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GRANITE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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24 Granite

Granite technically refers to a light-coloured granulose plutonic rock composed of felspars, plagioclase, quartz (35% approx.) and minor amounts (45% approx.) of mafic minerals, such as, biotite, hornblende, pyroxene, iron oxides, etc. But, in commercial parlance, the term granite has become synonymous with all those crystalline rocks which have pleasing colours, strength to bear the processes of quarrying and cutting & polishing and which are used commonly for decorative purposes. Being more resistant to wear and tear as well as weathering, granite is most sought-after stone to be used as building as well as decorative stone. The fascination for granite is due to its amenability for taking mirror-like polish, high compressive strength, longevity and aesthetics. India possesses enormous deposits of all types of dimension stones. It is one of the largest producers of dimension stones in the world. The Dimension Stone Industry employs a workforce of over one million at its various sectors. This Industry plays a vital role in the economy of the states like Tamil Nadu, Andhra Pradesh, Karnataka and Rajasthan. Rural economy of many developing States like Madhya Pradesh, Uttar Pradesh, Odisha and North-Eastern States is dependent on this Industry.

Within the country, granite used for decorative purposes is considered costly when compared with other materials, hence, its utilisation and trade in the domestic front has been relatively low when compared to its export potential.

RESOURCES

India is endowed with abundant resources of a wide variety of granite comprising over 200 shades. As on 1.4.2010, resources of granite dimension stone of all types are estimated at 46,230 million cubic metres. Of these resources, 264 million cubic metres (less than 1%) fall under reserves category while the remaining 45,966 million cubic metres or about 99% fall under resources category.

Of the total granite reserves, about 36 million cubic metres of all grades fall under proved category while 228 million cubic metres fall under probable category.

Ninety-four percent reserves relate to coloured granite and the balance about 6% to black granite. About 98% reserves are located in Rajasthan, Odisha and Karnataka with a share of 42%, 30% and 26%, respectively.

Statewise breakup of total resources reveals that Karnataka & Rajasthan share about 20% each of the resources which are followed by Jharkhand (19%), Gujarat (18%), Andhra Pradesh (5%) and Madhya Pradesh (4%)- these states together account for 86% of the total resources. Gradewise classification reveals that about 7% of the total resources fall under black granite while 92% under coloured granite. About 1% resources are of unclassified grade.

The details of reserves/resources as on 1.4.2010 are given in Table-1.

PRIME VARIETIES OF INDIAN GRANITE

In the world market, there are nearly 300 varieties of granite of which India supplies about 200 varieties. Out of these, prime varieties represent a wide spectrum of colour, texture and structure. These prime varieties have substantial resource base. Commercial names of granite are derived from area, colour, patterns, etc.

Karnataka specialises in the production of Ruby red, chilly red, cera grey, Kanakpura multicolour, Himalayan blue and Sira grey varieties of granite. Andhra Pradesh is famous for Black Galaxy, Srikakulam blue and black varieties of granite while Tamil Nadu is abundant in Jet-black & Tipu-white, Kashmir-white and Paradiso sea green varieties of granite. Odisha specialises in pink granite, silver grey, sea weed green, chilka blue, grey wave varieties of granite. Availability of varieties of granite in various States is furnished in Table- 2.

EXPLORATION & DEVELOPMENT

The increase in demand both in domestic and international markets for new varieties of granite has prompted DMG, Government of Chhattisgarh & Rajasthan to get significantly engaged in exploration activities. The details of work carried out by both these State Directorates in 2012-13 are summarised in Table - 3.

Table – 1 : Reserves/Resources of Granite (Dimension stone) as on 1.4.2010
(By Grades/States)

(In thousand cubic metres)

Grade/State	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	**35741**	**201377**	**26574**	**263692**	**38462**	**51990**	**8234**	**837325**	**2063964**	**42499338**	**467296**	**45966608**	**46230300**
By Grades													
Black Granite	6936	6060	3909	16906	-	45690	1	50934	466039	2572581	23538	3158783	3175688
Coloured Granite	28805	195316	22665	246786	38462	6300	8233	786391	1276125	39843847	443518	42402875	42649661
Unclassified	-	-	-	-	-	-	-	-	321800	82911	240	404951	404951
By States													
Andhra Pradesh	-	-	-	-	-	-	-	-	-	2405890	-	2405890	2405890
Assam	-	-	-	-	-	-	-	-	800	583150	-	583950	583950
Bihar	-	-	-	-	-	-	-	-	179000	698612	-	877612	877612
Chhattisgarh	-	-	-	-	-	-	-	-	-	50057	-	50057	50057
Gujarat	-	-	-	-	-	-	-	-	-	8501947	-	8501947	8501947
Haryana	-	-	-	-	-	-	-	-	-	34000	-	34000	34000
Jharkhand	-	-	-	-	-	-	-	-	651300	8197110	26930	8875340	8875340
Karnataka	26363	19389	21836	67587	-	-	-	238	1231625	8012784	25659	9270306	9337893
Kerala	140	-	-	140	-	-	-	-	99	2570	-	2669	2808
Madhya Pradesh	-	160	-	160	-	-	-	-	-	1885924	108000	1993924	1994084
Maharashtra	-	-	-	-	-	6300	-	486925	-	665622	-	1158847	1158847
Meghalaya	-	-	-	-	-	-	-	-	-	-	286467	286467	286467
Odisha	-	80000	-	80000	-	-	-	330328	-	1432492	240	1763060	1843060
Rajasthan	5581	100380	4500	110461	38462	-	-	-	-	9021742	20000	9080204	9190665
Tamil Nadu	-	1448	238	1686	-	45690	8234	7	-	503818	-	557749	559435
Uttar Pradesh	-	-	-	-	-	-	-	-	-	494819	-	494819	494819
West Bengal	3658	-	-	3658	-	-	-	19827	1140	8802	-	29768	33426

Figures rounded off.

Table – 2 : Varieties of Granite in Various States

State	Variety
Andhra Pradesh	Black galaxy, Srikakulam blue, Steel grey, Paradiso, Anantapur grey, Silver galaxy, etc.
Bihar	Tiger skin, Mayurakshi blue, Sawan rose, English teak, Black-cheeta, etc.
Gujarat	Sonabadi grey, Balaram pink, Ajapur Galaxy, Godhra grey, Maharaja tiger-black, etc.
Haryana	Steel-grey porphyry, Purplish granite porphyry, Deep pink.
Karnataka	Ruby red, Fish Belly, Himalayan blue, Sira grey, Red multi, Tumkur porphyry, Hassan green, Magadi pink, Tiger black, etc.
Kerala	Tropical green, Paradiso, Kerala white, etc.
Maharashtra	Grey silk, Light pink, Jhansi red, etc.
Madhya Pradesh	Multicoloured, Black granite, etc.
Odisha	Berhampur blue, Silver grey, Seaweed green, Chilka blue, Red pearl, Jeypur and Keonjhar black, etc.
Rajasthan	Mokalsar green, Nagina green, Rosy pink, Blue Pearl, Chima pink, Bala flower, Platinum-white, etc.
Tamil Nadu	Kashmir white, Rawsilk, Paradiso, Pink multi, Colombo Juparana, Tiger skin, Kunnam black, Turaiyur blue, etc.
Uttar Pradesh	Ruby red, Jhansi red, Grey granite, Black granite, etc.
West Bengal	Bero pink porphyry, Streaky gneiss, Purulia black, Birbhum pink, Spotty black, etc.

Table – 3 : Details of Exploration for Granite during 2012-13

Agency/ State/ District	Location/ Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DMG, Chhattisgarh							
Bastar, Kanker	Chararna, Keshkal	1:50,000	280	-	-	79	Objective of exploration was to study the suitability of granite and other rocks for cutting and polishing purpose. Black granite (dolerite) occurrences have been noticed at various localities as hillocks with a dimension of 500 m x 150 m & thickness of around 10 m. About 28 lakh m^3 black granite (dolerite) resources have been estimated
Kondagaon, Kanker	Keshkal, Jagarpali	1:50,000	165	-	-	43	Area is vastly covered with Dongargarh granite. Occurrences of black granite (dolorite) have also been marked at various locations.
Dantewada	Chingavaram-Bhusaras	1:50,000	278	-	-	13	About 4 lakh m^3 black granite (dolerite) resources have been estimated which is suitable for cutting/ polishing.
Rajasthan							
Jhunjhunu	Kesharpura, Ratanshar, Dhadaya,	1:10,000 1:4,000	10 3	- -	- -	-	Occurrences of granite are 7 located n/v Nand, Rijhani, Ratanshar (Mahakhar) and Kesharpura. Granite of this area is pink-red to grey, coarse-grained, porphyritic with blank chunks of tourmaline & could be used for decorative purposes. At places it is bouldery and traversed by widespread joints. It can yield sizeable blocks for cutting/polishing.
Pali	Narlai, Koliwara	1:2,000	2	-	-	-	Delineation upto 0.12 sq km was carried out.The granite of Narlai areas is greyish in colour & fine to medium grained in texture. Granite occurrences of Koliwara area are whitish and greyish in colour. These occur as big boulders on surface and as sheet on base of boulders.Resources have not been estimated.

PRODUCTION

Granite is declared as a "Minor Mineral," under the MMDR Act, 1957 and therefore falls under the purview of the State Governments. The data on production of granite therefore lacks precision as acquisition-delays hinder conclusivity. The production of granite compiled from the data received from various states is however detailed in Table-4 .

Major production of granite in raw as well as processed form is generally from Andhra Pradesh, Rajasthan, Karnataka, Tamil Nadu and Gujarat.

The important granite producing centres in Tamil Nadu are located at Dharmapuri, Erode, Madurai, Salem, Virudhunagar and Villupuram districts.

In Rajasthan, production centres are mainly spread in the districts of Jalore, Pali, Sirohi, Barmer, Ajmer, Jaisalmer, Jhunjhunu and Jodhpur. Karnataka is another important producer of granite varieties with production centres predominantly located at the districts of Bengaluru, Mysore, Gulbarga, Hassan, Raichur and Kolar. However, production data are not available from this State. The occurrences of granite have been reported from three districts of Uttar Pradesh, namely Lalitpur, Mahoba and Banda. Almost the entire production was reported from Lalitpur district. In Andhra Pradesh, important mining areas are located in the districts of Chittoor, Anantapur, Kurnool, Prakasam, Srikakulam, Warangal, Karimnagar and Khammam.

The granite resources of Gujarat are located in the districts of Mehasana, Banaskantha, Sabarkantha, Panchmahal, Dahod, Vadodara, Amreli, Bhavnagar and Kachchh. Bihar, Kerala, Odisha and West Bengal also produce granite.

Details regarding production of processed granite are not available. However, it could be contrived from the data on processed material exported-from which production level in the country with addition of 5 to 15% for internal use could be estimated. From all available data, it could be concluded that India is in a comfortable position to produce the required quantity of granite to meet the demand of both domestic as well as export markets.

MINING

Production of blocks of considerable size and weight is a special feature of granite mining. The process and equipment used for granite mining differ considerably from those used for mining other minerals. The mining of granite involves two important stages of operation- the first actual block splitting either from sheet rock or boulder and the second is operations involve many items of works, such as removal of weathered zone or overburden, opening of faces, lifting of cut blocks, transportation and many other ancillary work before and after block splitting.

Table – 4 : Production of Granite, 2009-10 to 2011-12
(By States)

(Value in ₹ '000)

State	Unit	2009-10		2010-11		20111-12 (P)	
		Quantity	Value	Quantity	Value	Quantity	Value
India	-	-	**18526785**	-	**26531579**		**54198761**
Andhra Pradesh	cu m	648789	13994677	919000	21435632	1255683	32381485
Chhattisgarh	cu m	-	-	477	568	-	136
Gujarat	tonne	102222	32192	78732	32649	-	-
Jammu & Kashmir	tonne	69	16	92	22	138147	14706
Karnataka	cu m	228533	2486396	268438	2914183	358490	11187507
Kerala	cu m	1109	47687	1068	32044	13101469	7860881
Madhya Pradesh	tonne	44424	113336	56043	148603	27968	153059
Rajasthan	tonne	760594	1339802	757620	1294141	1077000	1581250
Tamil Nadu	cu m	174819	362679	234192	473737	266889	757230
Uttar Pradesh	cu m	24000	150000	26667	200000	23334	262507

Source: *State Governments.*
Note:1*. Figures have been repeated wherever necessary, due to non-availability of data.*
2*. This table does not contain data with reference to Daman & Diu, Gujarat, Haryana, Manipur, Meghalaya, Nagaland, Odisha and West Bengal due to non-receipt of data for consecutive three years.*

The block splitting from the sheet rocks or boulders is mainly done manually or in some cases by semi-mechanised methods, whereas the other operations, such as, removal of overburden, lifting & transportation of cut blocks, etc. are carried out by mechanised methods. There are a few mines which have adopted the modern method of block splitting by using flame-jet burner and diamond wire saw for cutting. Heavy-duty derrick cranes of capacity to handle 50-tonne blocks from a depth of more than 60 m has brought revolution in granite quarrying by way of augmenting output with less cost. The percentage recovery of granite on the whole is quite low and it varies from 5 to 15% because of the prevalent unscientific mining method.

One of the modern and scientific mining methods adopted recently to enhance the recovery of dimensional blocks is that 'Water Jet Cutting', technique . In this technique, water with tremendous pressure is passed through an orifice to form a jet. This jet is used to cut into the primary blocks as well as secondary blocks. The cutting loss in this process is minimum and there is no damage to adjacent block as in case of blasting.

PROCESSING INDUSTRY

The processing of granite in India is an age-old phenomenon and started in a small way in 1930s when some trimmed blocks as kerbstones were exported to UK. Since then, semi-hand-worked or hand-polished granite tombstones found their acceptability in the UK. Granite processing basically involves sawing or cutting of raw blocks into the tiles/slabs of required size & thickness and polishing of sawn-off surfaces. Other ancillary functions involve edge cutting, milling, boring and contouring for enhancing the quality and price of production. In India, the Processing Industry is in three sectors, namely, small-scale units, medium-scale units and 100% export-oriented units (EOU). The Processing Industry of granite in the country has developed over the years, and the share in exports of processed material has increased manifolds.

Centre for Development of Stones (CDOS), registered as a Non-profit Making Society, is the common Facilities Centre for the entire Stone Industry, including granite, established under the National Programme for Development of Stone Industry in India (NPDSI), which is a joint effort of Govt. of India and United Nations Industrial Development Organisation (UNIDO). CDOS was set up as an autonomous organisation by Govt. of Rajasthan and Rajasthan State Industrial Development & Investment Corpn. Ltd (RIICO) at Jaipur, with an objective to develop, promote and support the Dimensional Stone Sector and related industries in India. It also has testing centre for stones that conforms to international standards.

USES & SPECIFICATIONS

Uses

Granite is the most sought-after among all building stones . In the ancient times, granite pillars and beams were preferred material to support the huge structures of temples and palaces and for making protective walls around them. With the invention of modern tools of greater hardness and polishing ability, the use of granite has rather increased on account of its aesthetic value. The modern motorised tools of tungsten carbide and brazed diamond have enabled the user to cut & polish granite as per the specifications of the Building Sector. Presently, cut and polished granite slabs of 20 mm thickness are preferred for flooring, while tiles of 10 or 12 mm thickness are used for cladding. In addition to this, gravestones and monuments of various shapes and sizes are also in vogue. The flexibility of the cutting tools have engendered creation of many artifacts of granite for decorative purposes.

Granite also finds its application in making garden furniture, such as, benches, fountains and many other articles which are used for landscaping and/or decorative purposes. The cut-to-size small blocks are used as cobblestone, kerbstone, road sidings and for many other innovative purposes.

Crude granites are utilised for structural purpose after little dressing & sizing whereas processed granites are used mostly in the construction of buildings and monuments and for interiors and exterior facing. Granites, because of its superior wear resistance and non-denting quality, are used as parts in various meteorological and engineering instruments, such as, surface plates, straight edges, parallels, cubes, V' blocks and work-mounting tables of co-ordinate measuring machines.

The surface plates are used as flat datum surface whenever precise measurements of dimensions and geometrical relationships are to be carried out. For this purpose, harder variety of granite is required so that it can bear the high-degree of grinding, polishing and calibration for achieving flat surface. For its use as surface plates, granites should have properties such as, close grain size, homogeneity, high density and hardness, uniform colour, low moisture absorption and should be free from flaws.

Specifications

The properties of granite which are normally valued for exploitation are compressive strength, tensile strength, density, p-wave velocity, etc. For marketability, other requirements like colour, texture, granularity, size, water absorption, porosity, hardness, moisture content, etc. are also essential. Raw blocks should be free from normal defects like fractures, joints, shears, hairline cracks, segregation, veins, etc.

A brief snippet of BIS specifications for granite are highlighted below:

IS: 3316 - 1974 (First Revision; Reaffirmed 2008) Specifications for Structural Granite

This Standard covers section, grading and strength requirements of structural granite for various constructional uses. The general requirements as per the specifications are that granite shall be free from flaws, injurious veins, cavities and similar imperfections that would impair its structural integrity and would affect adversely its strength and appearance. The strength requirements as per IS: 3316-1974 are as follows:

i) The compressive strength when tested according to IS: 1121 (Part 1) -1974 (Reaffirmed 2008) shall not be less than 1,000 kg/cm^2.

ii) The true specific gravity when tested according to IS:1122-1974 (Reaffirmed 2008) shall not be less than 2.6.

iii) The water absorption when tested according to IS: 1124-1974 (Reaffirmed 2008) shall not be more than 0.50%.

The shape of slabs shall be rectangular or square and of specified dimensions with tolerance in length and breadth as 12 mm and thickness 1 mm. The dimensions of blocks for masonry shall be as specified. The tolerance allowed for facing blocks is 15 mm.

IS:14223 (Part 1) - 1995; (Reaffirmed 2012) Specifications for Polished Building Stones: Part I Granite

This Standard covers physical properties and finish requirements of polished granites used for various purposes. The general requirements as per the specifications are that the granite should be free from all imperfections and deleterious minerals that may interfere with the appearance, strength, structural integrity and its amenability to take good polish. Imperfections are mostly imparted by the textural variations which is a function of degree of uniformity and the distribution of the constituent minerals. Hairline cracks/joints, flower, moles, knots, white and dark lines due to segregation of light-coloured minerals in multicoloured granite and ferromagnesium minerals in light-coloured granites are considered to be imperfections. Granite should be free from deleterious minerals, such as, pyrite, marcasite, biotite, chlorite and ilmenite which interfere with the colour and appearance on weathering and also affect polishing characteristics.

The shapes of the slabs shall be rectangular or square and of specified dimensions with a tolerance in length and breadth as +2 mm and thickness +1 mm. The bottom face may be rough but the top surface shall be fine-polished and joint faces shall be dressed with the top surface without hollowness and spalling off.

The physical properties of granite shall conform to the requirements given in Table-5. Surface of the polished granite shall be mirror-finish without any hairline crack. The polish on the surface shall be checked with glassometer and shall not be less than 95%.

On the international scene, with the formulation of European Economy, the CEN Norm has come into force. As per CEN TC 246, various standards of stones have been formulated. The objectives of these standards are to necessitate the companies to have the tests conducted for the different stones that are commercialised so as to profit the users the choice of the stone with desired physical characteristics according to the purpose intended. It has become mandatory for every company doing business with European Union to mark their products with 'CE' marking from March 2004 onwards.

Table – 5 : Physical Properties of Granite as per IS : 14223 (Part 1) -1995 (Reaffirmed 2012)

Sl. No.	Characteristic	Requirements	
		Pink granite	Multicoloured & grey granites
1	Moisture content (%) (max)	0.15	0.15
2	Dry density (m/v)	2.58 to 2.63	2.60 to 2.68
3	Apparent specific gravity (min)	2.75	2.75
4	Water absorption (%) (max)	0.50	0.50
5	Porosity (%)	1.02 to 2.50	1 to 2
6	Compressive strength (kg/cm^2)	1000-1500	1300-2200
7	Tensile strength (kg/cm^2) (min)	90	90
8	Shear strength (kg/cm^2)	280-425	300-540
9	Hardness (Mohs' scale)	6 to 7	6 to 7
10	Hardness (Schmidt No.)	80-100	85-110
11	Hardness (Shore No.)	50-60	46 to 61
12	Ultrasonic pulse velocity	5000	5000
13	Resistance to wear	Not greater than 2 mm, on an average and 2.5 mm for any individual specimen	Not greater than 2 mm, on an average and 2.5 mm for any individual specimen

POLICY

Granite is a 'Minor Mineral' under the MMDR Act, 1957. The grant of various mineral concessions for granite is therefore administered under the Minor Mineral Concession Rules of the respective State Governments. However, the Granite Conservation and Development Rules, 1999 aims at uniform rules for conservation, systematic development and scientific exploitation of granite resources. GCDR, 1999 inter alia, provides for:

Prospecting Licences (PL) prior to granting mining lease; Period of PL; Minimum and maximum period of mining lease and for renewals; Minimum and maximum area of lease; Preparation of scheme of prospecting; Mining Plan to be prepared for grant of mining lease; etc.

As per the Export-Import policy for 2009-14 and the Foreign Trade Policy thereunder, the imports of granite monumental and building stone that fall under Heading No. 2516 (whether or not roughly trimmed or cut, by sawing or otherwise, into blocks or slabs of a rectangular shape) are restricted. On the other hand, worked granite blocks/tiles under Sub-heading 680223 can be imported freely. There are no restrictions on exports of granite and items under Chapter 25 and Chapter 68.

ENVIRONMENT

The mining of granite, started initially in the bouldery zone, had little damage to the environment. As more and more blocks in huge sizes were required to meet the demand, the sheet rock was approached by making cut in the ground and by removing top soil or overburden, which resulted in general degradation of environment.

Environmental problems are similar to any opencast mining operations. The blasting and movement of heavy vehicles generate dust and aggravate air pollution in addition to noise pollution.

The processing of granite requires huge quantities of water for cutting and polishing. In some cases, kerosene and lime water are used as coolants for cutting purpose. Although most of the kerosene and lime is recycled, there are always chances that these coolants get mixed with natural water courses.

Sludge generated during cutting needs proper disposal to avoid increased silting and pollution of the natural waterways.

For abating environmental pollution, guidelines have been spelt out in GCDR,1999. The technology for making artificial stone calledTerrazzo will prove to be a boon for the utilisation of waste generated during mining and processing.

WORLD REVIEW

World dimension stone production including granite is estimated to be around 115 million tonnes in 2010. The principal producers by volume were: China, Turkey, India, Iran and Italy which accounted for about 73% of the global production.

China

China is the main producer in the world and USA the main customer of granite. There are four main regions for natural stone production and handling imports and exports: the provinces of Shandong, Fujian, Sichuan and Guangdong. The key centres of Chinese stone processing have been created mainly in Shandong, Fujian and Guangdong. Their chief function is to process local and imported materials into products for decorative interior finishing. Large quantities of natural stones are also imported for processing into gravestones for the Japanese and Korean markets.

Brazil

Brazil is the largest producer of natural stone in the world and well-known for producing prime varieties like Juparna, Classico and Tijuca black, from quarries located at the outskirts of Rio. Major areas of production are in Minas Gerais where multicoloured granite is produced. The yellow Veneziano variety of granite is produced in Victoria State. The production of granite was estimated at 60 million cu m during 2011.

More than half the Brazilian production is being exported, mostly to the North American market. In terms of weight, around half the Brazilian natural stone exports include rough blocks of granite.

Italy

Italy has a broad, in-depth know-how of stone quarrying and processing based on centuries of experience, but in the mass production segment, it has been overtaken by China, India, Iran and Brazil. Production of granite was estimated 1.6 million tonnes in 2011.

USA

In USA, dimension granite was produced by 39 companies in 15 States. Production was 500,000 tonnes valued at $118 million in 2012. Granite production tonnage increased by 8% and the value increased by 9% compared with those of 2011. The top five producing States were, in descending order by tonnage are Massachusetts, Georgia, Vermont, North Carolina and New Hampshire.

FOREIGN TRADE

Exports

Granite is an important commodity amongst ores and minerals that have tremendous export potential. It is mainly traded in the form of crude or roughly trimmed blocks, as cut blocks & slabs; and as polished blocks & tiles. The export value of granite (total) increased to ₹ 7,940 crore in 2012-13 from ₹ 6,381 crore in 2011-12. The share of granite (others) was 49% at ₹ 3,883 crore while that of crude or roughly trimmed blocks was about 37% at ₹ 2,929 crores. Similarly, the share of granite (polished blocks/tiles) was 10% at ₹ 776 crore, while granite (cut blocks/slabs) was 4% at ₹ 353 crore. China was the most important buyer for granite and its share in the total value of exports of granite was 34%, followed by USA (15%) and Turkey & Germany (4% each) (Tables - 6 to 10).

Imports

In 2012-13, imports of granite (total) decreased marginally to 62,540 tonnes from 64,982 tonnes in the previous year. Out of the total imports, 31,009 tonnes were of crude or roughly trimmed granite, 2,312 tonnes of cut blocks/slabs, 4,313 tonnes of polished blocks/tiles and 24,906 tonnes of other granite. Granite was mostly imported from China (32%) and Norway (24%) (Tables - 11 to 15).

Table – 6 : Exports of Granite : Total (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4605078**	**63815357**	**6062753**	**79403743**
China	2585683	19198118	3980366	26805646
USA	291565	9344382	384220	12061949
Turkey	118550	2771883	126485	3463517
Germany	93361	3092733	83371	3120022
UK	71070	2332351	60144	2623943
Italy	205243	2879124	137022	2437778
UAE	99849	1850978	106652	2300555
Belgium	89527	2013303	77720	2156840
Hong Kong	174825	1716824	199078	1773652
Chinese Taipei/ Taiwan	169633	1647199	145200	1570894
Other countries	705772	16968462	762495	21088947

Table – 7: Exports of Granite (Crude or Roughly Trimmed) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2992760**	**22882720**	**4189682**	**29290552**
China	2306773	16685826	3605886	23546325
Chinese Taipei/ Taiwan	154076	1370106	139523	1484652
Hong Kong	139006	1317586	119039	1032856
Italy	154045	1335783	93827	979977
Vietnam	40040	339209	45648	449710
Belgium	54868	486846	41030	423983
Thailand	21682	216352	19269	227072
Croatia	16604	127805	16534	188456
Poland	20777	167000	19395	176399
Spain	18001	151397	14435	159466
Other countries	66888	684810	75096	621656

Table – 8 : Exports of Granite (Cut Blocks/Slabs) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**365418**	**2672156**	**512752**	**3526543**
China	231404	1683146	318594	2277184
Hong Kong	30622	267850	76261	685815
USA	51335	235898	96127	323878
Sri Lanka	1952	19875	3527	44958
Chinese Taipei/ Taiwan	6703	109153	3329	41604
Germany	6487	33720	4353	21419
Italy	6365	55968	1018	17113
UK	3354	31233	1419	12640
Spain	795	11122	573	10925
Bangladesh	726	5775	1126	9543
Other countries	25675	218416	6425	81464

Table – 9 : Exports of Granite (Others) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**995724**	**31238867**	**1109974**	**38826979**
USA	193767	7478182	241236	9910400
Turkey	115946	2725432	118601	3249256
Germany	66519	2373149	61957	2492852
UK	58500	1993228	46479	2216050
UAE	77377	1554582	95699	2099871
Belgium	26898	1222318	29285	1372289
Canada	19856	818516	24944	1216555
Italy	36111	1195331	33946	1191959
Poland	34575	1020266	32331	1151116
Netherlands	24729	1086937	23504	1107549
Other countries	341446	9770926	401992	12819082

Table – 10 : Exports of Granite (Polished Blocks/Tiles) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**251176**	**7021614**	**250345**	**7759670**
USA	41079	1459482	42333	1757446
China	41584	739793	48895	833867
Germany	17655	667023	15043	589515
UK	7444	295077	9256	371067
Belgium	6995	300024	7251	357468
Netherlands	8237	324349	7489	347302
Nigeria	20133	432771	11168	278911
Libya	540	17334	6481	250839
Italy	8722	292043	8231	248729
Saudi Arabia	13451	260001	12806	241487
Other countries	85336	2233717	81392	2483039

Table – 11: Imports of Granite: Total (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**64982**	**1600947**	**62540**	**1870582**
China	23299	539674	19817	601687
Norway	13419	303124	14949	403561
Brazil	7023	208460	4790	221752
Italy	2653	94353	2625	110160
Ukraine	1403	35930	2554	74862
Finland	2799	36598	4103	71468
South Africa	2394	47852	2820	65738
Madagascar	2467	71789	1509	52527
Namibia	1537	23332	2733	44790
Angola	2147	42983	1071	26197
Other countries	5841	196852	5569	197840

Table – 12 : Imports of Granite (Crude or Roughly Trimmed) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**30660**	**733666**	**31009**	**873669**
Norway	11304	255942	13201	351403
Brazil	6547	175223	3465	165892
Finland	1849	21844	3988	66149
Ukraine	1294	29530	2113	63173
Madagascar	678	20314	1323	46203
South Africa	1901	35096	1888	41075
Angola	1747	35078	939	23451
Japan	-	-	385	20085
Italy	1018	30348	588	15426
Namibia	693	9109	588	14048
Other countries	3629	121182	2531	66764

Table – 13 : Imports of Granite (Cut Blocks/Slabs) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**3399**	**74268**	**2312**	**49713**
Brazil	-	-	562	14855
Norway	1608	34734	522	10585
Italy	251	6669	497	7943
Ukraine	-	-	210	4307
Singapore	-	-	137	2618
China	-	-	80	2403
Angola	400	7905	97	2036
South Africa	85	2253	92	1919
Russia	-	-	26	1642
Austria	-	-	70	980
Other countries	1055	22707	19	425

Table – 14 : Imports of Granite (Polished Blocks/Tiles) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2965**	**87554**	**4313**	**148805**
Norway	457	11655	1226	41574
China	652	20130	888	34623
Brazil	72	1918	253	12711
South Africa	286	6826	363	10090
Sri Lanka	-	-	216	9180
Namibia	314	7586	655	8029
Madagascar	199	5427	186	6323
Finland	330	5330	115	5319
Chinese Taipei/Taiwan	-	-	66	3958
USA	32	1619	79	3930
Other countries	623	27063	266	13068

Table – 15: Imports of Granite (Others) (By Countries)

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**27958**	**705459**	**24906**	**798395**
China	21536	478177	18646	553714
Italy	1364	55966	1494	84517
Brazil	404	31320	510	28294
Hong Kong	83	2138	357	23469
Namibia	530	6638	1490	22712
South Africa	122	3677	477	12654
Saudi Arabia	405	11549	351	10164
Germany	75	3897	180	9778
USA	75	5242	99	7599
Spain	1	18	153	7385
Other countries	3363	106837	1149	38109

FUTURE OUTLOOK

India possesses one of the best granite deposits in the world having excellent varieties comprising over 200 shades. India acounts for over 20% of the world resources in granite. The total granite resources in India as on 1.4.2010 are: 46,230 million cu m. As per the Report of the Working Group for 12th Plan (2012-17), the Indian stone production during 2009-10 was 35,342 thousand tonnes, and in value terms, the estimated turnover of the Indian Dimensional Stone market in 2009-10 was of the order of ₹ 30,000 crore out of which the southern states accounted for ₹ 18,000 crore, Rajasthan ₹ 7000 crore, and the rest of India ₹ 5000 crore. Granite alone accounts for 2/3rd of the value of production.

As per the Report for 12th Plan, the Dimension stone market is said to grow at a fervent pace as the demand for granite, marble, sandstone and other dimension stones and stone products is on the rise and are anticipated to grow at around 15% CAGR. A similar rate of growth in exports can also be achieved with the help of suitable policy framework, infrastructure and other facilities which the Industry expects to consolidate for augmentation of prospects. The Working Group for 12th Plan has recommended that well-planned, concerted and dedicated efforts are essentially needed for promotion of Indian stones to galvanise their export prospects. The emphasis needs to be on popularisation of Indian stones in both the traditional markets as well as other niche markets and exploration of new avenues by strengthening the activities of the Centre for Development of Stones (C-DOS) in Rajasthan by upgrading it into a national centre of excellence could render the much-needed fillip to the industry as a whole. Alternatively, other options for exporting granite and marble in processed form to maximise export earnings are to develop and promote artifacts and special decorative and ornamental items of high value addition. There is tremendous skill in the country, which can be explored and supported with special incentives. This can certainly bring about substantial foreign exchange addition, as well as significant employment generation.

The Working Group for 12th Plan had observed that the present investment in Dimensional Stone Industry in India is at ₹ 20,000 crore. Further, it was observed that with the right policy support, the total turnover of the sector could rise to around ₹ 30,000 crore in 2009-10 and even higher to over ₹ 40,000 crore by 2012-13, and thereafter, double every five years considering an estimated growth rate of 15%. To sustain this level of anticipated growth there must be a protracted growth, investment flow into this sector to the tune of ₹ 1,07,500 crore by 2022-23 (including foreign investment).