

The general characteristics and application of synthetic nylon fibre

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Nylon is one of the most common fabrics found in a broad range of clothing and accessories. It is a light weight, rigid, lustrous, elastic synthetic polymer with a protein-like chemical structure, able to be produced as sheets, filaments or embossed objects. It has been used to create everything from carpets, socks, ropes for rock climbing and parachutes to food packaging, string for tyres, conveyor belts airbags and fishing net. It can be blended with other materials such as glass, oil and carbon fibre to enhance certain aspects of its performance, as its wide range of qualities are often beneficial, but sadly lacking from the materials that it teams up with.

Socks are very important part of clothing. They are the caretakers of our shoes and feet, and a fashion quotient to add in our apparel. Since Socks enhance our apparel as well as shoes, they can never be optional. Socks are worn to absorb sweat that is produced by the feet and for warmth during cold seasons. They keep the feet free of bacteria and fungi that cause diseases. The socks we are referring in our document are nylon socks exclusively launched by Citizens Hosiery factory, Faisalabad. Its yarn composition is: 100% Nylon

Reasons for using nylon fiber in socks:

1. Nylon is a flexible, durable and significantly strong fibre that can be smooth thin or bulky. It is often used with other fibers to provide reliability or added stretch hence it is essential in almost all modern socks.

2. On crimping, nylon becomes elastic and provide the tensile feature of socks. It can be used as a strengthening or stretching material or as a coating on natural fabrics.
3. Nylon is used in making socks since it is cheap, easy to wash and water repellent.
4. Nylon socks wick away moisture and dry quickly hence keep our feet dry.
5. Machine knitted socks will always contain nylon as it works well to hold together fine fabrics in fine yarns.
6. Nylon has a soft feel against the skin and it is excellent resistant to pilling and abrasion.
7. It is breathable.
8. It provides absolute resistance to the development of mildew

Physical properties:

Composition:

The nylon is a polyamide with recurring amide group. It contains carbon, oxygen, nitrogen and hydrogen elements.

Appearance:

In microscopic appearance normal nylon looks like a long, smooth cylinder. Its cross section is circular, and it is lustrous, unless it is delustered. The cross-sectional shape of nylon 66 or nylon 6 can differ to produce fibers with a particularly desirable appearance or performance quality.

Specific gravity:

A relatively low density fiber, nylon has a specific gravity of 1.14, which is lower than most other fibers. It can be made into very light, pure fabrics of good strength.

Strength:

The strength of nylon is excellent. It is produced in a variety of tenacities. The regular tenacities of nylon 66 is 3 to 6 g/d; that of regular nylon 6, 4 to 7 g/d. Nylon's high strength has led to its predominance in the field of women's hosiery.

Modulus:

Despite the fact that it is a strong fiber, nylon has a low modulus so that it stretches easily with little force. On the other hand this is a plus for sweaters, swimwear, and active wear where low resistance to stretch provides comfort and fit.

Elongation and recovery:

Nylon exhibits fairly high elongation before breaking, but when extended short of the breaking point, it will recover well. This helps clothes made of nylon, or nylon blended with elastic fibers like spandex, to retain their form and dimensions.

Flexibility:

Nylon has low resistance to blending and can be flexed easily. Nylon fabrics are usually fairly drapeable depending on their weight and construction.

Durability:

Nylon is significantly stronger than polyester, more tensile than silk, as well as cotton and wool. Nylon is a rigid material, resistant to abrasion and fire-resistant.

Comfortable:

Nylon has a much soft feel against the skin that is more lustrous.

Easy to clean and wash:

Dirt/dust doesn't stick to nylon fiber. It can be washed easily or can be even cleaned by using a wet cloth.

Cheaper:

Nylon is used in more of the clothing that is less expensive. This is due to the manufacturing cost of nylon which is more appealing for the manufacturers and designers to use.

Chemical properties:**Absorbency:**

Nylon is moderately hydrophilic and has a low absorbency rate. Instead of absorbing and retaining moisture like natural fibers, nylon tends to push it to the surface, where it more readily evaporates. This property makes the nylon fabrics ideal for raincoats and shower curtains.

Electrical conductivity:

Nylon is a poor conductor of electricity, and builds up static electricity, particularly when humidity is low. Nylon serves as a good insulator in electric materials because of its nonconducting characteristics.

Effect of light:

Nylon fabrics have low resistance to sun light. They are not appropriate for curtains or draperies because it weakens when exposed to sun light.

Effect of heat:**Combustibility:**

The melting point of nylon 66 is about 500 F. It will soften and may start to stick at 445 F. Nylon 6 is even more heat sensitive. If a hot iron is used on nylons the fibers may glaze, soften or stick. The fiber burns in a flame but usually self extinguishes when the flame is removed. However, nylon fibers do melt, and as with any fiber that melts, if the molten fiber drips onto the skin, it may cause serious burns.

Chemical reactivity:

Like most synthetics, nylon is chemically stable. Dry-cleaning solvents will not harm nylon. It is seriously affected by dilute acids but is soluble in sturdy acids. Treatment with concentrated hydrochloric acid at high temperatures will break down nylon 66 into adipic acid and hexamethylene diamine, the substances from which it made. This reaction could be used to reclaim these basics materials and allow this fiber to be recycled after use. Prolonged exposure to acidic fumes from pollution can damage the fiber.

Uses of nylon:

The availability of a wide variety of types of nylon (from fine to coarse, from soft to crisp, from sheer to opaque) has resulted in the use of nylon in a large range of products for apparel, the home and industry.

For home use:

- Nylon has long been of major importance in the manufacture of swimming costumes and athletic clothes.
- Its light weight and durability make it ideal for dresses, tops, nightwears, raincoats, combat jackets, and so on.
- It is also used in making purse, necklace, beading cord, umbrella, stitching thread, bath sponge and so forth.
- For interior decoration, it is used in drapes, carpets, curtains and bed sheets.

For industrial use:

- It is used in making of different items, for example, sleeping bag, rope and net, seat belt, hose, tarpaulin, dental floss, tents, parachutes, thread spools, fishing line and nets, footwear, etc.
- It is, for all intents and purposes, preferable for processing by rotational moulding, injection moulding, and casting or extrusion into film or fiber. These compounds have innumerable applications as substitute for metal parts, like in automotive engine components.
- Nylon is generally used in the construction industry for a number of diverse applications. It is ideal for the construction industry as a result of its low weight, high pressure-bearing limit, high wear and erosion resistance, and excellent effect resistance.
- Another advantage is nylon has low coefficient of friction, which implies that it can often be applied with low or no lubrication. It can frequently be used in roads, sheets, tubes, stacks, wear pads, outrigger pads,

drapery equipment, roofing boards, fixtures, plumbing fittings, framing spacers, and indeed safety nets.

In medical:

It is a synthetic polyamide material, which can be used in the form of:

- Monofilament
- Multifilament
- Braided

Alternative to nylon socks:

Nylon was introduced to fashion in the 1930s as a contrasting option to silk hosiery. It then replaced silk in military parachutes throughout World War II. Now a days low quality nylon is the norm, and many nylon items do not last well as they ought to. Nylon or other synthetic fabrics don't permit sweat to evaporate and don't absorb it either, so your feet remain wet. Fortunately, there are lots of alternatives to nylon hosiery that you can try out. We are suggesting Merino wool socks as an alternate to nylon socks.

Merino wool:

Merino wool includes a number of properties that make it particularly comfortable when compared to fabrics like cotton, nylon, and so forth.

Merino wool socks are usually valued for many reasons.

When people think of wool, they often think winter and cold weather, yet Merino wool is so breathable that the fabric can be worn year round. Merino wool is more expensive than cotton, acrylic, or nylon, but it is arduous to

beat its performance. These properties are valuable for wide range of clothing, but particularly useful for socks.