

SLATE, SANDSTONE AND OTHER DIMENSION STONES



# Indian Minerals Yearbook 2013

(Part- III : MINERAL REVIEWS)

52<sup>nd</sup> Edition

## SLATE, SANDSTONE & OTHER DIMENSION STONES

(ADVANCE RELEASE)

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# 45 Slate, Sandstone & Other Dimension Stones

The principal rock types used as dimension stones other than granite and marble are slate, sandstone, limestone and quartzite. India is endowed with abundant resources of these types of dimension stones which are increasingly being used domestically. These stones are also important export commodities. India is one of the largest producers of dimensional stones in the world.

## 1. Slate

Slate is a low-cost decorative stone used for exterior and interior decoration of buildings. It is significantly used in roofing. Slate is a fine-grained, very low-to-low metamorphic rock possessing a well developed fissility (splitting attitude) parallel to the planes of slaty cleavage. It is formed by the metamorphism of pre-existing clay rocks such as claystone, shale or siltstone. The most remarkable feature of this rock is that it has cleavage planes that are well marked which enable it to be split manually or mechanically into relatively thin slabs. Slate is used as school slate and also as building dimension stone. Slate has an aesthetic value like other dimension stones, granite and marble. Slate has emerged as a low cost alternative to granite and marble which are comparatively expensive. The exports of slate have increased over the years resulting in a boost to slate mining industry in the country. Micaceous and chlorite slates are generally preferred.

## OCCURRENCES

The Aravalli Mountain ranges in Rajasthan and Haryana; rock assemblages under Cuddapah System in Andhra Pradesh and Tamil Nadu; and Himalayan region in Northern India have undergone metamorphism and given rise to the slate deposits along with other metamorphosed products. The availability of slates has also been reported from Madhya Pradesh, Haryana, Himachal Pradesh, Jharkhand, Andhra Pradesh, Rajasthan, Uttarakhand, Bihar and Gujarat.

## RESOURCES

An attempt has been made to prepare inventory of slate. This may not be complete. The total resources of slate as on 1.4.2010 as per UNFC system are placed at 2.4 million tonnes under unclassified grade. All the resources are located in Andhra Pradesh (Table - 1).

## PRODUCTION, STOCKS & PRICES

The production of slate was 278 tonnes during the year 2012-13. However, no production of slate was reported during the last three years. There was only one reporting mine of slate in 2012-13 (Tables- 2 to 4)

**Table – 1 : Reserves/Resources of Slate as on 1.4.2010  
(By Grades / States)**

(In '000 tonnes)

	Reserves Total (A)	Remaining Resources				Total (B)	Total Resources (A+B)
		Feasibility STD211	Pre-feasibility		Inferred STD333		
			STD221	STD222			
<b>All India : Total</b>	-	-	<b>113</b>	<b>1187</b>	<b>1069</b>	<b>2369</b>	<b>2369</b>
<b>By Grade</b>							
Unclassified	-	-	113	1187	1069	2369	2369
<b>By State</b>							
Andhra Pradesh	-	-	113	1187	1069	2369	2369

Figures rounded off.

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The mine-head stocks of slate at the end of the year 2012-13 were 1,267 tonnes as against 1,260 tonnes at the beginning of the year (Table -5).

The average daily employment of labour in the slate mine during the year was only three.

Value of production of slate (as dimension stones) increased to ₹ 672 lakh in 2011-12 from ₹ 365 lakh in the previous year as per the data available (Table-6).

**Table – 2: Producers of Slate, 2012-13**

Name and address of producer	Location of mine	
	State	District
Shri Ashok Somany, Khol House, Circular Road, In front of Ramlila Ground, Rewari- 123 401 Haryana	Haryana	Rewari

**Table – 3 : Production of Slate, 2010-11 to 2012-13  
(By State)**

(Qty in tonnes; value in ₹'000)

State	2010-11		2011-12		2012-13 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>India</b>	-	-	-	-	<b>278</b>	<b>263</b>
Haryana	-	-	-	-	278	263

**Table – 4 : Production of Slate, 2011-12 & 2012-13  
(By Sector/State/District)**

(Qty in tonnes; value in ₹'000)

State/District	2011-12			2012-13 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
<b>India</b>	-	-	-	<b>1</b>	<b>278</b>	<b>263</b>
Private sector	-	-	-	1	278	263
<b>Haryana</b>	-	-	-	<b>1</b>	<b>278</b>	<b>263</b>
Rewari	-	-	-	1	278	263

**Table – 5: Mine-head Stocks of Slate, 2012-13 (P)  
(By States)**

(In tonnes)

State	At the beginning of the year	At the end of the year
<b>India</b>	<b>1260</b>	<b>1267</b>
Andhra Pradesh	660	660
Madhya Pradesh	600	600
Haryana	-	7

## SLATE, SANDSTONE AND OTHER DIMENSION STONES

**Table – 6 : Value of Production of Slate  
2009-10 to 2011-12  
(By States)**

State	2009-10	2010-11	2011-12(P)
<b>India</b>	<b>22209</b>	<b>36497</b>	<b>67187</b>
Andhra Pradesh	18261	21978	16567
Himachal Pradesh	1838	12156	46000
Jammu & Kashmir	1440	21	40
Rajasthan	670	2342	4580

*Source: State Governments.*

### MINING AND PROCESSING

Mining of slate is done by opencast method. The slate bands are exposed by removing the overburden by means of drilling and controlled blasting. The mining in many places is carried out by manual means but in some mines, semi-mechanised method of mining is also adopted. After removing a thick slab of slate, preferably of larger size, the slab is split using hammers, specially-made chisels and cutting knives. The saleable tile or slab of slate is obtained in 6 to 10 mm thickness for cladding and 20 to 35 mm thickness for flooring or for panels. The edges are cut manually by using machines to have a smooth and regular edge. The slate as building stone is marketed under the commercial names, such as Golden Copper, Green, Black, Panther, Mica, Speckled, Deoli, Mahi, Silver Grey and Peacock. Peacock is the only premier variety produced in Kund area, Haryana.

The overall recovery of slate is very low, being a fragile material among all the building/dimension stones. Normally, huge accumulation of broken pieces in and around the slate quarry is observed incidental to mining & processing. Proper mining and processing techniques by using modern equipment may improve the situation in future.

### USES AND SPECIFICATIONS

There are two main uses or applications of slate as a natural stone in building work: 1) for roofing in the form of roofing tiles, and 2) for flooring in the form of tiles and for cladding purposes.

For roofing tiles, the slate should be exfoliated easily and should be free from minerals like iron sulphides or carbonates which in time could cause corrosion and staining on roofing tiles. For cladding or flooring purposes, the slate should be able to bear the cutting processes in required sizes, polishing or

smoothing process by machines and should not peel off during the process of fixing or laying. Bureau of Indian Standard has laid down Standard IS : 6250-1981 (First revision; reaffirmed 2008) namely, specification for roofing slate tiles (First revision) with respect to requirement of dimensions, physical properties and workmanship of slate tiles used for sloped roof covering.

### 2. Sandstone

Sandstone is a sedimentary rock largely made up of sand grains in size ranging from 2 mm to 120 mm of varying compositions. The sand may consist of grains of quartz, felspar and other detrital minerals with interstitial cementing material. The composition of sand particles and the cementing material, by and large, defines the colour of sandstone, while the mode of formation decides the thickness of bed which gives rise to various types of sandstones.

The colour of sandstone may range from dark red to brown, earthy to buff, white, yellow and a number of other shades. The pattern of the sandstone depends upon the thickness of bed. Sandstone produced in the country is being marketed as Vindhyan Red, Rainbow, Teak, Modak, Bundi, Bansi Pink, Mandana, Dholpur Cream, etc. The sandstone may occur as massive, thick, non-splittable bands or thin beds or layers that can be split by applying slight pressure.

### RESOURCES

The occurrences of sandstone in India are spread over Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Madhya Pradesh, Meghalaya, Mizoram, Karnataka, Odisha, Punjab, Rajasthan, Uttar Pradesh, Tamil Nadu and West Bengal.

The resource estimation has not been considered important because of its abundance and easy availability. Hence, there is no comprehensive inventory of sandstone. However, the Centre for Development of Stones (CDOS), a Government of Rajasthan Undertaking has reported estimated reserves of sandstone at over 1,000 million tonnes in the country. Huge deposits of sandstone in Rajasthan are associated with Vindhyan and Trans-Aravalli Formations, exposed over an area of nearly 35,000 sq km covering districts of Dholpur, Bharatpur, Karauli, Sawai Madhopur, Tonk, Bundi, Jhalawar, Kota, Bhilwara and Chittorgarh. It is also found scattered in the districts of western desert plane. Splittable sandstone deposits are confined to an area of 16,000 sq km out of which 10,000 sq km lies in eastern and south-eastern Rajasthan and 6,000 sq km in western Rajasthan.

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In Gujarat, fine to medium-grained sandstone of varying colours ranging from white, light-purplish, reddish-brown, cream to yellow are found in the district of Kachchh. A brownish-yellow sandstone occurs near Chabari and Mainapara in Bhachau tehsil. The sandstone at Rampur, Katada-Roha and Rajoda Dungar near Mangwana in Nakhtrana tehsil is cream coloured and is fairly hard. Extensive deposits are found around Songir, Naswadi, Ghautoli, Namaria and Lachharas in district Vadodara.

The Vindhyan and Satpura Mountains in Madhya Pradesh have vast resources of sandstone. The red, cream and white sandstone are being quarried extensively in Panna and Shivpuri districts and in many areas near Jabalpur.

In Uttar Pradesh, sandstones suitable for making slabs and tiles are located in Agra, Mirzapur, Lalitpur, Allahabad and Sonbhadra districts. The sandstone of Lalitpur district is yellow, light green and maroon and takes good polish. The sandstone

in Lalitpur occurs in Madanpur and Rampura (near Deogarh) areas and is traded under the commercial name Royal Gold, Beach Sand and U.P. Green. The sandstone of Agra occurring in Tatpur area is red and mottled and is used for interior as well as exterior flooring and cladding. In Mirzapur and Sonbhadra areas, good quality buff to pale and creamish sandstone is available.

The felspathic sandstone occurring with the coal seams as overburden is also used as building stone. The Kamthi Sandstone occurring in and around tehsil Saoner, district Nagpur in Maharashtra, is being quarried in huge quantities and is used as building stone.

## EXPLORATION & DEVELOPMENT

The DMG, Rajasthan, has carried out exploration for sandstone in 2012-13. The details of exploration are given in Table -7.

**Table – 7: Details of Exploration Activities for Sandstone, 2012-13**

Agency/State/ District	Location/ Area	Mapping		Drilling		Sampling (No.)	Remarks/ Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
<b>DMG</b>							
<b>Rajasthan</b>							
Alwar/ Bharatpur	N/v Dhanwara, Chinawara, Goleta, Bhatesra	-	15	-	-	14	The potential deposits of masonry stone were marked in these two districts. Resources not estimated.
Nagaur	N/v Guda Bhagwan- Das, Alai Tehsil	1:50,000 1:10,000	150 15	- -	- -	- -	Around these areas at about 16 places occurrences of ferruginous fine grained sand stone, whitish brown fine grained massive sand stone were noticed. Thickness of these sand stone beds varies from 2 to 3 m. Resources were not estimated.
Pali	N/v Moklawas, Sevki, Kastide, Bhopalgarh Tehsil	1:2,000	2	-	-	-	The main rock types of these areas are fine to medium grained whitish brown sandstone. The Moklawas area comprises of thick beds of horizontally bedded brown coloured, fine to medium grained sandstone which are suitable for making slabs and blocks which is suitable to use as dimensional stones.

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### PRODUCTION

Data on production of sandstone is not available. However, it is estimated that Rajasthan may be producing about 90% of the sandstone in the country used for building purposes and as road metal along with quartzite. Production value of quartzite and sandstone as available is given in Table-8.

**Table – 8: Value of Production of Quartzite & Sandstone\*, 2009-10 to 2011-12 (By States)**

State	2009-10	2010-11	2011-12(P)
<b>India</b>	<b>6746712</b>	<b>6274461</b>	<b>7737267</b>
Himachal Pradesh	-	-	93200
Jammu & Kashmir	-	-	36728
Madhya Pradesh	426420	472788	491407
Rajasthan	6320292	5801673	7113770
Tamil Nadu	-	-	2162

(In ₹'000)

*Source: State Governments*

*\* Used for purposes of building or for making road metals and household utensils.*

The intensive quarrying activities in Rajasthan are in the districts of Bharatpur, Sawai Madhopur, Karauli, Tonk, Bundi, Jhalawar, Kota, Bhilwara, Chittorgarh, Jodhpur, Nagaur and Bikaner. The red and blue Lower Bhander Sandstones which are exposed over a large area of about 5,000 sq km in south-eastern Rajasthan, covering Kota, Bundi, Bhilwara, Chittorgarh districts are quarried at a number of places, important ones being Bijolia, Barisal, Navanagar, Banio-ka-Talab in Bhilwara district and Dabi, Budhpura, Umarthan in Bundi district. The splittable sandstone areas are Bhanpura, Rajpura, Kasara, Chobe-ki-Guwari, Mokanpura, Berda and Bhakri in Karauli district. Other important areas of sandstone quarrying in Dholpur, Bharatpur and Sawai Madhopur districts are Sar Mathura, Bari Baseri, Hindon, Sapatra,

Masalpur, Roopwas and Band-Barolla. In other districts, important places are Fidusar, Sursagar, Mandor and Balesar (Jodhpur district) and Chhoti and Badi Khatau (Nagaur district).

### MINING & PROCESSING

Mining of sandstone is generally done manually by using hammers and chisels of various shapes. Firstly, the overburden is removed which is in the form of soil, rubble or non-splittable sandstone. The hard non-splittable sandstone is then drilled and blasted to expose the underlying splittable sandstone. But, with the advent of sandstone cutting and polishing machines, this operation is also executed carefully to obtain Khandas and blocks for further processing in the form of slabs.

In conventional mining, advantage of the natural vertical joints present in the range from 0.6 m to 60 m, is taken. The initial quarrying starts from these joints. After making the initial cut, blocks having 1.2 m width, 3 to 4 m length and thickness up to the nearest cleavage plane are removed.

In absence of joints, a 'jhiri' is opened in a line by drilling closely spaced (about 15 cm apart) oblong or eye-shaped holes (duggis) of about 8 to 10 cm depth and the eye-shaped steel wedges (Gullas) are hammered in these holes by expert miners. The continuous hammering develops a crack along the holes. The mining starts from these blocks. The required length and width of the slab to be obtained is marked and cut accordingly using the same technique of wedging. The splitting of individual slab is carried out using natural bedding plane by inserting sharp wedges or by hammering alone.

The majority of quarry owners produce hand-dressed slabs and tiles in different thicknesses. But, in the present export market, machine-cut tiles are in demand. Presently, the simple edge cutting machines with single or double cutters are used for getting machine-cut tiles. The further requirement of tiles in 10 to 12 mm thickness with

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one side natural and other calibrated has resulted in establishing cutting and polishing units of sandstone. In Rajasthan, there are four units engaged in the production of polished sandstone tiles measuring 30 x 30 x 1 cm and 40 x 40 x 1.2 cm. The sandstone is also exported with natural, honed and polish-finishes. BIS has prescribed IS:3622-1977 (First Revision, reaffirmed 2003) as the specifications for sandstone slabs and tiles.

### 3. Dimensional Limestone

The limestone which is used as a dimension stone differs from the limestone used for cement making or for any other industrial purpose in two ways: firstly, chemical composition and secondly the mode of occurrence. In both the types, the major constituent is calcium carbonate but very high silica content gives limestone sufficient hardness to be utilised as a dimension or building stone. The industrial limestone occurs as massive formation with less intercalations, while in case of dimensional limestone, thin-bedded deposits are preferred. Limestone which is compact and amorphous in texture is known as flaggy or splittable limestone and is quarried in the form of thin slabs ranging in thickness from 12 mm to 50 mm in ready-to-use form .

Limestone has been used since ancient times for construction of houses, flooring and for various other building purposes. In recent times, the use of limestone has increased manifold mainly in interior flooring, cobble stones and for decorative purposes in combination with other stones because of its various colours and shades. Depending upon the place of origin of limestone and its colour, various types of nomenclatures have been used in the trade for limestone, such as, Cuddapah Stone, Shahabad Stone, Kota Stone with different shades and colours (Kota Blue, Kota Brown, etc.), Kutch Stone, Miliolitic Limestone, etc.

## OCCURRENCES

The occurrences of dimensional limestone have been reported from various states, such as, Shahabad Stone of Bijapur, Gulbarga and Belgaum districts in Karnataka; and 'Cuddapah Stone' of Kurnool, Anantapur and Guntur districts and 'Tandur Stone' of Cuddapah district, Andhra Pradesh, etc. Other coloured well-known limestones are from Betamacherla, Tadipatri, Macherla, Nereducherla and Muddimanikyam. 'Milliolitic Limestone' from Saurashtra region, 'Yellow Limestone' of Kachchh district of Gujarat, 'Kota Limestone' of Kota district and 'Yellow Limestone' of Jaisalmer district, Rajasthan are the other prime localities of dimensional limestone occurrences in India.

Rajasthan is endowed richly with the occurrence of greenish-grey 'Kota' limestone. The Kota stone has gained tremendous popularity and is widely used for flooring and cladding purposes. The important deposits of limestone are in Kota, Jhalawar, Chittorgarh and Jaisalmer districts, Rajasthan. Kota, Jhalawar, and Chittorgarh are the major producing districts of the dimensional limestone in the state. Extensive limestone deposits are found in the Upper Stage of the Lower Vindhya, represented by limestone which has a good potential as cement-grade limestone as well as flooring stone. Certain portions of the limestone having splittable form are used extensively as flooring stones. The limestone occurs in a north-south belt from Dalla-ka-Khera to Nimbahera and extends into Madhya Pradesh, covering a distance of about 70 km. It is fine-grained, thinly bedded and has a total thickness of about 150 m. At a few places, the major portion of the limestone deposit is suitable for cement making, but there are pockets containing splittable forms that can be used for building and flooring purposes directly.

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### Yellow limestone deposits of Jaisalmer:

The yellow limestone of Jaisalmer is of Jurassic age and is found at Jaisalmer, Bada Bag, Mool Sagar and Kanod villages. It contains 42 to 51% calcium oxide and has a thickness of about 3 m. It is quarried in the form of blocks and can be sawed into slabs and tiles. It is also termed as yellow marble as it takes reasonably good polish.

### Flaggy limestone deposits of Jhalawar and Ramganjmandi, Kota area:

It belongs to Lower Vindhyan Group and is available in plenty at Sarola Kotri Chitawa and Khokhriya-Khurd. Extensive deposits are available near Ramganjmandi, Aroliya and Parolia areas. Ramganjmandi and Jhalawar Road are the main railway stations from where the splittable limestone produced is dispatched to various parts of the country. In the last few years, export market of this limestone which is popularly known as 'Kota Stone' has also been developed.

## PRODUCTION

Data on value of production of limestone is furnished in Table-9.

## MINING AND PROCESSING

Although, the mining methods as well as the processing of limestone have changed over the years, still there is a scope for improvement in mining techniques. Simultaneously, the handling of waste and utilisation of waste rock is equally essential.

The mining of Kota Stone is carried out by opencast manual methods or by semi-mechanised methods. The Kota Stone is found in the form of natural thickness ranging from 12 to 150 mm or even more. The mined out slabs are cut to size by using hammer and chisel. Diamond saws are used to cut the tiles in required thicknesses and measurements. Tiles of Kota Stone are available in various sizes and thicknesses to suit the requirement of various building projects.

This stone has a good market potential and its demand can be increased manifold by adopting proper mining, processing and marketing techniques.

**Table – 9: Value of Production of Limestone\*  
2009-10 to 2011-12  
(By States)**

(In ₹'000)

State	2009-10	2010-11	2011-12(P)
<b>India</b>	<b>7900950</b>	<b>14185473</b>	<b>10920803</b>
Andhra Pradesh	11985	9899	16790
Chhattisgarh	1728827	1815068	2549338
Gujarat	994178	4619709	1297406
Himachal Pradesh	-	16598	-
Jammu & Kashmir	967	429	29025
Karnataka	115	-	-
Madhya Pradesh	4660	1157	1227
Rajasthan	4588201	7150596	6455000
Uttarakhand	572017	572017	572017

Source: State Governments

\* Used in kilns for manufacture of lime to be used as building material.

## EXPLORATION & DEVELOPMENT

No exploration activities were reported for dimensional limestone during 2012-13.

## USES & SPECIFICATIONS

Application of Kota Stone ranges from interior flooring, wall cladding to exterior use in paving and facades for building of all kinds and types.

The Kota Stone has a natural split non-slip surface. Massive, dense and fine-grained varieties are generally durable as these are not porous. These are tough and have a crushing strength of 17.8 kg/mm<sup>2</sup> and a high compressive strength of over 2189 kg/cm<sup>2</sup>. Abrasion value of Kota Stone is 18.12 to 18.32 and it has a high resistance to delamination and failure under freezing and thawing conditions.

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Bureau of Indian Standards has adopted Specification for Limestone (Slab & Tiles) as IS : 1128 - 1974 (First Revision, reaffirmed 2008).

### 4. Other Dimensional Stones

In addition to the dimension stones already described, other dimension stones are being quarried and used for the construction of houses and other building purposes.

In Odisha, Karnataka, Goa and in parts of coastal states, laterite is quarried in huge quantities. It is utilised as bricks in the construction of houses and pavements.

Huge deposits of basalt in Maharashtra, Karnataka and Gujarat are used as building stones since ancient times. Quartzite bands occurring along with phyllite schists are also utilised for building purposes.

In addition, stone aggregates, such as broken and sized pieces of limestone, dolomite, quartzite and sandstone are mixed either with cement for building and road-making purposes or with asphalt for mending road. To utilise the huge waste generated during mining and processing, a new variety of man-made stone "Terrazo" has been developed, which is composed of stone chips set in cement, epoxy or polyacrylate and then polished. The Terrazo is an economical alternative to solid marble slabs or tiles.

### 5. Felsite

Felsite is a fine, evenly grained acid or intermediate igneous rock, usually occurring as dykes and veins in country rocks and in the parent plutonic mass. BIS has prescribed the specification IS:10874-1983 (reaffirmed 2010) for felsite grinding media and liner stones.

The production of felsite at 1,196 tonnes in 2012-13 increased by 7% as compared to that in the previous year. There were five reporting mines in current year whereas there were three reporting mines in previous year. Three producers operating five mines accounted for the entire production of felsite during the year. All the mines are located in the districts of Mandya and Mysore, Karnataka (Tables - 10 to 12).

The mine-head stock of felsite at the end of the year 2012-13 was 4,810 tonnes as against 4,547 tonnes at the beginning of the year (Table-13).

The average daily employment of labour was 43 in 2012-13 as against 22 in the previous year.

**Table – 10: Producers of Felsite, 2012-13**

Name and address of producer	Location of mine	
	State	District
Shri B.C. Mudda Madappa, New Mysore Industries, 196, 23 <sup>rd</sup> Cross, 6 <sup>th</sup> Block, Jayanagar, Bengaluru, Karnataka.	Karnataka	Mysore
Smt. S. Rajee V. Raman, Flat No. G-2, "Srivara Krishan", 3 <sup>rd</sup> Main Road, V.V. Mohalla, Distt. Mysore, Karnataka.	Karnataka	Mysore/ Mandya
Shri J. Madhu No. 164, K.R.S Road, Mogarahally, Distt. Mandya - 571 438, Karnataka.	Karnataka	Mandya

**Table – 11 : Production of Felsite, 2010-11 to 2012-13 (By State)**

State	(Qty in tonnes; value in ₹'000)					
	2010-11		2011-112		2012-13 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>India</b>	<b>1670</b>	<b>2420</b>	<b>1117</b>	<b>2590</b>	<b>1196</b>	<b>1346</b>
Karnataka	1670	2420	1117	2590	1196	1346

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**Table – 12 : Production of Felsite, 2011-12 & 2012-13  
(By Sector/State/Districts)**

(Qty in tonnes; value in ₹'000)

State/District	2011-12			2012-13 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
<b>India</b>	<b>3</b>	<b>1117</b>	<b>2590</b>	<b>5</b>	<b>1196</b>	<b>1346</b>
Private sector	3	1117	2590	5	1196	1346
<b>Karnataka</b>	<b>3</b>	<b>1117</b>	<b>2590</b>	<b>5</b>	<b>1196</b>	<b>1346</b>
Mandya	2	518	2263	2	311	726
Mysore	1	599	327	3	885	620

**Table – 13: Mine-head Stocks of Felsite, 2012-13 (P)  
(By State)**

(In tonnes)

State	At the beginning of the year	At the end of the year
<b>India</b>	<b>4547</b>	<b>4810</b>
Karnataka	4547	4810

## TRADE POLICY

As per the export-import policy announced for the period 2009-14; and the Foreign Trade Policy as amended, the imports of slate blocks or slabs whether or not roughly trimmed or merely cut are restricted under heading no. 2514. On the other hand, worked slate and articles thereof or of agglomerated slate can be imported freely under heading no. 6803.

Import of crude or roughly trimmed/cut blocks or slabs of sandstone and other monumental or building stones; viz, pakur stone, stone boulders, and others, are restricted under heading no. 2516. However, sets of curbstones and flagstones of natural stone (except slate) under heading no. 6801 and worked monumental building stone (excluding slate), tiles, cubes and similar articles of natural stone including slate, under heading no. 6802 can be imported freely. Worked slate and

articles of slate or of agglomerated slate under sub-heading 6803 can also be imported freely. Exports of stone aggregates which are restricted under Chapter 25, are permitted to be exported to Maldives subject to ceiling limits. The limits are 5 lakh tonnes, 5.5 lakh tonnes and 6 lakh tonnes for the years 2011-12, 2012-13 and 2013-14, respectively. The annual ceilings are monitored by CAPEXIL subject to exporters obtaining appropriate clearances.

## WORLD REVIEW

Reserves of slate and other dimension stones are substantial in the world. Spain was the major exporting country for dimension stones in the world. Other important exporters of slate were China, Italy, India and Brazil. Major importers of slate were Germany, UK, USA and France.

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### FOREIGN TRADE

#### Exports

Exports of building and monumental stones (NES) decreased marginally to 1.53 million tonnes in 2012-13 from 1.63 million tonnes in 2011-12. Quantitywise, Maldives was the leading buyer sharing 39% in the total exports, followed by Bangladesh (25%), Belgium (10%) and UK (9%). Valuewise, UK was the leading buyer, contributing 27% to total value of exports, followed by Belgium (14%) and Maldives (10%) (Table - 14).

In 2012-13, the total exports of slate decreased slightly to 109 thousand tonnes from 113 thousand tonnes in 2011-12. Out of the total exports of slate during 2012-13, 21,020 tonnes was of slate (worked), while the bulk of exports i.e. 87,786 tonnes was of slate (others). USA was the leading buyer, accounting for over 49% value of the total slate exported followed by UK (12%) and Canada (6%) (Tables - 15 to 17).

In 2012-13, the exports of sandstone increased slightly to 0.45 million tonnes from 0.37 million tonnes in the previous year. The UK was the leading buyer in 2012-13 with 57% of the total value of sandstone exported followed by Canada with 6% (Table - 18).

#### Imports

During 2012-13, imports of building & monumental stones (NES) increased to 1.21 million tonnes from 1.14 million tonnes imported in the previous year. Bangladesh was the leading supplier contributing 40% to the total value of imports followed by Nepal (38%) (Table-19).

Imports of slate during 2012-13 were 213 tonnes compared to 201 tonnes in 2011-12. Imports of sandstone in 2012-13 were at 42 tonnes as there was no import reported during the previous year (Tables - 20 to 21).

**Table – 14: Exports of Building and Monumental Stones, NES (By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1630292</b>	<b>6311353</b>	<b>1533215</b>	<b>5803448</b>
UK	143719	1451755	136302	1563091
Belgium	130243	803851	154022	824637
Maldives	617487	570189	595829	561990
USA	37093	488858	12986	431219
France	30908	216019	59556	312776
Italy	30240	282636	30029	303995
Germany	27013	220317	31671	228901
Bangladesh	464667	226029	390706	208560
UAE	13503	135510	20640	147506
Australia	5647	92827	6372	104185
Other countries	129772	1823362	95102	1116588

**Table – 15 : Exports of Slate (By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>113257</b>	<b>1534802</b>	<b>108806</b>	<b>1463313</b>
USA	48058	748477	47586	715712
UK	16387	147155	18959	176233
Canada	7404	101543	5796	85305
Australia	5358	61954	6026	46010
Italy	3212	49659	2253	32301
UAE	1745	17503	2083	28740
Belgium	3042	41321	2357	28620
Mauritius	1179	17900	1940	25036
Mexico	1829	19533	2176	24881
Germany	2838	52072	887	23160
Other countries	22205	277685	18743	277315

**SLATE, SANDSTONE AND OTHER DIMENSION STONES**

**Table – 16 : Exports of Slate (Others)  
(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>93141</b>	<b>1115007</b>	<b>87786</b>	<b>1058186</b>
USA	35167	507951	32566	443726
UK	15112	129280	17450	152101
Canada	6275	77270	5463	77428
Australia	4542	44905	5196	41538
Belgium	2705	26523	2357	28620
UAE	1653	16020	1994	27030
Italy	2696	33951	2105	25515
Mauritius	1126	16751	1940	25033
Mexico	1623	16647	2127	23942
Malaysia	1728	16954	1657	16339
Other countries	20514	228755	14931	196914

**Table – 17 : Exports of Slate (Worked)  
(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>20116</b>	<b>419795</b>	<b>21020</b>	<b>405127</b>
USA	12891	240526	15020	271985
UK	1275	17874	1509	24132
Germany	439	30406	278	14175
China	155	2786	337	8526
Canada	1129	24273	333	7876
Indonesia	105	2259	266	7162
Spain	57	1233	243	6921
Italy	516	15708	148	6786
Australia	816	17049	830	4471
Chinese Taipei/ Taiwan	160	4787	107	3695
Other countries	2573	62894	1949	49398

**Table – 18 : Exports of Sandstone  
(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>370238</b>	<b>3865872</b>	<b>449566</b>	<b>5157602</b>
UK	166508	1828772	230469	2921188
Canada	10287	158532	17788	309135
Germany	13255	144540	21493	202530
USA	8628	113973	18724	189942
Australia	14061	236903	12426	179515
Belgium	26500	183277	21862	168000
Italy	19193	174311	16879	148720
UAE	10900	109829	10538	127401
France	22678	127452	23279	125169
Korea, Rep. of	10263	105955	11235	119015
Other countries	67965	682328	64873	666987

**SLATE, SANDSTONE AND OTHER DIMENSION STONES**  
**Table – 19: Imports of Building and Monumental Stones, NES**  
**(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1137648</b>	<b>1315295</b>	<b>1209334</b>	<b>1257111</b>
Bangladesh	437409	540816	359984	506164
Nepal	690212	375437	840333	472892
China	2360	91179	4270	130230
Oman	989	14568	280	19293
Ukraine	-	-	645	18148
Indonesia	245	9785	304	17253
UK	355	3812	1630	16230
Italy	943	35287	116	8961
South Africa	213	3347	425	8836
Norway	-	-	151	7547
Other countries	4922	241064	1196	51557

**Table – 20: Imports of Slate**  
**(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>201</b>	<b>9426</b>	<b>213</b>	<b>23025</b>
Korea, Rep. of	-	-	89	11095
China	147	7186	82	4415
Germany	7	605	14	3789
Spain	-	-	4	1670
Japan	5	429	3	975
Italy	-	-	21	970
USA	2	249	++	77
UK	36	230	++	33
Other countries	4	727	++	1

## SLATE, SANDSTONE AND OTHER DIMENSION STONES

**Table – 21 : Imports of Sandstone  
(By Countries)**

Country	2011-12		2012-13	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	-	-	<b>42</b>	<b>643</b>
Bangladesh	-	-	18	268
Japan	-	-	20	262
China	-	-	4	113

## FUTURE OUTLOOK

Slate is mostly used as a roofing material, but other uses like cladding and flooring tiles are also gaining momentum. Slates occur widespread in the country and detailed study is required to be conducted

to quantify the resources. About 80% production of slate in the country was exported, whereas remaining 20% is consumed in the domestic market. The demand for dimension stones including sandstone & others and stone products is anticipated to grow at around 15% CAGR. A similar growth is also expected in exports.

The demand for artifacts especially carved work is on the rise in all over the world. India with its rich tradition of craftsmanship and trained artisans can embark upon the world scene.

Improved quarrying, finishing and hauling technology, availability of greater variety of stones and the rising cost of alternative construction materials are among the factors that suggest a consistent increase in demand for dimension stones in future.