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# INTERNATIONAL STANDARD



# 2185

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Muscovite mica blocks, thins and films — Visual classification

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## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2185 was drawn up by Technical Committee ISO/TC 56, *Mica*.

It was approved in August 1971 by the Member Bodies of the following countries :

Austria	India	Switzerland
Canada	Netherlands	Turkey
Czechoslovakia	Romania	United Kingdom
Egypt, Arab Rep. of	South Africa, Rep. of	U.S.A.
France	Spain	

The Member Body of the following country expressed disapproval of the document on technical grounds :

U.S.S.R.

Mica producers in different parts of the world are using varied, though basically similar, systems of classification of muscovite mica according to visual properties. The development of a co-ordinated standard is, however, beset with two major difficulties. Firstly, the quality classification of muscovite mica, being based on visual tests, depends on individual opinion. Secondly, products of different mines vary in physical characteristics to such an extent that the development of a single standard, with reasonable limits of tolerance, becomes an extremely 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.

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Under these circumstances, any standard for quality classification of mica such as the one described in this International Standard can give at best an approximate idea of a particular quality and its relative position with respect to other qualities.

On account of these considerations, ISO/R 67, *Muscovite mica blocks, thins and films – Methods for grading by size* has been issued separately. Another International Standard for grading and visual classification of muscovite mica splittings is under preparation.

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# Muscovite mica blocks, thins and films – Visual classification

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard establishes a system for classifying muscovite mica blocks, thins and films according to visual properties and structural imperfections.

## 2 DEFINITIONS

For the purpose of this International Standard, the following definitions apply :

**2.1 "A"** : Series of rulings or striations intersecting at an angle of about 60°.

**2.2 air chain** : A series of air inclusions or bubbles in the form of a chain or streak.

**2.3 buckle** : One or more large depression(s) and elevation(s).

**2.4 cracks** : Irregular visible fractures within a crystal that may be natural or may arise from blasting, rough handling, etc.

**2.5 cross-grains** or **jatahi** or **reeves** : Tangled laminations giving imperfect cleavage, which result in tears or breaks during splitting.

**2.6 crystallographic discoloration** : Discoloration appearing as bands of lighter or darker shades of the basic colour of a block of mica; such bands are generally parallel to the crystallographic faces of the crystal from which the block was separated.

**2.7 haircracks** or **hairline cracks** : Minute irregular cracks that are barely noticeable until mica is split into films, resulting in the production of torn films.

**2.8 hard mica** : Mica which, in thick pieces, gives an almost metallic sound when tapped.

**2.9 herring-bones** : Numerous rulings that intersect to form a series of V's, the legs making angles of about 120° and meeting at the apex to produce a herring-bone, horse-tail or feather structure.

**2.10 hole** : A perforation, sometimes minute, through the laminae.

**2.11 inclusion** : Inter-cleavage penetration of a foreign material, either gaseous or of mineral origin; for example, air inclusion, mineral inclusion.

### NOTES

1 Air inclusions appear as silvery bubbles when viewed by reflected light, and greyish spots when viewed by transmitted light.

2 The so-called "vegetable" inclusions are of pale yellow, brown, green or clay colour when viewed by transmitted light.

3 Mineral inclusions are distinctly black, red, brown or green when viewed by transmitted light.

**2.12 ribboned** or **ruled mica** : Mica which breaks into strips because of parallel fractures.

**2.13 ribs** or **ridges** : Crenellations in the form of steps.

**2.14 ripple** : Multiple short waves.

**2.15 soft mica** : Mica which, in thick pieces, gives a dull sound when tapped.

**2.16 stains** : Stains arise from foreign materials, resulting in a partial or total loss of transparency, and may be in the form of specks or patches of appreciable area; for example, slight stain, "vegetable" stain, clay stain, black stain, red stain, black speckled, light dot or spot, black, red, or green dot or spot, etc.

### NOTES

1 The so-called "vegetable" stains are of pale yellow, brown, green or clay colour when viewed by transmitted light.

2 Mineral stains are distinctly black, red, brown or green when viewed by transmitted light.

3 No data are available to support the impression that the "vegetable" stains are organic in nature. Tests conducted indicate that they are finely dispersed particles of the various iron oxides. The difference between these stains and the so-called mineral stains is probably only in their concentration, density, or type of oxide.

**2.17 stones** and **stone-holes** : Small embedded crystals or the holes resulting from them.

**2.18 tangle sheet** : Piece of mica that splits well in places but tears in others, producing a large percentage of partial films. Sometimes the term is applied to the intergrowth of mica crystals.

**2.19 "V" cuts or figure cuts** : Edge cuts converging towards the central area of the mica piece.

**2.20 waves** : Alternate elevations and depressions, which may be classified as slight, medium or heavy.

**2.21 wedge** : Piece of mica which, on splitting, yields pieces thicker at one end than at the other.

For definitions pertaining to commercial forms and trimming, see ISO/R 67.

**3 VISUAL QUALITY CLASSIFICATION**

Visual quality classification of muscovite mica blocks, thins and films as given in 3.1 and 3.2, follows trimming and grading in accordance with ISO/R 67.

**3.1 Blocks and thins**

**3.1.1** The classification of visual quality of muscovite mica blocks and thins falls into the following 13 categories :

- |                                |                        |
|--------------------------------|------------------------|
| V-1 Clear                      | V-6 Stained B quality  |
| V-2 Clear and slightly stained | V-7 Heavy stained      |
| V-3 Fair stained               | V-8 Densely stained    |
| V-4 Good stained               | V-9 Black dotted       |
| V-5 Stained A quality          | V-10 Black spotted     |
| V-5.1 Stained AI quality       | V-11 Black stained     |
|                                | V-12 Black/Red stained |

**3.1.2** The classification of muscovite mica blocks and thins is judged in terms of the requirements specified in the Table and the verbal descriptions given below :

**V-1 Clear** — Hard, of uniform colour, flat, free from all stains and foreign inclusions, waves, cracks, buckles, and other similar defects.

**V-2 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. Slight crystallographic discoloration is permitted to a limited extent.

**V-3 Fair stained** — Hard, of uniform colour, free from all vegetable and mineral stains, cracks, buckles and other similar defects, and foreign inclusions, except it may be slightly wavy, and may contain slight air inclusions in not more than one-half of the usable area. Slight crystallographic discoloration is permitted to a limited extent.

**V-4 Good stained** — Hard, free from vegetable or mineral stains, cracks, buckles and other similar defects, and foreign inclusions, except it may be medium 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 area. Slight crystallographic discoloration is permitted to a limited extent.

**V-5 Stained A quality** — Hard, free from cracks and other similar defects and foreign inclusions, except it may be medium wavy and may contain slight vegetable stains and the entire area may have air inclusions if not heavily concentrated. Crystallographic discoloration is permitted.

**V-5.1 Stained AI quality** — Hard, free from cracks and other similar defects and foreign inclusions except it may be wavy 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 an area greater than 40 mm<sup>2</sup> (0.062 5 in<sup>2</sup>) for grade 5 and above, and greater than 10 mm<sup>2</sup> (0.015 6 in<sup>2</sup>) for grade 5 1/2 and below. Crystallographic discoloration is permitted.

**V-6 Stained B quality** — Hard, free from cracks, and other similar defects and foreign inclusions, except it may be wavy and slightly buckled and may contain heavy air inclusions, medium vegetable, clay, and mineral stains. Crystallographic discoloration is permitted.

**V-7 Heavy stained** — Hard, free from cracks and other similar defects and foreign inclusions, except it may be wavy and buckled and may contain heavy air inclusions, heavy vegetable and medium mineral stains. Crystallographic discoloration is permitted.

**V-8 Densely stained** — May be soft and may contain heavy stains and inclusions, waves, cracks, buckles and other defects. Crystallographic discoloration is permitted.

**V-9 Black dotted** — Hard, free from cracks and other similar defects, but it may be medium wavy and may contain heavy air inclusions, vegetable stains and dispersed black dots. Crystallographic discoloration is permitted.

**V-10 Black spotted** — Hard, free from cracks and similar defects and foreign inclusions, except it may be medium wavy and contain slight buckles and vegetable stains, black spotted or red dotted mineral stains, and heavy air inclusions. Crystallographic discoloration is permitted.

**V-11 Black stained** — Hard, may contain medium waves, heavy air inclusions, smoky stains, black stains and red dots (mineral), green stains (vegetable type), and sand blast, medium black stains (mineral), slight red stains (mineral) and clay stains.

**V-12 Black/Red stained** — V-10 quality but may be soft and have black lines and/or short red bars or connected stains.

NOTE — In order to illustrate the verbal descriptions in 3.1.2, ISO/TC 56 has decided to prepare Master Standard Samples.

TABLE – Quality classification of muscovite mica blocks and thins based on visual properties

Visual quality classification	Crystallographic discoloration	Air inclusions				Stains				Waviness				Hardness														
		Very slight a	slight b	medium	heavy	smoky	mineral	vegetable	clay	flat	slight	medium	heavy	hard	soft	Stones	Buckles	Reeves	Ridges	Tears	Cracks	Hairline cracks	Wedge	Tangle sheet	Herring-bones	Sand blast		
V- 1 Clear	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Y	X	X	X	X	X	X	X	X	X	X	X	X	X
V- 2 Clear and slightly stained	Yd	Y	X	X	X	X	X	X	X	Y	X	X	X	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X
V- 3 Fair stained	Yd	Y	Y	X	X	X	X	X	X	Y	Y	X	X	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X
V- 4 Good stained	Yd	Y	Y	Yc	X	X	X	X	X	Y	Y	Y	X	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X
V- 5 Stained A quality	Y	Y	Y	Y	Ye	X	X	Yd	X	Y	Y	Y	X	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X
V- 5.1 Stained A1 quality	Y	Y	Y	Y	Yj	X	Yf	Yd	X	Y	Y	Y	Y	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X
V- 6 Stained B quality	Y	Y	Y	Y	Y	X	Yg	Yg	Yg	Y	Y	Y	Y	Y	X	X	Yd	X	X	X	X	X	X	X	X	X	X	X
V- 7 Heavy stained	Y	Y	Y	Y	Y	X	Yg	Yh	X	Y	Y	Y	Y	Y	X	X	Y	X	X	X	X	X	X	X	X	X	X	X
V- 8 Densely stained	Y	Y	Y	Y	Y	Yh	Yh	Yh	Yh	Y	Y	Y	Y	Y	S	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
V- 9 Black dotted	Y	Y	Y	Y	Y	X	Yk	Y	X	Y	Y	Y	X	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X
V-10 Black spotted	Y	Y	Y	Y	Y	X	Yl	Yl	X	Y	Y	Y	X	Y	X	X	Yd	X	X	X	X	X	X	X	X	X	X	X
V-11 Black stained	Y	Y	Y	Y	Y	Y	Yg	Y	Y	Y	Y	Y	X	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	Y
V-12 Black/Red stained	Y	Y	Y	Y	Y	Y	Yg	Y	Y	Y	Y	Y	X	Y	S	X	Yd	X	X	X	X	X	X	X	X	X	X	X

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- Y Permissible
- X Not permissible
- S Permissible only if specified
- a Few and tiny in one-fourth of usable area
- b In one-half usable area
- c In two-thirds usable area
- d Slight
- e Uniformly distributed
- f Not exceeding two specks within the usable area
- g Medium
- h Heavy
- j Not heavily concentrated over an area greater than 40 mm<sup>2</sup> (0.062 5 in<sup>2</sup>) for grade 5 and above, and greater than 10 mm<sup>2</sup> (0.015 6 in<sup>2</sup>) for grade 5 1/2 and below
- k Dispersed black dots

NOTES

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

- for stains and inclusions – transmitted daylight or equivalent;
- for air inclusions – reflected daylight or equivalent;
- for waves, buckles, ridges, etc – reflected daylight or equivalent, where distortion of parallel and vertical lines of reflected image such as a window frame can be judged.

2 The hardness or mechanical properties of muscovite mica are usually judged by a sharp, clear ring when mica is dropped on a hard surface.

3 Muscovite mica occurs in various colours which are more pronounced the thicker the block. Some typical colours are ruby, white, light green, rum, etc.

4 Cracks, Tears, Stones or Pin Holes are judged by transmitted daylight or equivalent.

5 Rigidity is judged by the relative stiffness when flexing with the fingers.

6 See section 2 for definition of terms used in the Table.

7 For verbal descriptions of these visual classifications, see 3.1.2.

### 3.2 Films

The classification of muscovite mica films falls into the following three categories :

**First quality** – of the visual quality that would result from the splitting of Fair Stained (V-3) or a higher quality mica (V-2, V-1) or its equivalent.

**Second quality** – of the visual quality that would result from the splitting of Good stained (V-4) mica or its equivalent.

**Third quality** – of the visual quality that would result from the splitting of Stained A and Stained AI (V-5, V-5.1) mica or its equivalent.

### 4 TOLERANCES

In all categories of visual quality of muscovite mica blocks and thins, and for first quality films, a tolerance of 10 % by mass of pieces having characteristics of the next lower category is permitted. In the case of second and third quality films, a tolerance of 5 % by mass of the next lower category is permitted.

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