

MICRO PLASTICS' MOLDED NYLON 6/6 FASTENERS

MECHANICAL TEST DATA - UNC - UNF

SECTION
XX
INFORMATION

Nylon 6/6 meets MIL-M20693B "A" Type 1, LP410A, and ASTM D789-66 Type 1, GDE 2
All test performed per ASTM specifications. Parts molded in Nylon 6/6, dry as molded, unmoisturized, at 73° F/23° C. Results are average of random parts tested. Data listed is for informational purposes only shall not be used to establish specifications limits or used alone as the basis of design.

MACHINE SCREWS

SIZE	MAX TORQUE		TENSILE TEST		DOUBLE SHEAR	
	ULTIMATE TORQUE	BEFORE DEFORMATION	YIELD LBS.	BREAK LBS.	YIELD LBS.	BREAK
256	---- NO TEST	----- NO TEST ---	16	19	-----NO TEST ----	
440	24 In Oz.	12-16 In Oz.	38	41	45	50
632	30 In Oz.	18-20 In Oz.	65	69	91	97
832	5 In Lbs.	2-3 In Lbs.	99	108	158	164
1024	6 In Lbs.	2-4 In Lbs.	139	149	187	257
1032	7 In Lbs.	3-4 In Lbs.	155	165	234	241
1/4-20	13 In Lbs.	9-10 In Lbs.	296	312	413	432

HEX NUTS

SIZE	# 1 TENSILE LBS.	# 2 TENSILE TORQUE	RECOMMENDED TORQUE BEFORE DEFORMATION
440	85	2 In Lbs.	1.5 In Lbs.
632	135	5.2 In Lbs.	4 In Lbs.
832	172	6.8 In Lbs.	5 In Lbs.
1024	211	7 In Lbs.	5.5 In Lbs.
1032	276	8 In Lbs.	6.5 In Lbs.
1/4-20	311	19.3 In Lbs.	17 In Lbs.
5/16-18	877	44.3 In Lbs.	42 In Lbs.
3/8-16	994	74 In Lbs.	72 In Lbs.
1/2-13	2,367	15.7 Ft Lbs.	13 Ft Lbs.
5/8-11	3,487	31.7 Ft.Lbs.	30 Ft Lbs.
Test #1 Pull Test -Nylon Nut on Metal Screw		Test #2 Torque on Nylon Nut on Metal Screw	

CAP SCREWS

SIZE	MAX TORQUE		TENSILE TEST		DOUBLE SHEAR	
	ULTIMATE TORQUE	BEFORE DEFORMATION	YIELD LBS.	BREAK LBS.	YIELD LBS.	BREAK LBS.
1/4-20	19 In Lbs.	15-16 In Lbs.	200	228	413	432
5/16-18	37 In Lbs.	32-34 In Lbs.	403	424	866	880
3/8-16	49 In Lbs.	45-46 In Lbs.	480	513	1108	1173
1/2-13	11 Ft. Lbs.	7-8 Ft. Lbs.	1393	1425	2276	2313
5/8-11	22 Ft. Lbs.	18-19 Ft. Lbs.	2260	2303	3340	3410

MICRO PLASTICS' MOLDED NYLON 6/6 FASTENERS MECHANICAL TEST DATA - METRIC

SECTION
XX
INFORMATION

Data listed is for informational purposes only shall not be used to establish specifications limits or used alone as the basis of design

MACHINE SCREWS

SIZE	ULTIMATE TORQUE	MAX TORQUE BEFORE DEFORMATION	TENSILE TEST		DOUBLE SHEAR	
			YIELD LBS.	BREAK LBS.	YIELD LBS.	BREAK LBS.
M2 X .4	NO TEST	NO TEST	7.12 N.	N/B	89 N.	116 N.
M2.5 X .45	NO TEST	NO TEST	8.9 N.	N/B	156 N.	169 N.
M3 X .5	.32 Nm.	.2-.26 Nm.	22 N.	N/B	294 N.	329 N.
M3.5 X .6	.43 N.	.28-.34 Nm.	53 N.	N/B	378 N.	405 N.
M4 X .7	.45Nm.	.36-.43 Nm.	214 N.	N/B	600 N.	636 N.
M5 X .8	.93 Nm.	.73-.79 Nm.	271 N.	N/B	1081 N.	1134 N.
M6 X .1	1.83 Nm.	1.41-1.47 Nm.	845 N.	912 N.	1806 N.	1877 N.
M8 X 1.25	3.39 Nm.	2.45-2.82 Nm.	1.677 N.	1744 N.	2980 N.	3034 N.
M10 X 1.50	5.31 Nm.	4.52 - 4.86 Nm.	2749 N.	N/B	5026 N.	5280 N.

HEX NUTS

SIZE	TENSILE	ULTIMATE TORQUE
M2	NO TEST	NO TEST
M2.5	135.23 N.	NO TEST
M3	142.34 N.	NO TEST
M3.5	369.20 N.	2.3 CM/KG
M4	451.94 N.	4.5 CM/KG
M5	940.35 N.	8.3
M6	1556.65 N.	17.6 CM/KG
M8	2597.76 N.	56.2 CM/KG
M10	6283.11 N.	89.93 CM/KG

PLASTIC MATERIALS PRINCIPAL PROPERTIES

SECTION
XX
INFORMATION

FOR ADDITIONAL MATERIAL INFORMATION SEE OUR WEBSITE
<http://www.microplastics.com/Materials/Material%20list.htm>

NYLON 6/6 POLYAMIDE (PA)

General-purpose nylon 6/6 has good toughness, tensile strength, and resistance to creep, particularly in the high temperature range. Nylon has excellent wear properties, low coefficient of friction, and exceptional chemical resistance particularly to aromatic hydrocarbons, greases, and oils. Nylon is a hygroscopic material. Moisture acts as a plasticizer reducing the tensile strength, stiffness, and increasing elongation, impact strength, and energy absorbing characteristics. Outdoor weathering can be improved by the addition of carbon black. Nylon will perform well in long range service in most applications at temperatures as high as 185° F (85° C). Nylon is a translucent off white color.

APPLICATIONS

Fasteners - Bearings - Gears - Cams - Gaskets - Printed Circuit Board Hardware - Washers - Spacers - Insulators - Spiral Wrap - Flexible Grommets - Wire Ties - Electronic Components - Bushings - Wiring Clips - Cable Clamps - Hole Plugs - Hose Clamps

QUALIFICATIONS

Mil - M20693B "A" Type 1
LP410A
ASTM D4066 Type 1 Grade 2 Per ASTM D789

NYLON 6/6 HEAT STABILIZED

Nylon 6/6 heat stabilized has the same mechanical properties as general purpose nylon 6/6 with the additional advantage of heat stabilization this material can withstand 250° F (121° C) temperature in long range service in most applications. Heat stabilized nylon is off white in color.

APPLICATIONS

Fasteners - Bearings - Gears - Cams - Printed Circuit Board Hardware - Washers - Spacers - Insulators - Electronic Components - Bushings - Strain Relief - Hole Plugs - Wiring Clips - Hose Clamps.

NYLON 6/6 IMPACT MODIFIED

Nylon 6/6 impact modified has the additional advantage of very high impact strength at low temperatures and enhanced resistance to heat distortion over general purpose nylon 6/6. Impact nylon 6/6 is off white in color.

APPLICATIONS

Fasteners - Bearings - Gears - Cams - Printed Circuit Board Hardware - Washers - Spacers - Insulators - Electronic Components - Bushings - Requiring additional impact resistance.

NYLON 6/6 33 % GLASSFILLED

Glass-Reinforced nylon has outstanding property improvements over unreinforced compositions. Improvements include greater tensile strength, deflection temperature, shear strength, improved creep resistance, better dimensional stability, and lower moisture absorption and thermal expansion. The good wear resistance, electrical properties and low coefficient of friction of nylon 6/6 un-reinforced are retained. 33% glass-filled nylon is opaque tan in color.

APPLICATIONS

Fasteners - Washers - Spacers - Insulators - Circuit Board Hardware - Requiring greater stiffness and strength.

NYLON 46 POLYAMIDE

High temperature nylon, which bridges the price performance gap between traditional nylons and high performance materials. Nylon 46 has excellent short term and long term heat resistance, high stiffness at elevated temperatures, high creep resistance, outstanding toughness, excellent fatigue behavior, good chemical resistance, and higher continuous-use temperature. Nylon 46 is translucent off white in color.

APPLICATIONS

Fasteners - Bearings - Cams - Gears - Printed Circuit Board Hardware - Washers - Spacers - Insulators - Electronic Components - Bushings - Wiring Clips - Cable Clamps - Hose Clamps.

NYLATRON GS

Nylon 66 with molybdenum disulphide (MOS2) solid lubricant added. Nylatron GS offers superior tensile and compressive strength, lower surface friction, higher heat resistance and greater dimensional stability than general purpose nylon 6/6. Nylatron is dark charcoal grey in color.

APPLICATIONS

Bushings - Bearings - Gears - Guides - Rollers - Washers

PLASTIC MATERIALS PRINCIPAL PROPERTIES

FOR ADDITIONAL MATERIAL INFORMATION SEE OUR WEBSITE
<http://www.microplastics.com/Materials/Material%20list.htm>

SECTION
XX
INFORMATION

NYLON 66/6 COPOLYMER FLAME RETARDANT

Flame retardant nylon 66/6 has similar properties to general purpose 66 nylon with flame retardant additives for UL94V0 rating. Flame retardant nylon 6/6 is opaque off white in color.

APPLICATIONS

Fasteners - Printed Circuit Board Hardware - Washers - Spacers - Insulators - Electric Components - Bushings - Strain Reliefs - Cable Clamps - Wiring Clips.

ACETAL COPOLYMER (POM)

Acetal resins are characterized by their strength, stiffness, and hardness and are stable over a wide range of temperatures, humidity, environments, and stress. Acetal has high load bearing characteristics, excellent creep resistance, and low coefficient of friction. Acetal absorbs little water, minimizing the effect of moisture on its physical properties. Acetal resists neutral oils, grease, petroleum-based fuels, many organic solvents, and alkalis. Oxidizing agents and acids, organic and inorganic, with PH less than four attack acetals. Compared to nylon acetal has better fatigue resistance, creep resistance, stiffness and water resistance, but lower impact strength and abrasion resistance. Acetal is translucent off white in color. Acetal is widely used in plumbing and irrigation because it resists scale build-up and has excellent thread strength, creep resistance, and torque retention.

APPLICATIONS

Fasteners - Bearings - Gears - Cams - Washers - Spacers - Dowel Pins - Actuators

QUALIFICATIONS

NSF and FDA Approved.

HIGH-DENSITY POLYETHYLENE (HDPE)

Polyethylene is among the lowest density plastics and therefore is one of the lowest cost per cubic measure compared to other plastics. High density polyethylene has good toughness, excellent electrical properties, and chemical resistance, good low temperature brittleness and very low water absorption. Polyethylene is essentially inert, unaffected by strong and weak acids, alkalies, detergents, alcohols, and ketones. Polyethylene has low tensile strength and is subject to considerable creep and stress relaxation under load. Polyethylene will swell with chlorinated and aromatic hydrocarbons including gasoline and oils.

APPLICATIONS

Washers - Spacers - Beaded Ties - Insulators - Wire Clips - Protective Caps - Plugs - Spiral Wrap Flexible Grommeting

POLYCARBONATE (PC)

Polycarbonate is one of the toughest, most dimensionally stable thermoplastics over wide temperature range. Polycarbonate has exceptionally high impact strength. PC is unaffected by water below 140°F and can be used in boiling water on a limited basis. PC is unaffected by greases, oils, detergents, aliphatic hydrocarbons, most mineral acids, and the higher alcohols. It is attacked by chlorinated hydrocarbons, and most aromatic solvents, esters, and ketones. PC has white water transparency with a 90% light transmission.

APPLICATIONS

Fasteners, Washers, Spacers, Lenses, Housings.

POLYPROPYLENE (PP)

Polypropylene has a good combination of rigidity and toughness, high rigidity at elevated temperatures, can be steam sterilized, good abrasion resistance and low coefficient of friction, nonhygroscopic, excellent electrical properties, unique flex properties, good chemical resistance without stress cracking, one of the lowest densities, and high surface gloss. PP has the highest tensile strength of the olefins, high tensile modulus, and relatively low impact resistance. PP has good fatigue resistance, excellent abrasion resistance and very low coefficient of friction comparable to nylon. However, lubricating nylon surfaces reduces the friction much more than for polypropylene. Polypropylene has excellent chemical resistance to dilute acids, concentrated acids (except oxidizing acids) alkalis, alcohols, detergents, and water. PP resists aromatic hydrocarbons, chlorinated hydrocarbons, greases, and oils at room temperature but is attacked at about 140° F.

APPLICATIONS

Fasteners-Spacers-Washers-Insulators-Hinge Applications-Containers-Battery Cases-Pump Parts

IMPORTANT

While the descriptions, applications, data, and information contained in the above specifications are presented in good faith and believed to be accurate, it is provided for guidance only. Because many factors affect application and use we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use.

PLASTIC MATERIALS PRINCIPAL PROPERTIES

SECTION
XX
INFORMATION

Nylon 46		Nylon 6/6 Flame Ret.		Nylatron GS	Acetal Copolymer	HDPE	Polycarbonate	Polypropylene
Dry	Moist	Dry	Moist					
14,400	9,400	11,600	6,500	13,500	8,800	2,470	10,300	4,700
				110	70		220	
435,000	145,000	520,000	290,000	550,000	410,000		340,000	165,000
30/25	280/250		10	15	60	700	150	9
				10,500	7,700		7	
460,000	145,000	250,000		460,000	375,000	146,000	350,000	210,000
1.8	7.5	1.5		0.7	1.3	2.3	16	0.6
				0.26				
				0.25	0.15			
		435			316		275	220
320		195		210	230		260	120
						256	309	305
563		470		480	329	270	309	320
425								
311		220			220			
1.18		1.16		1.16	1.41	0.954	1.2	0.905
3.7		2.6		0.9	0.22		0.15	0.3
R123	R107	M52		R119	M80	D62	R118	R95
94V2		94V0		Self Ext	94HB		94V2	
600		2000			500		420	425/550
3.8	5	3.6	6		3.7		2.93	
10 ¹⁶	10 ¹⁴	10 ¹⁵	10 ¹¹		10 ¹⁴		2X10 ¹⁷	

PLASTIC MATERIALS PRINCIPAL PROPERTIES

Property	ASTM Method	Units	Nylon 6/6		Nylon 6/6 Impact Modified		Nylon 6/6 33% Glassfilled	
			Dry	Moist	Dry	Moist	Dry	Moist
Mechanical								
Tensile Strength	D638	PSI	12,000	11,000	7,900		28,000	22,000
Tensile Impact Strength	D1822	FT LB/IN ²						
Tensile Modulus	D638	PSI	232,000		232,000			
Elongation	D638	%						
Break			40-60	300	150	170	4	5
Yeild								
Shear Strength	D732	PSI	9,500	8,200	6,900		13,000	10,100
Flexural Modulus	D790	PSI	410,000	185,000	220,000	100,000	1,300,000	900,000
Impact Strength	D256	FT LB/IN	1	2.1	17	NO BRK	2.2	2.6
Coefficient of Friction								
Static			0.31					
Dynamic			0.17					
Thermal								
Deflection Temperature	D648	°F						
66PSI			470		340		495	
264 PSI			170		140		485	
Softening Point	D1525	°F						
Melting Point	D789	°F	500		500		505	
Peak Temperature		°F						
Continuous Use Temperature		°F	185					
Physical								
Specific Gravity	D792		1.14		1.07		1.38	
Water Absorption	D570	%	1.5		2.3		1	
Hardness	D785		M80	M61	M60	M50	M100	M82
Underwriters Lab. Rating	BUL 94		94V2		94HB		94HB	
Dielectric Strength	D149	V/MIL	600		2250	1300		400
Dielectric Constant	D150	1000 HZ	5.3		3.1	3.6	4	
Volume Resistivity	D257	OHM/CM	10 ¹⁴	10 ¹³	4X10 ¹⁴	10 ¹²	10 ¹⁴	
Electrical								

Important: While the descriptions, applications, data, and information contained in the above specifications are presented in good faith and believed to be accurate, it is provided for guidance only. Because many factors affect application and use we recommend that you make tests to determine the suitability of a product for particular purpose prior to use.