



DuPont Filaments

DuPont Tynex® 612 Nylon Filament

Product Characteristics

Premium-quality Tynex® filaments, the result of DuPont's advanced research and engineering, meet the most demanding requirements of brush makers and consumers for toothbrushes and personal-care brushes of the highest quality. Significant benefits and extra values are:

Surface Finish

DuPont's proprietary finish enhances tufting efficiency and productivity. This finish complies with United States Food and Drug Administration (FDA) regulations.

Packaging

The diameter consistency of DuPont's paper-wrapped hanks meets or exceeds the stringent requirements of new autoloader toothbrush machines.

End-Rounding

High quality materials and precise process control give optimum end-rounding performance.

Color Uniformity

Pigmenting technology and special color-measuring methods maintain close color tolerances.

Caliper Uniformity

DuPont technology and high-precision laser micrometers assure maximum control of filament diameter.

Tynex® is a registered trademark of DuPont for its brand of nylon filament. Only DuPont makes Tynex®.



Chemical Properties

Tynex® 612 nylon filaments are not affected by chlorinated solvents, such as carbon tetrachloride, chloroform, trichlorethylene; petroleum hydrocarbons, such as gasoline, benzene, naphtha, toluene, kerosene; ester solvents, such as butyl acetate, amyl acetate; or detergents, such as soap, trisodium phosphate, trisodium phosphate-soda ash.

Tynex® may become limp in contact with methanol or ethanol, but will regain its original stiffness after evaporation of these solvents. Other alcohols have little or no effect on Tynex®.

Tynex® is more resistant to attack by acids than many other brush filling materials. However, acids may cause some degradation of Tynex® depending upon the nature and concentration of the acid and the conditions under which the filaments are used. Before using Tynex® with acids, it is recommended that tests be made under conditions which may be expected in actual use.

Tynex® filaments are attacked by phenol and chemically related compounds.

Effect of Moisture

Tynex® 612 nylon filaments absorb small quantities of water. The effect of this water absorption is a temporary decrease of stiffness and bend recovery while they are wet. This effect is compared below with commercial Nylon 66.

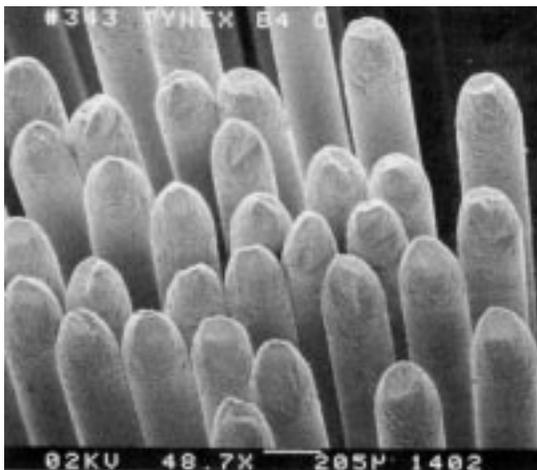
Water absorption	Tynex® 612	Nylon 66
50% relative humidity	1.4%	3.2%
100% relative humidity	3.0%	9.0%

Resistance to Fungi, etc.

Tynex® 612 nylon filaments are resistant to attack by rodents, insects, and fungi, and thus may be safely stored for long periods without damage.

Effect of Temperature

The properties of Tynex® 612 nylon filaments are not permanently affected by continuous exposure to temperatures up to 65°C (149°F). They do become slightly degraded on long exposure at high temperatures. For example, they begin to show a slight loss in strength after several months at 100°C (212°F); and after days at 180°C (356°F)—all in the presence of air. Melting point for Tynex® is approximately 212°C (412°F). Extended exposure at 150°C (302°F) in an inert atmosphere has no lasting effect. Continued exposure to steam, especially in the presence of acids or bases, will gradually weaken Tynex® filaments.



End-rounding performance is unsurpassed using Tynex® nylon filaments. DuPont's proprietary extrusion process and optimized 612 nylon polymer provide superior results using conventional toothbrush making equipment.

In this magnified toothbrush tuft, note the smoothness of individual ends in this scanning electron microscope (SEM) photograph of Tynex® 8 mil (0.20 mm) diameter natural color nylon filament.

Nominal Physical Properties

Properties	Units	Tynex® 0900	Nylon 66
Tensile Modulus, dry (Stiffness)	GPa (Kpsi)	4.0 (560)	4.14 (600)
Tensile Modulus, wet (Stiffness)	GPa (Kpsi)	2.9 (420)	1.66 (240)
Tensile Strength	GPa (Kpsi)	0.39 (56)	0.42 (61)
Elongation	%	30	37
Melting Point	°C (°F)	212 (412)	255 (490)
Specific Gravity	gm/cc	1.067	1.14

Tynex® Filaments—Sizes Available

2.5 mil = 0.064 mm	17 mil = 0.432 mm
3 mil = 0.076 mm	18 mil = 0.457 mm
4 mil = 0.102 mm	19 mil = 0.483 mm
5 mil = 0.127 mm	20 mil = 0.508 mm
6 mil = 0.152 mm	22 mil = 0.559 mm
7 mil = 0.178 mm	25 mil = 0.635 mm
8 mil = 0.203 mm	28 mil = 0.711 mm
9 mil = 0.229 mm	32 mil = 0.813 mm
10 mil = 0.254 mm	36 mil = 0.914 mm
11 mil = 0.279 mm	40 mil = 1.016 mm
12 mil = 0.305 mm	45 mil = 1.143 mm
13 mil = 0.330 mm	50 mil = 1.270 mm
14 mil = 0.356 mm	55 mil = 1.397 mm
15 mil = 0.381 mm	60 mil = 1.524 mm
16 mil = 0.406 mm	

Standard Product Descriptions

Hanks

Hanks are bundles of filaments each weighing about 1.8 kg (4 lb). Each hank is wrapped in paper to a diameter of 47–52 mm and a length of 1168 ± 3 mm (for filament diameters of 6 mil and less, hank diameter is 42–46 mm, and the length is 1143 ± 3 mm).

Diameters

Diameters are available from 2.5 mil (0.064 mm) to 60 mil (1.524 mm) as shown above. Tolerance allowance for variations in diameter is $\pm 8\%$ for toothbrush sizes and slightly more for other sizes.

Colors

Over 30 colors are offered in addition to White, Natural and Black. They are updated routinely to provide a dynamic selection. Please see color sample brochure for current selection.

Standard Packages

Standard packages for hanks are corrugated cartons of about 21 kg net weight per item of one diameter, length, color, and crimp. Net weight is calculated without wrapping paper.

Minimum Order

Minimum order quantities for standard products is 85 kg for sizes 5 mil and greater, and 55 kg for smaller sizes.

Custom Product Descriptions

Crimp

Crimp is a wave in the filament. It is available in a majority of filament sizes, and some variations are possible.

Spool Products

Spool products are available in single strand and multi-strand rope form on a plastic spool with a 1.9 cm center hole. Each spool holds about 5.5 kg (12 lb) of filament.

Cut Pieces

Cut pieces are available at extra charge. Standard package for cut pieces is a carton of cut pieces on trays within the box. Weight is 11–15 kg per carton.

DuPont Filaments

Tynex® A Abrasive Filaments

Floor Care Brushes
Industrial Brushes

Tynex® Filaments

Toothbrushes
Cosmetic Brushes

Tynex®, Chinex®, Orel® Tapered Filaments

Paintbrushes

DuPont Filaments
Wilmington, DE 19898

www.dupont.com/filaments

For more information about DuPont filaments or the name of a brushmaker who might fill your needs, contact one of the DuPont offices below:

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

