

36 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 function of the alloy is to increase resistance to corrosion, oxidation to improve hardness, tensile strength at high temperatures, wear and abrasion resistance with addition of carbon to increase 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 of 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 able to utilise 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.

About 35 to 40% production of ferro-alloys 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 and 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 3.60 million tonnes per annum and for noble ferro-alloys it is 40 thousand tonnes per annum. The industry is

reported to be working at about 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
Total	3640000
Bulk Ferro-alloys:	3600000
Manganese alloys	2100000
Chrome alloys	1300000
Ferro-silicon	200000
Noble Ferro-alloys:	40000(e)

Source: IFAPA.

The ferro-alloys industry is spread all over the country. It was established as an ancillary industry to cater to the growing needs of the domestic steel industry. Most of the ferro-alloy units have been set up in Andhra Pradesh, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa and West Bengal because of availability or proximity 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 2007-08 has increased substantially by 18% from 2.00 million tonnes in 2006-07 to 2.36 million tonnes. 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 the effective pollution control measures in the form of gas cleaning, deoxidising and waste heat recovery.

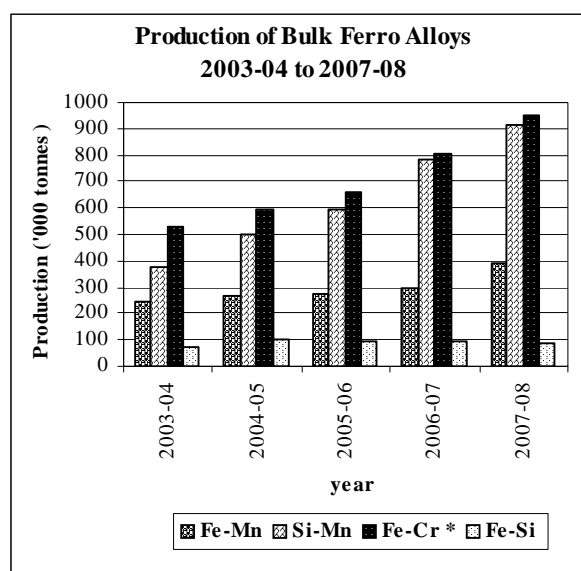
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Table - 2 : Production of Ferro-alloys, 2006-07 and 2007-08

(In tonnes)

Ferro-alloy	2006-07	2007-08
Total (A) + (B)	2001451	2364614
A) Bulk Ferro-alloys	1973688	2334929
HC Ferro-manganese	281013	377,958
MC Ferro-manganese	9190	7517
LC Ferro-manganese	6523	5735
Silico-manganese	738314	858601
MC Silico-manganese	29581	35041
LC Silico-manganese	15067	17760
Ferro-silicon	92632	83716
HC Ferro-chrome/charge-chrome	801138	948366
LC Ferro-chrome	230	235
B) Noble Ferro-alloys	27763	29685
Ferro-molybdenum	3120	2899
Ferro-vanadium	1139	1585
Ferro-tungsten	54	51
Ferro-silico-magnesium	11387	13525
Ferro-aluminium	9947	9377
Ferro-silico-zirconium	178	109
Ferro-titanium	1761	1937
Ferro-boron	80	80
Ferro-nickel-magnesium	97	122

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



* Including charge-chrome

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

The 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. Adhunik Meghalaya Steels Pvt. Ltd, Bymihat, Meghalaya; Anjaneya Ferro Alloys Ltd, Mihijam, Jharkhand; Bhaskar Shrachi Alloys Ltd, Durgapur, West Bengal; Chhattisgarh

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Electricity Co. Ltd, Raipur, Chhattisgarh; Cosmic Ferro Alloys Pvt. Ltd, Bankura, West Bengal; Dayal Ferro Alloys Ltd, Ramgarh, West Bengal; Gautam Ferro Alloys Ltd, Ramgarh, Jharkhand; Haldia Steels Ltd, Burdwan, West Bengal; Impex Ferro Tech Ltd, Burdwan, West Bengal; Indsil Electromelt Ltd, Palakkad, Kerala; Indsil Energy & Electro Chemicals Ltd, Raipur, Chhattisgarh; Ispat Godavari, Raigarh, Chhattisgarh; Maharashtra Electros melt Ltd, Chandrapur, Maharashtra; Maithan Alloys Ltd, Burdwan, West Bengal; Meghalaya Sova Ispat Ltd, Meghalaya; Modern India Con-Cast Ltd, Birhampur, West Bengal; Monet Ispat Ltd, Raipur, Chhattisgarh; Nagpur Power Ind. Ltd, Kanhan, Maharashtra; Natural Sugar & Allied Ind. Ltd, Osmanabad, Maharashtra; Nawa Bharat Ferro Alloys Ltd, Paloncha, Andhra Pradesh; Union Ferro, Raigarh, Chhattisgarh; Prakash Industries, Raigarh, Chhattisgarh; SAL Steels Ltd, Gandhidham, Gujarat; Sandur Manganese & Iron Ores Ltd, Sandur, Karnataka; Sharp Ferro Alloys Ltd, Durgapur West Bengal; Shivam Iron & Steel Co. Pvt. Ltd, Giridih, Jharkhand; Shri Gayatri Minerals Ltd, Bihunpur, West Bengal; Shayam Century Ltd, Meghalaya; Shayam Ferro alloys Ltd, Burdwan, West Bengal; Sova Ispat Ltd, Durgapur, West Bengal; Tata Steel Ltd, Joda, Orissa; Tirumala Balaji Alloys Pvt. Ltd, Raigarh, Chhattisgarh; Vandana Global Ltd, Raipur, Chhattisgarh were the major producers of ferro-manganese/silico-manganese.

Silico-manganese, a combination of 60-70% manganese, 10-20% silicon and 20% carbon substitutes 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-alloys producers.

The total production of ferro-manganese in 2007-08 was about 391,000 tonnes which increased from 297,000 tonnes in 2006-07. Consumption of ferro-manganese was 121,000 tonnes in 2007-08.

The production of silico-manganese including Medium Carbon & Low Carbon silico-manganese was 911,400 tonnes in 2007-08 which has increased from 783,000 tonnes in 2006-07. The total consumption of silico-manganese by all

industries is witnessing continuous rising trend. The reported consumption in 2007-08 at 189,500 tonnes attributed mainly to the rise in production of iron and steel.

Ferro-chrome/Charge-chrome

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

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

Tata Steel Ltd, FACOR and Indian Charge Chrome Ltd, the three major producers of charge-chrome in the country are 100% export-oriented, having a total capacity of 162,500 tpy. Tata Steel with its charge-chrome plant at Bamnipal, Orissa, has a capacity of 50,000 tpy. FACOR has a capacity of 50,000 tpy charge-chrome at its Randia Plant, Bhadrak district, Orissa. Indian Charge Chrome Ltd, Cuttack district, Orissa has an installed capacity of 62,500 tpy.

The production of high carbon ferro-chrome/charge-chrome was 948,400 tonnes in 2007-08 which has increased from 801,000 tonnes in 2006-07. The production of low carbon ferro-chrome was static at about 200 tonnes for 2006-07 and 2007-08. The consumption of ferro-chrome in 2007-08 was reported to be 150,600 tonnes.

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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 and automobile valves, in iron casting and mineral dressing.

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

The production of ferro-silicon was 83,700 tonnes in 2007-08 which decreased from 93,000 tonnes in 2006-07. The domestic consumption of ferro-silicon in the organised sector was 45,600 tonnes in 2007-08.

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 the 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 alumino thermic process.

Ferro-nickel

The reported consumption of ferro-nickel in 2007-08 was 2,110 tonnes.

Ferro-molybdenum

There were five important units; namely, Mehra Ferro-alloys, Electro Ferro-alloys Pvt. Ltd, India Thermit Corporation, Dandeli Steel and Ferro-alloys Ltd and Eastern Metals & Ferro-alloys Ltd. The all India production at 2,899 tonnes in 2007-08 which slightly decreased from 3,120 tonnes in 2006-07. The consumption reported in 2007-08 was 940 tonnes.

Ferro-tungsten

Production of ferro-tungsten in 2007-08 was reported at 51 tonnes which decreased slightly from 54 tonnes in 2006-07. The internal consumption was 50 tonnes for the same year.

Ferro-vanadium

Production of ferro-vanadium in 2007-08 at 1,585 tonnes increased from 1,139 tonnes in 2006-07. The reported consumption in 2007-08 was 671 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 2006-07 and 2007-08 are already given in Table - 2.

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

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

(In tonnes)

Name & location of the plant	Product	Specifications	Installed capacity
Andhra Pradesh			
Andhra Ferro-alloys Ltd Srinivasanagar, Distt. Vizianagaram	HC ferro-chrome	Cr: 60-65% Si: 2-4% C: 6-8% P: 0.040% S: 0.040%	20000
Ferro Alloys Corporation Ltd Shreeramnagar, Dist. Vizianagaram	Ferro-manganese	NA	72500 (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	-	
	Ferro-silicon	NA	
	Silico-chrome	NA	
	Other ferro-alloys	NA	
Jindal Stainless Ltd (Ferro Alloys Division) Jindal Nagar, Kothavalasa Dist.Vizianagaram .	HC ferro-chrome	Cr : 62%, Si : 2.5% C : 7-8%, P: 0.040%	40000
GMR Technologies & Industries Ltd. Village Ravivalasa Dist. Srikakulam.	LC ferro-manganese	Mn : 60%	25000 (Total)
	MC ferro-manganese	Si : 16%	
	HC ferro-manganese	S: 0.05%, P: 0.5%	
	Silico-manganese	-	-
	Ferro-silicon	-	-
	LC ferro-chrome	Cr: 60-68%	-
	HC ferro-chrome	Si: 2.0 to 4%	-
	Silico-chrome	P: 0.03%, S:0.05%	-
VBC Ferro Alloys Ltd Village Rudram Dist. Medak.	Ferro-silicon	-	19000
	HC ferro-chrome	-	18000
Nav Bharat Ferro-Alloys Ltd E.M.D., Paloncha, Kothagudem Dist. Khammam.	HC Ferro-chrome	Cr: 60% (min), Si : 3-4% (max) C: 6-8%, P : 0.03% (max) S: 0.03% (max)	12491
	Silico-manganese	Mn : 60-70% Si: 15-16% (min) C: 2% (max), P: 0.03% (max) Si: 0.03% (max)	9581
	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)	9309
Sree Sarda Alloys Ltd Ravivalasa, Tekkali Mandal Dist. Srikakulam.	Ferro-chrome	NA	6000
Chhattisgarh			
Hira Group of Industries Jain Carbides & Chemical Ltd (i) Unit 1, Urla, Dist. Raipur.	HC ferro-manganese	Mn : 70-75%, Si: 1.5% (max) C: 6-8% (max), P: 0.40% (max) S: 0.05% (max)	7000
	Silico-manganese	Mn: 60-65%, Si : 13-17% (max) C: 2.5% (max), P : 0.35% (max) S: 0.03% (max)	6000
(ii) Unit 2	HC Ferro-manganese		14000
	Silico-manganese	Mn: 60-65%	12000

Contd.

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Table - 3 (Contd.)

Name & location of the plant	Product	Specifications	Installed capacity
(iii) Hira Ferro Alloys Ltd Urla, Dist. Raipur.	Ferro-manganese	NA	10000
	Silico-manganese	NA	7000
(iv) Alok Ferro-Alloys Ltd Raipur.	Silico-manganese	NA	18000
Sarda Energy & Minerals Ltd (Formerly Raipur Alloys & Steel Ltd.)	Ferro-manganese	-	-
	Silico-manganese	-	-
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	36000
	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 Dist. Raipur.	HC ferro-manganese	NA	21560
	Silico-manganese	NA	NA
	HC ferro-chrome	NA	14700
Deepak Ferro Alloys Ltd Urla Industrial Area Raipur.	HC ferro-chrome	Cr : 60-70% Si : 2 to 4%, S : 0.05% C : 6 to 8%	5000
Jindal Steel & Power Ltd Raigadh.	HC Ferro-chrome	Cr: 60-66% C : 6 to 8% Si: 4% max. P: 0.050% max S: 0.050% max	36000
Goa Karthik Alloys Ltd	NA	NA	4100
Gujarat Essel Mining & Industries Ltd Vapi, Dist. 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%	1200
	Ferro-titanium	NA	600
Electro Ferro-Alloys (Pvt.) Ltd Ahmedabad, Gujarat.	Ferro-molybdenum Ferro-silico-zirconium	NA	300
Baroda Ferro-Alloys Dist. Panchmahals.	HC ferro-chrome	NA	3500
Haryana Haryana Ferro-Alloys Ltd	-	-	2500
Jharkhand Anjaney Ferro Alloys Ltd Mihijam Dist. Dumka.	Ferro-silicon Silico-manganese Ferro-manganese	NA NA NA	NA NA NA
Gautam Ferro-Alloys Ltd Ramgarh Industrial Area, Marar, Dist. Hazaribgh, Bihar	-	-	5500

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Table - 3 (Contd.)

Name & location of the plant	Product	Specifications	Installed capacity
Karnataka			
Sandur Manganese & Iron Ore Ltd Vyasanakere, Dist. Bellary (Plant closed since 1.8.1998)	HC ferro-manganese		29100
	Silico-manganese		20000
	Ferro-silicon		24000
Dandeli Steel & Ferro Alloys Ltd Dandeli, Dist. Uttar Kannada.	Ferro-manganese	Mn : 70-75%, C: 0.1% Si : 2.4%, P : 0.15% S : 0.05%, Size: 37 mm	6000
	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 KSSIDC Industrial Estate Shimoga.	Ferro-manganese	NA	1200
	Silico-manganese	NA	
	Ferro-chrome	NA	
	Ferro-silicon	NA	
	Silico-chrome	NA	
Kerala			
The Silcal Metallurgic Ltd Wayalur, Dist. Palakkad.	Silico-manganese	Mn: 70-75%	3600
INDSIL Electrosmelts Ltd Pallatheri, Dist. Palakkad.	Silico-manganese	NA	NA
	Ferro-silicon	NA	NA
Shri Laxmi Electro Smelters (Pvt.) Ltd Industrial Development Area Erumathala, P.O. Aluva - 683 105.	Ferro-silicon	NA	NA
Madhya Pradesh			
Manganese Ore (India) Ltd Ferro-manganese Plant Bharweli (Manjhara), Dist. Balaghat.	HC ferro-manganese	Mn:78±1% P: 0.35% (max) C: 6.8%	10000
	Silico-manganese	Mn: 60-65%, Si: 15-20% C: 2% (max), P: 0.35%	12000
	Ferro-silicon	N.A.	4500
Crescent Alloys Pvt. Ltd Seoni.	Ferro-manganese	N.A.	(Total)
Maharashtra			
Maharashtra Electros melt Ltd Mul Road, Chandrapur - 442 401.	HC ferro-manganese	Mn : 70-74% Si : 1.5% (max) C : 6.8%, P: 0.43%. (max)	100000
	MC ferro-manganese	NA	(Total)
	Silico-manganese	NA	
Nagpur Power & Industries Ltd P.O. Khandelwalnagar Dist. Nagpur.	Silico-manganese	Mn : 60-65%, P: 0.35%	NA
	HC ferro-manganese	Mn : 70-75%, P: 0.4%	NA
Bharat Pulverising Mills Ltd Andheri, Mumbai.	Ferro-molybdenum	NA	200
	Ferro-tungsten	NA	(Total)
	Ferro-vanadium	NA	
Sunbel Alloys Co. of India Ltd Thane-Belapur, Mumbai.	Ferro-molybdenum	NA	300
	Ferro-silicon	NA	(Total)
	Ferro-tungsten	NA	
	Ferro-vanadium	NA	

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Table - 3 (Contd.)

Name & location of the plant	Product	Specifications	Installed capacity
Natural Sugar and Allied Ind. Ltd, Sainagar, Ranjani, Dist.: 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)
Orissa			
Ferro Alloys Corporation Ltd (Charge-chrome Division) Randia Dist., Bhadrak.	HC Ferro-chrome/ Charge-chrome	Cr: 60-64%, Si: 3-4% S: 0.03-0.05% (max) P: 0.03-0.05% (max) C: 6-8%	50000/ 65000
Tata Steel Ltd Ferro-manganese Plant, Joda, Dist. Kendujhar.	HC ferro-manganese	Mn: 68-73%	30500
	Silico-manganese	Mn: 46-48% Si: 14.56%, P: 0.197%	NAS
Tata Steel Ltd., Ferro Alloy Plant Bamnipal, Dist. Kendujhar.	HC Ferro-chrome/ Charge-chrome	Cr: 60 (min), Si: 4% (max) C: 8% (max), P: 0.03% (max) S: 0.03% (max)	50000
Balasore Alloys Ltd, Balgopalpur, dist. Balasore, Orissa. (Formerly Ispat Alloys Ltd)	Ferro-manganese Silico-manganese Ferro-chrome	Mn: 70-75% Mn : 60-65% & 65-70% Cr : 60-65%	100000 (Total)
Jeypore Sugar Co. Ltd, (Ferro-manganese Plant) Dist. Rayagada.	HC ferro-chrome	Cr: 60-65% P: 0.055% C: 2% S: 0.05% Si: 4% Fe: Balance	22000
	Silico-manganese	Mn: 60-65% Si: 15-18% C: 2% Max.	22000
IDCOL Ferro Chrome & Alloys Ltd Jajpur Road, Dist. Jajpur.	LC ferro-chrome	Cr: 62-65% Si: 1.5 to 8% C: 8% (max)	18, 000
Indian Charge Chrome Ltd Choudwar, Dist. Cuttack.	HC ferro-chrome/ Charge-chrome	Cr : 60%	62500
Indian Metals & Ferro Alloys Ltd (IMFA), Therubali, Dist. Rayagada.	Ferro-silicon	Si: 70-75%	53000
	HC ferro-chrome	Cr: 60%	195000
Superb-Metal Alloys (Pvt.) Ltd Rairangpur, Dist. Sundergarh	Ferro-columbium Ferro-molybdenum Ferro-tungsten Ferro-vanadium	NA	300 (Total)
Puducherry			
The Silcal Metallurgic Ltd	Ferro-silicon	-	10560
	Ferro-silicon-magnesium	-	1800
Snam Alloys (Pvt.) Ltd Kariamanikam Dist. Puducherry.	Ferro-silicon	NA	4000
Punjab			
Mehra Ferro-Alloys Verka, Amritsar	Ferro-molybdenum Ferro-vanadium Ferro-titanium Ferro-tungsten Ferro-boron	NA	300 (Total)

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Table - 3 (Concl.d.)

Name & location of the plant	Product	Specifications	Installed capacity
Sikkim			
Akshay Ispat & Ferro Alloys Ltd, Mamring, Dist. Namchi.	Ferro-silicon	NA	6000
Tamil Nadu			
VSK Ferro Alloys Ltd Thuthipet.	Ferro-silicon	Si : 72.3%, C: 0.15% S : 0.051%, Mn : 0.55% P : 0.042%, Fe : 26.127%	3000
Uttar Pradesh			
The India Thermit Corpn. 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	3200
West Bengal			
Cosmic Ferro Tech. Ltd, Distt: Bankura, Bishnupur	HC ferro-manganese	Mn: 66-71%, Si: 1.4% C: 6.5-7%, P: 0.3%	45375
	Silico-manganese	Mn: 61-65%, Si: 15.5% C: 1.9%, P: 0.28%	
Gayatri Minerals Pvt. Ltd, WBHDC Growth Centre, Bishnupur, Bomkura (WB).	Silico-manganese	Mn: 60% (Min) Si: 14-16% C: 2% (max)	
Karthik Alloys Ltd (I & II) Durgapur.	Silico-manganese	NA	7300
Maithan Alloys Ltd, Burdwan.	Ferro-manganese Silico-manganese Ferro-chrome	NA	52600 (Total)
Monnet Ferro Alloys Ltd Burdwan.	Silico-manganese	NA	12500
Shyam Ferro Alloys Ltd Burdwan.	HC silico-manganese HC ferro-manganese HC ferro-chrome	NA	100000 (Total)
Shri Vasavi Industries Ltd WBIIDC Industrial Growth Centre Bishnupur, Dist. Bankura.	HC ferro-chrome	Cr: 62% Si: 3-5%	45000
Modern India Con-Cast Ltd, WBIIDC Industrial Growth Centre, Bishnupur, Dist; Bankura.	Bulk fero-alloys	-	22000
Rohit Ferro Tech. Ltd Bishnupur, Dist. Bankura	HC ferro-chrome	Cr: 60% Min., C: 8% Max. Si: 3.5% Max., P: 0.03% Max S: 0.04% Max.	45375

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

Source: Information collected by IBM on non-statutory basis.

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**Table - 4 : Reported Consumption of Principal Ferro-alloys, 2007-08 (p)
(By Industries)**

(In tonnes)

Ferro-alloy	Iron & steel	Alloy steel	Sponge iron	Foundry	Electrode	Ferro-alloys	Total
Ferro-aluminium	169 (1)	52(2)	-	-	-	-	221
Ferro-chrome	115,000(10)	34900(16)	-	700(20)	++(5)	-	150,600
Ferro-chrome-silicon	-	460(1)	-	-	-	-	460
Ferro-manganese	109,800(13)	9600(16)	-	1100(29)	500(14)	-	121,000
Ferro-molybdenum	227(9)	626(10)	-	87(12)	-	-	940
Ferro-nickel	-	2110(6)	-	-	-	-	2110
Ferro-niobium	273(4)	5(2)	-	-	-	-	278
Ferro-phosphorus	288(2)	46(3)	-	17(2)	-	-	351
Ferro-silicon	37800(13)	5500(13)	-	2200(26)	++(6)	100(1)	45600
Ferro-silicon-magnesium	-	-	-	23(3)	-	-	23
Ferro-titanium	737(8)	225(7)	-	5(3)	-	-	967
Ferro-tungsten	-	50(4)	-	-	-	-	50
Ferro-vanadium	515(9)	148(8)	-	8(4)	-	-	671
Silico-manganese	184100(12)	3800(8)	1500(3)	100(3)	-	-	189500

Note : Figures rounded off. Figures in parentheses denote the number of units in the organised sector reporting consumption. Data collected on non-statutory basis.

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 (fine 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 to building materials will result in reduced building material cost and conservation of natural resources like clay and sand.

Domestic vanadium sludge is being used to produce 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 CO₂ reduction technologies which could be traded in terms of carbon credits. Installation of an electricity generation facility driven by the CO-rich furnace gas is an obvious means of achieving a CO₂ saving.

WORLD REVIEW

The top six ferro-alloy producing countries were China, South Africa, Ukraine, Kazakhstan, Norway and Russia. Estimated world production of bulk ferro-alloys of chromium, manganese and silicon generally ranged from 18 to 20 million tonnes. The world production of ferro-alloys for the years 2005 to 2007 are given in Table-5. The markets for the bulk alloys like high carbon ferro-manganese, silico-manganese, ferro-silicon and high carbon ferro-chrome showed a varied response to the fluctuations in steel and stainless steel production according to the different circumstances prevailing within different markets.

FERRO-ALLOYS

**Table - 5 : World Production of Ferro-alloys, 2005 to 2007
(By Principal Countries)**

(In tonnes)				
Country	Ferro-alloy	2005	2006	2007
Brazil	FeCr	185533	158585	177656
	FeSiCr	18683	8221	12943
	FeSiMg	43980	31314	30221
	FeMn	257083	61434	135757
	FeSiMn	341565	198753	225373
	FeNi	21200	27600	28900
	FeNb	58616	60826	71676
	FeSi	199856	196814	196403
	Others	42588	44280	45330
Canada	FeNb ^e	4800	6400	6800
	FeSi ^e	70000	70000	70000
China	FeCr	854000	1042000	1296000
	FeSiCr	48000	35000	38700
	Others	9698000	12000000 ^e	15000000 ^e
Colombia	FeNi	122700	118900	114600
Dominican Republic	FeNi	73962	76659	75069
Finland	FeCr	234881	243350	241760
Greece	FeNi ^e	96000	89000	94000
Iceland	FeSi	114844	113798	114886
India	FeAl	7214	9947	9377
	FeCr	662297	801368	948601
	FeSiMg	11171	11387	13525
	FeMn	273057	296726	391210
	FeSiMn	596372	782962	911402
	FeMo	2827	3120	2899
	FeSi	90652	92632	83716
	FeTi	735	1761	1937
	FeV	877	1139	1585
	Others	225	409	362
Japan	FeCr	12367	13056	12016
	FeMn	448616	406162	420151
	FeSiMn	94725	59424	52901
	FeMo	4019	4229	4573
	FeNi	391074	335884	351503
	FeV	2360	2042	3205
	Others	10057	13123	13982
Kazakhstan	FeCr	1156167	1190673	1307536
	FeSiCr	97870	117607	145685
	FeSiMn	170001	218323	188445
	FeSi	104186	85924	59886
	Others	NA	1787	1222
New Caledonia	FeNi	172067	180724	170000 ^e
Norway	FeMn ^e	130000	130000	130000
	FeSiMn ^e	290000	310000	280000
	FeSi ^e	165000	80000	NA
	Others ^e	60000	60000	62000

(Contd.)

FERRO-ALLOYS

Table - 5 (Concl.d.)

Country	Ferro-alloy	2005	2006	2007
Russia	Spiegeleisen ^e	7000	7000	7000
	FeCr	511600	500837	564474
	FeSiCr	74150	92404	97915
	FeMn ^e	108000	125000	125000
	FeSiMn ^e	145000	170000	170000
	FeNi	17000	20795	21000 ^e
	FeSi ^e	742000	750000	750000
	Others ^e	34900	35000	35000
South Africa	FeCr	2811836	2893400	3626871
	FeMn	570574	570000 ^e	570000 ^e
	FeSiMn	275324	275000 ^e	275000 ^e
	FeSi	127000	127000 ^e	127000 ^e
	FeV ^e	25000	25000	25000
Sweden	FeCr	127500	136400	124400
Ukrain	Spiegeleisen ^e	5000	5000	5000
	FeMn	359000	373000	368000
	FeSiMn	1045900	1168000	1281000
	FeNi ^e	78000	78000	78000
	FeSi	227500	169000	218000
	Others	87985	133402	141912
USA	FeSi	209000	253000	271000
Venezuela	FeMn ^e	15000	15000	15000
	FeSiMn ^e	35000	35000	35000
	FeNi ^e	56000	56000	56000
	FeSi ^e	92000	92000	92000
Zimbabwe	FeCr	218143	200673	200833

Source: World Mineral Production, 2003-2007.

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.

FOREIGN TRADE

Exports

In 2007-08, exports of ferro-alloys increased to 8,78,718 tonnes valued at Rs.4,484.95 crore as against 5,10,578 tonnes valued at Rs.1,642.78 crore in the previous year. In terms of quantity, exports of ferro-chrome accounted for 55% followed by ferro-silico-manganese (30%) and ferro-manganese (13%) in 2007-08. The other ferro-alloys together accounted for remaining 2% of exports. Exports were mainly to Netherlands (19%), Italy and China (15% each), Republic of Korea (13%) and Japan (9%) (Tables -6 to 24).

Imports

Imports of ferro-alloys increased to 1,64,104 tonnes valued at Rs.1,571.65 crore from 1,34,910 tonnes valued at Rs.1,333.2 crore in the previous year. In terms of quantity, imports of ferro-silicon accounted for about 59% followed by ferro-manganese (13%), ferro-chrome (12%) and ferro-nickel (5%). Other ferro-alloys together accounted for remaining 11% of imports in 2007-08. Imports were mainly from China (44%) followed by Bhutan (17%), Russia and Norway (10% each) and South Africa (5%) (Tables - 25 to 42).

FERRO-ALLOYS

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	510578	16427788	878718	44849514
Netherlands	42768	1231978	167301	9326511
Italy	76269	2180018	130432	6658831
China	142944	4857308	131267	5972225
Korea, Rep. of	64629	2224080	114578	5824150
Japan	60569	2035146	78063	3883581
USA	3854	110276	36415	2199641
Belgium	7285	226805	20766	1092698
Pakistan	17167	510266	17792	844764
Spain	13801	478752	13962	691416
Chinese Taipei/ Taiwan	13821	459904	9220	413194
Other countries	67471	2113255	158922	7942503

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	4	64	++	38
Thailand	-	-	++	38
Turkey	4	64	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	287761	9939296	482953	24800480
China	142740	4849659	130995	5956128
Korea, Rep. of	49051	1765342	81087	4104446
Netherlands	7135	215805	65244	3898246
Japan	46414	1631016	56117	2688733
USA	499	15695	34077	2068958
Italy	1252	47322	27732	1496606
Belgium	4101	134047	11048	616099
Spain	3806	139910	8292	444172
Korea, D.P. Rep. of	-	-	10285	436475
Turkey	2616	87903	6103	322043
Other countries	30147	1052597	51973	2768574

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	++	14	-	-
Malaysia	++	14	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	54227	1552885	114461	5921631
Netherlands	8412	245444	37928	2134272
Italy	5800	169094	17657	921834
Pakistan	9968	267075	10943	505022
Belgium	1026	28075	7932	391059
Saudi Arabia	184	5846	2848	176808
Iran	108	3420	3335	173296
Turkey	4969	148027	3710	156639
Chinese Taipei/ Taiwan	3521	101431	3904	143372
Korea, Rep. of	2568	70403	2783	116053
USA	3000	83340	2020	113395
Other countries	14671	430730	21401	1089881

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	465	23603	820	39502
UAE	32	1967	230	12615
Australia	2	7897	200	10126
Israel	73	2588	119	6299
Malaysia	-	-	84	4929
Pakistan	190	2965	110	1978
Morocco	-	-	40	1772
Saudi Arabia	70	2321	20	850
Indonesia	52	1978	-	-
Philippines	21	1448	-	-
Turkey	20	1408	-	-
Other countries	5	1031	17	933

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	10	1059	-	-
Belgium	10	1059	-	-

**Table - 15 : Exports of Ferro-Selenium
(By Countries)**

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	-	-	2	118
Malaysia	-	-	2	118

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	177	9524	316	12745
UK	-	-	200	8555
UAE	70	5377	106	3370
Israel	-	-	10	820
Belgium	60	3487	-	-
Nigeria	26	347	-	-
Turkey	21	313	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	122	4800	64	5561
Brazil	-	-	24	4087
Chinese Taipei/ Taiwan	-	-	40	1474
Bangladesh	69	2143	-	-
Congo, People's Rep. of	5	252	-	-
Saudi Arabia	20	2155	-	-
Yemen Republic	28	250	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	807	16574	1136	24453
Spain	186	4307	252	5708
Netherlands	185	3703	287	5686
Korea, Rep. of	187	3602	261	5614
Japan	129	2336	156	3114
Finland	27	532	96	2099
Sweden	72	1501	48	1159
UK	21	586	30	995
Turkey	-	-	5	62
Bahrain	-	-	1	16
UAE	++	7	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	2743	98645	2157	107875
Slovenia	174	8115	431	22477
Turkey	204	7810	406	19297
Malaysia	218	10066	236	12525
Egypt	8	431	180	9345
France	12	612	168	7733
Thailand	97	4405	128	5376
Indonesia	76	3771	88	3990
Italy	216	6315	62	3792
Colombia	180	8887	42	1974
Greece	744	20976	-	-
Other countries	814	27257	416	21366

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**Table - 18 : Exports of Ferro-Silico-Manganese
(By Countries)**

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	152052	4423577	262591	13325024
Italy	65356	1849151	81126	4062243
Netherlands	24459	715960	62545	3224875
Korea, Rep. of	12530	375886	30447	1598037
Japan	9508	268641	21086	1162590
Thailand	1907	51215	7102	317871
Greece	5496	145613	6422	310850
Chinese Taipei/ Taiwan	1257	44048	4696	246245
Spain	9455	319821	4790	211252
Pakistan	3346	101699	4274	210542
Israel	1500	42855	2785	140449
Other countries	17238	508688	37318	1840070

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	7943	263951	9377	443320
Italy	3645	108136	3855	174356
Netherlands	1055	32107	1167	53165
Spain	277	11542	465	22677
UK	92	4434	376	19746
Turkey	60	2648	386	19234
Slovenia	2	51	347	17902
Thailand	166	10426	335	17788
USA	335	10378	318	17288
Greece	262	6755	282	12096
Iran	80	3659	213	11642
Other countries	1969	73815	1633	77426

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	131	7168	146	7952
Pakistan	-	-	75	2803
Belgium	100	2927	25	2748
Argentina	-	-	20	816
Turkey	8	893	10	530
UAE	++	14	8	495
Malaysia	-	-	1	293
Morocco	-	-	4	97
UK	-	-	2	86
Israel	1	271	-	-
Netherlands	22	3017	-	-
Other countries	++	46	1	84

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	32	1272	8	708
UAE	1	102	5	541
Israel	-	-	1	95
Nepal	-	-	2	72
Oman	10	120	-	-
Pakistan	21	1015	-	-
Turkey	++	35	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	1972	40666	788	49296
Austria	-	-	300	15326
China	-	-	200	13166
Mauritius	257	19707	79	6966
UAE	15	1140	75	5777
Tanzania	103	810	46	3253
Pakistan	-	-	20	1798
Turkey	70	1144	10	299
Netherlands	1500	15942	-	-
Philippines	21	1084	-	-
Unspecified	-	-	20	1109
Other countries	6	839	38	1602

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	37	624	30	1814
Bahrain	-	-	20	889
UAE	6	69	7	640
Oman	-	-	3	285
Morocco	10	181	-	-
Saudi Arabia	21	374	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	2095	44066	3869	108997
Mauritius	675	9413	1287	32972
Japan	-	-	601	24247
Bhutan	26	1041	746	12244
Netherlands	-	-	130	10267
Bangladesh	250	2557	357	8228
Ethiopia	-	-	270	3735
UAE	58	2021	54	3644
Kenya	57	2516	82	1225
Nepal	234	12705	6	350
Tanzania	106	3498	2	128
Other countries	689	10315	334	11957

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	134910	13331975	164104	15716456
China	58897	3086183	72925	4027300
Colombia	5294	3097452	5549	3014766
Russia	13139	1096694	15789	1490903
Brazil	2657	804731	4231	1390006
Norway	8599	489690	15655	1144040
Bhutan	20999	643657	27085	1034962
South Africa	5652	444652	8640	514198
Korea, Rep. of	1064	657292	2397	419399
New Caledonia	860	946436	761	399530
Indonesia	654	618252	207	394383
Other countries	17095	1446936	10865	1886969

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	176	13495	197	14566
China	175	13408	197	14393
Germany	++	58	++	173
Singapore	1	29	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	19054	1315321	19303	1627664
Russia	12727	887962	14478	1214250
South Africa	1942	127012	1087	86618
Kazakhstan	1195	74537	863	85459
China	1717	115769	929	74510
Brazil	-	-	534	50403
USA	205	14822	358	35587
Netherlands	159	10610	276	22569
UAE	75	3973	187	17250
Korea, Rep. of	158	12032	92	10575
Unspecified	285	21195	-	-
Other countries	591	47409	499	30443

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	10	696	869	31720
South Africa	10	696	749	26830
Sweden	-	-	120	4890

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	12037	550471	21750	1467911
Norway	5625	282037	12789	958236
South Africa	3522	112441	4713	231265
Korea, Rep. of	280	13633	1940	132741
China	2450	134172	1300	83228
Netherlands	-	-	210	23072
Mexico	-	-	210	12947
Russia	-	-	72	5627
Thailand	-	-	44	3285
Brazil	53	3206	-	-
Unspecified	-	-	450	16183
Other countries	107	4982	22	1327

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	262	512113	481	1152400
Belgium	-	-	++	31
China	235	458428	275	-
Netherlands	6	15396	133	702318
Korea, Rep. of	10	16946	45	-
Singapore	-	-	16	82637
USA	1	1745	11	303543
UK	5	9818	1	43078
Brazil	++	362	-	-
Iran	5	9227	-	2917
Sweden	++	191	-	17876

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	7753	5533744	8133	4821994
Colombia	5294	3097452	5549	3014766
New Caledonia	860	946436	761	399530
Indonesia	654	618252	207	394383
Austria	248	147912	347	351286
France	100	101308	233	197411
Russia	35	34017	296	185337
China	-	-	296	119093
Germany	-	-	377	104116
Brazil	-	-	26	31561
Korea, Rep. of	498	534976	-	-
Other countries	64	53391	41	24511

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	1707	761554	1599	1246737
Brazil	1661	733580	1548	1181319
Singapore	28	12457	33	32719
UK	15	11535	8	13567
Germany	3	3982	6	12465
China	-	-	4	6667

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	1098	23608	1264	32702
China	967	17774	1073	25803
Iran	-	-	125	3134
Sweden	7	1011	10	1551
UK	32	781	8	1158
UAE	-	-	48	1050
Norway	24	1239	++	6
Chinese Taipei/ Taiwan	68	2803	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	114	8308	59	5844
China	5	582	-	-
Russia	109	7726	59	5844

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	207	5655	513	19132
Saudi Arabia	149	3058	391	8739
Spain	-	-	47	4789
Russia	-	-	40	4186
Poland	-	-	8	525
China	58	2597	-	-
Unspecified	-	-	27	893

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	1757	79988	4062	204619
China	1666	74689	2647	128484
Brazil	43	2816	641	34866
Norway	48	2483	568	31159
Korea, Rep. of	-	-	200	9805
Japan	-	-	6	305

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	86833	3129023	96310	4039459
China	49875	1782481	61952	2559931
Bhutan	20999	643657	26023	984402
France	1386	91814	2749	176819
Norway	2416	175598	2144	146643
Brazil	692	43829	698	41624
Argentina	264	15683	515	29750
Russia	83	2140	634	24162
UK	455	17520	501	18557
Iran	7908	255111	75	3506
Bangladesh	1620	48421	-	-
Other countries	1135	52769	1019	54065

FERRO-ALLOYS

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	441	344022	570	225563
UK	152	117671	324	138351
Russia	106	98617	110	43907
Ecuador	9	8524	57	23006
Netherlands	7	5778	18	8645
Germany	12	8204	14	6199
China	18	5421	45	5264
Austria	80	66373	-	-
Brazil	20	8241	-	-
Korea, Rep. of	13	6502	-	-
Sweden	14	13523	-	-
Other countries	10	5168	2	191

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	87	98968	67	73119
China	80	91370	62	67735
Netherlands	-	-	5	5384
USA	7	7598	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	523	774588	196	302242
Korea, Rep. of	65	71823	120	183641
South Africa	120	202312	51	82791
China	198	318009	17	25589
Korea, D.P. Rep. of	-	-	5	6079
Japan	7	11792	3	3955
Germany	77	100229	++	187
Netherlands	1	985	-	-
Russia	49	63223	-	-
UK	6	6215	-	-

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	63	6790	298	20513
China	63	6790	267	17292
Brazil	-	-	21	2355
Hong Kong	-	-	10	866

FERRO-ALLOYS

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

Country	2006-07		2007-08	
	Qty. (t)	Value (Rs. '000)	Qty. (t)	Value (Rs. '000)
All Countries	2788	173631	8433	430271
China	1390	64693	3861	196993
South Africa	-	-	2021	85358
Bhutan	-	-	1062	50560
Brazil	188	12697	763	47878
Argentina	381	22132	343	19597
Norway	486	28333	154	7996
Russia	30	3009	100	7590
UK	147	24685	45	5587
Germany	69	7739	30	2313
Japan	40	4788	17	2238
Other countries	57	5555	37	4161

FUTURE OUTLOOK

Indian ferro-alloys industry is an important player in the international market. According to IFAPA, on an average, about 35 to 40% production is exported. Presently, the boom in World Steel Production drove demand mainly for the bulk alloys of manganese and silicon and alloys of micro-alloying elements, vanadium and niobium. The rise in stainless steel production resulted in increase in demand for alloys of chromium, nickel and molybdenum.

Indian ferro-alloys industry has a great future and it can compete with any country. India has advantage of having highly qualified and experienced technical personnel supported by skilled labour force. There is a need to encourage Indian ferro-alloys industry for setting up captive power plants and also allot coal linkages for the same. As per industry sources, the recent global financial melt down has hit the ferro-alloys industrial scenario badly. Ferro-alloys industry can grow provided innovations are made in the process technology and plant equipment design, along with frequent changes in product mix, to be more cost-effective.