

GOST 6120-75
Title FLEXIBLE MICANITE
Translated
and
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Micanite - Mica splittings bonded by varnish or shellac into a large sheet; mechanically weak at high temperatures.

Muscovite - The common or white mica; a hydrous silicate of aluminium and potassium, crystallizing in the monoclinic system. It occurs in many geological environments but deposits of economic importance are found in granitic pegmatites. It can be used as an insulator (not above 600°C, when its water of composition is driven off; see phlogopite), as a lubricant, or for non-inflammable windows.

Phlogopite - Hydrous silicate of potassium, magnesium, iron, and aluminium, crystallizing in the monoclinic system. It is a magnesium mica, and is usually found in metamorphosed limestones or in ultrabasic igneous rocks. Not so good an electrical insulator as muscovite (q.v.) at low temperatures, but keeps its water of composition until 950°C.

Glyptal resins - Alkyd resins.

Alkyd resins - Formerly known as glyptal resins, i.e., condensation products derived from glycerol and phthalic anhydride. Now the term also covers diallyl esters and various polyesters used as resin binders in alkyd moulding materials.

USSR STATE STANDARD

Flexible Micanite
Specifications
OKP 34 9211
(OKP)
Valid upto 01.01.1982

GOST 6120-75
This supersedes
GOST 6120-61

The present standard relates to flexible micanite intended for use as electrical insulating material in electrical machines and equipment.

1. GRADES AND DIMENSIONS

1.1. Nine different grades of micanite as shown in Table 1 are to be manufactured.

Table 1

Grade	Type of mica	Type of binder	Type of micanite	Long duration permissible operating temperature, °C
ГМС (GMS)	Muscovite	Oil-gl/ptal varnish	Without backing	130
ГФС (GFS)	Ordinary Phlogopite			
ГМЧ (GMCh)	Muscovite	Oil-bitumen varnish	With paper backing on both sides	130
ГФЧ (GFCh)	Ordinary Phlogopite			
ГМС-ББ (GMS-BB)	Muscovite	Oil-gl/ptal varnish	Without paper backing	180
ГФС-ББ (GFCh-BB)	Ordinary Phlogopite			
ГМЧ-ББ (GMCh-BB)	Muscovite	Oil-bitumen varnish	Without paper backing	180
ГФЧ-ББ (GFCh-BB)	Ordinary Phlogopite			
ГФК (GFK)	Heat resistant phlogopite	Organo-silicon varnish		

The letters in the grade denomination denote the following :

- Г (G) - flexible (M) ; M-muscovite;
- Ф (F) - phlogopite ; G-oil-glyptal varnish (light)
(S)
- У (Ch) - oil-bitumen varnish (black);
- В (K) - organo-silicon varnish ;
- ББ (BB) - With paper backing on both sides.

Conventional designation of micaite must consist of its grade and thickness and the designation of the present standard.

EXAMPLE OF CONVENTIONAL DESIGNATION of ГМC(GMS) grade micaite 0.5 mm thick.

Micaite ГМC 0.5 GOST 6120-75.
(GMS)

1.2. Micaite must be manufactured in sheets of width and length ranging from 450 to 900 mm with limit deviations of ± 15 mm in these dimensions. Micaite sheet dimensions are defined with the customer's concurrence.

A box may contain not more than two micaite sheets of length falling short of the figures indicated above by more than 200 mm.

1.3. Nominal thickness of micaite sheets and limit deviations in it must conform to values shown in Table 2.

Micaite of thickness over 0.5 mm may be manufactured with the customer's concurrence.

mm

Table 2

Grade	Nominal thickness	Limit deviation	
		Average	At particular points
GMS, GFS, GMCh	0.15	± 0.05	± 0.12 - 0.08
GFCh and GFK	0.20; 0.25	± 0.05	± 0.12
	0.30; 0.35; 0.4); 0.45; 0.50	± 0.08	± 0.15
GMS - BB GFS - BB	0.20; 0.25	± 0.05	± 0.12
GMCh - BB and GFCh - BB	0.30; 0.40; 0.45	± 0.08	± 0.15

2. TECHNICAL REQUIREMENTS

2.1. Micanite sheets must be free from peeling, through holes and extraneous inclusions. Their surface must be clean. Mica flakes must not peel off. Paperbacked micanite must not have any wrinkles in the paper layer leading to deviations in the thickness at particular points being exceeded. Paper layer must not peel off.

Micanite sheets must have evenly trimmed edges. A box may contain upto 10 % of micanite sheets with a cut not longer than 50 mm in one of the corners.

Micanite sheet may be compressed in the cold or hot condition.

2.2. Mica and binder must be uniformly distributed in micanite.

2.3. Micanite must conform to the requirements in Table 3 and 4 in respect of electrical properties and composition.

Norm for grades

Parameter	Norm for grades									
	GMS	GMS-BB	GMCh	GMCh-BB	GFC	GFS-BB	GFCh	GFCh-BB	GFK	
1. Dielectric strength in initial condition*, kV eff/mm, not less than, for thickness:										
	0.15-0.25 mm	28	21	28	21	24	21	24	21	23
0.30-0.50 mm	23	16	23	16	20	16	20	16	19	
2. Volume resistivity (for all thicknesses) ohm.cm, not less than in initial condition* after holding in air at 20±2°C and 95±2% Relative humidity for 48 hours ;	1.10 ¹³	1.10 ¹⁰	1.10 ¹⁰	1.10 ¹⁰	1.10 ¹⁰	1.10 ¹⁰	1.10 ¹⁰	1.10 ¹⁰	1.10 ¹⁰	1.10 ¹³
	1.10 ¹²	1.10 ¹¹	1.10 ¹²	1.10 ¹¹	1.10 ¹¹	1.10 ¹¹	1.10 ¹¹	1.10 ¹¹	1.10 ¹¹	1.10 ¹¹
3. Proportion of various components (for all thicknesses), % by weight volatile substances, not more than;	5	10	5	10	5	10	5	10	5	
	Binder: 10-25 mica: 75-90	10-25 not less than 50	15-25 75-85	15-25 not less than 50	10-25 75-90	10-25 not less than 50	15-25 75-90	15-25 not less than 50	12-31 69-88	

* At a temperature of 15 to 35°C and relative humidity of 45 to 75%. Annexure 2 lists average weight of 1 m² of flexible micanite.

2.4. Micanite of all grades must withstand :

- a) bending at a temperature of 15 to 35°C and relative humidity of 45 to 75 %;
- b) bending at a temperature of 15 to 35°C and relative humidity of 45 to 75 % after heating for 6 hours at a temperature of 105 ± 2°C.

Table 4

Micanite thickness, mm	Breakdown voltage at particular spots, not less than kV_{eff}		
	GMS and GMCh	GFS, GFCh and GFK	GMS-BB, GFS-BB, GMCh-BB and GFCh-BB
0.15	2.3	2.1	-
0.20	2.9	2.7	2.3
0.25	3.6	3.2	2.7
0.30	4.2	3.8	2.7
0.35	4.9	4.4	-
0.40	5.7	5.0	3.8
0.45	6.3	5.5	-
0.50	6.8	6.3	5.0

2.5. The following materials must be used in the manufacture of micanite: chipped muscovite mica or phlogopite conforming to GOST 3028-78; micatape paper conforming to GOST 6500-64, oil-bitumen, oil-glyptal, and organosilicon glueing varnishes conforming to technical documentation approved in the established manner.

Appearance, size, thickness and sort of mica used in the manufacture of micanite must be those approved in the established manner.

The use of other binders for each grade of micanite and of other base materials for micanite with backing material is permitted, provided the quality of micanite based on these alternatives is not below the requirements specified in the present standard.

The use of such materials must be got approved by the manufacturing ministry and the consumer ministry.

3. ACCEPTANCE RULES

3.1. Acceptance tests, periodic tests and type tests have been laid down for the manufacturer to check conformity of micanite with the requirements of the present standard.

3.2. Acceptance tests must be carried out on every batch of micanite on the following sampling scale :

- on 10% of the sheets of a batch against clauses 1.2 and 1.3 ;
- on every sheet against clauses 1.1 and 2.2 ;
- on a single sheet from a batch against clause 2.4a and items 1 and 3 of Table 3.

Micanite of a single grade and thickness manufactured using a single type of binder from one and the same mica and registered in a single quality certificate constitutes a batch. A batch should not weigh more than 350 kg.

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3.3. Periodic tests must be conducted at least once in six months against item 2 of Table 3 ^{and} clause 2.4b on sheets which have passed acceptance tests. The tests are conducted on a single sheet out of a batch.

3.4. If unsatisfactory results are obtained in acceptance and periodic tests, the particular tests are repeated on twice the number of sheets drawn from the same batch. If unsatisfactory results are obtained against clause 1.3, each sheet of the batch is subjected to the test. Results of repeated acceptance tests apply to the whole batch.

If unsatisfactory results are obtained in the repeated periodic tests, further supply of micanite to customers must be stopped, till the reasons for its nonconformity with the requirements of

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the present standard are found out and eliminated and satisfactory results are obtained in fresh tests.

3.5. Type () tests for conformity with all the requirements of the present standard must be conducted whenever there has been a change in the production process or in basic materials.

Sampling scale is the same as for acceptance and periodic tests.

The manufacturer must make the report on periodic and type tests available to the customers on request.

3.6. When the customer checks the quality of micaite, its marking and its packing for conformity with the requirements of the present standard, the sampling scale will be the one laid down in this standard for acceptance and periodic tests. A batch for purposes of customer's check consists of micaite of a single grade and thickness received against a single supporting document.

If unsatisfactory test results are obtained, the particular tests are repeated on twice the number of samples.

The results of the repeated test are applicable to the whole batch.

4. METHODS OF TESTING

4.1. Micaite must first be normalized for 24 hours at a temperature of 15 to 35°C and a relative humidity of 45 to 75% before the tests.

Normalizing of specimens may be skipped if tests are conducted within 24 hours of manufacturing micaite, provided it is stored at room conditions as per GOST 6433.1-71.

4.2. Dimensional check of micaite sheets must be carried out using a measuring instrument capable of providing measurement error not exceeding 1 mm.



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4.6. Dielectric strength of micaite must be determined in accordance with GOST 6433.3-71 at a temperature of 15 to 35°C and relative humidity of 45 to 75%.

The test is conducted by gradually increasing the voltage using cylindrical electrodes made out of copper or brass. The upper electrode is of diameter 25 ± 0.2 mm and the lower electrode of diameter 75 ± 0.2 mm. Five specimens each of size 150 x 150 mm are selected for the test. Alternatively, a single specimen large enough for testing breakdown at five spots without surface discharge may be used.

Breakdown voltage is measured with error not exceeding 0.1 kV.

Dielectric strength in kV/mm is calculated in accordance with GOST 6433.3-71 with error not exceeding 0.1 kV/mm.

4.7. Volume resistivity of micaite must be determined in accordance with GOST 6433.2-71 on three specimens of size 100 x 100 mm at a voltage of 100 to 1000 V (1000 V being the preferred value).

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Soft annealed aluminium foil of thickness 0.005 to 0.02 mm conforming to GOST 618-73 is used as electrode. The measuring electrode must have a diameter of 50 mm and the electrode to which voltage is applied, a diameter not less than 75 mm. The width of the protective ring electrode must be not less than 10 mm.

Pressure on the specimen must be $0.28 \cdot 10^4$ Pa (0.1 kgf/cm²).

4.8. Two weighed portions are taken for determining the proportion of the components. Each portion is made up of four cut pieces of approximately the same weight (two specimens from the centre of the sheet in two places and two from the edges of

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the sheet but not closer than 50 mm from the edge): The total weight is about 20 g for micanite without backing; each specimen from micanite sheet with backing should have an area of 50 cm². The selected specimens are cut up into pieces of size about 15 x 20 mm, placed in a porcelain crucible and weighed with error not exceeding 0.01 g.

The weighed portion is dried at a temperature of 105 ± 2°C till it attains a constant weight for determining the volatile substance content.

The weight is considered constant if it does not alter by more than 0.1 % in the course of one hour of drying.

Volatile substance content X_1 is calculated with error not exceeding 0.1 % from the formula

$$X_1 = \frac{m_1 - m_2}{m_1} \cdot 100,$$

where m_1 is the weight of micanite before drying, g and m_2 is the weight of micanite after drying, g.

Mica and binder contents are determined by calcining the crucibles containing the dried micanite, in a muffle furnace at a temperature of 500 ± 10°C for not less than one hour. The crucibles are then cooled in a desiccator containing calcium chloride down to a temperature of 15 to 25°C and weighed with error not exceeding 0.01 g.

Binder Content X_2 and mica content X_3 are calculated with error not exceeding 0.1 % using the formulae given in Table 5.

Table 5

Grade	Formula for determining	
	binder content	mica content
GMS, GFS, GMCh and GFCh.	$X_2 = \frac{m_2 - m_3}{m_2} \cdot 100$	$X_3 = \frac{m_3}{m_2} \cdot 100$
GMS -BB, GMCh-BB, GFS -BB, GFCh-BB	$X_2 = \frac{m_2 - (m_3 - m_4)}{m_2} \cdot 100$	$X_3 = \frac{m_3}{m_2} \cdot 100$
GFK	$X_3 = \frac{2.5 (m_2 - m_3)}{m_2} \cdot 100$	$X_3 = 100 - X_2$

where m_3 is the weight after calcination, g and

m_4 is the weight of paper in the specimens of paper-backed micanite, g.

The arithmetic mean value of the proportion of volatile substances binder and mica determined on two weighed portions is taken as the test result.

4.9. Flexibility of micanite must be determined on a specimen of width 50 mm and length at least twice the circumference of the mandrel which in turn must have a diameter 100 times the sheet thickness.

Before the test against clause 2.4 (b) the specimens are held at a temperature of $105 \pm 2^\circ\text{C}$ for 6 hours and cooled down to 15 to 35°C . The specimen is bent around the mandrel in a single layer. It must bend freely without peeling.

5. PACKING, MARKING, TRANSPORT AND STORAGE

5.1. Micanite sheets of a single grade and thickness, manufactured from one and the same mica must be formed into packets.

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The packets must be wrapped in packing paper conforming to GOST 515-77 or waxed paper to GOST 9569-79 and tightly packed in plywood boxes to GOST 5959-80. Gross weight of the box should not exceed 60 kg.

5.2. The cases must be marked in accordance with GOST 14192-77. The following additional designations should also be marked.

box number;

gross and net weight in kilograms;

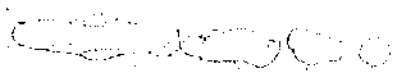
conventional designation of micaite.

The (caution) handling sign "Keep away from moisture " must be painted on the case.

5.3. Each box containing micaite must be accompanied by a manufacturer's document attesting conformity of the micaite with the requirements of the present standard. The document should also contain the following :

- a) micaite grade ;
- b) thickness in millimetres ;
- c) size and sort of mica ;
- d) weight of 1 m² of paper (for paper-backed micaite);
- e) net weight in kilograms;
- f) batch number and date of manufacture ;
- g) box number ;
- h) designation of the present standard ;
- i) test results ;
- j) stamp of the manufacturer's quality control department.

5.4. Micaite in factory packing may be carried by any form of transport ensuring protection from atmospheric precipitations.



Micanite must be protected against impact and mechanical damage during transport.

5.5. Micanite must be stored in factory packing in enclosed premises and arranged on shelves or pallets clear of the floor by 5 cm and of heating systems by 1 m.

Micanite must be held in a heated enclosure at a temperature not lower than 10°C for 24 hours before use.

6. MANUFACTURER'S GUARANTEE

6.1. The manufacturer must guarantee conformity of the micanite produced with the requirements of the present standard provided the storage conditions laid down in this standard are observed.

6.2. Guaranteed shelf life for micanite is 2 months for the oil-glyptal and oil-bitumen varnish-based variety and 3 months for the organosilicon varnish-based variety reckoned from the date of manufacture.

Micanite must be checked for conformity with all the requirements of the present standard after the expiry of the guaranteed shelf life and before use.

ANNEXURE 1
For reference

MARKING OF FLEXIBLE MICANITE

Marking of micanite as per the present standard	Designation of micanite grades as per GOST 6120-61
GFCh-BB (ГФЧ-ББ)	GFChO (ГФЧО)
GFС-BB (ГФС-ББ)	GFСO (ГФСО)
GMCh-BB (ГМЧ-ББ)	GMChO (ГМЧО)
GMS-BB (ГМС-ББ)	GMSO (ГМСО)

ANNEXURE 2
for reference

AVERAGE WEIGHT OF 1 m² OF FLEXIBLE MICANITE

Nominal thickness, mm	Weight of 1 m ² of micanite without backing, kg	Weight of 1 m ² of micanite with backing, kg
0.15	0.260	0.250
0.20	0.350	0.330
0.25	0.430	0.410
0.30	0.520	0.500
0.35	0.610	0.580
0.40	0.695	0.660
0.45	0.780	0.745
0.50	0.870	0.830

Amendment No. 1 to GOST 6120-78

Valid from 01.01.1981

Insert OKP Code number 34 9:11 under title.

Add to clause 1.1.

" The reference annexure lists OKP Code numbers for various grades and standard sizes of micanite".

Clause 2.3. Table 3 Item 3. to read "proportion of components" ~~as~~
by "weight".

Clause 2.5. Amend reference GOST 3028-68 to GOST 3028-78.

Clause 5.1. Amend reference as below :

GOST 515-56 to read GOST 515-77.

GOST 9569-65 to read GOST 2669-79.

Clause 5.2. Amend reference to : GOST 14192-71 to read
GOST 14192-77 and " caution sign " to read " handling sign "

Clause 6.1. Insert new version

" 6.1. The manufacturer guarantees conformity of micanite
with the requirements of the present standard provided
storage conditions are observed ".

Add new annexure 3 to the standard :

Micaite grade	Thickness, mm	Sheet size	mica type	OKP Code
ГФС; ГФ4 GFS; GFCh	from 0.30 to 0.50 incl.	15		34 9211 1209
		10		34 9211 1210
		6		34 9211 1211
		15*		34 9211 1212
		10*		34 9211 1213
ГМС-ББ (GMS-BB) ГМЧ-ББ (GMCh-BB)	from 0.20 to 0.25 incl.	15	1	34 9211 1301
			2	34 9211 1302
		10	1	34 9211 1303
			2	34 9211 1304
	from 0.20 to 0.50 incl.	6	1	34 9211 1305
			2	34 9211 1306
ГФС-ББ (GFS-BB) ГФЧ-ББ (GFCh-BB)	from 0.20 to 0.25 incl.	15		34 9211 1401
		10		34 9211 1402
	from 0.20 to 0.50 incl.	6		34 9211 1403
ГФК GFK	0.15	30*	-	34 9211 1501
		20*		34 9211 1502
	from 0.20 to 0.25 incl.	15*		34 9211 1503
	from 0.20 to 0.50 incl.	10*		34 9211 1504
	from 0.30 to 0.50 incl.	6*		34 9211 1505

* Heat-resistant mica

(ISI No 9, 1981)

ANNEXURE 3

For reference

OKP Codes

Micanite grade	Thickness, mm	Sheet size	Mica type	OKP Code
GMS; GMCh (ГМС; ГМЧ)	0.15	50	2	34 9211 1101
		40	2	34 9211 1102
		30	1	34 9211 1103
			2	34 9211 1104
		20	1	34 9211 1105
			2	34 9211 1106
	from 0.20 to 0.25 incl.	50	1	34 9211 1107
		15	1	34 9211 1108
			2	34 9211 1109
		10	1	34 9211 1110
			2	34 9211 1111
		from 0.30 to 0.50 incl.	6	1
			2	34 9211 1113
	from 0.20 to 0.25 incl.	20	1	34 9211 1114
from 0.30 to 0.50 incl.	10	1	34 9211 1115	
		2	34 9211 1116	
0.15	30		34 9211 1201	
	20		34 9211 1202	
GFS; GFCB (ГФС; ГФЧ)	from 0.20 to 0.25 incl.	50		34 9211 1203
		40		34 9211 1204
		30		34 9211 1205
		20	-	34 9211 1206
		15		34 9211 1207
		10		34 9211 1208

BASE SI UNITS

Quantity	Unit		
	Name	Russian symbol	International symbol
Length	metre	М	m
Weight (Mass)	Kilogram	кг	kg
Time	second	с	s
Current	ampere	А	A
Thermodynamic temperature	kelvin	К	K
Amount of substance	mole	моль	mol
Intensity of light	candela	кд	cd

SUPPLEMENTARY SI UNITS

Plane angle	radian	рад	rad
Solid angle	steradian	ср	sr

DERIVED SI UNITS WITH PROPRIETARY NAMES

Quantity	Unit		Expression for derived unit		
	Name	Symbol	using other units	using base SI units	
Frequency	hertz	Hz	-	s^{-1}	
Force	newton	N	-	m, kg.	s^{-2}
Pressure	pascal	Pa	N/m^2	m, kg.	s^{-2}
Energy, work, heat	joule	J	N.m	m, kg.	s^{-2}
Power, energy, flow	watt	W	J/c	m, kg.	s^{-3}
quantity of electricity, electric charge	coulomb	C	A.s	S.A	
Electric potential	volt	V	W/A	m, kg.	$s^{-3} s^{-1}$ S.A
Electric capacitance	farad	F	C/V	m, kg.	$s^{-4} s^{-2}$ S.A
Electric resistance	ohm		V/A	m, kg.	$s^{-3} s^{-2}$ S.A
Conductance	siemens	S	A/V	m, kg.	$s^{-3} s^{-2}$ S.A
Magnetic flux	weber	Wb	V.s	m, kg.	$s^{-2} s^{-1}$ S.A
Magnetic induction	tesla	T	Wb/m ²	kg.	$s^{-2} s^{-1}$ S.A
Inductance	henry	H	Wb/A	m, kg.	$s^{-2} s^{-2}$ S.A
Luminous flux	lumen	lm	-	cd.sr. *	
Illumination	lux	lx	-	m^{-2} cd.sr.*	
Nucleid activity	becquerel	Bq	-	s^{-1}	
Radiation dosage	grey	g	-	$m^{-2} s^{-2}$	

* The supplementary unit steradian figures along with base SI units in these two expressions.

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