

SLATE, SANDSTONE AND OTHER DIMENSION STONES



Indian Minerals Yearbook 2014

(Part- III : Mineral Reviews)

53rd Edition

SLATE, SANDSTONE & OTHER DIMENSION STONES

(FINAL RELEASE)

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July, 2016

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 completed. 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).

EXPLORATION & DEVELOPMENT

No exploration activities were reported for slate during 2013-14.

PRODUCTION, STOCKS & PRICES

The production of slate at 339 tonnes in the year 2013-14 increased by 22% as compared to that in the previous year due to increase in demand. There was only one reporting mine of slate in both the years (Tables- 2 to 4).

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

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

Figures rounded off.

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The mine-head closing stock for the year 2013-14 was only 11 tonnes (excluding stocks of a mine in Madhya Pradesh which reported stocks up to 2012-13) as compared to 608 tonnes in the previous year (Table -5).

The average daily employment of labour in the slate mine during the year was only two as against five in the previous year.

The value of production of slate for 2012-13 was decreased to ₹ 2.03 crore from ₹ 6.72 crore in 2011-12 (Table-6).

Table – 2: Producers of Slate, 2013-14

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, 2011-12 to 2013-14 (P)
(By State)**

(Qty in tonnes; value in ₹ '000)

State	2011-12		2012-13		2013-14 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India/ Haryana	-	-	278	263	339	319

**Table – 4 : Production of Slate, 2012-13 & 2013-14 (P)
(By Sector/State/District)**

(Qty in tonnes; value in ₹ '000)

State/District	2012-13			2013-14 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	1	278	263	1	339	319
Private sector	1	278	263	1	339	319
Haryana	1	278	263	1	339	319
Rewari	1	278	263	1	339	319

**Table – 5: Mine-head Closing Stocks of Slate, 2012-13 & 2013-14 (P)
(By States)**

(In tonnes)

State	2012-13	2013-14 (P)
India	608	11
Haryana	8	11
Madhya Pradesh	600	*

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**Table – 6 : Value of Production of Slate
2010-11 to 2012-13(P)
(By States)**

State	2010-11	2011-12	2012-13(P)
	(In ₹'000)		
India	36497	67187	20332
Andhra Pradesh	21978	16567	5922
Himachal Pradesh	12156	46000	10200
Jammu & Kashmir	21	40	10
Rajasthan	2342	4580	4200

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 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 smoothening 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, feldspar 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 across 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-

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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.

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 2013-14. The details of exploration are given in Table -7.

Table – 7: Details of Exploration Activities for Sandstone, 2013-14

Agency/State/ District	Location/ Area	Mapping		Drilling		Sampling (No.)	Remarks/ Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DMG							
Rajasthan							
Alwar, Dhaulpur, Bharatpur Dausa	-	-	6.75	-	-	8	The potential deposits of masonry stone were marked in these districts. Resources not estimated.
Nagaur	-	1:10,000 1:2000	25 3	-	-	8	Occurrence of splittable & blockable sandstone. Resources not calculated.
Jhalawar	N/v Khamkhera, Nanera, Mawasa, Pathariya, Lambawar Tehsil-Aklera,	1:50,000 1:10,000 1:2,000	150 11 1.5	-	-	-	Occurrence of splittable sandstone for masonry. The resources were estimated for about 13.725 million tonnes.
Bundi	N/v Chatarganj, Gordhanpura, Chauhada, Pithapura, etc. Tehsil-Hindoli	1:50,000 1:10,000 1:2,000	155 10 1.75	-	-	12	Resources of masonry stone were estimated about 80 million tonnes.

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*, 2010-11 to 2012-13 (P)
(By States)

State	2010-11	2011-12	2012-13(P)
India	6274461	7735190	7609977
Himachal Pradesh	-	93200	155000
Jammu & Kashmir	-	36728	53355
Madhya Pradesh	472788	491407	11179
Rajasthan	5801673	7113770	7390200
Tamil Nadu	-	85	243

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 Sarmathura, Bari, Baseri,

Hindaun, Sapotra, 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, the natural vertical joints present in the range from 0.6 m to 60 m is an advantage. 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.

A 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 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 richly endowed 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 Vindhyan, 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 Nimbaheera 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.

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

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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 size and thickness to suit the requirement of different 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*
2010-11 to 2012-13(P)
(By States)**

(In ₹'000)

State	2010-11	2011-12	2012-13(P)
India	14185473	10920803	12138165
Andhra Pradesh	9899	16790	16997
Chhattisgarh	1815068	2549338	2860753
Gujarat	4619709	1297406	1160346
Himachal Pradesh	16598	-	-
Jammu & Kashmir	429	29025	26283
Karnataka	-	-	-
Madhya Pradesh	1157	1227	12069
Rajasthan	7150596	6455000	7489700
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 dimension limestone during 2013-14.

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/mm² and a high compressive strength of over 2189 kg/cm². 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.

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 549 tonnes in 2013-14 decreased by 57% as compared to that in the previous year. This decrease is due to temporary discontinuance of mining operations in the two felsite mines for want of environmental and forest clearance. There were three reporting mines in current year whereas there were five reporting mines in previous year. Two producers operating three 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 closing stock of felsite for the year 2013-14 was 5,052 tonnes as against 5,385 tonnes in the previous year (Table-13).

The average daily employment of labour was 10 in 2013-14 as against 40 in the previous year.

Table – 10: Producers of Felsite, 2013-14

Name and address of producer	Location of mine	
	State	District
Smt. S. Rajee V. Raman, Flat No. G-2, "Srivara Krishan", 3 rd Main Road, V. V. Mohalla, Dist. Mysore, Karnataka.	Karnataka	Mysore/ Mandya
Shri J. Madhu, No. 164, K. R. S Road, Mogarahally, Dist. Mandya- 571 438, Karnataka.	Karnataka	Mandya

**Table – 11 : Production of Felsite, 2011-12 to 2013-14 (P)
(By State)**

(Qty in tonnes; value in ₹'000)

State	2011-12		2012-13		2013-14 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India/ Karnataka	1117	2590	1266	909	549	449

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Table – 12 : Production of Felsite, 2012-13 & 2013-14 (P)
(By Sector/State/Districts)

(Qty in tonnes; value in ₹'000)

State/District	2012-13			2013-14 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	5	1266	909	3	549	449
Private sector	5	1266	909	3	549	449
Karnataka	5	1266	909	3	549	449
Mandya	2	315	234	2	237	180
Mysore	3	951	675	1	312	269

Table – 13: Mine-head Closing Stocks of Felsite, 2012-13 & 2013-14 (P)
(By State)

(In tonnes)

State	2012-13	2013-14 (P)
India	5385	5052
Karnataka	5385	5052

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) increased marginally to 1.69 million tonnes in 2013-14 from 1.54 million tonnes in 2012-13. Quantitywise, Bangladesh was the leading buyer accounting for 70% of the total exports, followed by Maldives (7%), UK (6%) and Belgium (5%). Valuewise, UK was the leading buyer, contributing 27% to total value of exports, followed by USA (13%) and Belgium (9%) (Table- 14).

In 2013-14, the total exports of slate decreased slightly to 86 thousand tonnes from 108 thousand tonnes in 2012-13. Out of the total exports of slate during 2013-14, 16,106 tonnes was of slate (worked), while the bulk of exports, i.e., 69,984 tonnes was of slate (others). USA was the leading buyer, accounting for over 45% value of the total slate exported followed by UK (10%) and Canada (4%) (Tables- 15 to 17).

In 2013-14, the exports of sandstone increased slightly to 0.54 million tonnes from 0.44 million tonnes in the previous year. Quantity-wise, UK was the leading buyer in 2013-14 with 61% of the total sandstone exported followed by Canada with 4% and value-wise also 63% and 5%, respectively (Table- 18).

Imports

During 2013-14, imports of building & monumental stones (NES) decreased considerably to 0.96 million tonnes from 1.21 million tonnes in the previous year. Nepal was the leading supplier contributing 47% to the total value of imports followed by Bangladesh (34%) (Table- 19).

Imports of slate during 2013-14 were 850 tonnes compared to 213 tonnes in 2012-13. Imports of sandstone in 2012-13 were at 42 tonnes. There was no import of sandstone reported during year 2013-14 (Tables-20 to 21).

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1540625	5806657	1686357	6268602
UK	136050	1563091	107818	1672610
USA	12944	431219	14297	822296
Belgium	153090	824637	86315	585938
Bangladesh	404445	211711	1176941	550640
France	59348	312776	49138	428563
Italy	29876	303995	19557	277608
Germany	29245	228901	18994	252183
Maldives	595829	561990	112319	142864
UAE	19776	147506	9301	142092
Australia	5936	104185	7498	131497
Other countries	94086	1116646	84179	1262311

Table – 15 : Exports of Slate (By Countries)

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	108028	1463313	86090	1688206
USA	47347	715712	35095	768470
UK	18959	176233	14634	173951
Canada	5796	85305	3473	63294
Germany	888	23160	1535	56250
Australia	5508	46010	3277	49410
Italy	2253	32301	2220	44245
Indonesia	1222	22775	1308	41416
Belgium	2357	28620	2372	34327
Mexico	2176	24881	1882	33598
Norway	181	3799	1334	31596
Other countries	21341	304517	18960	391649

SLATE, SANDSTONE AND OTHER DIMENSION STONES

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	86997	1058186	69984	1146507
USA	32295	443726	25757	509960
UK	17450	152101	13530	141391
Canada	5463	77428	3331	54214
Australia	4678	41538	2985	39052
Belgium	2357	28620	2344	33424
Indonesia	956	15613	1064	29861
Italy	2105	25515	1926	28158
Mexico	2127	23942	1755	27848
Germany	609	8985	1313	21991
Mauritius	1940	25033	1441	21313
Other countries	17017	215685	14538	239295

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	21031	405127	16106	541699
USA	15052	271985	9338	258510
Germany	279	14175	222	34258
UK	1509	24132	1104	32559
Chinese Taipei/ Taiwan	107	3695	56	16770
Italy	148	6786	294	16086
Norway	18	527	489	15319
Spain	243	6921	195	14204
France	57	2078	200	13140
Indonesia	266	7162	244	11555
China	337	8526	137	10389
Other countries	3015	59140	3827	118909

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

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	443010	5157627	540874	7579286
UK	230493	2921633	329143	4760663
Canada	17788	309135	20632	408021
USA	13516	189942	15016	284215
Germany	21136	202530	15576	228499
Australia	12184	179515	11495	216120
UAE	10538	127401	18537	214719
Italy	16879	148720	16682	213015
Korea, Rep. of	11235	119015	11112	145644
Belgium	21683	168000	14405	140982
France	23279	125169	14840	135505
Other countries	64279	666567	73436	831903

SLATE, SANDSTONE AND OTHER DIMENSION STONES

Table – 19: Imports of Building and Monumental Stones, NES (By Countries)

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1211434	1257775	958905	1147451
Nepal	842454	473793	699543	533753
Bangladesh	359984	506164	251907	387097
China	4334	134016	2062	64841
Germany	2	152	686	37991
South Africa	425	8836	977	21335
USA	53	1821	91	18872
Switzerland	++	4	88	16778
UK	1627	16083	1302	14930
Indonesia	330	18280	264	12747
UAE	75	4148	1353	7949
Other countries	2150	94478	632	31158

Table – 20: Imports of Slate (By Countries)

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	213	23024	850	23951
China	82	5137	815	21371
Spain	4	1670	4	1696
UK	++	33	29	450
USA	++	77	1	167
Italy	21	970	++	123
Germany	16	3952	1	115
Portugal	-	-	++	16
France	-	-	++	12
Other countries	90	11185	++	1

Table – 21 : Imports of Sandstone (By Countries)

Country	2012-13		2013-14	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	42	643	-	-
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. The demand for dimension stones including sandstone & others and stone products is anticipated to grow at around 15%. A similar growth is also expected in exports.

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

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.