GOST	:	10549-73
Title	:	MOULDING POLYAMIDE 610
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Checked

Name:

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STATE STANDARD OF THE USSR

MOULDING POLYAMIDE 610

GOST 10589-7[illegible]

OFFICIAL EDITION

STATE COMMITTEE ON STANDARDS
COUNCIL OF MINISTERS, USSR
MOSCOW

Parameter	Standard value		Test procedure
	for high grade product	for first grade product	
1. External appearance	White granules 3 to 3.5 mm in size without oxidised resin particles	Light yellow granules 3 to 5 mm in size	As per para 3.2
2. Water content, % not greater than	0.2		As per GOST 11736-68 and para 3.3 of this standard.
3. Melting point °C	215 to 221		As per GOST 18995.4-73 and para 3.4 of this standard.
4. Viscosity number, ml/g	130 to 190		As per GOST 11034-71 and para 3.5 of this standard.
5. Bending stress kgf/cm^2, not less than	90		As per GOST 4648-71 and para 3.7 of this standard.
6. Impact strength $kgf.cm/cm^2$, not less than	-		As per GOST 4647-69 and para 3.8 of this standard.
a) of notched specimens	5		
b) of un-notched specimens	100		
7. Volume resistivity ohm. cm, not less than	$1X10^{14}$		As per GOST 6433.2-71 and para 3.9 of this standard.
8. Dissipation factor at 10 Hz, not greater than	0.01		As per GOST 22372-77 and para 3.10 of this standard.
9. Dielectric strength, kV/mm not less than	20		As per GOST 6433.3-71 and para 3.11 of this standard.

Note:

1. Parameters 7 to 9 are determined for every tenth batch.
2. Polyamide 610 may be supplied in the form of granules not more than 5 mm in size upto 10% of the batch weight.
3. A table of reference parameters relating to polyamide 610 is given in the annexure.

(REVISED EDITION "INF. INDICATOR OF STANDARDS", No. 4, 1974).

2. ACCEPTANCE PROCEDURE

2.1. Moulding polyamide 610 must be supplied in batches. A quantity of uniform quality product obtained from a single synthesizing operation supported by a single quality certificate constitutes a batch. A batch must weigh not less than 500 kg.

2.2. Specimens are collected from 10% of the bags at random from a batch, or from three bags, whichever is greater.

2.3. If results obtained from the tests on even a single one of these parameters are unsatisfactory, retest is carried out in respect of that parameter on specimens collected from twice the number of bags.

Results of the retest are final and applicable to the whole batch.

3. TEST PROCEDURE

3.1. Individual specimens taken from bags selected at random as per para 2.2 are mixed up. The common specimen so obtained is thoroughly stirred and "quartered" to a one kg weight of average specimen.

This average specimen is placed in a clean dry jar with a tightly fitting lid or in a polyethylene packet. A tag containing the name of the product, the batch number and date of collection of the sample is pasted on the jar or packet or placed inside.

3.2. The external appearance of moulding polyamide 610 is determined visually by comparing 100 g of the product drawn from the average specimen with a high or first grade standard specimen approved in the established manner. The quantity of oxidised resin particles in first grade polyamide 610 is a metter for negotiation between manufacturer and user.

3.3. Water content is determined as in GOST 11736-38.

About 1 g of moulding polyamide 610 is ground to a powder and weighed with an accuracy of 0.0002 g. The weighed portion is placed in a 100 ml capacity conical flask with a ground glass stopper (GOST 10394-72). Fifty ml of distilled M-cresol and 10 ml of anhydrous methanol (GOST 2222-70 are added to it. The flask is tightly closed with a stopper and placed in a heating chamber at 60 to 65° C for 3 hours so that the polyamide is completely dissolved. The flask is then cooled down to room temperature. Titration is done with Fischer reagent in accordance with GOST 11736-68.

3.3.1. Water content determination by the dry method.

About 2 to 3 g of polyamide 610 is weighed in a weighing bottle accurately with error not exceeding 0.0002 g. The weighing bottle itself is first dried till it attains a constant weight and is weighed accurately with error not exceeding 0.0002 g.

The weighing bottle is kept open in a heating chamber and dried at 125 ± 2° C for 4 hours. It is cooled down to room temperature, closed and placed in a desiccator containing calcined calcium chloride (GOST 4460-77). It is then held in air for 30 minutes and weighed.

The water content (X) as a percentage is calculated from the formula:

$$X = \frac{(m_1 - m_2) \times 100}{m}$$

where m is the weight of polyamide, g;

m_1 is the weight of the weighing bottle with polyamide before drying, g;

m_2 is the weight of the weighing bottle with polyamide after drying, g;

(REVISED EDITION - "INF. INDICATOR OF STANDARDS" No. 4, 1974).

3.4. Melting point is determined as per GOST 18995.4-73 using glycerine as the heat-carrier in accordance with GOST 6824-76.

Polyamide is first powdered and dried for 30 to 40 minutes at 100 to 105° C. The column of the compacted product in a glass capillary must be 3 to 4 mm high.

The device prepared as above is heated at the rate of 4 to 5° C a minute and from 180° C onwards at the rate of 1° C per minute.

The temperature at which the polyamide goes over from solid to molten state is determined.

The arithmetic mean between two parallel readings, differing by not more than 2° C is taken as the final result.

3.5. Viscosity is determined as per GOST 11034-71 using M-cresol as solvent.

3.6. Testing of polyamide for parameters 5 to 9 of the Table is carried out on injection moulded specimens observing the general requirements of GOST 12019-66.

3.6.1. Before making the specimens the product must be dried in a vacuum chamber at 80 to 90° C in a 10 mm layer for 4 to 6 hours down to 0.2% moisture content.

3.6.2. Specimens are made to the following parameters:

Temperature of the moulded mass . 250 to 270° C;
Temperature of the mould . 40 to 50° C;
Pressure moulding . 700 to 1200 kgf/cm^2;
Holding time in mould under pressure:
for disc - 15 to 20 s
for bar - 10 to 15 s.

The product must not remain in the cylinder for more than 15 minutes as otherwise it will disintegrate.

3.6.3. Test specimens for parameters 5 and 6 in the Table are placed in a polyethylene packet immediately after they are moulded and the packet is sealed. Alternatively they may be kept in a desiccator at 23 ± 2° C for 24 hours in accordance with GOST 12423-66 *. The interval between removal of the samples from the packet (or the desiccator) and completion of testing must not exceed 40 minutes.

3.6.4. Specimens for tests against parameters 7 to 9 must be held in distilled water at 20 ± 2° C for 24 hours before the test.

They are taken out of the water just before the electrical tests and dried using filter paper. These tests are conducted on at least three specimens.

3.7. Bending stress is determined in accordance with GOST 4648-71 on a specimen of length not less than 80 mm; width 10 ± 0.5 mm and thickness 4 ± 0.2 mm for a sag 1.5 times the thickness.

3.8. Impact strength is determined as per GOST 4647-69 on specimens in the form of bars of size (50 + 1) x (6 ± 0.2) x (4 ± 0.2) mm with and without notching. The specimens should be made to drawing 4 in GOST 4647-90. The pendulum speed must be 2.9 + 0.1 m/s.
- 0.00

Notching of the bar is done using a single tooth milling tool 0.8 X 40 mm as per GOST 2679-73 on a Universal Milling machine (model 676 or similar).

The spindle speed must be 1630 r.p.m. and the feed rate 80 to 100 mm/min.

3.9. Volume resistivity is determined as per GOST 6433.2-71 at 1000 V on discs of diameter 100 ± 1 mm and thickness 2 ± 0.2 mm. The diameter of the measuring electrode is 50 ± 0.2 mm.

(REVISED EDITION - "INF. INDICATOR OF STANDARDS" No. 4, 1974).

3.10. Dissipation factor is determined as per GOST 6433.3-71 at a frequency of 10^6 Hz on discs of diameter 100 ± 1 mm and thickness 2 ± 0.2 mm.

3.11. Dielectric strength is determined as per GOST 6433.3-71 at a frequency of 50 Hz raising the voltage smoothly at the rate of 1 KV/s on discs of diameter 100 ± 1 mm and thickness 2 ± 0.2 mm.

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* This is valid till 01.01.1978.

4. PACKING, MARKING, TRANSPORT AND STORAGE

4.1 Moulding polyamide 610 must be packed in double-layer polythylene bags placed in four-layer kraft-cellulose paper or rubberised bags. The polyethylene bags are sealed after they are filled with the product and the outer bags are tied up.

The nett weight of a bag must not exceed 25 kg.

If crumbs are present in the batch they must be packed separately from granules.

4.2 A nameplate or tag must be attached or pasted to each bag with the following details as per GOST 14192-71;

a) Name of the manufacturing organisation or its trade mark;

b) Name of product;

c) Batch number;

d) Gross and nett weights;

e) Number of cases;

f) Date of manufacture;

g) The number of this standard.

A tag with these details is placed in each packing case between two polyethylene bags.

4.3 Each batch of polyamide must be accompanied by a document certifying that the quality of the product conforms to the requirements of this standard.

This document must contain:

a) Name of the manufacturing organisation or its trade mark;

b) Name of product;

c) Batch number;

d) Gross and nett weights;

e) Number of cases in the batch;

f) Date of manufacture;

g) Test results or a declaration that the quality of the product conforms to this standard.

h) The number of this standard.

4.4 Moulding polymide 610 packed in bags may be consigned by any form of transport ensuring protection from atmospheric precipitations and direct exposure to the sun's rays.

4.5 Moulding polyamide 610 must be stored in a closed stores enclosure.

4.6 The period for long-term storage of moulding polyamide in factory packing in a closed stores enclosure is 12 years without change in properties.

5. MANUFACTURER'S GUARANTEE

5.1 Moulding polyamide 610 must bear acceptance by the quality control Department of the manufacturing organisation. The manufacturer must guarantee the conformity of the entire product with the requirements of the present standard provided the user observes the storage conditions laid down in this standard.

5.2 The guaranteed shelf life of moulding polyamide 610 is one year from the date of manufacture.

After the expiry of the guaranteed shelf life, moulding polyamide 610 may be used if the test results meet the requirements of the present standard.

Increase in moisture content of moulding polyamide 610 during long storage does not constitute grounds for rejection of the product since it is a hygroscopic material. It must be dried to a water content of 0.2% before reprocessing.

6. SAFETY REQUIREMENTS AND PRODUCTION SANITATION

6.1 Moulding polyamide 610 causes no harmful influence on the human organism.

6.2 Moulding polyamide 610 reprocessed at 260 to 270°C does not decompose or release harmful substances but the molten product may cause heat burns if the operating mode of the moulding machines is upset, eg., by nozzle opening out, etc. Therefore the rules for operation of the reprocessing machines must be observed in reprocessing polyamide 610.

6.3 Moulding polyamide 610 decomposes at temperatures over 300°C releasing carbon monoxide, carbondioxide and ammonia.

REPLACEMENTS

GOST 2679-73	supercedes	GOST 2679-61	
GOST 4460-77	supercedes	GOST 4460-66	
GOST 6824-76	supercedes	GOST 6824-54	
GOST 10394-72	supercedes	GOST 10394-63	
GOST 18995.4-73	supercedes	GOST 9884-61	section IV
GOST 22372-77	supercedes	GOST 9141-65	

Attention of the inspecting authority is drawn to the following

1. Title : "Poliamid" should read "POLYAMIDE". The more common term is 610 NYLON.

2. Page : Item 8 of Table Dissipation factor (instead of "Tangent of the Dielectric Loss Angle")

3. Page 8 : Items 9 & 10 Вин Марпемс not clear.

UDC 678.675(083.74) Group L27

STATE STANDARD OF THE USSR

MOULDING POLYAMIDE 610

GOST 10589-73*
This supercedes GOST 10589-63

BY ORDER NO.176 DATED 29th JANUARY 1973 OF THE STATE COMMITTEE ON STANDARDS, COUNCIL OF MINISTERS OF THE USSR THIS STANDARD IS VALID

FROM 01.01.1974
TO 01.01.1979

NONOBSERVANCE OF THIS STANDARD IS PUNISHABLE BY LAW

The present standard is applicable to moulding polyamide 610 (formerly polyamide 68) which is a product of condensation polymerisation of (HS) salt (Hexamethylene sebacate salt).

Moulding polyamide 610 is used in the manufacture of various structural and electrical insulation articles by injection moulding.

Articles made out of moulding polyamide 610 can operate without deterioration in mechanical properties over the temperature range of minus 60 to plus 70°C. These include electrical insulation parts operating on low and medium frequencies.

The upper limit of temperature can be increased to plus 100°C for parts which ~~that~~ are not mechanically stressed.

Moulding polyamide 610 is resistant to the action of hydrocarbons, organic solvents, oils and alkalis, fungi and solar radiation.

1. TECHNICAL REQUIREMENTS

1.1 Moulding polyamide 610 must conform to the requirements and standards given in the Table on page 2.

* Reissued (April 1977) with revision No.1 published in April 1974.

ANNEXURE to GOST 10589-73

Reference

REFERENCE PARAMETERS OF MOULDING POLYMIDE 610

Table 1

Parameter	Standard	Test Procedure
1. Density, g/cm^3	1.09 to 1.11	As per GOST 15139-69
2. Ultimate tensile strength kgf/cm^2	500 to 600	As per GOST 11262-76
3. Yield limit under compression, kgf/cm^2	700 to 900	As per GOST 4651-68
4. Ultimate shear stress, kgf/cm^2	400 to 500	As per GOST 17302-71
5. Brinell hardness, kgf/mm^2	10 to 15	As per GOST 4670-67
6. Modulus of elasticity under tension, kgf/cm^2	$(1.5 \text{ to } 1.7) \times 10^4$	As per GOST 9550-71
7. Relative elongation at rupture, % not less than	100	As per GOST 11262-76
8. Coefficient of friction on steel	0.26 to 0.32	As per GOST 11629-75
9. Heat resistance on VIK scale, °C	200 to 220	As per GOST 15065-69
10. Heat resistance on Martens scale, °C	55 to 60	As per GOST 21341-75
11. Coefficient of linear expansion per 1°C in the temperature range 20 to 200°C	11.7×10^{-5}	As per GOST 15173-70
12. Maximum water absorption, %	3.3	As per GOST 4650-73
13. Shrinkage in injection moulding	0.8 to 1.3%	on specimens of different shapes
14. Surface resistivity (after immersion in water at 20 ± 2°C for 24 hours), ohms	5×10^{12} to 1×10^{13}	As per GOST 6433.2-71
15. Dielectric permeability at 10^6 Hz	4 to 5	As per GOST 22372-77
16. Melting index at plus 235°C and a pressure of 2.16 kgf/cm^2, g/10 min.	4.0 to 70	As per GOST 11645-73
17. Heat resistance under bending stress, °C		
at σ = 18.5 kgf/cm^2	65	As per GOST 12021-75
at σ = 4.5 kgf/cm^2	160	As per GOST 12021-75
18. Impact strength, $kgf.cm/cm^2$ on notched specimens at minus 65°C	2.0 to 4.0	As per GOST 4647-69

(REVISED EDITION - "INF. INDICATOR OF STANDARDS" NO.4. 1974)

INTERNATIONAL SYSTEM OF UNITS (SI)

Quantity	Unit		
	Name	Russian Abbreviation	International Abbreviation
	BASE UNITS		
Length	metre	М	m
Mass	kilogram	к	kg
Time	second	с	s
Electric current	ampere	А	A
Thermodynamic temperature	kelvin	К	K
Luminous Intensity	candela	кд	cd
	SUPPLEMENTARY UNITS		
Plane angle	radian	рад	rad
Solid angle	steradian	ср	s
	DERIVED UNITS		
Area	square metre	$М^2$	m^2
Volume	cubic metre	$М^3$	m^3
Density	kilogram/metre^3	$кг/М^3$	kg/m^3
Velocity	metre/second	М/с	m/s
Angular velocity	radian/second	рад/с	rad/s
Force (force of gravity, weight)	newton	Н	N
Pressure (Mechanical stress)	pascal	Па	Pa
Work, Energy, Heat	joule	Дж	J
Power, heat flow	watt	Вт	W
Quantity of electricity, electrical charge	coulomb	К	C
Electric potential, potential difference, electromotive force	volt	В	V
Electrical resistance	ohm	Ом	Ω
Conductance	siemens	См	S
Capacitance	farad	Ф	F
Magnetic flux	weber	Вб	Wb
Inductance, mutual inductance	henry	Г	H
Specific heat	joule/kg.kelvin	Дж/кг.к	J/(kg.K)
Heat conductivity	W/m. Kelvin	Вт/м.К	W/(m.K)
Luminous flux	lumen	лм	lm
Brightness	candel/m^2	кд/$м^2$	cd/m^2
Illumination	lux	лк	lx

RESISTANCE TO RADIOACTIVE RADIATION IN RESPECT OF CHANGE OF MECHANICAL PROPERTIES IN %

Table 2

Radiation dosage, M_{γ}ad	Impact strength (on notched specimens)	Bending stress	Brinell hardness
0	100	100	100
100	110	120	115
500	50	125	180
1000	40	135	145
1500	30	70	70

Table 3

COMPARATIVE BENDIN STRESS DATA

Bending stress, kg/cm^2			
Specimen 4X6X55 mm	As per GOST 4648-71 specimen 4X10X80	Specimen 4X6X55 mm	As per GOST 4649.71 specimen 4X10X80
773	472.0	743	451.0
739	466.0	748	486.0
736	448.0	768	491.0
738	451.0	752	455.0
712	456.0	776	493.0
750	530.6	770	476.0
721	451.0	770	461.0

REPLACEMENTS

GOST 4650-73 supercedes GOST 4650-65
GOST 11262-76 supercedes GOST 11262-68
GOST 11629-75 supercedes GOST 11629-65
GOST 11645-73 supercedes GOST 11645-65
GOST 12021-75 supercedes GOST 12021-66
GOST 21341-75 supercedes GOST 5089-69
GOST 22372-77 supercedes GOST 9141-65.

FACTORS AND PREFIXES FOR FORMING DECIMAL MULTIPLES AND FRACTIONS OF UNI'S AND THEIR NAMES

Factor	Prefix	Abbreviation	
		Rissian	International
10^{12}	tera	Т	T
10^{9}	giga	Г	G
10^{6}	mega	М	M
10^{3}	kilo	К	k
10^{2}	(hecto)	г	h
10^{1}	(deca)	да	da
10^{-1}	(deci)	д	d
10^{-2}	(centi)	с	c
10^{-3}	milli	м	m
10^{-6}	micro	мк	μ
10^{-9}	nano	н	n
10^{-12}	pico	п	p
10^{-15}	femto	ф	f
10^{-18}	atto	а	a

Note: Prefixes which may be used only in the names of multiples and fractions of units which have received wide acceptance are shown in parantheses (for example, hectare, decalitre, decimetre, centimetre).