



# Indian Minerals Yearbook 2017

(Part- II : Metals & Alloys)

**56<sup>th</sup> Edition**

**FERRO ALLOYS**

**(FINAL RELEASE)**

**GOVERNMENT OF INDIA  
MINISTRY OF MINES  
INDIAN BUREAU OF MINES**

Indira Bhavan, Civil Lines,  
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471  
PBX : (0712) 2562649, 2560544, 2560648  
E-MAIL : [cme@ibm.gov.in](mailto:cme@ibm.gov.in)  
Website: [www.ibm.gov.in](http://www.ibm.gov.in)

**March, 2018**

# 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, improve hardness and tensile strength at high temperature, give 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**

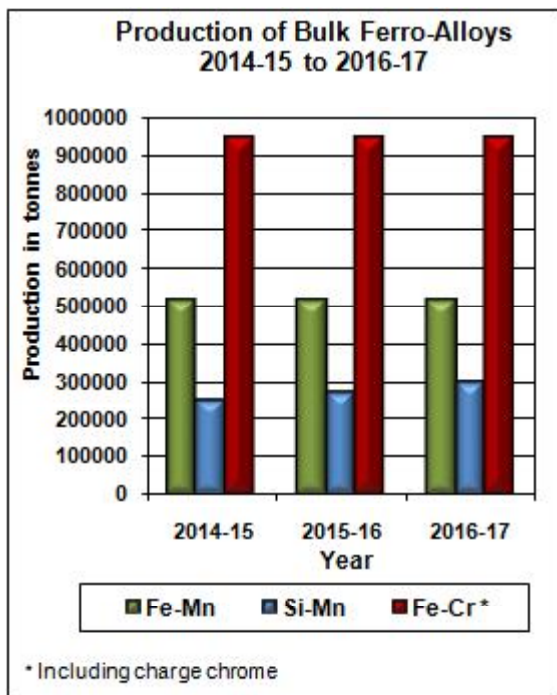
(In tonnes per annum)

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

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

The Ferro-alloys Industry was established as an ancillary industry to cater to the growing needs of the domestic Steel Industry and is spread all over the country. Most of the ferro-alloys units have been set up in Andhra Pradesh, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha and West Bengal because of availability of the raw material 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
<b>A) Bulk Ferro-alloys</b>			
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>B) Noble Ferro-alloys</b>			
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 Shrichi 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 at 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 were 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 were 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.

**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)
<b>Andhra Pradesh</b>			
Andhra Ferro-alloys Ltd Srinivasanagar, Distt. Vizianagaram	HC ferro-chrome	Cr: 60-65% max, Si: 2-4% max, C: 6-8% max, P: 0.040% max, S: 0.040% max	
	Silico-manganese	Mn: 60% min, C: 2.5% max, Si: 14% min, P: 0.3 % max, S: 0.035% max	20,000
FACOR Alloys Ltd Shreeramnagar, Garividi Distt. Vizianagaram	HC ferro-manganese	Mn: 70-80%, C:6-8%, Si: 1-5 % max, P: 0.35% max,  S: 0.05% max, Size: 25-150 mm +/- 10%, Corresponding ISI specification: IS 1171-2011.	72,500 (For all ferro-alloys)
	Ferro-chrome	Cr: 60-63%, Si: 3-4%, C: 6-8%, P: 0.03-0.05% (max), S: 0.03-0.05% (max)	
	Silico-manganese	Mn: 60-70%, Si: 16-20% , C: 2.0% max, S: 0.03%, P: 0.3 %, Size: 10 - 150 mm +/- 10%, Corresponding ISI specification: IS 1470-1990.	
	Ferro-silicon	Si: 60-80%, C: 0.15% max, P: 0.05%, S: 0.05% max, Al : 1-15% max, Size: 25-150 mm +/- 10%, Corresponding ISI specification: IS 1110-2011.	
	Ferro- silicon- magnesium	Mg: 4-30%, Si: 44-55 %, Al: 1.00%, Ca: 1.0-4.0%,	
	Silico-chrome Other ferro-alloys	NA NA	
Deccan Ferro Alloys (P) Ltd Chintalapalem (PO), Pendurthi (SO) 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.)

FERRO-ALLOYS

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
<b>Chhattisgarh</b>			
Hira Group of Industries Jain Carbides & Chemical Ltd			
(i) Unit-1, Urla, Distt. Raipur.	HC ferro-manganese	Mn: 70-75%, Si: 1.5% (max), C: 6-8% (max), P: 0.40% (max), S: 0.05% (max)	7,000
	Silico-manganese	Mn: 60-65%, Si: 13-17% (max), C: 2.5% (max), P: 0.35% (max), S: 0.03% (max)	20,000
(ii) Unit-2, Urla, Distt. Raipur	HC ferro-manganese	Mn: 60-65%	14,000
	Silico-manganese		12,000
(iii) Hira Ferro Alloys Ltd Urla, Distt. Raipur.	HC ferro-manganese	Mn: 70-75%, Si: 1.50% max, C: 6-8 %, P: 0.30% max, S: 0.05% max	60,500
	Silico-manganese	Mn: 60-65%, Si: 14-17%, C: 2.0% max, P: 0.35% max, S: 0.05% max	
(iv) Alok Ferro-Alloys Ltd Raipur.	Silico-manganese	NA	18,000
INDSIL Energy & Electrochemical Ltd Raipur, Chhattisgarh	HC ferro-manganese	NA	25,000
	Silico-manganese	Mn: 55% (min), Si: 23-27%, C: 0.1 % (max)/0.2%, (max)/0.3% (max), S: 0.02% (max), P:0.15% (max)	21,500
Sarda Energy & Minerals Ltd (Formerly Raipur Alloys & Steel Ltd)	Ferro-manganese	–	66,000
	Silico-manganese	–	–
Chhattisgarh Electricity Co. Ltd Siltara, Raipur.	HC ferro-manganese	Mn: 70-75%, Si: 1.5-2.0%, C: 6.0-8.0%, P: 0.35-0.40%, S: 0.05 (max)	36,000
	Silico-manganese	Mn: 60-65% , Si: 15-20%, C: 2.0-2.5%, P : 0.3-0.35 %, S: 0.05% (max)	NA
Nav-chrome Ltd Urla Industrial Area Distt. Raipur.	HC ferro-manganese	NA	21,560
	Silico-manganese	NA	
	HC ferro-chrome	NA	14,700
Deepak Ferro Alloys Ltd	Ferro-manganese		5,000

(Contd.)

FERRO-ALLOYS

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  Silico-chrome Others	NA Cr: 60-70%, Si: 2 to 4%, S : 0.05%, C: 6 to 8%	5,000
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
	Silico-manganese		
Sai Chemical Pvt Ltd , Tadesara, Distt. Rajnandgaon	Silico-manganese	NA	10,200
MSP Spong Iron Ltd, Manuapali, Jamgaon, Raigarh (Chhattisgarh)	Silico-manganese	NA	42057
<b>Goa</b> Karthik Alloys Ltd Cuncolin, Distt. South Goa.	NA	NA	4,100
<b>Gujarat</b> Essel Mining & Industries Ltd Vapi, Distt. Valsad.	Ferro-vanadium	V: 50%, C: 0.1% (max), S and P: 0.05% each, Al: 1.5%	400
	Ferro-molybdenum	Mo: 60%, C: 0.1%, S: 0.08%, P: 0.06%, Al: 0.5%	1,200
	Ferro-titanium	NA	600
Electro Ferro-Alloys (Pvt.) Ltd Ahmedabad, Gujarat.	Ferro-molybdenum Ferro-silico-zirconium	NA	300
Baroda Ferro-Alloys Distt. Panchmahals.	HC ferro-chrome	NA	3500
Sal Steel Ltd, Gandhidham, Distt. Kachchh	Silico manganese	NA	61890
<b>Haryana</b> Haryana Ferro-Alloys Ltd Gohana Road, Distt. Rohtak.	–	–	2,500
<b>Jammu and Kashmir</b> Shree Sitaram Industries Pvt. Ltd Phase II, SIDCO Complex, Bari Brahmana.	Ferro-chrome	NA	3,325

(Contd.)



FERRO-ALLOYS

Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
<b>Jharkhand</b>			
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
<b>Karnataka</b>			
Sandur Manganese & Iron Ores Ltd Vyasanakere, Distt. Ballari	HC ferro-manganese	-	29,100
	Silico-manganese		20,000
	Ferro-silicon		24,000
Dandeli Steel & Ferro Alloys Ltd Dandeli, Distt. Uttar Kannada.	Ferro-manganese	Mn: 70-75%, C: 0.1%, Si: 2.4%, P : 0.15%, S: 0.05%, Size: 37 mm	6,000
	MC ferro-manganese	Mn: 70-75%, C: 1.5%, P: 0.25%, Si: 2%, S: 0.05%	
S.R. Chemicals & Ferro-Alloys KIADB Honaga, 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	NA	1,200
	Silico-manganese	NA	
	Ferro-chrome	NA	
	Ferro-silicon	NA	
	Silico-chrome	NA	
<b>Kerala</b>			
The Silical Metallurgic Ltd Wayalur, Distt. Palakkad.	Silico-manganese	Mn: 70-75%	3,600
INDSIL Electrosmelts Ltd Pallatheri, Distt. Palakkad.	Silico-manganese	NA	NA
	Ferro-silicon	NA	NA
INDSIL Hydro Power & Manganese Ltd 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
<b>Madhya Pradesh</b>			
MOIL Ltd (formerly Manganese Ore India Ltd) Ferro-manganese Plant Bharweli (Manjhara), Distt. Balaghat.	HC ferro-manganese	Mn:78±1%, P: 0.35% (max), C: 6.8%	10,000
Jalan Ispat Castings Ltd Industrial Area Meghnagar, Distt. Jhabua.	Silico-manganese	Mn: 60-65%, Si: 15-20%, C: 2% (max), P: 0.35%	12,000
Crescent Alloys Pvt. Ltd Seoni.	Ferro-silicon	N.A.	4,500
	Ferro-manganese	N.A.	(Total)
S.R Ferro Alloys, Jhabua	Silico- manganese	NA	8,639

(Contd.)

FERRO-ALLOYS

Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
<b>Maharashtra</b>			
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	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	
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
<b>Meghalaya</b> Maithan Alloys Ltd, Distt. Rio Bhoi.	Ferro-manganese	NA	28,000
<b>Odisha</b>			
Ferro Alloys Corporation Ltd Ferro Chrome Plant Randia D. P. Nagar Randia, Distt. Bhadrak.	HC ferro-chrome/ Charge-chrome	Cr: 60-64%, Si: 3-4%, C: 6-8%, P: 0.03-0.05% (max), S: 0.03-0.05% (max)	65,000
	Tata Steel Ltd, Ferro Manganese Plant, Joda, Distt. Keonjhar	HC ferro-manganese  Silico-manganese	Mn: + 70%, C: 6-8 %, Si :0.3-2%, P: 0.2-0.4%, Mn: 46-48%, Si: 14.56%, P: 0.197%
Tata Steel Alloys Ltd, Ferro Alloy Plant Cuttack.	Ferro-chrome		50,000
Tata Steel Ltd, Charge-chrome Plant Bamnipal, Distt. Keonjhar.	Charge-chrome	Cr: 60% (min), Si: 4% (max) , C: 8% (max), P: 0.03% (max), S: 0.03% (max)	55,000
Balasore Alloys Ltd, Balgopalpur, Dist. Balasore. (Formerly Ispat Alloys Ltd)	HC ferro-chrome	Cr: 60-63% ,Si: 3.5% (max) Grade I C: 8.0% (max), Cr: 57-60% S: 4.0% (max) Grade II, C: 8.0% (max)	150,000

(Contd.)

FERRO-ALLOYS

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 Jajpur Road, Distt. Jajpur.	HC ferro-chrome	Cr: 62-65%, Si: 1.5 to 8%, C: 8% (max)	18,000
Indian Metals & Ferro Alloys Ltd (IMFA)	HC ferro-chrome/ Charge-chrome	Cr: 60%	62,500
Indian Metals & Ferro Alloys Ltd (IMFA), Therubali, 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 Ferro-molybdenum Ferro-tungsten Ferro-vanadium	NA	300 (Total)
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 Mandia, Distt. Jajpur	HC Ferro-chrome	NA	8052
<b>Puducherry</b>			
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 Ferro-silicon-magnesium	NA	12,000

(Contd.)

FERRO-ALLOYS

Table- 3 (Contd.)

Name and location of the plant	Product	Specifications	Installed capacity (tpy)
<b>Punjab</b>			
Mehra Ferro-Alloys Verka, Amritsar.	Ferro-molybdenum Ferro-vanadium Ferro-titanium Ferro-tungsten Ferro-boron	NA	300 (Total)
<b>Sikkim</b>			
Akshay Ispat & Ferro Alloys Ltd, Mamring, Namchi, Distt. South Sikkim.	Ferro-silicon	NA	6,000
<b>Telangana</b>			
VBC Ferro Alloys Ltd	Ferro-silicon	–	10,000
Village Rudraram Patancheru Mandal Distt. Medak.	Ferro-chrome Silico-manganese/ Ferro-manganese	–	27,000 31,500
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
<b>Uttar Pradesh</b>			
The India Thermit Corp. Ltd Fazalganj, Distt. Kanpur.	Ferro-molybdenum Ferro-titanium Ferro-chrome Ferro-boron Chromium metal LC ferro-manganese Ferro-vanadium	NA	300 (Total)
Hindustan Ferro-Alloys Hamirpur.	Ferro-silicon	NA	3,200
<b>West Bengal</b>			
Bhaskar Shrachi Alloys Ltd, Durgapur	Silico-manganese	Si: 15%	24,000
Cosmic Ferro Tech. Ltd, Bishnupur, Distt. Bankura.	HC ferro-manganese Silico-manganese	Mn: 66-71%, Si: 1.4% C: 6.5-7%, P: 0.3% Mn: 61-65%, Si: 15.5% C: 1.9%, P: 0.28%	45,375
Sri Gayatri Minerals Pvt. Ltd, WBIIDC Growth Centre, Bishnupur, Bankura.	HC silico-manganese	Mn: 60-65% & 65% min, Si: 15% min & 16% min, C: 2% max, P: 0.3 max, S: 0.03 max	24,000
Industrial Metals & Ferro Alloys Jamuria, Burdwan.	LC ferro-titanium 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
	Silico-manganese Ferro-chrome		(Total)
Monnet Ferro Alloys Ltd Burdwan.	Silico-manganese	NA	12,500
Shyam Ferro Alloys Ltd Palitpur Road, Burdwan. Dewandighi (Katwa Road)	HC silico-manganese	NA	104,957
	HC ferro-manganese		(Total)
	HC ferro-chrome		
Srinivasa Ferro Alloys Ltd Durgapur, Burdwan.	HC ferro-manganese	Mn: 70-74%, 74-76% Si: 1.5% max, C: 6-8%, P: 0.25, 0.30 and 0.40 max, S: 0.03 max	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 WBIIDC Industrial Growth Centre, Bishnupur, Distt. Bankura.	HC ferro-chrome	Cr: 58-60%, Si: 2-4%, C: 8% max, P: 0.05% max S: 0.05% max	45,000 (16MVA 1No. & 12MVA 1 No.)
Modern India Con-Cast Ltd,  WBIIDC Industrial Growth Centre, Bishnupur, Distt. Bankura.	Bulk ferro-alloys	-	22,000
Rohit Ferro Tech. Ltd Bishnupur, Distt. Bankura	HC ferro-chrome	Cr: 60% (min), C: 8% (max) Si: 3.5% (max), P: 0.03% (max) S: 0.04% (max)	45,375
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 Alloya 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 : Consumption\* of Principal Ferro-alloys, 2016-17 (P)**

	(In tonnes)
	Reported
Ferro-chrome	15900
Ferro-manganese	79200
Ferro-silicon	30200
Silico-manganese	161400

**Note:** 1) \*Includes actual reported consumption and/or estimates made wherever required and paucity of data, hence consumption may not be complete.

2) The apparent consumption of ferro-chrome, ferro-manganese & ferro-silicon was 3,10,617, 5,00,238 and 2,66,703 tonnes respectively.

## 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 CO<sub>2</sub> reduction technologies, which could be traded in terms of carbon credits. Installation of an electricity generation facility driven by CO-rich furnace gas is an obvious means by which CO<sub>2</sub> saving could be achieved.

## WORLD REVIEW

The 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.

**Table – 5 : World Production of Ferro-alloys, 2014 to 2016  
(By Principal Countries)**

(In tonnes)

Country	Ferro-alloys	2014	2015	2016
Australia	FeMn & FeSiMn	269000	278000	222000
Bhutan	FeSi <sup>e</sup>	79500	104500	106000
Brazil	FeCr	188700	173500	175000 <sup>e</sup>
	FeMn <sup>e</sup>	80000	40000	50000
	FeNi	37200	71500	75000 <sup>e</sup>
	FeNb	51700	150000	150000 <sup>e</sup>
	FeSiCr <sup>e</sup>	13000	13000	13000
	FeSiMg <sup>e</sup>	20000	20000	20000
	FeSiMn <sup>e</sup>	230000	230000	230000
	FeSi	230000	200000 <sup>e</sup>	200000 <sup>e</sup>
	Other ferro-alloys <sup>e</sup>	40000	40000	40000
	Canada	FeNb	5770	5760
FeSi		35500	35000 <sup>e</sup>	35000 <sup>e</sup>
China	Ferro-alloys	37860000	36664000	35588000
Colombia	FeNi <sup>e</sup>	113000	100500	101600
Finland	FeCr	441000	457000	469000
France	FeMn	115700	116000 <sup>e</sup>	116000 <sup>e</sup>
	FeSiMn	64800	64800 <sup>e</sup>	64800 <sup>e</sup>
	FeSi	40000	45000 <sup>e</sup>	45000 <sup>e</sup>
Georgia	FeSiMn	243951	217289	244616
Greece	FeNi	94952	89129	87880
Iceland	FeSi	112657	121556	128019
India	FeAl	3737	3212	4345
	FeCr	944000	944000	944000
	FeMn	518000	518000	518000
	FeMo	1295	1459	1603
	FeSiMg	26123	20541	20183
	FeSiMn	249691	269920	300625
	FeSi	90000	90000	90000
	FeTi	545	198	291
	FeV	1035	937	1329
	Other ferro-alloys <sup>e</sup>	730	730	730
Indonesia	FeNi	84255	182000 <sup>e</sup>	411000 <sup>e</sup>
Italy	FeSiMn	67000	82000	80000 <sup>e</sup>
Japan	FeMn	463345	465952	473740
	FeNi	379291	396969	333448
Kazakhstan	FeCr	1351803	1414476	1525222
	FeSiCr	158825	74609	94467
	FeSiMn	200379	164189	125898
	FeSi <sup>e</sup>	470	470	470
Korea, Rep. of	FeMn <sup>e</sup>	355000	355000	355000
	FeSiMn <sup>e</sup>	196000	196000	196000

(Contd.)

FERRO-ALLOYS

Tab- 5 (Concl.)

Country	Ferro-alloys	2014	2015	2016
Mexico	FeSiMn	164852	139363	134251
New Caledonia	FeNi	224884	228484	261420
Norway	FeMn	312400	350000 <sup>e</sup>	300000 <sup>e</sup>
	FeSiMn	314300	315000 <sup>e</sup>	315000 <sup>e</sup>
	FeSi	192389	243813	249475
Russia	FeCr	400000 <sup>e</sup>	363286	268439
	FeMn	170000 <sup>e</sup>	155700	124200
	FeMo	4503	4500 <sup>e</sup>	4500 <sup>e</sup>
	FeNi <sup>e</sup>	20000	20000	20000
	FeSiCr <sup>e</sup>	4200	4200	4200
	FeSiMn	148000 <sup>e</sup>	188895	203216
	FeSi	1050000 <sup>e</sup>	1057909	935912
	FeV	14076	12277	12392
	Other ferro-alloys <sup>e</sup>	34000	34000	34000
South Africa	FeCr <sup>e</sup>	3000000	3000000	3000000
	FeMn <sup>e</sup>	650000	650000	650000
	FeSiMn <sup>e</sup>	150000	150000	150000
	FeSi <sup>e</sup>	90000	90000	90000
	FeV <sup>e</sup>	16000	16000	16000
Spain	FeMn	227000	225000 <sup>e</sup>	220000 <sup>e</sup>
	FeSiMn	128700	130000 <sup>e</sup>	129000 <sup>e</sup>
	FeSi <sup>e</sup>	80500	80000	80000
Sweden	FeCr	65703	82616	81102
USA	Ferro-Alloys *	502000	525000 <sup>e</sup>	525000 <sup>e</sup>
Ukraine	FeMn	104291	100209	100200 <sup>e</sup>
	FeNi	114222	95209	95200 <sup>e</sup>
	FeSiMn	960657	750181	750200 <sup>e</sup>
	FeSi	167977	114826	114800 <sup>e</sup>
Venezuela	FeNi <sup>e</sup>	50000	50000	50000
	FeSiMn <sup>e</sup>	14000	14000	14000
	FeSi <sup>e</sup>	80000	80000	80000
Zimbabwe	FeCr	325256	190837	190000 <sup>e</sup>

**Source:** World Mineral Production, 2012-2016, BGS.

**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 & silicon metal.



## FOREIGN TRADE

### Exports

In 2016-17, exports of ferro-alloys increased to 15,41,794 tonnes valued at ` 10,128 crore from 13,50,224 tonnes valued at ` 7,226 crore in the previous year. In terms of quantity, exports of ferro-chrome were (46%) followed by ferro-silico-manganese (44%), ferro-manganese (8%), ferro-silicon (1%). The other ferro-alloys together accounted for remaining negligible of exports in 2016-17. Exports were mainly to China (18%), Korea Rep. of (14 %), Chinese Taipei/Taiwan (11%), Japan (10%), Italy (6%) and UAE & Netherlands (4% each) (Tables-6 to 25).

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>1350224</b>	<b>72257850</b>	<b>1541794</b>	<b>101280507</b>
China	142696	8562511	281148	21804119
Korea, Rep. of	168303	10260241	217651	15515388
Chinese Taipei/ Taiwan	125118	6563880	174307	11773015
Japan	166709	8680184	156051	9916314
Italy	131045	6188504	89831	4795123
Netherlands	47958	2501214	62901	3860193
UAE	44001	2491104	67739	3786735
Indonesia	15954	874528	41461	2692052
Thailand	39436	1815108	45687	2607458
Pakistan	36276	1610226	40407	2165683
Other countries	432728	22710350	364611	22364427

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>53</b>	<b>10662</b>	<b>91</b>	<b>14608</b>
South Africa	47	9996	82	13247
Brazil	-	-	7	940
UAE	5	338	1	294
Turkey	++	85	1	118
Indonesia	-	-	++	9
Malaysia	1	154	-	-
Oman	++	89	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>449430</b>	<b>27954672</b>	<b>706756</b>	<b>52675081</b>
China	132042	7956869	265524	21012454
Korea, Rep. of	136215	8550598	192048	13830417
Chinese Taipei/ Taiwan	53919	3282451	107584	8007401
Japan	34351	2317042	57865	4481903
Netherlands	18660	990760	21057	1066798
USA	12479	823281	14744	1032919
Italy	16947	1115630	12845	878969
Mexico	8335	530519	8592	580279
Thailand	898	53754	3043	226372
Brazil	2239	146960	3361	224835
Other countries	33345	2186808	20093	1332734

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>1</b>	<b>208</b>	<b>1</b>	<b>362</b>
Uganda	1	208	1	362

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>170167</b>	<b>8255066</b>	<b>127368</b>	<b>7317747</b>
UAE	24796	1478270	30366	1582712
Indonesia	6419	292746	14721	939240
Iran	17310	824089	11797	797807
Netherlands	3971	181541	8185	497215
Pakistan	11213	468428	9257	467464
Chinese Taipei/ Taiwan	11598	507769	6856	365021
Japan	12554	559398	6011	332441
Brazil	13322	713291	4328	328064
Libya	4779	269246	6669	307586
Italy	19493	852005	3765	215602
Other countries	44712	2108283	25413	1484595

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>140</b>	<b>53665</b>	<b>162</b>	<b>121113</b>
Oman	-	-	99	69143
Netherlands	-	-	20	16570
Belgium	20	10461	20	13968
Pakistan	3	2953	5	3701
Iran	-	-	4	3549
Peru	2	3326	3	2773
Israel	1	1712	2	2431
Egypt	-	-	2	2402
Indonesia	29	3180	2	2070
Philippines	1	581	2	1327
Other countries	84	31452	3	3179

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>++</b>	<b>73</b>	<b>++</b>	<b>107</b>
Ivory Coast/ Cote-D Ivoire	-	-	++	107
Bangladesh	++	73	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>11</b>	<b>24104</b>	<b>13</b>	<b>19545</b>
Malaysia	10	20574	9	15707
Indonesia	++	266	1	2194
Pakistan	++	216	1	1165
South Africa	-	-	2	360
Chile	-	-	++	119
Iran	1	2055	-	-
Bangladesh	++	536	-	-
Singapore	++	457	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>44</b>	<b>7562</b>	<b>43</b>	<b>4968</b>
Sweden	40	7376	42	4838
Italy	-	-	1	129
Japan	-	-	++	1
Oman	4	146	-	-
USA	++	40	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>-</b>	<b>-</b>	<b>8</b>	<b>858</b>
Nigeria	-	-	8	830
Uganda	-	-	++	28

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>8527</b>	<b>866310</b>	<b>9249</b>	<b>856923</b>
Mexico	748	80656	1572	160194
Turkey	1352	125155	1602	142045
USA	1252	125430	1566	136309
Saudi Arabia	1160	118299	819	74125
Iran	100	10511	626	62289
Brazil	210	22526	375	32556
Oman	473	48531	332	30353
South Africa	163	18108	275	26015
Korea, Rep. of	723	77761	292	25421
Bulgaria	50	4946	258	22225
Other countries	2296	234387	1532	145391

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>671904</b>	<b>31326676</b>	<b>672039</b>	<b>37948700</b>
Japan	111784	5250837	91759	5082732
Italy	90282	3936680	71276	3580758
Chinese Taipei/ Taiwan	59366	2748423	59541	3369568
Thailand	36850	1676931	41108	2285688
UAE	18294	926591	36261	2097008
Netherlands	19229	875109	32985	2038357
Pakistan	24645	1103108	30519	1637230
Indonesia	8512	490123	25178	1599073
Bangladesh	15018	676868	29554	1597740
Korea, Rep. of	24117	1275968	23307	1527522
Other countries	263807	12366038	230551	13133024

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>29912</b>	<b>2344427</b>	<b>18381</b>	<b>1354987</b>
Bangladesh	1680	110805	4073	263043
Brazil	2300	211120	1953	173419
Slovenia	839	86868	967	92153
Turkey	942	66275	1675	71352
USA	445	63112	574	65645
Korea, Rep. of	677	71856	654	57795
Oman	700	56701	681	50694
Libya	54	3766	650	41404
UAE	439	33423	598	40685
Italy	2647	164649	747	38346
Other countries	19189	1475852	5809	460451

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>120</b>	<b>18248</b>	<b>299</b>	<b>46063</b>
U K	20	2159	146	19581
Korea, Rep. of	-	-	35	5606
Netherlands	-	-	35	4478
Oman	-	-	20	4022
China	-	-	25	3710
South Africa	12	3972	9	2480
Brazil	6	1938	7	1151
Bangladesh	7	1168	5	1108
Iran	2	644	5	1065
Indonesia	++	142	3	742
Other countries	73	8225	9	2120

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value ( ` '000)	Qty (t)	Value ( ` '000)
<b>All Countries</b>	<b>16</b>	<b>18217</b>	<b>11</b>	<b>12638</b>
Netherlands	10	12641	10	10396
Pakistan	1	1087	1	2143
Turkey	3	848	++	99
Ireland	1	1618	-	-
South Africa	1	759	-	-
Russia	++	582	-	-
Indonesia	++	549	-	-
Chile	++	133	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>67</b>	<b>55754</b>	<b>460</b>	<b>493144</b>
Netherlands	-	-	180	198865
Belgium	-	-	170	177534
Kuwait	-	-	30	27676
Baharain	-	-	20	25609
USA	1	805	23	25046
UAE	12	13026	20	20298
Oman	-	-	10	9936
Mauritious	27	4428	5	5186
Turkey	1	1125	1	984
Malaysia	3	5531	1	808
Other countries	23	30839	++	1202

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>10</b>	<b>6894</b>	<b>3</b>	<b>6262</b>
Peru	2	4764	2	4290
Malaysia	++	568	1	1766
Pakistan	1	408	++	206
Turkey	7	795	-	-
Indonesia	++	359	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>5</b>	<b>2652</b>	<b>58</b>	<b>11240</b>
Iran	-	-	50	6727
Brazil	4	2003	6	3567
Indonesia	1	496	1	803
UAE	-	-	1	143
Sri Lanka	++	101	-	-
Turkey	++	52	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>++</b>	<b>288</b>	<b>++</b>	<b>860</b>
Malaysia	++	288	++	855
UAE	-	-	++	5

**Table – 25 : Exports of Ferro-alloys (Others)  
(By Countries)**

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>19817</b>	<b>1312228</b>	<b>6852</b>	<b>395108</b>
South Africa	319	38998	740	87274
Italy	1483	99583	1031	65249
Korea, Dp Rep.	-	-	961	60045
Bhutan	-	-	2307	27617
Saudi Arabia	295	52709	170	26739
Iran	-	-	313	23829
Bangladesh	49	9009	154	18696
Brazil	++	3	95	13959
Egypt	6	698	229	13944
Turkey	1	92	150	11769
Other countries	17664	1111136	702	45987

**Imports**

Imports of ferro-alloys increased to 4,68,245 tonnes in 2016-17 from 3,61,997 tonnes in the previous year. In terms of value, the ferro-alloys imports increased to ` 5,101 crore in 2016-17 from ` 4,414 crore in 2015-16. In terms of quantity, imports of ferro-silicon accounted for about 42% followed by ferro-manganese (23%), ferro-chrome (16%), ferro-nickel (13%), charge-chrome (2%), Other ferro-alloys together accounted for remaining 4% of imports in 2016-17. Imports were mainly from Bhutan (22%), followed by South Africa (16%), China (9%), Russia (8%), Korea, Rep. of, Brazil & Indonesia (4% each) and Japan (2%) (Tables-26 to 43).

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>361997</b>	<b>44137175</b>	<b>468245</b>	<b>51012884</b>
Brazil	6066	5168472	19766	7016221
Bhutan	77931	4961231	102845	5621073
China	35211	4043169	39898	4166814
South Africa	87778	4825257	77149	3973037
Indonesia	5825	2115515	17730	3382604
Russia	19785	2140887	37097	3326171
Dominican Rep.	-	-	4722	2730506
Japan	9890	2779063	10034	2502013
Colombia	1725	616896	5713	2470755
Korea, Rep. of	21482	2212679	20177	2070305
Other countries	96304	15274006	133114	13753385

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>966</b>	<b>179916</b>	<b>1349</b>	<b>181830</b>
China	943	175118	1349	181830
Japan	20	4389	-	-
UK	2	363	-	-
USA	1	46	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>91263</b>	<b>7703306</b>	<b>73433</b>	<b>8004752</b>
China	10419	1692993	9969	1764298
Russia	9318	1311457	8043	1434554
Kazakhstan	4648	531484	12615	1349465
Turkey	2173	172286	9327	897520
Oman	16109	1061161	12640	829279
South Africa	45860	2468042	13783	705128
Albania	636	61915	3456	367905
Brazil	476	105476	2037	345391
Germany	310	89287	291	83687
Korea, Rep. of	50	6433	366	77398
Other countries	1264	202772	906	150127

**Table – 29: Imports of Ferro-alloys Charge-Chrome (By Countries)**

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>32045</b>	<b>1710279</b>	<b>11151</b>	<b>549561</b>
South Africa	27546	1480536	9751	463613
Oman	3500	169019	1000	54998
UAE	-	-	400	30950
Zimbabwe	999	60718	-	-
USA	++	6	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>47273</b>	<b>2983426</b>	<b>109605</b>	<b>6197334</b>
South Africa	11489	499993	50545	2382591
Korea, Rep. of	20852	1620310	19307	1456377
Malaysia	-	-	22129	1183407
Norway	6500	475125	6581	521739
Spain	-	-	3460	224391
France	7423	299361	3876	190335
Australia	-	-	1746	112014
Brazil	-	-	618	36058
Russia	-	-	460	26342
China	240	16736	276	25588
Other countries	769	71901	607	38492

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>704</b>	<b>640857</b>	<b>1026</b>	<b>741934</b>
Korea, Rep. of	528	536524	472	494871
Austria	53	17144	278	94291
Brazil	-	-	111	69791
China	76	48091	48	30625
Chile	-	-	40	29817
USA	-	-	38	15117
Canada	-	-	38	6982
Kazakhstan	-	-	1	440
Vietnam	25	16698	-	-
Iran	9	11387	-	-
Belgium	13	11013	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>40207</b>	<b>15410698</b>	<b>62768</b>	<b>17396666</b>
Indonesia	5825	2115515	17642	3368345
Brazil	4152	1684640	8485	3027390
Dominican Rep.	-	-	4722	2730506
Colombia	1725	616896	5713	2470755
Japan	9814	2710574	9919	2391374
New Caledonia	5132	3312384	8346	1610679
Macedonia	1018	443888	6286	1532833
Netherlands	-	-	438	95219
Canada	334	108356	1005	86245
Dominica	-	-	55	43914
Other countries	12207	4418445	157	39406

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
<b>All Countries</b>	<b>1572</b>	<b>3837041</b>	<b>1783</b>	<b>3737118</b>
Brazil	1338	3367676	1392	2944205
Canada	176	359310	306	637489
UAE	-	-	36	54325
China	-	-	16	32746
USA	-	-	13	30951
Sweden	-	-	6	13092
Netherlands	-	-	5	11856
Russia	2	2502	8	11843
UK	-	-	1	611
Singapore	55	106612	-	-
Malaysia	1	941	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>2126</b>	<b>57588</b>	<b>3098</b>	<b>62679</b>
China	1438	37318	2267	45226
Vietnam	506	13239	802	14703
Sweden	9	1214	16	1781
UK	5	1227	3	667
Canada	-	-	10	302
Turkey	168	4590	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>27</b>	<b>1469</b>	<b>25</b>	<b>2967</b>
Kazakhstan	-	-	25	2967
South Africa	27	1469	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>177</b>	<b>9513</b>	<b>1623</b>	<b>86025</b>
Spain	-	-	1100	59962
Baharain	-	-	250	12014
Germany	-	-	198	9907
Zambia	-	-	55	2321
France	20	1833	20	1777
Korea, Rep. of	-	-	++	44
South Africa	157	7680	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>399</b>	<b>35592</b>	<b>345</b>	<b>32588</b>
China	378	33494	178	15738
Norway	21	2098	63	6292
Argentina	-	-	48	4657
Russia	-	-	26	2301
Belgium	-	-	13	1778
France	-	-	15	1622
Germany	-	-	2	200

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>139258</b>	<b>10114698</b>	<b>195086</b>	<b>12618930</b>
Bhutan	77931	4961231	102845	5621073
Russia	10137	714409	28341	1804656
China	18988	1492153	23033	1604947
Norway	5698	679349	7077	815070
Malaysia	16118	1033233	12933	797763
France	4771	645952	5217	629969
Brazil	100	10680	6534	499124
South Africa	2645	364812	3042	420397
Kuwait	1637	98187	1367	80885
Argentina	144	17400	696	69258
Other countries	1089	97292	4001	275788



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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>2180</b>	<b>633541</b>	<b>2722</b>	<b>579422</b>
UK	1169	327818	1363	281279
Canada	603	194452	1043	234338
Russia	320	91721	219	45920
China	-	-	15	4905
Netherlands	68	14596	24	4207
Estonia	-	-	20	3322
USA	20	4954	14	2916
Tajikistan	-	-	24	2535

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>347</b>	<b>406343</b>	<b>311</b>	<b>372113</b>
China	198	250756	149	179779
Japan	51	61704	81	106324
Korea, Rep. of	52	49412	32	41615
USA	-	-	30	20956
Czech Republic	20	22668	8	12896
Latvia	7	5651	9	7637
Singapore	-	-	2	2906
Korea, Dp Rep.	8	7242	-	-
Austria	8	6816	-	-
Malaysia	3	2094	-	-

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

Country	2015-16		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
<b>All Countries</b>	<b>7</b>	<b>11777</b>	<b>3</b>	<b>5266</b>
China	7	11669	3	5266
Australia	++	108	-	-

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

Country	2015-16		2016-17 (P)	
	Qty	Value	Qty	Value
	(t)	(` '000)	(t)	(` '000)
<b>All Countries</b>	<b>313</b>	<b>47515</b>	<b>339</b>	<b>45224</b>
China	195	31320	314	42120
France	118	16195	25	3104

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

Country	2015-16		2016-17 (P)	
	Qty	Value	Qty	Value
	(t)	(` '000)	(t)	(` '000)
<b>All Countries</b>	<b>3133</b>	<b>353616</b>	<b>3578</b>	<b>398475</b>
China	2328	253251	2230	228964
Brazil	-	-	589	94262
Canada	564	45123	425	36142
Indonesia	-	-	88	14259
Argentina	48	4993	96	9904
France	-	-	96	9069
Japan	4	2269	12	2496
South Africa	54	2725	28	1308
USA	3	688	11	816
UK	-	-	3	700
Other countries	132	44567	++	555

## **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-alloys 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.