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Indian Standard

**METHODS FOR GRADING AND
CLASSIFICATION OF MUSCOVITE MICA
BLOCKS, THINS AND FILMS**

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METHODS FOR GRADING AND CLASSIFICATION OF MUSCOVITE MICA BLOCKS, THINS AND FILMS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 November 1957, on approval by the Electrotechnical Division Council of the draft finalized on 12 October 1957, by the Mica Sectional Committee. It replaces IS : 13-1949 Methods for Grading Processed Mica (*Tentative*) and IS : 14-1949 Classification of Processed Muscovite Mica (*Tentative*) in respect of muscovite mica blocks, thins and films.

0.2 For many years, Indian mica producers have been using a particular system of size-grading and classification of muscovite mica. The Indian system has been adopted by various other countries, such as the USA, Canada, Brazil, South Africa, etc, and has been generally used in international trade. In order that this system may attain the status of a formally recognized International Standard, the Indian Delegation at the Conference of the United Nations' Standards Coordinating Committee held in London in 1946, which was the forerunner of present International Organization for Standardization (ISO), took initiative to include mica on the programme of ISO and accepted the responsibility of the Secretariat for the Technical Committee set up to deal with mica. This Committee known as ISO/TC 56 — Mica, is now constituted with the UK, USA, USSR, France, Australia, Czechoslovakia, Brazil and India as the Participating Members.

0.3 In 1949, ISI published two tentative Indian Standards, namely IS : 13-1949 and IS : 14-1949 and in its capacity as the Secretariat submitted them as draft proposals to ISO/TC 56 — Mica. After several years of discussion, the International Committee succeeded in preparing after its third meeting in Paris in October 1954, a draft ISO Recommendation for Methods for Grading Muscovite Mica Blocks, Thins and Condenser Films which was finally accepted at the fourth meeting in Harrogate (UK) in June 1958 with deletion of all references to 'condenser' for films. Classification of muscovite mica and grading of muscovite mica splittings are still under study by this Committee.

0.4 Taking into consideration the views of the producers, consumers and technologists, the Sectional Committee responsible for the preparation of this standard felt that it should be related to the trade practices followed in the country in this field. Furthermore, due weightage had to be given to the need for international co-ordination between standards prevailing in different countries of

the world. These considerations led the Sectional Committee to base this standard on the draft ISO Recommendation for Methods for Grading Muscovite Mica Blocks, Thins and Films as finally adopted at the Harrogate meeting. The classification of muscovite mica adopted in this standard also represents to a substantial extent agreements reached at the international level by ISO/TC 56 — Mica.

0.5 The development of a co-ordinated system of classification of muscovite mica according to visual quality has been found to present a number of difficulties. The quality classification of muscovite mica, being based on visual tests, depends on individual opinion. Also, products of different mines vary in physical characteristics to such an extent that the development of a single standard, with reasonable limits of tolerances, becomes an acutely difficult task. Added to these difficulties are the facts that quality classification has to be carried out by a large number of individual workers, and that it is highly influenced by such circumstantial factors as lighting conditions, mood of the inspector, etc. Under these circumstances, any standard for quality classification of mica, such as the one described in this standard, can give at best an approximate idea of a particular quality and its relative position with respect to other qualities.

0.6 The Government of India have decided to introduce throughout the country uniform weights and measures based on the metric system. Keeping this decision in view, a new set of grade designations based on metric units has been included in this standard together with the existing grade designations. The new designations are based on preferred numbers, which are dealt with in ISO Recommendation R3, July 1953 and IS : 1076-1957 Preferred Numbers. This has been done with a view to simplifying the notation and rationalizing the grading system to promote easy understanding in future. It is proposed that, in order to differentiate between the old and the new grade designations, the word 'size' be used in connection with the new grades while retaining the word 'grade' or 'number' to designate the old grades. For example, 'size 630' in the new system is equivalent to 'grade OOOE special' in the old, and 'size 40' is equivalent to 'No. 4'.

0.7 Requirements in respect of the minimum thickness of block mica appear to be different in different consuming countries. For this reason, in defining block mica, the minimum thickness has

been stated to be either 0.20 mm (or 0.008 in.) or 0.18 mm (or 0.007 in.) as may be agreed between the buyer and the seller (*see* IS:1174-1957 Definitions of Mica Terms). Producer countries are known to be prepared to supply block mica which would meet either of these limits.

0.8 The presence of 'V' cuts in full-trimmed mica has been a point of much discussion in ISO/TC 56. While all other Member Bodies agreed that specifying the minimum yield of a piece of mica (*see* 3.2) would automatically limit the presence of 'V' cuts, the French Member Body expressed the opinion that it would be desirable not to allow any 'V' cuts.

0.9 With a view to making allowances for unavoidable variations during manufacture and to facilitate commercial transactions, certain tolerances on all sizes of blocks, thins and films have been included in this standard. Tolerances to be permitted in acceptance inspection would always be a matter for agreement between the buyer and the seller and tolerances so agreed, unless otherwise stated, shall be considered as substitute for and not additional to any tolerances stated in this standard.

0.10 A set of Master Standard Samples referred to in the Note under 4.2.2 of this standard has been prepared by the Mica Sectional Committee of ISI. It is kept in the custody of the Geological Survey of India, Calcutta. Working Standard copies of these Master Standard Samples can be had on application and on payment of nominal cost, from the Director, Geological Survey of India, Calcutta.

0.11 This standard is one of a series of Indian Standards relating to grading and classification of muscovite mica. Other standards in the series are:

IS:1174-1957 DEFINITIONS OF MICA TERMS

*IS:1176- METHODS FOR GRADING AND CLASSIFICATION OF MUSCOVITE MICA SPLITTINGS

0.12 The Indian Standard Definitions of Mica Terms (IS:1174-1957) is a necessary adjunct to this standard. Besides, this standard requires reference to Indian Standard Preferred Numbers (IS:1076-1957).

0.12.1 Wherever a reference to any standard mentioned in 0.12, appears in this standard, it shall be taken as a reference to the latest version of the standard.

0.13 In addition to some of the unpublished material of various standards agencies, the following publications have been taken into consideration in drafting this standard:

ASTM DESIGNATION D 351-52 T TENTATIVE SPECIFICATIONS FOR NATURAL MUSCOVITE MICA BASED ON VISUAL QUALITY. American Society for Testing Materials.

ASTM DESIGNATION D 748-49 T SPECIFICATIONS FOR NATURAL BLOCK MICA AND MICA FILMS SUITABLE FOR USE IN FIXED MICA-DIELECTRIC CAPACITORS. American Society for Testing Materials.

PUB: MEI-1952 STANDARDS FOR MANUFACTURED ELECTRICAL MICA. National Electrical Manufacturers' Association, USA.

PUB: No. 11 LXXVII 11-1943 STANDARD SIZES AND QUALITIES OF INDIAN MUSCOVITE MICA INCLUDING NOTES ON ESTABLISHING SUCH A STANDARD. Geological Survey of India.

I.C. NO. 6258: SEPTEMBER 1943 STRATEGIC MICA. U.S. Department of Interior, Bureau of Mines, USA.

0.14 This standard is intended chiefly to cover the technical provisions relating to the supply of muscovite mica blocks, thins and films, and it does not include all the necessary provisions of a contract.

1. SCOPE

1.1 This standard describes a standard system of grading and classifying muscovite mica blocks, thins and films according to size, visual qualities, and presence of structural imperfections.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS:1174-1957 shall apply.

3. GRADING

3.1 General — The standard grading system for all full-trimmed muscovite mica is based on the maximum usable rectangle (usable area) that may be cut from the specimen, and not on the total area. (For half-trimmed muscovite mica, *see* 3.2.2). The grade designations for muscovite mica blocks, thins and films and the corresponding areas of the usable rectangles with minimum dimension of

ane side shall be as given in Table I and indicated in Fig 1. All mica blocks, thins and films shall contain a fair proportion of sizes throughout the entire range of the specified grade.

3.1.1 All specimens to be graded shall first be trimmed (*see* 3.2). The trimmed specimens shall then be graded according to the procedure laid down in 3.4. All muscovite blocks, thins and films shall meet, in the usable rectangle, the requirements of the desired visual quality specified in 4.

3.2 Trimming — All full-trimmed muscovite mica blocks, thins and films shall be trimmed as to remove all cracks, holes, reeves, cross-grains, etc, so as to comply with the specification for the desired visual quality. Trimming should follow the natural contour of mica. As far as possible, all marginal cracks should be removed by re-cutting.

*Under preparation.

3.2.1 The total area of full-trimmed size 40 (grade 4) and larger sizes shall be not more than 1.54 times the area of the largest usable rectangle or, in other words, shall have a rectangular yield of at least 65 percent with the tolerance that not more than 5 percent of blocks by weight shall have a yield of less than 65 percent. For full-trimmed size 20 (grade 5) and smaller sizes, the total area of each piece shall be not more than 2 times the area of the largest usable rectangle or, in other words, shall have a rectangular yield of at least 50 percent with the tolerance that not more than 5 percent of blocks by weight shall have a yield of less than 50 percent. The usable area of full-trimmed mica is the area of the maximum rectangle obtainable.

3.2.2 Half-trimmed mica shall be trimmed on two sides, with at least two-thirds of the pieces trimmed on two adjacent sides, the balance of the pieces trimmed on the two parallel long sides with no cracks extending into the area by which the piece is graded. The foregoing does not apply to sizes 06 and 16 (grades 6 and 5½), for which at least one of any two trimmed sides shall be free of cracks and no crack may extend into the area by which the piece is graded. The mica shall be capable of permitting the cutting of rectangles of accepted size and quality with a weight loss not to exceed 60 percent based on the total inspection sample.

3.2.3 If limitation as to the size, number and frequency of 'V' cuts is desired, it shall be subject to agreement between the buyer and the seller. If mica without any 'V' cut is demanded by a buyer,

it shall be supplied by the seller subject to mutual agreement.

3.2.4 Muscovite mica blocks shall be finished with sickle or knife-cut bevelled edges.

3.3 Grading Chart — The range of area and the minimum dimension of one side of the usable rectangle for the various grades given in Table I shall apply for grading all muscovite mica blocks, thins and films. A grading chart based on this table is shown in Fig 1. This chart, or templates prepared in accordance with it, shall be used for grading in accordance with the method outlined in 3.4.

3.3.1 For thumb-trimmed mica, the following additional grades shall be permissible:

Grade	Diameter of Usable Circle	
	cm	in.
Small punch	2.54	1
Punch	3.81	1.5
Circle	5.08	2

3.3.2 Madras rounds shall be graded to yield circles of the following diameters:

Grade	Diameter of Circle	
	mm	
25-29	25 to 29	
30-34	30 to 34	
35-39	35 to 39	
40-44	40 to 44	
45-49	45 to 49	
50-54	50 to 54	
55+	55 and over	

TABLE I STANDARD GRADING TABLE FOR MUSCOVITE MICA BLOCKS, THINS AND FILMS
(Clauses 3.1 and 3.3, and Fig 1)

GRADE DESIGNATION		AREA OF USABLE RECTANGLE		MINIMUM DIMENSION OF ONE SIDE OF USABLE RECTANGLE		PERMISSIBLE STRIP TOLERANCE	
(1)		(2)		(3)		(4)	
Old (Grade or Number)	*New (Size)	sq cm	sq in.	cm	in.		
OEEE Special	630	645.2 and above	100 and above	10.2	4	Nil	
OEE Special	500	516.1 tlt 645.2	80 tlt 100	10.2	4	Nil	
EE Special	400	387.1 tlt 516.1	60 tlt 80	10.2	4	Nil	
E Special	315	309.7 tlt 387.1	48 tlt 60	10.2	4	Nil	
Special	250	232.3 tlt 309.7	36 tlt 48	8.9	3½	Nil	
1	160	154.8 tlt 232.3	24 tlt 36	7.6	3	5% of pieces having width down to and including 5.1 cm (or 2 in.)	
2	100	96.8 tlt 154.8	15 tlt 24	5.1	2	5% of pieces having width down to and including 3.8 cm (or 1½ in.)	
3	63	64.5 tlt 96.8	10 tlt 15	5.1	2	5% of pieces having width down to and including 3.8 cm (or 1½ in.)	
4	40	38.7 tlt 64.5	6 tlt 10	3.8	1½	5% of pieces having width down to and including 2.5 cm (or 1 in.)	
5	20	19.4 tlt 38.7	3 tlt 6	2.5	1	Nil	
5½	16	14.5 tlt 19.4	2.25 tlt 3	2.2	7⁄8	Nil	
6	06	6.4 tlt 14.5	1 tlt 2.25	1.9	¾	Nil	
7	05	4.8 tlt 6.4	0.75 tlt 1	1.6	5⁄8	Nil	

(tlt = to less than)
*This system of grade designations should be considered as a first step towards a unified classification of all forms of mica based on a series of preferred numbers recommended in IS : 1076-1957 (see 0.6).

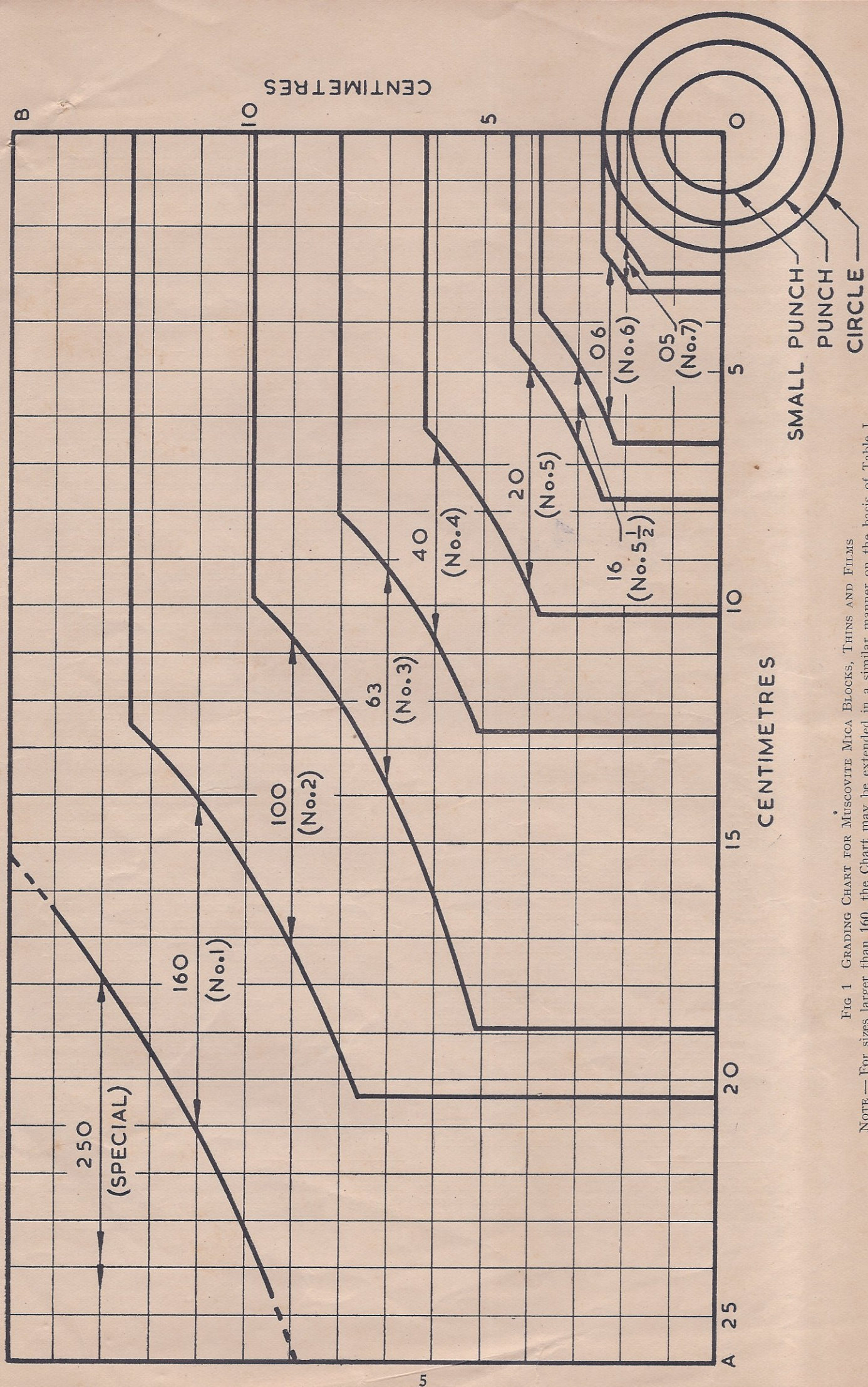


FIG 1 GRADING CHART FOR MUSCOVITE MICA BLOCKS, THINS AND FILMS

NOTE — For sizes larger than 160, the Chart may be extended in a similar manner on the basis of Table I.

3.4 Method of Grading — The specimen to be graded shall be laid upon the chart or corresponding template so that it covers point 0 and has its maximum and minimum dimensions extending along and covering lines 0A and 0B, respectively. The specimen shall be shifted until the usable area completely covers the largest rectangle, determined by a diagonal extending from point 0 to a point lying in one of the regions designated 05, 06, 16, 20, 40 . . . 500, 630. The number of the region, in which the diagonal of the rectangle terminates, designates the grade of the specimen.

3.4.1 For blocks, all dimensions shall apply to the smaller surface measured from the foot of the bevel-trimmed edge.

3.4.2 In no case shall a crack extend into the usable area.

4. VISUAL QUALITY CLASSIFICATION

4.1 Visual quality classification of muscovite mica blocks, thins and films shall follow trimming and grading in accordance with 3 and shall be as given in 4.2 and 4.3.

4.2 Blocks and Thins

4.2.1 The classification of visual quality of muscovite blocks and thins shall fall into the following 16 categories:

- V-1 Ruby Clear
- V-2 Ruby Clear and Slightly Stained
- V-3 Ruby Fair Stained
- V-4 Ruby Good Stained
- V-5 Ruby Stained A Quality
- V-6 Ruby AQ
- V-7 Ruby Stained B Quality
- V-8 Ruby BQ
- V-9 Ruby Heavy Stained
- V-10 Ruby Densely Stained
- V-11 Black Dotted
- V-12 Black Spotted
- V-13 Black Stained
- V-14 Green/Brown First Quality
- V-15 Green/Brown Second Quality
- V-16 Green/Brown Stained or BQ

4.2.2 The classification of muscovite mica blocks and thins into 16 categories shall be judged in terms of the requirements specified in Table II and the verbal descriptions given below:

- a) *V-1, Ruby Clear* — Hard, of uniform colour, flat, free from all stains and foreign inclusions, waves, cracks, buckles and other similar defects. Crystallographic discolouration is permitted to a limited* extent.
- b) *V-2, Ruby Clear and Slightly Stained* — Hard, of uniform colour, fairly flat, free from all vegetable and mineral stains, cracks, buckles and other similar defects, and foreign inclusions except for a few tiny air inclusions

in not more than one-fourth of the usable area. Crystallographic discolouration is permitted to a limited* extent.

- c) *V-3, Ruby Fair Stained* — Hard, of uniform colour, free from all vegetable and mineral stains, cracks, buckles and other similar defects and foreign inclusions, except that may be slightly wavy and may contain slight air inclusions in not more than one-half of the usable area. Crystallographic discolouration is permitted to a limited* extent.
- d) *V-4, Ruby Good Stained* — Hard, free from vegetable and mineral stains, cracks, buckles and other similar defects, and foreign inclusions, except that may be somewhat wavy but not rippled and may contain medium air inclusions in not more than two-thirds of the usable area, but may not have heavily concentrated air inclusions in any of the usable areas. Crystallographic discolouration is permitted to a limited* extent.
- e) *V-5, Ruby Stained A Quality* — Hard, free from cracks and other similar defects and foreign inclusions, except that may be wavy with slight buckles and may contain slight vegetable stains, slight mineral stains not exceeding two specks within the usable area, and the entire area may have air inclusions if not heavily concentrated over more than $\frac{1}{16}$ sq in. for grade 5 and up, and over more than $\frac{1}{4}$ sq in. for grade $5\frac{1}{2}$ and below. Crystallographic discolouration is permitted.
- f) *V-6, Ruby AQ* — Hard, free from cracks and other similar defects and foreign inclusions, except that may be wavy with slight buckles and may contain medium vegetable stains which are usually brown diffused stains, and the entire area may have air inclusions if not heavily concentrated. Occasional black dots are allowed. Crystallographic discolouration is permitted.
- g) *V-7, Ruby Stained B Quality* — Hard, free from cracks and other similar defects and foreign inclusions, except that may be wavy and slightly buckled and may contain heavy air inclusions, medium vegetable, clay, and mineral stains. Crystallographic discolouration is permitted.
- h) *V-8, Ruby BQ* — Hard, free from cracks and other similar defects and foreign inclusions, except that may be wavy and slightly buckled and may contain heavy air inclusions, heavy vegetable stains and medium mineral stains. Crystallographic discolouration is permitted.
- j) *V-9, Ruby Heavy Stained* — Hard, free from cracks and other similar defects and foreign

(Continued on page 8)

*In the absence of any agreement to the contrary between the buyer and the seller, 'limited' shall imply that discolouration is limited to not more than 25 percent of the bulk, and further that in each individual piece, such discolouration should be limited as to its density.

*In the absence of any agreement to the contrary between the buyer and the seller, 'limited' shall imply that discolouration is limited to not more than 25 percent of the bulk, and further that in each individual piece, such discolouration should be limited as to its density.

TABLE II QUALITY CLASSIFICATION OF MUSCOVITE MICA BLOCKS AND THINS BASED ON VISUAL PROPERTIES

VISUAL QUALITY CLASSIFICATION	AIR INCLUSIONS					WAVINESS					HARDNESS					TANGLE SHEET	HERRING-BONES	RIBBONED OR RULED										
	Very Slight <i>a</i>	Slight <i>b</i>	Medium <i>c</i>	Heavy <i>d</i>	CRYSTALLOGRAPHIC DISCOLOURATION	SMOKY STAINS	LIGHT DOTS (MINERAL)	SOOTY STAINS (MINERAL)	SLIGHT BLACK STAINS (MINERAL)	HEAVY BLACK STAINS (MINERAL)	SLIGHT RED STAINS (MINERAL)	MEDIUM GREEN STAINS (VEGETABLE TYPE)	CLAY STAINS	NEARLY FLAT	Slight				Medium	Heavy	Hard	Soft	Stones	BUCKLES	REEVES	RIDGES	TEARS	CRACKS OUTSIDE USABLE AREA
CLEAR-UNIFORM BASIC COLOUR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Clear	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Clear and Slightly Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Fair Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Good Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
A Quality	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby AQ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
B Quality	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby BQ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Heavy Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ruby Densely Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Black Dotted	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Black Spotted	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Black Stained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Green/Brown	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
First Quality Green/Brown	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Second Quality Green/Brown	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Green/Brown Stained or BQ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓ Permissible

a Few and tiny in one-fourth of usable area

X Not permissible

b In one-half usable area

S Permissible only if specified

c In two-thirds usable area

L Permissible to a limited extent

d Uniformly distributed

Symbols —

✓	Permissible	X	Not permissible	S	Permissible only if specified	L	Permissible to a limited extent
<i>a</i>	Few and tiny in one-fourth of usable area	<i>b</i>	In one-half usable area	<i>c</i>	In two-thirds usable area	<i>d</i>	Uniformly distributed

NOTE 1 — The visual properties of muscovite mica are usually judged under the following conditions:

i) *For stains and inclusions* — Transmitted daylight or equivalent.

- ii) *For air inclusions* — Reflected daylight or equivalent.
- iii) *For various bushes, ridges, etc.* — Reflected daylight or equivalent where distortion is not excessive.

iii) *For waves, uncles, nudes, etc* — reflected daylight or equivalent window frame can be judged.

NOTE 2 — The hardness or mechanical properties of muscovite mica are usually

NOTE 3—Muscovite mica occurs in various colours which are more pronounced in some than in others.

inclusions, except that may be wavy and buckled and may contain heavy air inclusions, heavy vegetable stains and medium mineral stains. Crystallographic discolouration is permitted.

- k) *V-10, Ruby Densely Stained* — May be soft and may contain heavy stains and inclusions, waves, cracks, buckles and other similar defects. Crystallographic discolouration is permitted.
- m) *V-11, Black Dotted* — Hard, free from cracks and other similar defects, but may contain medium waves, heavy air inclusions, vegetable stains and dispersed black dots. Crystallographic discolouration is permitted.
- n) *V-12, Black Spotted** — Hard, free from cracks and other similar defects and foreign inclusions, except that may be medium wavy and may contain slight buckles and vegetable stains, black or red spotted mineral stains, and heavy air inclusions. Crystallographic discolouration is permitted.
- p) *V-13, Black/Red Stained†* — Same as V-12 quality, except that may be soft and may have black lines and/or short red bars or connected stains.
- q) *V-14, Green/Brown First Quality* — Flat, hard, of uniform colour, free from all vegetable and mineral stains, cracks, buckles, and other similar defects and foreign inclusions, but may contain slight air inclusions in not more than one-half of the usable area.
- r) *V-15, Green/Brown Second Quality* — Hard, free from cracks and other similar defects and foreign inclusions, but may be wavy with slight buckles and may contain medium vegetable stains, and the entire area may have air inclusions if not heavily concentrated. Crystallographic discolouration is permitted.
- s) *V-16, Green/Brown Stained or BQ* — Free from cracks and other similar defects and foreign

*Also known as 'Spotted First Quality'.

†Also known as 'Spotted Second Quality'.

inclusions, but may be wavy and may contain heavy air inclusions, heavy vegetable stains and medium mineral stains. Crystallographic discolouration is permitted.

NOTE — In order to clarify the verbal descriptions given in 4.2.2, a set of Master Standard Samples has been prepared to illustrate each quality class. Working Standard copies of the Master Standard Samples may be had from the Geological Survey of India, Calcutta (see 0.10).

4.3 Films — Visual quality classification of muscovite mica films shall fall within the following categories:

- a) *First Quality* — Shall be of the visual quality that would result from the splitting of Fair Stained or a higher quality mica or its equivalent.
- b) *Second Quality* — Shall be of the visual quality that would result from the splitting of Good Stained mica or its equivalent.
- c) *Third Quality* — Shall be of the visual quality that would result from the splitting of Stained A mica or its equivalent.

5. TOLERANCES

5.1 Grading — In any one batch or shipment, a tolerance of 5 percent by weight of the next lower grade shall be permissible.

5.2 Classification — In all categories of visual quality of muscovite mica blocks and thins, and for first quality films, a tolerance of 10 percent by weight of pieces having characteristics of the next lower category shall be permissible. In the case of second and third quality films, a tolerance of 5 percent of off-standard pieces by weight shall be permissible.

6. PACKING

6.1 Mica shall be packed in wooden cases and secured in such a way as to prevent movement during transit. The inside of cases shall be free from nail-projections and shall be lined with paper.