

SRI LANKA STANDARD 677:1984

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**METHODS FOR
SAMPLING OF HEAVY MINERALS**

SRI LANKA STANDARDS INSTITUTION

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SRI LANKA STANDARD

METHODS FOR SAMPLING OF HEAVY MINERALS

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1984-12-20, after the draft, finalized by the Drafting Committee on Mineral Sands had been approved by the Chemicals Divisional Committee.

The heavy mineral beach sand deposits found in Sri Lanka, contain large concentrations of ilmenite, rutile, and manazite. Importance of mineral sands in the export market is well recognized. Therefore it is desirable that due consideration is given to scientific methods of sampling which will help in the proper and objective assessment of the chemical and physical characteristics of the material. This standard is intended to supplement product specifications for heavy minerals.

In the preparation of this standard, valuable assistance derived from the relevant publications of the Indian Standards Institution is gratefully acknowledged.

1 SCOPE

This standard prescribes the methods for sampling of heavy minerals from stock pile, from product while in motion, and from bags.

2 REFERENCES

SLS 428 Random sampling methods

3 DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

3.1 lot: The quantity of material, indicated to be of one type and grade, offered for inspection at one time and covered by a particular contract or shipping document.

- 3.1.1 A lot may consist of whole or a part of the quantity ordered or may consist of a part shipment or full shipment.
- 3.2 sub lot: The quantity of material in a portion of a lot, into which the lot is divided for the purpose of sampling.
- 3.3 primary sample (increment): A small quantity of material taken from a single position in a lot or sub-lot.
- 3.4 gross sample: The quantity of material obtained by mixing together all the primary samples collected from the same sub-lot.
- 3.5 individual sample: The quantity of material obtained by reducing a gross sample, following a specified procedure.
- 3.6 composite sample: The quantity of material prepared by mixing together in equal quantities, the material obtained from the gross samples and reduced following a specified procedure.

4 SAMPLING INSTRUMENTS

The following sampling instruments or any other suitable sampling instrument may be used.

- 4.1 Slotted tube sampler
 - 4.2 Hand scoop
 - 4.3 Sampling auger and casing tube
 - 4.4 Slotted tube sampler
 - 4.5 Spears
 - 4.6 Hand scoop
 - 4.7 Dividing instrument (sample divider)
 - 4.8 Shovel
- } for sampling from bulk
- } for sampling from bags
- > for mixing and dividing

5 SCALE OF SAMPLING

5.1 General

- 5.1.1 Each lot shall be tested separately to ascertain its conformity to the relevant product specification.

5.2 Sampling from stock piles or heaps

5.2.1. When the material offered for inspection is presented as stock piles or heaps (see Note) before drawing samples, such stock piles or heaps shall be divided into a number of sub-lots of approximately equal mass in accordance with Table 1, by suitably marking the line of demarcation on the surface of the stock pile or heap. The surface of the material in the sub-lot shall be levelled to a uniform height of not more than 1.2 m and each sub lot shall be sampled using the method given in 5.3.

NOTE - The size of the stock pile or heap will vary, particularly in height. Hence the collection of representative samples from a stock pile or heap becomes difficult and costly. For obtaining reliable conclusions, it is recommended that as far as possible, sampling be done when the product is in motion, that is during loading or unloading of stock pile or heap.

TABLE 1 - Number of sub-lots into which a lot is to be divided

Mass of the lot (tonnes)	Number of sub-lots
Up to 1 000	02
1 001 to 2 000	03
2 001 to 3 500	04
3 501 to 5 000	05

5.3 Sectional sampling

5.3.1 The number of primary samples to be collected from a sub-lot shall depend upon the quantity of the product in the sub-lot and shall be in accordance with Table 2.

TABLE 2 - Number of primary samples

Mass of the sub-lot (tonnes)	Number of primary samples to be selected
Up to 15	05
16 to 30	09
31 to 50	11
51 to 200	15
201 to 400	20
401 to 600	25
601 to 800	30
801 to 1 000	35

5.3.2 For collecting these samples an equal number of points shall be located at random on the surface of the material in each sub-lot. At every selected point, a primary sample shall be collected by taking the whole section of the product from top to bottom over an area of a circle of 150 mm diameter using an appropriate sampling instrument.

5.4 Sampling during loading or unloading of stock piles

5.4.1 The quantity of product to be loaded into or unloaded from a stock pile or heap shall be considered as divided into the number of sub-lots of approximately equal mass in accordance with Table 1.

5.4.2 The number of primary samples to be collected from each sub-lot shall be in accordance with Table 2. These primary samples shall be collected at regular time intervals during the whole period of loading or unloading the sub-lot, using an appropriate sampling instrument.

5.5 Sampling from product while in motion

5.5.1 *Sampling from a conveyor belt*

5.5.1.1 If sampling takes place while the product is being loaded to a ship or unloaded from a ship through a conveyor belt, the quantity of material shall be divided into a number of sub-lots of approximately equal mass in accordance with Table 1, before drawing samples.

5.5.1.2 The number of primary samples to be collected from each sub-lot shall be in accordance with Table 2. These primary samples shall be collected at regular time intervals from the conveyor belt using an appropriate sampling instrument.

5.5.2 *Sampling from a lorry or wagon*

5.5.2.1 If sampling takes place from wagons or lorries, each wagon or lorry shall constitute a sub-lot. The number of primary samples to be collected from a sub-lot shall be in accordance with Table 2. The primary samples shall be taken throughout the whole depth of the product by means of a sampling instrument.

5.6 Sampling from bags

5.6.1 For the purpose of sampling, all the bags in the lot shall be divided into a number of sub-lots of approximately equal mass in accordance with Table 1. The number of bags to be sampled from each sub-lot shall be in accordance with Table 3. These bags shall be selected at random. In order to ensure randomness of selection, random number tables as given in SLS 428 shall be used.

TABLE 3 - Number of bags to be selected from a sub-lot

Number of bags in the sub-lot	Number of bags to be selected
Up to 200	10
201 to 500	20
501 to 800	30
801 to 1 000	40

5.6.2 Two primary samples shall be drawn from opposite ends of a bag or across the diagonal of a bag using a spear or a sampling tube.

6 PREPARATION OF GROSS SAMPLE

6.1 All the primary samples collected from the same sub-lot shall be mixed together to constitute a gross sample.

7 PREPARATION OF COMPOSITE SAMPLE AND INDIVIDUAL SAMPLES

7.1 An equal quantity of material shall be taken from each gross sample of the lot and mixed together, and reduced (see 8) if necessary, to form a composite sample.

7.2 After taking a sufficient quantity of the material to form the composite sample, each gross sample in the lot shall be reduced (see 8) separately to form a set of individual samples.

8 REDUCTION OF A SAMPLE

8.1 Reduction by coning and quartering

8.1.1 The material shall be well mixed and made into a cone-shaped pile. After the cone is made, it shall be flattened by pressing the top of the cone. Then it is cut into quarters by two lines which intersect at right angles. The bulk of the sample is reduced by rejecting any two diagonally opposite quarters.

8.2 Reduction using an apparatus

8.2.1 The sample may be reduced using a mechanical sample divider or any other appropriate instrument.

9 PACKAGING AND LABELLING OF SAMPLES

9.1 Packaging of samples

9.1.1 The material in each individual sample shall be thoroughly mixed and divided into three approximately equal parts. All the three parts shall be carefully packed in a moisture-proof packing, either clean glass bottles or plastic bags, sealed and labelled. One sample shall be given to the buyer, one to the seller and the third shall be kept as a reference sample at a place agreed to between the buyer and the seller to be used in case of dispute between the two.

9.1.2 The composite sample shall be divided into three approximately equal parts and each part shall be packed, sealed and labelled. One sample shall be given to the buyer, one to the seller and the third shall be kept as a reference sample at a place agreed to between the buyer and the seller to be used in case of dispute between the two.

9.3 Labelling of samples

9.3.1 Each sample shall be marked with the following information;

- a) Name of the product;
- b) Sample number or other identification marks;
- c) Date of sampling;
- d) Place of sampling;
- e) Name and signature of person drawing sample; and
- f) Method of sampling (for example from bags, stock piles etc.).

10 REPORTING

10.1 For those characteristics where composite sample has been tested, only one test result will be available and that result shall be reported as the value of the characteristic for the lot sampled.

10.2 The results obtained by testing all the individual samples for moisture shall be reported in accordance with 10.2.1 or 10.2.2.

10.2.1 When only two individual samples have been analysed from a lot, the mean of two available test results shall be reported as the value of the characteristics for the lot sampled. The individual test results shall also be reported to give an indication of the range of variation in quality.

10.2.2 When three or more individual samples have been analysed from a lot, the mean and range of these test results shall be reported. The individual test results shall also be reported.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI which includes surveillance inspection of the factory, testing of both factory and market samples.

Further particulars of the terms and conditions of the permit may be obtained from the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.



SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.