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DOLOMITE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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16 Dolomite

Dolomite ($CaCO_3.MgCO_3$) theoretically contains $CaCO_3$ 54.35% and $MgCO_3$ 45.65% or CaO 30.4%, MgO 21.9% and CO_2 47.7%. However, in nature, dolomite is not available in this exact proportion. Hence, in commercial parlance, the rock containing 40-45% $MgCO_3$ is usually called dolomite. Dolomite rock which contains in addition to dolomite either Calcite or a mixture of Calcite & Magnesite are called "Dolomitic Limestone". It is grouped under flux & construction minerals and is important for iron & steel and ferro-alloys industries. Dolomite occurrences are widespread in almost all parts of the country.

RESOURCES

Dolomite occurrences are widespread in the country. As per NMI data, based UNFC system, as on 1.4.2015 total reserves/resources of dolomite have been placed at 8,415 million tonnes, out of which 677.8 million tonnes are placed under reserves category and the balance 7,737 million tonnes under remaining resources category. Gradewise, BF/sintering grade accounts for 23% resources followed by S.M.S. (OH),S.M.S. (L.D.) and S.M.S. (O.H. & L.D. Mixed) (25%), refractory (8%), B.F. & S.M.S. mixed (5%), and glass (3%). Others, unclassified, not-known, B.F., S.M.S. & refractory grades together account for the remaining 36% resources. Major share of about 88% resources were distributed in eight states, namely, Madhya Pradesh (27%), Andhra Pradesh (15%), Chhattisgarh (11%), Odisha (10%), Karnataka & Rajasthan (7% each), Gujarat (6%), and Maharashtra (5%). The remaining 12% resources are distributed in Arunachal Pradesh, Jharkhand, Haryana, Sikkim, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh and West Bengal. Gradewise and Statewise reserves/resources of dolomite are furnished in Table-1.

EXPLORATION & DEVELOPMENT

In 2014-15, exploration activities were undertaken by the State Directorate of Geology & Mining, Chhattisgarh in Bastar, Janjgir & Champa and by DMG, Rajasthan in Tonk district. Details of exploration activities for dolomite are furnished in Table- 2.

PRODUCTION AND STOCKS

As per the Government of India notification S.O.423(E), dated 10th February 2015, dolomite has been declared a 'minor mineral'. Hence the production for 2015-16 (beyond January,2015) is not available with IBM. List of producers of dolomite is given in Table-3.

MINING AND MARKETING

In India, dolomite mines are generally worked by opencast method of mining. Manual working is in vogue in most of the mines. However, few mines are semi-mechanised.

Steel plants draw major supplies of dolomite for use as a flux and also as a refractory material. The requirement of low silica dolomite is increasing in steel plants at Bhilai, Rourkela, Visakhapatnam and Jamshedpur. However, the supply of such materials from indigenous sources is posing a problem. Therefore Bokaro, Rourkela, Durgapur and Jamshedpur steel plants are drawing supplies of low silica dolomite from Bhutan for use in tar-bonded refractory bricks required for lining of LD furnaces and also for fluxing purposes.

Bhilai, Bokaro, Rourkela, Jamshedpur, Visakhapatnam and Bhadravati steel plants have captive mines. Besides, these plants draw supplies from private parties. Dolomite produced from Tulsidamar mine in Garhwa district, Jharkhand, is used mainly by Bokaro Steel Plant.

Dolomite produced in Tumakuru district of Karnataka is supplied to the ferro-manganese plants at Dandeli in Uttar Kannada district. The VISP's steel plant at Bhadravati receives its supplies from Nerelekere mine in Bagalkot, Karnataka..

Table – 1 : Reserves/Resources of Dolomite as on 1.4.2015
(By Grades/States)

(In '000 tonnes)

Grades/States	Reserves				Remaining Resources								Total Resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221	STD222						
All India : Total	**431750**	**107364**	**138770**	**677884**	**372515**	**323183**	**537932**	**307103**	**757005**	**5215075**	**224194**	**7737007**	**8414891**
By Grades													
B.F./Sintering	114238	7657	55233	177128	82335	77121	139875	185566	412641	863924	34946	1796407	1979535
S.M.S.(O.H.)	64004	26454	13147	103605	87822	27618	36350	32509	123316	863484	76707	1247806	1351411
S.M.S.(L.D.)	39244	4317	12740	56300	27207	9680	159913	8697	5464	136145	80	347186	403487
S.M.S.(O.H.& L.D mixed)	50417	328	2539	53284	7142	44258	9977	30718	4000	184470	969	281534	334818
B.F. & S.M.S. mixed	43316	670	10031	54017	32665	14474	2811	18140	35000	226370	-	329461	383478
Refractory	8305	6457	4097	18859	34984	68817	51803	-	271	515375	2994	674244	693103
B.F., S.M.S.& Refractory	-	-	-	-	-	1797	1258	-	-	5387	-	8441	8441
Glass	285	25792	369	26446	4392	22136	44773	2093	1297	127978	-	202668	229114
Others	70539	17960	16122	104622	68632	33909	41387	28073	47783	124737	4969	349490	454112
Unclassified	40599	17609	23720	81928	21639	21593	25698	1099	58954	591618	7674	728276	810203
Not-known	803	122	770	1695	5697	1780	24087	207	68279	1575587	95856	1771493	1773188
By States													
Andhra Pradesh	86134	11371	17539	115045	176477	31908	38234	22373	77	910217	4301	1183677	1298722
Arunachal Pradesh	-	-	-	-	-	-	-	-	204	77633	-	77837	77837
Chhattisgarh	34465	48130	11623	94218	29294	80865	24512	150795	24412	511610	1950	823439	917657
Gujarat	34862	15934	20829	71625	11947	27064	68785	20263	63780	280592	-	472431	544056
Haryana	-	-	-	-	1692	6037	3722	-	-	16183	-	27633	27633
Jharkhand	4510	-	6720	11230	10620	350	860	-	-	1857	-	13686	24916
Karnataka	28609	5910	6093	40612	16264	6684	9202	8519	76244	455337	13482	585731	626344
Madhya Pradesh	23765	10078	18714	52557	33798	94599	102857	33030	295222	1584534	114799	2258839	2311395
Maharashtra	8301	4346	7768	20416	13986	16036	7371	-	18050	339141	2994	397578	417994
Odisha	109551	6421	34839	150811	42521	33896	110904	48535	46683	330660	85884	699082	849892
Rajasthan	57910	4579	13994	76483	20483	10807	121082	16132	25480	327838	784	522607	599089
Sikkim	-	-	-	-	-	-	-	-	-	2756	-	2756	2756
Tamil Nadu	-	-	-	-	-	-	-	2010	135	-	-	2145	2145
Telangana	42072	-	651	42723	2869	1594	1944	-	132511	6380	-	145298	188021
Uttar Pradesh	-	-	-	-	-	12622	-	3500	-	66230	-	82352	82352
Uttarakhand	1570	594	-	2165	36	721	371	1946	981	199834	-	203888	206053
West Bengal	-	-	-	-	12528	-	48000	-	73226	104275	-	238029	238029

Figures rounded off.

Table – 2 : Details of Exploration Activities for Dolomite, 2015-16

Agency State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DGM							
Chhattisgarh							
Bastar							
	Kurundi	1:50000	-	15	170.75	159	Dolomite reserves resources of about 10 lakh tonnes have been estimated.
	Jiragaon Markel area	1:4000	-	-	-	-	
Rajasthan							
Tonk	Khalipura, Dadwari,	1:10000	10	-	-	25	Exploration was carried out for extimation of resources for Limestone/Dolomite.
	Davri, jabriya, etc.	1:2000	3	-	-	-	
Rajsamand	Lalmadri, Karauli	1:10000	20	-	-	-	
	Semal in Nathdwara tehsil	1:4000	3	-	-	-	Objective of exploration was to estimate the resources of dolomite.

Table – 3 : Producers of Dolomite

Name & address of producer	Location of mine	
	State	District
Steel Authority of India Ltd, Ispat Bhavan, P. B. No. 3049, Lodhi Road, New Delhi- 110 003.	Chhattisgarh Jharkhand	Bilaspur Garhwa
Rashtriya Ispat Nigam Ltd, Room No. 384, Main Admn.Building, C Block, II Floor, North Wing, Visakhapatnam- 530 031, Andhra Pradesh.	Telangana	Khammam
*South West Mining Ltd, Talur Cross, Vidya Nagar (Post), Torangallu, Sandur- 583 275, Karnataka.	Andhra Pradesh	Kurnool
A.N.Patnaik, Block H/2, Civil Township, Rourkela, Sundergarh-769 004, Odisha.	Odisha	Sundergarh
Manish Singh Banafer, D/22, Vidya Nagar, Near Shiv Mandir, Bilaspur- 495 001, Chhattisgarh.	Chhattisgarh	Janjgir- Champa

Contd....

(Table -3 Concld..)

Name & address of producer	Location of mine	
	State	District
Ultratech Cement Ltd, 'B' Wing, 2nd Floor, Ahura Center, Mahakali Caves Road, Andheri (E) Mumbai- 400 093.	Madhya Pradesh	Katni
Sri Balaji Metals & Minerals Pvt. Ltd, 23 A, Netaji Subhash Road, 3rd Floor, Suit No. 6, Kolkata - 700 001, West Bengal.	Chhattisgarh	Janjgir- Champa
Dolomite Mining Corporation, Sakti Road, Baradwar, Sakti- 495 687, Chhattisgarh.	Chhattisgarh	Janjgir- Champa
#S. Sohan Singh Joginder Singh & Co., A 431, Main Road, Bhupalpura, Udaipur- 313 001, Rajasthan.	Rajasthan	Udaipur
Ashish Goyal, O.P. Jindal Marg, Jagatpur, Raigarh- 496 001, Chhattisgarh.	Chhattisgarh	Raigarh
Mrityunjay Singh Sisodiya, Podhishankar, Janjgir, Janjgir-Champa- 495 660, Chhattisgarh.	Chhattisgarh	Janjgir- Champa
N. S. Saigal Associated Mining Co, H-2/133, Nanak House, Narmada Nagar, Bilaspur– 495 001, Chhattisgarh.	Chhattisgarh	Bilaspur
*The Bisra Stone Lime Co. Ltd, A.G.,104, Sourav Abason, Sector-II, Salt Lake City, Kolkata- 700 091.	Odisha	Sundergarh
#Aravali Polyart Pvt. Ltd, A-251(B-1) Road No.1, M.I.A Madri, Udaipur - 313 003	Rajasthan	Udaipur
Hussain Bhai Ismailbhai Madri, Mahudi Falia, Station Road, Chhota Udaipur, Vadodara- 391 165, Gujarat.	Gujarat	Vadodara

**Associated mine with limestone*
#Associated mine with steatite.

Dolomite of Baradwar and Hirri areas in Chhattisgarh is supplied to the steel plants at Bhilai, Bokaro and Rourkela besides, foundry and glass manufacturing units. Birmitrapur, Panposh and Gomardih areas of Sundergarh district, Odisha, supplied dolomite to iron and steel plants at Durgapur, Rourkela, Burnpur and Jamshedpur. Dolomite from this region is also used by the ferro-manganese plants at Joda and Rayagada in Odisha. Low-silica dolomite from Jayanti area in Jalpaiguri district of West Bengal is supplied mainly to steel plants at Durgapur and Jamshedpur.

In Odisha and Rajasthan, dolomite is supplied to the foundry and grinding units. The production from Vadodara district, Gujarat is used for making chips and tiles. In Gujarat and Maharashtra, dolomite is used for making potteries and in ferro-alloys industry.

Dolomite produced in Jhabua district, Madhya Pradesh, is utilised by fertilizer, tile-making and grinding units. Dolomite of Jabalpur and Mandla districts is supplied to chips manufacturing units at Katni and Bhilai respectively.

USES

Dolomite after calcination is used for refractory purposes (as a substitute of magnesite refractories) in linings of furnaces like basic open-hearth steel furnaces and basic Bessemer converters.

High purity dead-burnt dolomite bricks are required for lining LD furnaces, while mini-steel plants generally require dolomite for fettling and refractory purposes. Like limestone, dolomite is used as a flux in iron & steel, ferro-alloys and glass works. Few steel plants have dispensed with the use of dolomite in blast furnaces and its use in the preparation of self-fluxing sinters is found adequate for blast-furnace charge.

It is useful in the recovery of magnesia and also in the manufacture of magnesium metal; for the manufacture of basic magnesium carbonate (termed 'technical carbonate'), 'block magnesia' or 'magnesia alba' used in pipe and boiler coverings as heat insulation, in pharmaceutical, rubber, chemical industries, paper, leather, glass, potteries and high-magnesium limes. In agriculture, it is used as a soil conditioner to neutralise acidity. Regular application of dolomite improves crop yields owing to its neutralisation potential. It finds use as a filler in fertilizers, paints & varnishes and for supression of dust in coal mines. It is also used as a building stone and in the making of flooring tiles as chips & powder.

SPECIFICATIONS

Generally, insolubles like SiO_2, Fe_2O_3 and Al_2O_3 are considered deleterious constituents of dolomite for any industrial use. It is essential that these insolubles should be as low as possible. High purity dolomite with less than one percent insolubles is preferred for making refractory bricks which are used in the lining of LD furnaces.

Similarly, high-grade dolomite containing low iron (less than 0.15%) is required in Glass Industry.BIS has prescribed the specifications of dolomite used in Glass Industry vide IS: 997-1973; (First Revision; Reaffirmed 2008). The general specifications of dolomite consumed in different steel plants are given in Table-4. Specifications for flux grade dolomite for use in Iron & Steel Industry have been revised and are prescribed in IS: 10346 - 2004 (second revision, Reaffirmed 2009), while specifications of dolomite for refractory industry are prescribed in IS: 14296 - 1995 (Reaffirmed 2010). IS: 15366 - 2003 (Reaffirmed 2009) lays down the specifications of dolomite for Paint Industry.

CONSUMPTION

Dolomite is consumed by Iron & Steel, Ferro-alloys, Fertilizer, Glass, Alloy steel and other Industries. The total consumption of dolomite in 2015-16 was 8.24 million tonnes. It increased by 14% owing to demand from Iron & Steel and Sponge Iron Industry. Iron & Steel Industry was the major consumer of dolomite in 2015-16 accounting 81%, followed by Sponge Iron (9%), Refractory (4%) and Cement & Ferro-alloys (2% each). The remaining quantity was utilised by other industries, such as Alloy steel, Glass, Fertilizer, Paint, etc. (Table - 5).

Table – 4 : General Specifications of Dolomite Consumed in Different Steel Plants

(In Percent)

Plant	Constituent	SP/BF	SMS	Refractory
Bhilai Steel Plant	MgO	19 (min)	20 (min)	20 (min)
	CaO	29 (min)	30 (min)	30 (min)
	SiO_2	-	-	1.7 (max)
	Al_2O_3	-	-	2.5(max)
	Acid insoluble	6 (max)	5 (max)	-
	Size	0-60 mm	60-100 mm	50-80 mm
Bokaro Steel Plant	MgO	20 (min)	-	20 (min)
	CaO	30 (min)	-	30 (min)
	SiO_2	5 (max)	-	1.5 (max)
	Al_2O_3	-	-	1.0 (max)
	Fe_2O_3	-	-	-
	Acid insoluble	-	-	-
	Size	25-80 mm	-	5-25 mm
Rourkela Steel Plant	MgO	19 (min)	20 (min)	21 (min)
	CaO	-	-	-
	SiO_2	-	2.5 (max)	1.5 (max)
	Al_2O_3	-	1.5 (max)	0.75 (max)
	Fe_2O_3	-	1.0 (max)	1.0 (max)
	Acid insoluble	8 (max)	-	-
	Size	0 to 6 mm	40 to 80 mm	–
Durgapur Steel Plant	MgO	18 (min)	20 (min)	–
	CaO	-	30.85	–
	SiO_2	16 (max)	2.5 (max)	–
	Al_2O_3	-	0.8 (max)	–
	Fe_2O_3	-	1.0 (max)	–
	Acid insoluble	10 (max)	44	–
	Size	3	16 mm	–
IISCO Steel Plant	MgO	19.5 (min)	19.5 (min)	–
	CaO	-	-	
	SiO_2	-	-	–
	Al_2O_3	-	-	
	Fe_2O_3	-	-	
	Acid insoluble	8.7 (max)	8.7 (max)	
	Size	25 to75 mm	50 mm to 125 mm	–
Tata Steel Ltd	MgO	20 (min)	20 (min)	20 (min)
	CaO	-	-	-
	SiO_2	-	-	-
	Al_2O_3	-	3.5 (max)	1.7 (max)
	Fe_2O_3		-	-
	Acid insoluble	6 (max)	6 (max)	11.5 (max)
	Size	20-75 mm	25-50 mm	5-25 mm
Visvesvaraya Iron & Steel Plant	MgO	–	21-22	–
	CaO	–	30-31	–
	SiO_2	–	1.1(max)	–
	Al_2O_3			
	Fe_2O_3			
	Acid insoluble			
	Size	–	10-50 mm	–
Visakhapatnam Steel Plant	MgO	19.80 (min)	21.20 (min)	21.20 (min)
	CaO	29.04 (min)	30.50 (min)	30.50 (min)
	SiO_2	3.80 (max)	0.90 (max)	0.90 (max)
	Al_2O_3	1.10 (max)	0.30 (max)	0.30 (max)
	Fe_2O_3	1.20 (max)	1.10 (max)	1.10 (max)
	Acid insoluble	-	46.00	10.00
	Size	6 to 80 mm	25-50 mm	5-25 mm
IDCOL, Kalinga Iron Works	MgO	-	-	-
	CaO	-	-	-
	SiO_2	-	-	-
	Al_2O_3	-	-	-
	Fe_2O_3	-	-	-
	Total insoluble	8.00 (max)	-	-
	Size	25 to 75	-	-

Note: *SP: Sinter Plant; BF: Blast Furnace; SMS: Steel Melting Shop; AI: Acid Insolubles*

Table - 5 : Consumption* of Dolomite 2013-14 to 2015-16 (By Industries)

(In tonnes)

Industry	2013-14	2014-15 (R)	2015-16 (P)
All Industries	**6971600**	**7207300**	**8242700**
Alloy steel	5300	6700	6600
Cement	131500	120600	125700
Ceramic	20200	20300	20400
Ferro-alloys	137500	141100	136600
Fertilizer	8800	8000	6800
Glass	135400	141300	151600
Iron & steel 1/	5544300	5669400	6640200
Paint	29300	29300	29800
Refractory	321300	349600	349600
Sponge iron	627400	702100	733400
Others	10600	18900	42000
(Chemical, electrical, electrode and rubber)			

Figures rounded off.

**Includes actual reported consumption and/or estimates made wherever required. Due to paucity of data, the coverage may not be complete not be complete.*

1/ The figures for iron & steel and pelletisation (iron & steel) added.

Table – 6 : Exports of Dolomite (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**44620**	**156629**	**85273**	**155665**
Nepal	28550	67980	73533	86697
Bangladesh	12455	57805	9775	49535
Malaysia	616	5067	646	5861
Nigeria	272	2690	253	2411
Mauritious	122	1394	157	1765
Singapore	219	1518	180	1739
Ethiopia	178	1440	152	1372
U Arab Emts	1604	5748	133	1242
USA	—	—	65	1232
Oman	117	1055	105	1013
Other Countries	487	11932	274	2798

Table – 7 : Imports of Dolomite (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**2014760**	**3146097**	**1931136**	**2998295**
UAE	1016350	1450082	934777	1212195
Thailand	688220	965404	570592	724328
Vietnam	47525	330262	46737	322460
Italy	2544	46516	11990	265225
Egypt	-	-	136368	186688
Oman	-	-	99030	127676
Philippines	173227	239612	73290	74572
Australia	-	-	51067	54494
Bhutan	1278	3842	5867	7988
Spain	356	3067	508	5535
Other countries	85260	107312	910	17134

FOREIGN TRADE

Exports

Exports of dolomite increased considerably to 85,273 tonnes in 2015-16 from 44,620 tonnes in 2014-15. Exports were mainly to Nepal (86%), Bangladesh (11%) and Malaysia (1%) in 2015-16 (Table - 6).

Imports

Imports of dolomite decreased to 19,31,136 tonnes in 2015-16 from 20,14,760 tonnes in 2014-15. Imports were mainly from UAE (48%), Thailand (30%) and Egypt (7%) (Table- 7).

FUTURE OUTLOOK

Over 95% of the total production of dolomite finds outlet mainly in iron & steel and allied industries. The importance of high purity dead-burnt dolomite bricks for lining LD furnaces has gained ground due to LD process of steel making. At the same time, a few of the steel plants have dispensed with the use of dolomite pin blast furnace. Mini-steel plants generally require dolomite for fettling and refractory purpose only.

The resources of the refractory grade dolomite in the country are meagre and this typeof material is in short supply but very much required for making tar-bonded dolomite bricks. Therefore, intensive search is needed in non-Himalayan regions for locating deposits of massive non-crystalline dolomite, containing less than 2.5% R_2O_3 for use in tar-dolomite bricks required for lining of LD steel furnaces. The Sub- Group - II of the Working Group on Minerals for the 12th Plan has recommended the exploration of low silica dolomite in the states of Andhra Pradesh and Odisha which may be initiated by the State DGMs.

The Sub-Group has estimated the apparent domestic demand of dolomite at about 9.46 million tonnes at 9% growth rate by 2016-17.