C: 1.5% max, P: 0.4% max,	NA
	Silico-manganese	Mn: 60-65% and 65% Min, Si: 15-20%, C: 2 % max, P: 0.35% max	32,765
Nagpur Power & Industries Ltd P.O. Khandelwalnagar Distt. Nagpur.	Silico-manganese HC ferro-manganese	Mn: 60-65%, P: 0.35% Mn: 70-75%, P: 0.4%	NA NA
Bharat Pulverising Mills Ltd Andheri, Mumbai.	Ferro-molybdenum Ferro-tungsten Ferro-vanadium	NA NA NA	200 (Total)
Sunbel Alloys Co. of India Ltd Thane-Belapur, Mumbai.	Ferro-molybdenum Ferro-silicon Ferro-tungsten Ferro-vanadium	NA NA NA NA	300 (Total)
Natural Sugar and Allied Ind. Ltd, Sainagar, Ranjani, Distt. Osmanabad.	HC Ferro-manganese	Mn: 70-75%, Si: 2-2.5%, P: 0.4%, C: 6-8%	(5 MVA)
	Silico-manganese	Mn: 60-65%, Si: 13-15%, P: 0.3%, C: 2-2.5%	(6 MVA)
<b>Odisha</b> Ferro Alloys Corporation Ltd Ferro Chrome Plant Randia D. P. Nagar Randia, Distt. Bhadrak.	HC ferro-chrome/ Charge-chrome	Cr: 60-64%, Si: 3-4%, C: 6-8%, P: 0.03-0.05% (max), S: 0.03-0.05% (max)	65,000
Tata Steel Ltd, Ferro Manganese Plant, Joda, Distt. Keonjhar	HC ferro-manganese Silico-manganese	Mn: + 70%, C: 6-8 %, Si :0.3-2%, P: 0.2-0.4%, Mn: 46-48%, Si: 14.56%, P: 0.197%	50,400
Tata Steel Alloys Ltd, Ferro Alloy Plant Cuttack.	Ferro-chrome		50,000
Tata Steel Ltd, Charge-chrome Plant Bamnipal, Distt. Keonjhar.	Charge-chrome	Cr: 60% (min), Si: 4% (max) , C: 8% (max), P: 0.03% (max) , S: 0.03% (max)	55,000
Balasore Alloys Ltd, Balgopalpur, Dist. Balasore. (Formerly Ispat Alloys Ltd)	HC ferro-chrome	Cr: 60-63% Si: 3.5% (max)   Grade I C: 8.0% (max)    Cr: 57-60% S: 4.0% (max)   Grade II C: 8.0% (max)	100,000
Jeypore Sugar Co. Ltd, (Ferro-manganese Plant) Distt. Rayagada.	HC ferro-chrome	Cr: 60-65%, P: 0.055%, C: 2%, S: 0.05%, Si: 4%, Fe: Balance	22,000

(Contd.)

FERRO-ALLOYS

Table - 3 (Contd.)

Name & location of the plant	Product	Specifications	Installed capacity (tpy)
	Silico-manganese	Mn: 60-65%, Si: 15-18%, C: 2% max.	22,000
J. B. Ferro Alloys ,Ward - 2 Barbil,	LC ferro manganese	NA	200
IDCOL Ferro Chrome & Alloys Ltd Jajpur Road, Distt. Jajpur.	HC ferro-chrome	Cr: 62-65%, Si: 1.5 to 8%, C: 8% (max)	18,000
Indian Metals & Ferro Alloys Ltd., (IMFA)	HC ferro-chrome/ Charge-chrome	Cr: 60%	62,500
Indian Metals & Ferro Alloys Ltd (IMFA), Therubali, Dist. Rayagada.	Ferro-silicon HC ferro-chrome	Si: 70-75%, Cr: 60%	61,000 275,000
Superb-Metal alloys (Pvt.) Ltd Rairangpur, Distt. Sundergarh	Ferro-columbium Ferro-molybdenum Ferro-tungsten Ferro-vanadium	NA	300 (Total)
<b>Puducherry</b>			
The Silical Metallurgic Ltd	Ferro-silicon Ferro-silicon-magnesium	- -	10,560 1,800
VSK Ferro Alloys Ltd Thuthipet.	Ferro-silicon	Si: 72.3%, C: 0.15%, S: 0.051%, Mn: 0.55%, P: 0.042%, Fe: 26.13%	3,000
Snam Alloys (Pvt.) Ltd Kariamankam, Distt. Puducherry.	Ferro-silicon Ferro-silicon-magnesium	NA	12,000
<b>Punjab</b>			
Mehra Ferro-Alloys Verka, Amritsar.	Ferro-molybdenum Ferro-vanadium Ferro-titanium Ferro-tungsten Ferro-boron	NA	300 (Total)
<b>Sikkim</b>			
Akshay Ispat & Ferro Alloys Ltd, Mamring, Namchi, Distt. South Sikkim.	Ferro-silicon	NA	6,000
<b>Uttar Pradesh</b>			
The India Thermit Corp. Ltd Fazalganj, Kanpur.	Ferro-molybdenum Ferro-titanium Ferro-chrome Ferro-boron Chromium metal LC ferro-manganese Ferro-vanadium	NA	300 (Total)
Hindustan Ferro-Alloys Hamirpur.	Ferro-silicon	NA	3,200
<b>West Bengal</b>			
Bhaskar Shracchi Alloys Ltd, Durgapur	Silico-manganese	Si: 15%	24,000
Cosmic Ferro Tech. Ltd, Bishnupur, Distt: Bankura.	HC ferro-manganese	Mn: 66-71%, Si: 1.4% C: 6.5-7%, P: 0.3%	45,375
	Silico-manganese	Mn: 61-65%, Si: 15.5% C: 1.9%, P:0.28%	

(Contd.)

FERRO-ALLOYS

Table - 3 (Concl.d.)

Name & location of the plant	Product	Specifications	Installed capacity(tpy)
Sri Gayatri Minerals Pvt. Ltd, WBIIDC Growth Centre, Bishnupur, Bankura.	HC silico-manganese	Mn: 60-65% & 65% min, Si: 15% min & 16% min, C: 2% max, P: 0.3 max, S: 0.03 max	24,000
Industrial Metals & Ferro Alloys Jamuria, burdwan	LC Ferro Titanium	NA	20
	LC ferro Chrome	NA	20
Hira Concast Ltd,Salanpur Burdwan	Silico-manganese	NA	11,455
	Ferro manganese	NA	15,225
Karthik Alloys Ltd (I & II) Durgapur.	MC silico-manganese	Mn: 54-56%, C: 0.2-0.5% Si: 22-25% P: 0.15-0.2, S: 0.05%	19,000
	LC silico-manganese	Mn: 53-55%, C: 0.15-0.2% Si: 25-28% P: 0.15-0.2%, S: 0.05%	NA
Maithan Alloys Ltd, Burdwan.	Ferro-manganese Silico-manganese Ferro-chrome	NA	52,600 (Total)
Monnet Ferro Alloys Ltd Burdwan.	Silico-manganese	NA	12,500
Shyam Ferro Alloys Ltd Burdwan.	HC silico-manganese	NA	100,000
	HC ferro-manganese		(Total)
	HC ferro-chrome		
Srinivasa Ferro Alloys Ltd Durgapur,Burdwan.	HC ferro-manganese	Mn: 70-74%, 74-76% Si: 1.5% max C: 6-8% P: 0.25,0.30 and 0.40 max, S: 0.03 max	10800
	HC silico-manganese	Mn: 60-65% & 65% min Si: 15% min & 16% min C: 2% max P: 0.3% max, S: 0.03% max	23,400
	LC silico-manganese	NA	5,400
Shri Vasavi Industries Ltd WBIIDC Industrial Growth Centre, Bishnupur, Distt. Bankura.	HC ferro-chrome	Cr: 58-60%, Si: 2-4%, C: 8% max, P: 0.05% max S: 0.05% max	45,000 (16MVA 1No. & 12MVA 1 No.)
Modern India Con-Cast Ltd, WBIIDC Industrial Growth Centre, Bishnupur, Distt. Bankura.	Bulk ferro-alloys	–	22,000
Rohit Ferro Tech. Ltd Bishnupur, Distt. Bankura	HC ferro-chrome	Cr: 60% (min), C: 8% (max) Si: 3.5% (max), P: 0.03% (max) S: 0.04% (max)	45,375

*Note: HC : High carbon. MC: Medium carbon. LC: Low carbon.*

*Source: Information collected by IBM .*

FERRO-ALLOYS

**Table – 4 : Reported Consumption of Principal Ferro-alloys, 2011-12 (P)  
(By Industries)**

(In tonnes)

Ferro-alloy	Iron & steel	Alloy steel	Foundry	Electrode	Total
Ferro-aluminium	1165 (3)	57(1)	–	–	1222
Ferro-chrome	259200(14)	27500(12)	400(8)	200(3)	287300
Ferro-chrome-silicon	–	460(1)	–	–	460
Ferro-manganese	117900(15)	6400(11)	600(18)	700(17)	125600
Ferro-molybdenum	161(10)	435(8)	50(8)	25(1)	671
Ferro-nickel	–	2235(4)	–	–	2235
Ferro-niobium	1166(5)	0(1)	–	–	1166
Ferro-phosphorus	263(3)	0(1)	10(1)	–	273
Ferro-silicon	37300(24)	3300(8)	2200(21)	300(6)	43100
Ferro-silicon-magnesium	–	–	13(2)	–	13
Ferro-titanium	1037(9)	191(6)	4(1)	–	1232
Ferro-tungsten	–	18(2)	–	–	18
Ferro-vanadium	1141(11)	26(5)	4(1)	–	1171
Silico-manganese	214375(27)	1965(3)	150(3)	–	216490

*Note: Figures rounded off. Figures in parentheses denote the number of units in the organised sector reporting\* consumption.*

*(\* Includes actual consumption and / or estimates made wherever required)*

## ENVIRONMENTAL ASPECTS AND FUTURE SCOPE

Studies reveal that depending on the ferro-alloy manufactured, waste generation per day in 35 tpd and 50 tpd ferro-silicon and ferro-chrome plants respectively, may be in the following range:

Silica fines: 7 to 8 tonnes/day

Fe-Cr slag (fined boulder): 40 tonnes/day

Charcoal & coke fines: 7 to 8 tonnes/day

To utilise the waste from ferro-alloys industries, a typical Fe-Si or Fe-Cr manufacturing unit can provide material for 10 small-scale units for manufacturing bricks and each unit can produce 2,400 bricks per day. Other units which can be set up

are board-and-briquette-making units. The utilisation of waste materials by converting them into building materials will result in bringing down the building material cost, and therefore, lead to conservation of natural resources like clay and sand.

Domestic vanadium sludge is used for producing ferro-vanadium by Essel Mining & Industries Ltd, Gujarat.

The implementation of the Kyoto Protocol by European Union provides significant opportunities for Ferro-alloys Industry in India to implement CO<sub>2</sub> reduction technologies, which could be traded in terms of carbon credits. Installation of an electricity generation facility driven by CO-rich furnace gas is an obvious means by which CO<sub>2</sub> saving could be achieved.

## WORLD REVIEW

The top ferro-alloys producing countries were China, South Africa, India, Kazakhstan and Russia. Estimated world production of bulk ferro-alloys of chromium, manganese and silicon was about 34.1 million tonnes produced in 2010. The markets for the bulk alloys like high carbon ferro-manganese, silico-manganese, ferro-silicon and high carbon ferro-chrome showed varied responses to the fluctuations in steel and

stainless steel production which seem to have had influences as per the different circumstances that prevailed in different markets.

SRC process (Show Denko, Japan) Outo Kumpu Process (Finland) are some of the energy saver well-known processes which have been adopted as large scale in the world.

World production of various ferro-alloys in principal producing countries is furnished in Table-5.

**Table – 5 : World Production of Ferro-alloys, 2009 to 2011  
(By Principal Countries)**

		(In tonnes)		
Country	Ferro-alloy	2009	2010	2011
Australia	FeMn & FeSiMn	212000	219000	267000
Brazil	FeCr	108893	172800	145000
	FeSiCr	1750	13100	11600
	FeSiMg	18300	33600	20900
	FeMn	44600	87200	77000
	FeSiMn	109500	218700	218600
	FeNi	31600	23800	45600
	FeNb	48900	77200	81900
	FeSi	175000	247300	210900
	Others	21200	36650	32700
Canada <sup>e</sup>	FeNb <sup>e</sup>	7000	7000 <sup>e</sup>	7000 <sup>e</sup>
	FeSi <sup>e</sup>	27200	35000	35000
China	FeCr	1813000	-	-
	FeSiCr	116000	-	-
	Others	20171000	24300000	25000000*
Colombia	FeNi	153628	145239	103371
Dominican Republic	FeNi	-	-	34576
Finland	FeCr	123310	238000	231000
France	FeMn	46000	138000	140000
	FeSiMn	54100	54000	54000
	FeSi	18300	27000	27000
Georgia	FeSiMn	112016	203791	226592
	FeMn	4500	4500	4500
Greece	FeNi	42400	69600	94000
Iceland	FeSi	112992	114230	120076
India*	FeAl	7017	7538	7393
	FeCr	892923	1003598	906556
	FeSiMg	17132	19079	24452
	FeMn	356123	402017	446733
	FeSiMn	1116047	1242139	1478403
	FeMo	2822	3090	4362
	FeSi	97682	115164	127092
	FeTi	1929	2172	2217
	FeV	1389	1521	2459
	Others	569	595	730

(Contd.)

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Table- 5 (Concl.d.)

Country	Ferro-alloy	2009	2010	2011
Japan	FeCr	7698	16208	17217
	FeMn	361375	453265	456798
	FeSiMn	49205	49865	49798
	FeMo	3598	4615	5167
	FeNi	284884	348420	279944
	FeV	2560	4190	3980
	Others	12957	16374	20913
Kazakhstan	FeCr	977235	1189593	1170193
	FeSiCr	51576	144936	129996
	FeSiMn	181776	203778	210502
	FeSi	30028	4456	1527
	Others	1205	1283	3118
New Caledonia	FeNi	156553	165506	169513
Norway	FeMn <sup>e</sup>	130000	130000	130000
	FeSiMn <sup>e</sup>	250000 <sup>e</sup>	250000 <sup>e</sup>	250000 <sup>e</sup>
	FeSi	233974	235000	170102
	Others <sup>e</sup>	60000	60000	60000
Russia	Spiegeleisen <sup>(e)</sup>	7000	7000	7000
	FeCr	378000	414000	414000
	FeSiCr	8285	4200	4200 <sup>e</sup>
	FeMn <sup>e</sup>	88000	171000	170000
	FeSiMn <sup>e</sup>	98700	147900	148000
	FeNi	31529	34363	34400 <sup>e</sup>
	FeSi <sup>e</sup>	745000	916000	916000
	Others	34000	34000	34000
South Africa	FeCr	2346132	3607132	3421911
	FeMn <sup>e</sup>	265000	517000 <sup>e</sup>	696000 <sup>e</sup>
	FeSiMn <sup>e</sup>	140000	273000 <sup>e</sup>	696000 <sup>e</sup>
	FeSi	110000	128000 <sup>e</sup>	135000 <sup>e</sup>
	FeV <sup>e</sup>	13000 <sup>(e)</sup>	19000	18000 <sup>e</sup>
Sweden	FeCr	31100	64400	80140
Ukraine	FeMn	135339	285643	187897
	FeSiMn	771950	1000329	930337
	FeNi	76487	102940	89903
	FeSi	193034	253801	186306
	Others	23882	28546	25126
USA	FeSi <sup>e</sup>	194000	246000	246000 <sup>e</sup>
Venezuela	FeMn <sup>e</sup>	15000	15000	15000
	FeSiMn <sup>e</sup>	35000 <sup>e</sup>	35000	35000
	FeNi <sup>e</sup>	40113	40150	40000
	FeSi <sup>(e)</sup>	52100	76800	80000
Zimbabwe	FeCr	72223	154336	161839
	FeSi	603	-	-

**Source:** World Mineral Production, 2007-2011.

**Note :** FeAl : Ferro-aluminium; FeCr : Ferro-chrome; FeSiCr : Ferro-silico-chrome; FeSiMg : Ferro-Silico-magnesium; FeMn : Ferro-manganese; FeSiMn : Ferro-silico-manganese; FeMo : Ferro-molybdenum; FeNi : Ferro-nickel; FeNb : Ferro-niobium; FeSi : Ferro-silicon; FeTi : Ferro-titanium; FeV : Ferro-vanadium.

\* India's production of ferro-alloys during 2009-10, 2010-11 and 2011-12 is furnished in Table-2.

## FOREIGN TRADE

### Exports

In 2011-12, exports of ferro-alloys decreased to 15,32,694 tonnes valued at ₹ 8,399 crore from 15,54,988 tonnes valued at ₹9,447 crore in the previous year. In terms of quantity, exports of ferro-silico-manganese accounted for 48%, followed by ferro-chrome (37%), ferro-manganese (10%) and ferro-silicon (3%) in 2011-12. The other ferro-alloys together accounted for remaining 2% of exports. Exports were mainly to China (17%), Rep. of Korea (16%), Japan (11%), Italy (10%), Netherlands (8%), Chinese Taipei/Taiwan (6%), Turkey (4%), Iran (3%) and Ukraine & Thailand (3% each), (Tables 6 to 24).

### Imports

Imports of ferro-alloys increased from 2,25,263 tonnes valued at ₹2,523 crore in 2010-11 to 2,78,759 tonnes valued at ₹2,975 crore in 2011-12. In terms of quantity, imports of ferro-silicon accounted for about 53% followed by

charge-chrome and ferro-chrome (12% each), ferro-manganese (9%), ferro-silico-manganese (5%) and ferro-nickel (2%). Other ferro-alloys together accounted for remaining 7% of imports in 2011-12. Imports were mainly from Bhutan (27%), followed by South Africa (22%), China (18%), Russia (10%) and Norway & Brazil (3% each) (Tables 25 to 42).

**Table – 7 : Exports of Ferro-Boron (By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1</b>	<b>157</b>	<b>2</b>	<b>351</b>
UAE	-	-	2	230
Iran	-	-	++	61
Turkey	-	-	++	54
Korea, Rep. of	-	-	++	6
Other countries	1	157	-	-

**Table – 6 : Exports of Ferro-alloys : Total (By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1554988</b>	<b>94468214</b>	<b>1532694</b>	<b>83992730</b>
Korea, Rep. of	181359	11409158	251904	14870177
China	442583	26854424	262806	13921073
Japan	239438	15776393	169033	9418853
Italy	116280	6404794	147463	7653418
Netherlands	96268	6103242	116918	6526764
Chinese Taipei/ Taiwan	85520	4858201	86355	4564768
Turkey	58746	3308426	61653	3058679
Iran	17054	1068014	40937	2596215
Ukraine	26084	1548563	42149	2301934
Thailand	20939	1217007	40277	2121576
Other countries	270717	15919992	313199	16959273

**Table – 8 : Exports of Ferro-Chrome (By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>774429</b>	<b>50865971</b>	<b>567660</b>	<b>32760788</b>
China	413912	26318236	245642	13193611
Korea, Rep. of	137679	8723318	202332	12183073
Japan	85368	7698591	47370	2951185
USA	36564	2307239	10781	659470
Italy	9105	571911	7751	492216
Hong Kong	448	26769	8074	461838
Korea, Dem. Rep. of	13800	832540	7462	456169
Netherlands	24511	1265875	6665	409345
Mexico	2849	181629	4374	277161
Chile	2621	188164	3830	276384
Other countries	47572	2751699	23379	1400336



**Table – 9 : Exports of Charge-Chrome  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>6</b>	<b>1074</b>	<b>39</b>	<b>4709</b>
Saudi Arabia	-	-	9	1853
Jordan	-	-	21	1774
Oman	-	-	7	667
Tanzania Rep.	-	-	1	227
Nigeria	-	-	1	188
Other countries	6	1074	-	-

**Table – 10 : Exports of Ferro-Manganese  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>106272</b>	<b>6232130</b>	<b>159122</b>	<b>8379784</b>
Iran	14072	867459	31554	1817548
Netherlands	8599	515153	14373	738951
Chinese Taipei/ Taiwan	23102	1292238	14348	698794
Korea, Rep of	4277	276244	13915	682031
Italy	11365	632893	13037	659247
Pakistan	7858	424906	7319	371278
Qatar	-	-	8180	346373
Saudi Arabia	5384	318779	8513	337637
Bulgaria	891	51817	5564	299022
Kuwait	205	11228	4055	290147
Other countries	30519	1841413	38264	2138756

**Table – 11: Exports of Ferro-Molybdenum  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1646</b>	<b>788314</b>	<b>292</b>	<b>223797</b>
Netherlands	1217	663145	145	159396
UAE	47	29705	26	26135
Pakistan	12	3527	16	7828
Chile	6	7840	4	7282
Belgium	-	-	5	5062
Oman	44	5546	25	4496
Indonesia	18	2696	23	3242
Jordan	56	4638	23	2269
Israel	3	3366	1	1827
Saudi Arabia	3	746	11	1754
Other countries	240	67105	13	4506

**Table – 12 : Exports of Ferro-Nickel  
(By Country)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	-	-	++	<b>413</b>
Kenya	-	-	++	413

**Table – 13 : Exports of Ferro-Niobium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1754</b>	<b>28857</b>	<b>14</b>	<b>6445</b>
Israel	8	1624	11	5693
UAE	-	-	3	752
Other countries	1746	27233	-	-

**Table – 14 : Exports of Ferro-Phosphorus  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>216</b>	<b>6184</b>	<b>240</b>	<b>6401</b>
Korea, Rep. of	136	3454	68	1852
Spain	-	-	106	1496
UK	++	429	23	1118
Sweden	-	-	10	727
Netherlands	80	2301	23	725
Japan	-	-	10	306
Germany	-	-	++	177

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**Table – 15 : Exports of Ferro-Silico-Chrome  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>50476</b>	<b>878413</b>	<b>15</b>	<b>903</b>
Nepal	10	256	15	903
Other countries	50466	878157	-	-

**Table – 16 : Exports of Ferro-Silico-Magnesium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>3955</b>	<b>308922</b>	<b>7047</b>	<b>688615</b>
Turkey	830	63849	1459	128831
Iran	234	25360	1094	121686
Oman	205	17692	588	67850
Brazil	1165	85569	878	63472
Spain	-	-	349	38485
Slovenia	288	24853	424	37429
Italy	159	12519	307	31859
UK	25	2396	300	31632
Saudi Arabia	228	16886	290	29733
Sri Lanka	170	12493	123	17108
Other countries	651	47305	1235	120530

**Table – 17 : Exports of Ferro-Silico-Manganese  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>572551</b>	<b>32265076</b>	<b>732424</b>	<b>37641216</b>
Japan	125016	7256446	117435	6216684
Italy	82916	4309363	113822	5629064
Netherlands	45832	2523549	78641	4036383
Chinese Taipei/ Taiwan	41620	2289520	69771	3741670
Turkey	48378	2671360	51811	2437868
Ukraine	25587	1518119	39428	2135708
Korea, Rep. of	38957	2395707	34733	1949138
Thailand	17840	1015166	36587	1896699
Malaysia	3628	214098	25434	1392437
Nigeria	8727	496389	12208	619041
Other countries	134050	7575359	152554	7586524

**Table – 18 : Exports of Ferro-Silicon  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>41963</b>	<b>2965091</b>	<b>46422</b>	<b>3265270</b>
Netherlands	15963	1103718	16442	1147146
Italy	12485	861605	11704	780199
Brazil	1656	125400	1950	160827
Slovenia	634	48574	1752	131383
Turkey	1464	108201	1244	97666
Poland	1086	75664	1105	76407
Saudi Arabia	254	16709	897	65398
Bulgaria	-	-	1041	64506
Oman	301	21964	855	61818
Japan	1058	78486	630	57815
Other countries	7062	524770	8802	622105

**Table – 19 : Exports of Ferro-Titanium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>46</b>	<b>5065</b>	<b>1041</b>	<b>56766</b>
Netherlands	4	587	363	18418
Bulgaria	-	-	216	11444
Italy	-	-	134	7041
Slovenia	-	-	106	5634
Chinese Taipei/ Taiwan	-	-	100	5011
Pakistan	-	-	54	2785
Belgium	1	164	8	1513
Iran	-	-	25	1264
Philippines	++	16	20	1058
Turkey	2	281	5	752
Other countries	39	4017	10	1846

**Table – 20 : Exports of Ferro-Tungsten  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>8</b>	<b>1475</b>	<b>16</b>	<b>5239</b>
Finland	6	1020	9	3850
Saudi Arabia	-	-	1	885
Nepal	-	-	6	422
Philippines	2	437	++	82
Other countries	++	18	-	-

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**Table – 21 : Exports of Ferro-Vanadium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>186</b>	<b>44847</b>	<b>209</b>	<b>92494</b>
U A E	3	1544	74	62381
Mauritius	27	1900	103	9530
Malaysia	-	-	22	9408
USA	++	230	5	6134
Finland	1	576	1	1396
Turkey	7	1165	1	1185
Tanzania Rep.	-	-	1	1066
Iran	50	5278	++	928
Israel	7	314	++	137
Jordan	++	252	++	114
Other countries	91	33588	2	215

**Table – 22 : Exports of Ferro-Columbium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>48</b>	<b>7028</b>	<b>2</b>	<b>3711</b>
Finland	20	918	1	1904
Israel	28	6110	1	1807

**Table – 23 : Exports of Ferro-Zirconium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>26</b>	<b>1706</b>	<b>115</b>	<b>10269</b>
Italy	-	-	108	7999
Brazil	25	1425	5	1431
Argentina	-	-	1	451
Indonesia	-	-	1	388
Other countries	1	281	-	-

**Table – 24 : Exports of Ferro-alloys (Others)  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1405</b>	<b>67904</b>	<b>18024</b>	<b>844699</b>
Iran	1	82	2860	335758
China	-	-	10278	315939
Nepal	-	-	2727	63976
Italy	250	16503	600	45792
Korea Rep. of	290	8431	548	26272
Japan	340	10544	540	20323
Saudi Arabia	1	79	58	10128
Luxembourg	-	-	125	8972
Bangladesh	7	1248	31	5403
Uganda	-	-	74	3296
Other countries	516	31017	183	8840

**Table – 25 : Imports of Ferro-alloys: Total  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>225263</b>	<b>25230287</b>	<b>278759</b>	<b>29752569</b>
China	42959	4116187	49124	4810101
Bhutan	76313	4472382	76257	4624446
South Africa	32309	1627168	60465	3523592
Russia	26558	2811788	26747	2953020
Brazil	4929	2528662	7629	2885826
Greece	1588	1324761	1478	1254061
Japan	2668	2073678	1733	1235940
Korea, Rep. of	3057	976554	3721	1146631
Norway	9201	947714	9514	990662
Macedonia	611	42694	749	729494
Other countries	25070	4308699	41342	5598796

**Table – 26 : Imports of Ferro-Boron  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>429</b>	<b>58265</b>	<b>642</b>	<b>124181</b>
China	381	53671	629	120979
Germany	-	-	11	2669
UK	-	-	2	473
Malaysia	-	-	++	60
Other countries	48	4594	-	-

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**Table – 27 : Imports of Ferro-Chrome  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>22412</b>	<b>3041559</b>	<b>32064</b>	<b>3694428</b>
Russia	13522	1903995	9945	1423301
South Africa	1472	198071	11222	855724
China	1876	256285	3046	382487
Kazakhstan	2607	308819	2136	222984
Brazil	1482	185973	1545	211217
Germany	133	22516	527	93100
USA	386	38809	572	74546
Turkey	172	21211	566	68919
Indonesia	-	-	238	40160
Malaysia	-	-	195	39851
Other countries	762	105880	2072	282139

**Table – 28 : Imports of Ferro-alloys Charge-Chrome  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>2503</b>	<b>125126</b>	<b>34731</b>	<b>1847286</b>
South Africa	2503	125126	33732	1792726
China	-	-	999	54560

**Table – 29 : Imports of Ferro-Manganese  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>38929</b>	<b>2140883</b>	<b>24660</b>	<b>1732494</b>
South Africa	25708	1005111	12854	676374
Norway	6887	675311	6283	584499
Korea Rep. of	2188	185698	2323	212855
China	1283	109978	1298	113479
USA	-	-	563	50697
France	-	-	265	19729
Germany	297	16983	224	14572
Bahrain	1324	62628	267	13425
Mexico	-	-	68	6982
Nepal	-	-	153	6972
Other countries	1242	85174	362	32910

**Table – 30 : Imports of Ferro-Molybdenum  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>963</b>	<b>1443459</b>	<b>1067</b>	<b>1541479</b>
Korea, Rep. of	438	647191	437	639673
China	228	336452	287	396790
Russia	33	51019	158	270952
Chile	54	76223	80	87088
Italy	-	-	34	37578
Qatar	-	-	12	21759
Chinese Taipei / Taiwan	-	-	12	21344
Vietnam	20	21605	20	20419
USA	51	69068	7	13818
Japan	6	10330	6	10234
Other countries	133	231571	14	21824

**Table – 31 : Imports of Ferro-Nickel  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>6862</b>	<b>4892738</b>	<b>6864</b>	<b>4796001</b>
Greece	1274	1302935	1441	1249606
Japan	2335	2027345	1063	1130376
Macedonia	-	-	749	729494
Brazil	-	-	1898	706078
New Caledonia	284	286037	625	553722
Chinese Taipei/ Taiwan	-	-	286	110876
Yugoslavia F Rp Serbia	-	-	395	102994
Mt-Negro	-	-	76	83816
Sweden	-	-	230	72718
Venezuela	-	-	91	44032
Columbia	2359	864303	10	12289
Other countries	610	412118	10	12289

**Table – 32 : Imports of Ferro-Niobium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1432</b>	<b>2221360</b>	<b>1660</b>	<b>2355931</b>
Brazil	1317	2054218	1114	1571089
Singapore	87	118096	433	593817
China	-	-	29	57986
USA	-	-	22	28576
Germany	2	5262	38	26236
UK	15	22926	7	12890
Canada	7	13138	3	7155
Korea Rep. of	-	-	2	4646
Japan	-	-	1	1590
Unspecified	-	-	4	50163
Other countries	4	7720	7	1783

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**Table – 33 : Imports of Ferro-Phosphorous  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1749</b>	<b>38095</b>	<b>2373</b>	<b>56798</b>
China	1328	27265	2073	48054
Iran	42	777	116	2470
Kuwait	–	–	73	1670
UK	22	830	6	1311
Sweden	33	2944	5	1257
Switzerland	–	–	26	602
Germany	–	–	27	597
Vietnam	231	4262	26	461
Japan	–	–	21	376
Other countries	93	2017	–	–

**Table – 34 : Imports of Ferro-Silico-Chrome  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>16</b>	<b>2156</b>	<b>107</b>	<b>7137</b>
China	10	992	107	7137
Other countries	6	1164	–	–

**Table – 35 : Imports of Ferro-Silico-  
Manganese  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1642</b>	<b>87831</b>	<b>13223</b>	<b>529245</b>
Saudi Arabia	–	–	8229	283869
South Africa	1350	60016	2472	90782
UAE	–	–	1350	65959
Norway	–	–	400	31392
China	100	8798	211	18041
Netherlands	–	–	227	17890
Russia	30	6402	168	11897
Singapore	–	–	124	5467
UK	–	–	20	2578
Japan	–	–	20	1285
Other countries	162	12615	2	85

**Table – 36 : Imports of Ferro-Silico-Magnesium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1597</b>	<b>139830</b>	<b>2227</b>	<b>235038</b>
China	827	68113	896	80421
Brazil	251	26113	494	58451
Iceland	147	12594	328	40914
Norway	26	2738	103	13875
Vietnam	–	–	124	9141
Japan	–	–	71	8085
Switzerland	–	–	42	5183
Turkey	–	–	25	3861
Russia	–	–	50	3367
Spain	–	–	21	3100
Other countries	346	30272	73	8640

**Table – 37 : Imports of Ferro-Silicon  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>135094</b>	<b>8660391</b>	<b>148759</b>	<b>10206947</b>
Bhutan	76313	4472382	76095	4612859
China	32716	2224755	35597	2656121
Russia	12493	768829	15986	1106475
France	2795	312117	3701	444563
Norway	2288	269665	2605	343154
Vietnam	628	43852	3906	257824
Egypt	966	66756	2552	120337
Argentina	748	69946	620	68274
USA	24	2642	717	54893
Germany	181	19218	713	54759
Other countries	5942	410229	6267	487688

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**Table – 38 : Imports of Ferro-Titanium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1658</b>	<b>397378</b>	<b>1370</b>	<b>496047</b>
UK	996	254010	574	216688
Canada	81	20778	321	116138
Russia	204	54226	191	65815
Germany	16	7227	74	21423
Belgium	-	-	37	12768
Austria	-	-	28	12159
China	81	19454	24	7354
Korea, Rep. of	14	4781	13	4521
Malaysia	-	-	4	1482
Unspecified	20	4442	101	36408
Other countries	246	32460	3	1291

**Table – 39 : Imports of Ferro-Tungsten  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>72</b>	<b>71671</b>	<b>10</b>	<b>23797</b>
China	55	64853	6	14360
Brazil	-	-	2	4990
Russia	-	-	2	3995
Unspecified	-	-	++	451
Other countries	17	6818	++	1

**Table – 40 : Imports of Ferro-Vanadium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>891</b>	<b>1005527</b>	<b>907</b>	<b>1098356</b>
China	362	404374	359	421152
Korea, Rep. of	96	111701	166	206860
South Africa	161	181934	78	100498
USA	134	143719	85	87462
Japan	12	16012	36	43084
Germany	++	346	24	33621
Czech Republic	-	-	25	33504
Switzerland	8	10797	24	28872
Russia	-	-	21	26235
Austria	59	67250	20	25709
Other countries	59	69394	69	91359

**Table – 41 : Imports of Ferro-Zirconium  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>238</b>	<b>36640</b>	<b>689</b>	<b>75704</b>
China	238	36640	513	54158
France	-	-	119	14656
USA	-	-	50	5843
Brazil	-	-	4	675
Australia	-	-	3	372

**Table – 42 : Imports of Ferro-alloys (Others)  
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>8775</b>	<b>865367</b>	<b>7406</b>	<b>931700</b>
China	3266	305194	3050	377022
Brazil	1476	173646	2179	275420
Argentina	3351	325988	1485	191444
Russia	19	2369	171	22442
Norway	-	-	98	13888
Bhutan	-	-	162	11587
Korea, Rep. of	-	-	8	11111
Iceland	24	2235	42	5029
Malaysia	-	-	48	5019
USA	1	41	27	2977
Other countries	638	55894	136	15761

## FUTURE OUTLOOK

Depending upon the process of steel making and the type of steel being manufactured, the requirement of different ferro alloys varies widely. According to IFAPA, on an average, about 30 to 40% production of ferro-alloys is exported. The Industry output has always been surplus and meeting the demand of the domestic steel industry. India has also established itself as one of the regular exporters of ferro-chrome and silico-manganese in the world.

The ferro-alloys industry has a capacity of 5.15 million tonnes and is accounting for nearly 10% of the world's ferro alloys production and is among the 10 largest producers of the material in the world. At present, there are some problems due to high input prices of manganese and chrome ore, coal, coke and a high energy tariff. On the other hand, it is not getting required prices from the steel producers.

However, India is expected to show strong growth in steel use in the coming years due to its strong economy, massive infrastructure needs and

expansion of industrial production. India is expected to be one of the highest in growth of steel consuming nations in the next decade. With this steel scenario globally and domestically, the Ferro Alloy Industry estimates that the consumption of Ferro Alloys will increase domestically and internationally in the coming years. Some of the Ferro Alloy Producers have already gone in for expansion and some new units are coming up.

Indian Ferro-alloys Industry has immense potential and it can compete with any country. There is a need to encourage the Indian Ferro-alloys Industry for setting up captive power plants and also allot coal linkages for the same. The prospects for the Ferro-alloys industry is bright provided innovations are made in the process technology and plant equipment design, and new cost-effective product mix is frequented at.

The global slowing of demand for ferro-alloys and the re-emergence of China as a major exporter and the threat of imports are some of the factors that the Indian-ferro alloys industry would need to tackle.