

FERRO-ALLOYS



Indian Minerals Yearbook 2017

(Part- II : Metals & Alloys)

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FERRO-ALLOYS

(ADVANCE RELEASE)

**GOVERNMENT OF INDIA
MINISTRY OF MINES
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. They 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. Owing to high cost of power, Ferro-alloys Industry has not been operating to its full capacity in India. 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 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 5.10 million tonnes per annum and for noble ferro-alloys it is 50,000 tonnes per annum. The details are given in Table- 1.

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

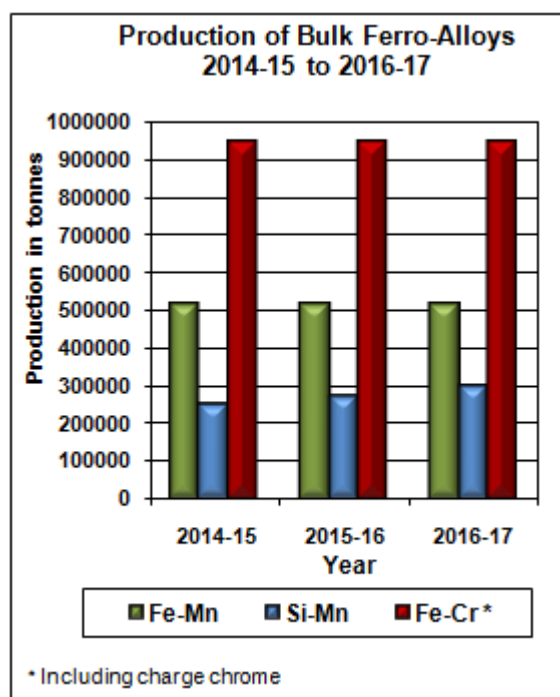
(In tonnes per annum)

Ferro-alloys	Installed capacity
Total	5150000
Bulk Ferro-alloys:	5100000
Manganese-alloys	3160000
Chrome-alloys	1690000
Ferro-silicon	250000
Noble Ferro-alloys:	50000

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 as well as uninterrupted electricity supply. 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 is given in Table-2.

The ferro-alloy 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.



BULK FERRO-ALLOYS

Bulk ferro-alloys consist of principal alloys, viz, ferro-manganese, silico-manganese, ferro-chrome, charge-chrome and ferro-silicon. The production of different kinds of ferro-alloys was not received from IFAPA as well as from other sources. However, the data received from JPC for some of the ferro-alloys as well as partial coverage from ferro-alloys have been published in IBM's Monthly Statistics of Mineral Production (MSMP) - March, 2016 & 2017 which is being reproduced in Table-2. It may be noted that the data coverage in Table-2 is partial and does not reflect the actual production of ferro-alloys.

Table – 2 : Production of Ferro-alloys, 2014-15 to 2016-17

	(In tonnes)		
Ferro-alloys	2014-15	2015-16	2016-17
A) Bulk Ferro-alloys			
Ferro-manganese	518000	518000	518000
Silico-manganese	249691	269920	300625
Ferro-silicon	90000	90000	90000
Ferro-chrome	944000	944000	944000
Charge-chrome	NA	NA	NA
B) Noble Ferro-alloys			
Ferro-molybdenum	1295	1459	1603
Ferro-vanadium	1035	937	1329
Ferro-tungsten	NA	NA	NA
Magnesium ferro-silicon	26123	20541	20183
Ferro-aluminium	3737	3212	4345
Ferro-silicon-zirconium	NA	NA	NA
Ferro-titanium	545	198	291
Ferro-boron	42	NA	NA
Ferro-niobium	8	1	NA

Source: Monthly Statistics of Mineral Production (MSMP), IBM. March, 2016 & 2017.

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 Godawari Power & Ispat Ltd. (GPIL), 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 Electros melt 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; Shyam Century Ltd, Meghalaya; Tata Steel Ltd, Joda, Odisha; Bhaskar Shracchi 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, Bishnupur, West Bengal; Shyam 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, 16-28% silicon and 1.5 to 2.5% carbon is used as a more effective deoxidizing agent than high

carbon ferromanganese in the production of various types of steels. It is also used as feedstock to produce refined alloys like medium and low carbon ferromanganese. 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 2015-16 was about 5,18,000 tonnes which remained same in 2016-17. Estimated Consumption of ferro-manganese was 79,200 tonnes while the apparent consumption was 5,00,238 tonnes in 2016-17. The production of silico-manganese (including medium carbon & low carbon silico manganese) which was about 2,69,920 tonnes in 2015-16 increased to 3,00,625 tonnes in 2016-17. In 2016-17, the total consumption of silico-manganese by all industries has been estimated at 1,61,400 tonnes while it is observed that the export of silico-manganese is more than total of import & Production in 2016-17.

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; 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.

The total production of ferro-chrome/charge chrome in 2015-16 was about 9,44,000 tonnes which remained same in 2016-17. The consumption of ferro-chrome in 2016-17 was estimated 15,900 tonnes while the apparent consumption was 3,10,679 tonnes in 2016-17.

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 in 2015-16 was about 90,000 tonnes which remained same in 2016-17. The domestic consumption of ferro-silicon in the organised sector was estimated at 30,200 tonnes while the apparent consumption of ferro silicon was 2,66,303 tonnes in 2016-17.

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 alumino-thermic process.

Ferro-nickel

The consumption and Production of ferro-nickel was not reported in the organised sector.

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 1,459 tonnes in 2015-16 increased to 1,603 tonnes in 2016-17.

Ferro-tungsten

The consumption and Production of ferro-tungsten in 2016-17 was not reported in the organised sector.

Ferro-vanadium

Production of ferro-vanadium in 2015-16 was 937 tonnes which increased to 1,329 tonnes in 2016-17.

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 2014-15 to 2016-17 are furnished in Table- 2.

Information on plant-wise 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 given in Table- 4 & 4A

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

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Andhra Pradesh			
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- magnesium	Mg: 4-30%, Si: 44-55 %, Al: 1.00%, Ca: 1.0-4.0%,	
	Silico-chrome	NA	
	Other ferro-alloys	NA	
Deccan Ferro Alloys (P) Ltd Chintalapalem (PO), Pendurthi (SO) Visakhapatnam	Silico-manganese	NA	13,054
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
Sree Sarda Alloys Ltd Ravivalsa, Tekkali Mandal Distt. Srikakulam.	Ferro-chrome	NA	6,000
Metkore Alloys and Industries Ltd Srikakulam.	H C ferro-chrome	NA	25000

(Contd.)

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Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Anjaney Alloys Ltd, Atchutapuram Distt. Visakhapatnam	Ferro alloys	NA	120,000
M.B.SMELTERS Pvt. Ltd., Hindupur, Distt. Anantpur	Ferro silico manganese	NA	3000
Chhattisgarh			
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, Urla, Distt. Raipur 12,000	HC ferro-manganese	Silico-manganese	14,000 Mn: 60-65%
	(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 Silico-manganese	- -	66,000 -
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	HC ferro-manganese	NA	21,560
Urla Industrial Area Distt. Raipur.	Silico-manganese HC ferro-chrome	NA NA	14,700
Deepak Ferro Alloys Ltd	Ferro-manganese		5,000

(Contd.)

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Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Urla Industrial Area Distt. Raipur.	HC ferro-manganese MC ferro-manganese LC ferro-manganese Silico-manganese Ferro-silicon	Std. Specified	5,000
	Ferro-chrome LC ferro-chrome HC ferro-chrome	NA Cr: 60-70%, Si: 2 to 4%, S : 0.05%, C: 6 to 8%	5,000
	Silico-chrome Others		
Jindal Steel & Power Ltd Kharsia, Distt. Raigarh.	HC Ferro-chrome	Cr: 60-66%, C: 6 to 8%, Si: 4% (max), P: 0.050 (max), S: 0.050 (max), Mn: 60%, Si: 15%, P: 0.3% max	36,000
Sai Chemical Pvt Ltd , Tadesara, Distt. Rajnandgaon	Silico-manganese	NA	10,200
MSP Spong Iron Ltd, Manuapali, Jamgaon, Raigarh (Chhattisgarh)	Silico-manganese	NA	42057
Goa Karthik Alloys Ltd	NA Cuncolin, Distt. South Goa.	NA	4,100
Gujarat 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
Sal Steel Ltd, Gandhidham, Distt. Kachhh	Silico manganese	NA	61890
Haryana Haryana Ferro-Alloys Ltd Gohana Road, Distt. Rohtak.	-	-	2,500
Jammu and Kashmir Shree Sitaram Industries Pvt. Ltd Phase II, SIDCO Complex, Bari Brahmana.	Ferro-chrome	NA	3,325

(Contd.)

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Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Jharkhand			
Anjaneya Ferro Alloys Ltd, Mihijam Distt. Jamtara	Ferro-alloys	NA	41850
Bihar Foundry & Casting Ltd (Unit Gautam Ferro Alloys)	Silico-manganese	Si: 14%, Mn : 60%	34,000
Castron Technologies Ltd, Bokaro Industrial Area,	Ferro-manganese Silico-manganese	NA NA	14400
Shivam ron & Steel Co. Ltd., Ferro Alloys Division, Jambad, Udnabad, Giridih	Ferro-manganese	NA	37,400
Karnataka			
Sandur Manganese & Iron Ores Ltd Vyasanakere, Distt. Ballari (Plant closed since 1.8.1998)	HC ferro-manganese Silico-manganese Ferro-silicon	-	29,100 20,000 24,000
Dandeli Steel & Ferro Alloys Ltd Dandeli, Distt. Uttar Kannada.	Ferro-manganese MC ferro-manganese	Mn: 70-75%, C: 0.1%, Si: 2.4%, P : 0.15%, S: 0.05%, Size: 37 mm Mn: 70-75%, C: 1.5%, P: 0.25%, Si: 2%, S: 0.05%	6,000
S.R. Chemicals & Ferro-Alloys KIADB Honaga, Distt. Belagavi.	LC Ferro-manganese	Mn: 70%, C: 0.1%, P: 0.12%	25
Thermit Alloys (Pvt.) Ltd N-7, Industrial Estate Distt. Shimoga.	Ferro-manganese Silico-manganese Ferro-chrome Ferro-silicon Silico-chrome	NA NA NA NA NA	1,200
Kerala			
The Silical Metallurgic Ltd Wayalur, Distt. Palakkad.	Silico-manganese	Mn: 70-75%	3,600
INDSIL Electrosmelts Ltd Pallatheri, Distt. Palakkad.	Silico-manganese Ferro-silicon	NA NA	NA NA
INDSIL Hydro Power & Manganese Ltd Distt. 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
Madhya Pradesh			
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 Ferro-manganese	N.A. N.A.	4,500 (Total)
S.R Ferro Alloys, Jhabua	Silico- manganese	NA	8,639

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Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Maharashtra			
Chandrapur Ferro Alloy Plant, (Erstwhile Maharashtra Electros melt Ltd) Distt. 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
	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. Khandelwal Nagar 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%	16,500
	Silico-manganese	Mn: 60-65%, Si: 13-15%, P: 0.3%,C: 2-2.5%	16,500
Mahavir Ferro Alloys Paonakhari, Distt- Bhandara	Ferro Alloys	NA	100
Meghalaya			
Maithan Alloys Ltd, Distt. Rio Bhoi.	Ferro-manganese	NA	28,000
Odisha			
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	Mn: + 70%, C: 6-8 %, Si :0.3-2%, P: 0.2-0.4%, Silico-manganese	50,400 Mn: 46-48%,
			Si: 14.56%, P: 0.197%
Tata Steel Alloys Ltd, Cuttack.	Ferro-chrome Ferro Alloy Plant		50,000
Tata Steel Ltd, Bamnipal, Distt. Keonjhar.	Charge-chrome Charge-chrome Plant	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)	150,000

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Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
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
	Silico-manganese	Mn: 60-65%, Si: 15-18%, C: 2% max.	22,000
J. B. Ferro Alloys, At Tanto P.O.Bhadrashahi, Keonjhar.	LC ferro-manganese	NA	200
IDCOL Ferro Chrome & Alloys Ltd	HC ferro-chrome Jajpur Road, Distt. Jajpur.	Cr: 62-65%, C: 8% (max)	18,000 Si: 1.5 to 8%,
Indian Metals & Ferro Alloys Ltd., (IMFA)	HC ferro-chrome/ Charge-chrome	Cr: 60%	62,500
Indian Metals & Ferro Alloys Ltd (IMFA), Therubali, Distt. Rayagada.	Ferro-silicon	Si: 70-75%,	61,000
	HC ferro-chrome	Cr: 60%	275,000
Superb-Metal Alloys (Pvt.) Ltd Rairangpur, Distt. Sundergarh.	Ferro-columbium	NA	300
	Ferro-molybdenum		(Total)
	Ferro-vanadium		
Jabamayee Ferro Alloys Ltd. Sukinda, Distt. Jajpur	HC Ferro-chrome	NA	15660
M M Minerals & Alloys Pvt Ltd. Jamirdiha, Distt. Mayurbhanj.	HC Ferro-chrome	NA	25000
T S Alloys Ltd. Anantpur, Cuttack.	HC Ferro-chrome	NA	59400
Stork Ferro and Minerals Industries Pvt Ltd. Somnathpur, Distt. Balasore	Silico manganese Ferro manganese	NA NA	25,000 29,700
Aarti Steel Ltd, Ghantikhal, Distt. Cuttack.	Ferro-chrome	NA	25,000
Kalinga Ferro Ispat Pvt.Ltd., Mandía, Distt. Jajpur	HC Ferro-chrome	NA	8052
Puducherry The Silical Metallurgic Ltd	Ferro-silicon	-	10,560
	Ferro-silicon-magnesium	-	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 Kariamanikam, Distt. Puducherry.	Ferro-silicon	NA	12,000
	Ferro-silicon-magnesium		

(Contd.)

FERRO-ALLOYS

Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
Punjab			
Mehra Ferro-Alloys	Ferro-molybdenum	NA	300
Verka, Amritsar.	Ferro-vanadium Ferro-titanium Ferro-tungsten Ferro-boron		(Total)
Sikkim			
Akshay Ispat & Ferro Alloys Ltd, Mamring, Namchi, Distt. South Sikkim.	Ferro-silicon	NA	6,000
Telangana			
VBC Ferro Alloys Ltd	Ferro-silicon	–	10,000
Village Rudraram Patancheru Mandal	Ferro-chrome Silico-manganese/	–	27,000 31,500
Distt. Medak.	Ferro-manganese		
Shree Raghvendra Ferro Alloys Pvt Ltd , Nalgonda	Silico-manganese	NA	15000
Nava Bharat Ventures Limited Paloncha, Distt. Khammam,	HC Silico-manganese HC ferro-manganese	NA	1,25,000
Uttar Pradesh			
The India Thermit Corp. Ltd	Ferro-molybdenum	NA	300
Fazalganj, Distt. Kanpur.	Ferro-titanium Ferro-chrome Ferro-boron Chromium metal LC ferro-manganese Ferro-vanadium		(Total)
Hindustan Ferro-Alloys Hamirpur.	Ferro-silicon	NA	3,200
West Bengal			
Bhaskar Shrachi 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
Sri Gayatri Minerals Pvt. Ltd,	Silico-manganese	Mn: 61-65%, Si: 15.5% C: 1.9%, P: 0.28%	
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 LC ferro-chrome	NA NA	20 20
Hira Concast Ltd, Salanpur Burdwan.	Silico-manganese Ferro-manganese	NA NA	11,455 15,225

(Contd.)

FERRO-ALLOYS

Table- 3 (Concl.d.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
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	NA	94,600 (Total)
Monnet Ferro Alloys Ltd Burdwan.	Silico-manganese Ferro-chrome Silico-manganese	NA	12,500
Shyam Ferro Alloys Ltd Palitpur Road, Burdwan. Dewandighi (Katwa Road)	HC silico-manganese	NA	104,957 (Total)
	HC ferro-manganese		
	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	10,800
	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	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.)
WBIIDC Industrial Growth Centre, Bishnupur, Distt. Bankura.			
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
Sharp Ferro Alloys, Durgapur	HC silico-manganese	NA	42,500
Nilkantha Ferro Ltd, Bankura	HC silico-manganese	NA	39,960
	Silico-manganese Slag	NA	40,200
Lalwani Ferro Alloysa Ltd, Kolkata	Silico-manganese	NA	48,780
	HC ferro manganese	NA	69,285
Ispat Damodar Pvt. Ltd, Sponge Iron Plant Nabagram, PS-Neturia Digha, Purulia.	ferro-alloys	NA	40000
Sonic Thermal Pvt. Ltd, Ferro Alloys Plant Namobandh, Sitarampur Bankura.	Silico-manganese	NA	39,500

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

Source: Information collected by IBM .

Table – 4 : Estimated Consumption* vs Apparent Consumption of Principal Ferro-alloys, 2016-17 (P)

	Reported	Apparent
Ferro-chrome	15900	310679
Ferro-manganese	79200	500238
Ferro-silicon	30200	266703
Silico-manganese	161400	-

*Note: (*Includes actual reported consumption and/or estimates made wherever required and paucity of data, hence consumption may not be complete.)*

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 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 for 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 the 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 CO-rich furnace gas is an obvious means by which CO₂ saving could be achieved.

WORLD REVIEW

The major ferro-alloys producing countries were China, South Africa, India, Russia and Kazakhstan. Estimated world production of bulk ferro-alloys of chromium, manganese and silicon was about 39.30 million tonnes produced in 2014. 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 influence as per the different circumstances that prevailed in different markets.

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

FERRO-ALLOYS

**Table – 5 : World Production of Ferro-alloys, 2013 to 2015
(By Principal Countries)**

(In tonnes)				
Country	Ferro-alloys	2013	2014	2015
Australia	FeMn & FeSiMn	234000	269000	278000
Brazil	FeCr	174200	188700	173500
	FeMn	83348	80000 ^e	40000 ^e
	FeNi	34500	37200	71500
	FeNb	46600	51700	150000
	FeSiCr	13184	13000 ^e	13000 ^e
	FeSiMg ^e	20000	20000	20000
	FeSiMn	227652	230000 ^e	230000 ^e
	FeSi	158000	230000	200000 ^e
	Others ferro-alloys ^e	40000	40000	40000
Canada	FeNb	7974	8485	8500 ^e
	FeSi	38817	35500	35000 ^e
China ^e	Ferro-alloys	37762000	37860000	36664000
Colombia	FeNi	137995	113000 ^e	100500 ^e
Finland	FeCr	434000	441000	457000
France	FeMn	104000	115700	116000 ^e
	FeSiMn	64900	64800	64800 ^e
	FeSi	49600	40000	40000 ^e
Georgia	FeMn ^e	4500	4500	4500
	FeSiMn	253361	243951	210680
	FeNi	86850	94952	89129
Iceland	FeSi	125204	109739	121556

(Contd.)

FERRO-ALLOYS

Tabe- 5 (Contd.)

Country	Ferro-alloys	2013	2014	2015
India	FeAl	5497	3737	3212
	FeCr	944000	944000	944000
	FeMn	518000	518000	518000
	FeMo	1231	1295	1459
	FeSiMg	21964	26123	20541
	FeSiMn	225395	249691	269920
	FeSi	90000	90000	90000
	FeTi	821	545	198
	FeV	906	1035	937
	Others ferro-alloys ^e	730	730	730
Indonesia	FeNi	91245	84255	86055
Italy	FeSiMn	153000	67000	82000
Japan	FeMn	460936	463345	465952
	FeNi	402768	379291	396969
	FeSiMn	24741	25000 ^e	25000 ^e
Kazakhstan	FeCr	1337275	1351803	1414476
	FeSiCr	165195	158825	74609
	FeSiMn	203926	200379	164189
	FeSi	470	470 ^e	470 ^e
Korea, Rep. of	FeMn ^e	355000	355000	355000
	FeSiMn ^e	196000	196000	196000
	Others ferro-alloys ^e	4200	4200	4200
New Caledonia	FeNi	174078	224884	228484
Norway	FeMn	320000	325000 ^e	350000 ^e
	FeSiMn ^e	250000	250000	250000
	FeSi	337281	192389	243813
Russia	FeCr ^e	480000	480000	480000
	FeMn ^e	170000	170000	170000
	FeMo	5297	4503	4500 ^e
	FeNi ^e	20000	20000	20000

(Contd.)

FERRO-ALLOYS

Tabe- 5 (Concl.)

Country	Ferro-alloys	2013	2014	2015
Russia	FeSiCr ^e	4200	4200	4200
	FeSiMn ^e	148000	148000	148000
	FeSi ^e	1050000	1050000	1050000
	FeV	14059	14076	14000 ^e
	Others ferro-alloys ^e	34000	34000	34000
	Spiegeleisen ^e	7000	7000	7000
South Africa	FeCr	3219000	3000000 ^e	3000000 ^e
	FeMn ^e	650000	650000	650000
	FeSiMn ^e	150000	150000	150000
	FeSi ^e	90000	90000	90000
	FeV ^e	16000	16000	16000
Spain	FeSiMn	148500	149000 ^e	150000 ^e
Sweden	FeCr	55078	65703	82616
USA*	Ferro-Alloys	468000	502000	525000 ^e
Ukraine	FeMn	88626	104291	100209
	FeNi	121586	114222	95209
	FeSiMn	724892	960657	750181
	FeSi	191207	167977	114826
	Others ferro-alloys	15908	15326	19360
Venezuela	FeMn ^e	12000	12000	12000
	FeNi ^e	50000	50000	50000
	FeSiMn ^e	14200	14000	14000
	FeSi ^e	74300	80000	80000
Zimbabwe	FeCr	150060	214110	220000 ^e

Source: World Mineral Production, 2014-2015

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.

*Ferro-silicon & silcon metal.

FOREIGN TRADE

Exports

In 2016-17, exports of ferro-alloys were at 15,41,794 tonnes. In 2015-16, exports of ferro-alloys decreased to 13,50,224 tonnes valued at ₹ 7,226 crore from 21,69,453 tonnes valued at ₹ 9,984 crore in the previous year. In terms of quantity, exports of ferro-silico-manganese accounted for 50%, followed by ferro-chrome (33%), ferro-manganese (13%), ferro-silicon (2%) and ferro alloys others (1%). The other ferro-alloys together accounted for remaining negligible of exports in 2015-16. Exports were mainly to Korea Rep. of & Japan (12 % each), China (11%), Italy (10%), Chinese Taipei/Taiwan (9%), Netherlands & Iran (4% each) and UAE, Turkey & Thailand (3% each) (Tables-6 to 26).

Table – 6: Exports of Ferro-alloys : Total* (By Countries) 2016-17

Country	Quantity (t)	Values (₹'000)
All Countries	1541794	101280501
Korea, Rep. of	217651	15515387
Japan	156052	9916313
China	281148	21804119
Chines Taipei/ Taiwan	174307	11773015
Italy	89831	4795123
Netherland	62901	3860192
UAE	67740	3786736
Iran	35273	2138436
Turkey	27612	1800629
Thailand	45687	2607457
Other countries	383592	23283095

Source: Import-Export data bank, DGCIS, Ministry of Commerce, *HSCode-720211, 720219, 72021, 72029, 72030, 72041, 72049, 72050, 72060, 72070, 72080, 72091, 72093, 72092,

Table – 7: Exports of Ferro-alloys : Total (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2169453	99837096	1350224	72257859
Korea, Rep. of	176043	11280232	168303	10260241
Japan	243753	14420833	166709	8680184
China	99608	5853691	142696	8562511
Chinese Taipei/ Taiwan	140178	8058814	125118	6563880
Italy	149173	8246719	131045	6188504
Netherlands	92217	5518047	47958	2501214
UAE	48165	2998182	44001	2491104
Iran	112104	8278568	47621	2411681
Turkey	55905	3307124	43412	2177821
Thailand	46460	2703130	39436	1815108
Other countries	1005847	29171756	393925	20605611

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	28	7412	53	10662
South Africa	25	6521	47	9996
UAE	2	625	5	338
Malaysia	1	171	1	154
Oman	-	-	++	89
Turkey	++	75	++	85
Nepal	++	17	-	-
Brazil	++	3	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	426245	27051294	449430	27954674
Korea, Rep. of	138301	8912930	136215	8550598
China	99127	5824978	132042	7956869
Chinese				
Taipei/Taiwan	28451	1820335	53919	3282451
Japan	51170	3092570	34351	2317042
Italy	16604	1176066	16947	1115630
Netherlands	25531	1567478	18660	990760
USA	15844	1122005	12479	823281
Belgium	7110	312780	10038	544942
Mexico	13170	932812	8335	530519
Turkey	2796	206585	3415	235621
Other countries	28141	2082755	23029	1606961

**Table – 10 : Exports of Charge-Chrome
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	10	2036	1	208
Uganda	2	333	1	208
Saudi Arabia	6	1278	-	-
Nigeria	2	425	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	748617	12592464	170167	8255070
UAE	29802	1775317	24796	1478270
Italy	4052	210257	19493	852005
Iran	70343	5078830	17310	824089
Brazil	785	46427	13322	713291
Japan	23207	1241615	12554	559398
Chinese Taipei/ Taiwan	17011	881846	11598	507769
Pakistan	8192	430115	11213	468428
Kuwait	550515	298808	7536	395193
Bangladesh	1827	106681	7233	341513
Indonesia	16026	945139	6419	292746
Other countries	26857	1577429	38693	1822368

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	220	69420	140	53666
Czech Republic	20	16458	20	14666
Belgium	10	9263	20	10461
Chile	3	6168	2	5412
Thailand	-	-	8	5328
Peru	-	-	2	3326
Indonesia	14	4080	29	3180
Pakistan	6	3408	3	2953
Malaysia	3	4314	6	2552
Israel	2	2518	1	1712
Ghana	++	188	3	879
Other countries	162	23023	46	3197

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	-	-	++	73
Bangladesh	-	-	++	73

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	11	20047	11	24104
Malaysia	11	19814	10	20574
Iran	-	-	1	2055
Bangladesh	-	-	++	536
Singapore	-	-	++	457
Indonesia	++	121	++	266
Pakistan	++	112	++	216

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	38	7640	44	7561
Sweden	38	7617	40	7376
Oman	-	-	4	146
USA	-	-	++	39
UAE	++	23	-	-

FERRO-ALLOYS

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3	384	-	-
Ivory Coast /Cote-DIvoire	3	311	-	-
Uganda	++	73	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	14933	1668030	8527	866310
USA	2347	249494	1252	125430
Turkey	1004	97792	1352	125155
Saudi Arabia	2428	270328	1160	118299
Mexico	2404	301747	748	80656
Korea, Rep. of	715	81339	723	77761
Oman	549	57993	473	48531
Spain	119	12499	475	48360
Netherlands	510	58265	244	24476
Brazil	828	90834	210	22526
Poland	229	26117	175	22090
Other countries	3800	421622	1715	173026

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	918847	53051405	671904	31326678
Japan	168049	9983326	111784	5250837
Italy	123185	6457469	90282	3936680
Chinese Taipei/ Taiwan	94261	5308359	59366	2748423
Thailand	42321	2433222	36850	1676931
Turkey	49826	2840372	34438	1605601
Iran	21981	1333535	27407	1338977
Korea, Rep. of	32343	1974794	24117	1275968
Pakistan	20192	1098840	24645	1103108
Malaysia	22758	1339039	19601	956165
UAE	15705	958896	18294	926591
Other countries	328226	19323553	225120	10507397

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	57084	4749615	29912	2344428
Netherlands	13997	1063744	5816	414265
Brazil	3286	315698	2300	211120
Spain	736	50502	2624	192445
Italy	4471	326841	2647	164649
France	4633	362309	2042	152891
Iran	15708	1319473	1838	138869
Bangladesh	173	13379	1680	110805
Japan	803	84562	1425	92913
Slovenia	965	104132	839	86868
Korea, Rep.of	561	62385	677	71856
Other countries	11751	1046590	8024	707747

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	245	68738	120	18249
Germany	1	682	56	4148
South Africa	4	1083	12	3972
UAE	++	46	11	2527
UK	-	-	20	2159
Brazil	24	5773	6	1938
Bangladesh	1	83	7	1168
Iran	174	55111	2	644
Russia	-	-	2	591
Turkey	5	2011	2	429
Saudi Arabia	-	-	1	269
Othr countries	36	3949	1	404

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	12	10141	16	18217
Netherlands	-	-	10	12641
Ireland	++	746	1	1618
Pakistan	5	306	1	1087
Turkey	++	591	3	848
South Africa	1	737	1	759
Russia	-	-	++	582
Indonesia	-	-	++	549
Chile	-	-	++	133
Ethiopia	3	4579	-	-
Finland	1	2903	-	-
Germany	2	279	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	176	213865	67	55755
Iran	102	146357	22	29626
UAE	48	56582	12	13026
Malaysia	2	4355	3	5531
Mauritius	16	4662	27	4428
Turkey	7	827	1	1125
Congo, P. Rep	-	-	1	1013
USA	-	-	1	805
Israel	++	163	++	139
Thailand	-	-	++	36
Chile	-	-	++	25
Other countries	1	919	++	1

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	6	7001	10	6893
Peru	4	2294	2	4764
Turkey	-	-	7	795
Malaysia	++	353	++	568
Pakistan	-	-	1	408
Indonesia	-	-	++	358
Israel	2	4354	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1	590	5	2652
Brazil	-	-	4	2003
Indonesia	1	493	1	496
Srilanka	-	-	++	101
Turkey	-	-	++	52
UAE	++	83	-	-
Baharain Is	++	14	-	-

**Table – 25 : Exports of Ferro Selenium
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2	116	++	288
Malaysia	2	116	++	288

**Table – 26 : Exports of Ferro-alloys (Others)
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2975	316896	19817	1312227
China	-	-	10529	595018
Japan	524	18758	6595	459850
Italy	570	44102	1483	99583
Saudi Arabia	293	51622	295	52709
South Africa	182	29596	319	38998
USA	-	-	40	13902
Bahrain Is	-	-	62	9049
Bangladesh	19	4163	49	9009
France	-	-	91	6296
UAE	18	2449	52	4205
Other countries	1369	166206	302	23608

Imports

In 2016-17, imports of ferro-alloys were at 4,68,247 tonnes. Imports of ferro-alloys increased to 3,61,997 tonnes in 2015-16 from 3,36,575 tonnes in the previous year. In terms of value, the ferro-alloys imports decreased to ₹ 4,414 crore in 2015-16 from ₹ 4,769 crore in 2014-15. In terms of quantity, imports of ferro-silicon accounted for about 38% followed by ferro-chrome (25%), ferro-manganese (13%), ferro-nickel (11%) charge-chrome (9%), Other ferro-alloys together accounted for remaining 4% of imports in 2015-16. Imports were mainly from South Africa (24%), followed by Bhutan (22%), China (10%), Korea, Rep. of (6%), Russia (5%), Japan (3%), Brazil & Indonesia (2% each) and New Caledonia & Greece (1% each) (Tables-27 to 45).

Table – 27: Imports of Ferro-alloys : Total* (By Countries) 2016-17

Country	2016-17(P)	
	Quantity (t)	Values (₹'000)
All Countries	468247	51012883
Brazil	19765	7016221
Bhutan	102845	5621073
China	39898	4166814
South Africa	77149	3973037
Indonesia	17730	3382604
Russia	37097	3326171
Dominic, Rep. Of	4722	2730506
Japan	10034	2502012
Colombia	5713	2470755
Korea, Rep. Of	20178	2070305
Other countries	133116	13753385

Source: Import-Export data bank, DGCIS, Ministry of Commerce, *HSCode-720211, 720219, 72021, 72029, 72030, 72041, 72049, 72050, 72060, 72070, 72080, 72091, 72093, 72092,

Table – 28: Imports of Ferro-alloys: Total (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	336575	47686136	361997	44137176
Brazil	5216	4519949	6066	5168472
Bhutan	75277	5531306	77931	4961231
South Africa	98657	6328393	87778	4825257
China	35697	5367947	35211	4043169
New Caledonia	2376	1292317	5132	3312384
Japan	4649	4601164	9890	2779063
Korea, Rep. of	19516	2569348	21482	2212679
Russia	31443	3482408	19785	2140887
Indonesia	205	236866	5825	2115515
Greece	2632	2367141	2668	1898169
Other countries	60907	11389297	90229	10680350

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	822	177769	966	179916
China	809	175151	943	175118
Japan	-	-	20	4389
UK	12	1682	2	363
USA	-	-	1	46
Germany	1	936	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	70834	7295272	91263	7703307
South Africa	31989	2059827	45860	2468042
China	9516	1635554	10419	1692993
Russia	11892	1738547	9318	1311457
Oman	8554	614335	16109	1061161
Kazakhstan	2917	414226	4648	531484
Turkey	2740	355039	2173	172286
Brazil	740	120924	476	105476
Germany	125	36343	310	89287
Chinese Taipei /Taiwan	134	21876	438	79236
Vietnam	824	129879	461	68834
Other countries	1403	168722	1051	123051

**Table – 31: Imports of Ferro-alloys Charge-Chrome
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	22678	1405744	32045	1710278
South Africa	19492	1194725	27546	1480535
Oman	-	-	3500	169019
Zimbabwe	2727	183287	999	60718
USA	-	-	++	6
Mozambique	459	27732	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	78362	5506866	47273	2983425
Korea, Rep. of	18876	1762121	20852	1620310
South Africa	44472	2746805	11489	499993
Norway	5207	513283	6500	475125
France	5664	256903	7423	299361
Turkey	-	-	595	60461
China	505	44201	240	16736
Vietnam	75	6560	54	3994
Egypt	1895	91017	75	3302
Mexico	42	4103	24	2726
UAE	-	-	19	1176
Other countries	1626	81873	2	241

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

Country	2014-15		2015-16 (P)	
	Qty	Value	Qty	Value
	(t)	(₹'000)	(t)	(₹'000)
All Countries	952	1571945	704	640858
Korea, Rep. of	455	743021	528	536525
China	459	771612	76	48091
Austria	-	-	53	17144
Vietnam	11	16448	25	16698
Iran	-	-	9	11387
Belgium	-	-	13	11013
Russia	26	40101	-	-
Malaysia	1	763	-	-

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

Country	2014-15		2015-16 (P)	
	Qty	Value	Qty	Value
	(t)	(₹'000)	(t)	(₹'000)
All Countries	20840	15042595	40207	15410700
New Caledonia	2376	1292317	5132	3312384
Japan	4565	4486457	9814	2710574
Indonesia	205	236866	5825	2115515
Greece	2632	2367141	2668	1898169
Brazil	2925	1047514	4152	1684640
Albania	-	-	4376	959939
Venezuela	5743	3117741	2753	901508
Colombia	1329	1366292	1725	616896
Macedonia	519	538822	1018	443888
UAE	288	335172	1948	300438
Other countries	258	254273	796	466749

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

Country	2014-15		2015-16 (P)	
	Qty	Value	Qty	Value
	(t)	(₹'000)	(t)	(₹'000)
All Countries	1570	3751259	1572	3837040
Brazil	1345	3319082	1338	3367675
Canada	160	308001	176	359310
Singapore	37	78263	55	106612
Russia	-	-	2	2502
Malaysia	3	5442	1	941
UK	17	22844	-	-
Germany	3	7702	-	-
Netherlands	3	6707	-	-
UAE	2	3218	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2244	64133	2126	57588
China	1562	42432	1438	37318
Vietnam	520	13295	506	13239
Turkey	120	3154	168	4590
UK	8	1950	5	1227
Sweden	9	2554	9	1214
UAE	24	616	-	-
Japan	1	130	-	-
Thailand	++	2	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	25	1273	27	1469
South Africa	25	1273	27	1469

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3630	144223	177	9513
South Africa	577	24749	157	7680
France	-	-	20	1833
Australia	2477	91663	-	-
Saudi Arabia	199	7962	-	-
Bahrain Is	162	7207	-	-
USA	150	5929	-	-
Norway	42	4043	-	-
Poland	22	2641	-	-
UK	1	29	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	440	42614	399	35592
China	367	33693	378	33494
Norway	72	8768	21	2098
Thailand	1	153	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	127988	10422863	139258	10114698
Bhutan	75277	5531306	77931	4961231
China	20069	1662297	18988	1492153
Malaysia	-	-	16118	1033233
Russia	18991	1500674	10137	714409
Norway	5311	662585	5698	679349
France	4289	610231	4771	645952
South Africa	2102	301013	2645	364812
Kuwait	406	21343	1637	98187
Vietnam	603	48346	479	34991
Canada	138	19561	172	23613
Other countries	802	65507	682	66768

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2352	778277	2180	633540
UK	1258	401879	1169	327817
Canada	435	162816	603	194452
Russia	401	131814	320	91721
Netherlands	-	-	68	14596
USA	1	207	20	4954
Belgium	75	28429	-	-
China	96	22864	-	-
Germany	30	13126	-	-
Brazil	15	6687	-	-
Ukraine	20	5281	-	-
Other countries	21	5174	-	-

**Table – 43 : Imports of Ferro-Vanadium
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	653	923629	347	406343
China	429	634297	198	250756
Japan	81	113547	51	61704
Korea, Rep. of	25	39120	52	49412
Czech Republic	-	-	20	22668
Korea, DP Rp	-	-	8	7242
Austria	20	22722	8	6816
Latvia	10	14933	7	5651
Malaysia	5	4935	3	2094
Russia	32	50790	-	-
USA	32	14076	-	-
Other countries	19	29209	-	-

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

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	55	120791	7	11778
China	39	83169	7	11670
Australia	-	-	++	108
Vietnam	12	28166	-	-
Sweden	3	8893	-	-
UK	1	563	-	-

**Table – 44 : Imports of Ferro-Zirconium
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	532	86979	313	47515
China	322	54049	195	31320
France	197	29441	118	16195
Brazil	13	3353	-	-
Austria	++	136	-	-

**Table – 45 : Imports of Ferro-alloys (Others)
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2598	349904	3133	353616
China	1524	208627	2328	253251
Canada	2	1434	564	45123
Norway	84	15089	120	21992
Russia	1	2609	8	20798
Argentina	384	52898	48	4993
South Africa	-	-	54	2725
Japan	1	889	4	2269
Sweden	-	-	3	765
USA	++	323	3	688
Hong Kong	++	74	++	365
Other countries	602	67961	1	647

FUTURE OUTLOOK

Depending on the process of steel making and the type of steel being manufactured, the requirement of different ferro alloys varies widely.

The ferro-alloys industry in India has a capacity of around 5.15 million tonnes and is accounted for nearly 10% of the world's ferro-alloys production. It is among 10 largest producers of the material in the world.

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

India is expected to show strong growth in usage of steel in the coming years because of its

robust economy, massive infrastructure needs and expansion of industrial production. India is expected to become one of the leading steel consuming nations in the next decade. In this scenario, 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 for expansion and some new units are coming up.

As per The National Steel Policy, 2017, Ferro-alloy is a power intensive industry. Hence, captive power generation in the ferro-alloys plants will be extensively supported. Since the demand for ferro-alloys is likely to grow along with steel production in the country, the industry may be encouraged to set up larger units to achieve adequate economies of scale. Efforts will be made to provide necessary raw materials linkages and stable supply of power to grow Ferro-alloys units on priority.