

SHIVPRIYA TEXCHEM · KNOWLEDGE SERIES

# Nylon. The strength specialist.

Caprolactam to polymer. Polymer to the toughest fibre in mainstream textiles. A working guide to nylon (polyamide) — where its strength, stretch and silk-like hand earn their premium.

## Strongest

mainstream textile fibre — tenacity above even polyester

## 1938

the first fully synthetic fibre ever commercialised

## PA6

the dominant Indian grade, spun from caprolactam



Bridging world-class spinning mills and your needs, since 2003.

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## CHAPTER 01

# What exactly is nylon?

Nylon is the family name for polyamide fibres — melt-spun synthetics whose amide backbone delivers exceptional strength, abrasion resistance and elastic recovery with a smooth, cool, silk-like hand.

| TYPE               | CHEMISTRY          | WHAT IT SIGNIFIES                                               |
|--------------------|--------------------|-----------------------------------------------------------------|
| Nylon 6 (PA6)      | Caprolactam        | The Indian standard — filament for textiles, tyre cord, fishing |
| Nylon 66 (PA66)    | HMDA + adipic acid | Higher melting point; automotive, airbags, premium hosiery      |
| Textured nylon     | PA6 DTY            | Stretch-bulk filament for hosiery, sarees and knits             |
| High tenacity      | Industrial PA6/66  | Tyre cord, ropes, webbing, parachute and technical uses         |
| Micro / speciality | Fine dpf PA        | Peach-hand wovens, premium innerwear and sports                 |

**Buyer's note.** Nylon dyes with acid dyes and absorbs some moisture — unlike polyester — so it takes deeper, richer shades but also stains and yellows differently. Never mix nylon and polyester lots in one dye programme and expect one recipe to serve both.

## Raw material

Caprolactam (PA6) or HMDA/adipic acid (PA66), petroleum-derived.

## Process

Melt spinning, like polyester, at very high uniformity.

## Supplied as

Filament (flat, textured, high-tenacity) and minor staple volumes.

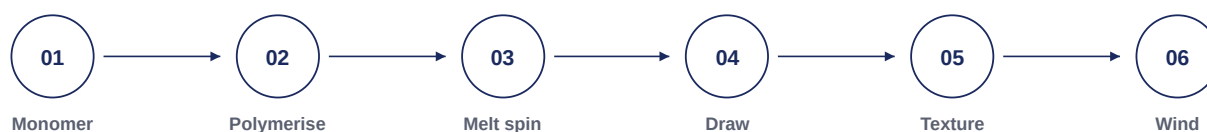
## End of life

Not biodegradable; PA6 is chemically recyclable back to caprolactam.

CHAPTER 02

# Caprolactam to filament

Nylon's production mirrors polyester's melt-spinning — the differences that matter commercially are in the polymer's behaviour: moisture uptake, dye affinity and elasticity.



## 01 Polymerisation

Caprolactam ring-opens into PA6 polymer; chip is dried hard — nylon is moisture-sensitive at melt.

## 02 Melt spinning

Polymer extrudes through spinnerets into filament; uniformity standards exceed polyester practice.

## 03 Drawing

Filaments draw to orient the polymer — the source of nylon's exceptional tenacity.

## 04 Texturising

False-twist texturing adds stretch and bulk for hosiery and knit uses.

## 05 High-tenacity route

Industrial yarns draw further under heat for tyre cord, ropes and webbing.

## 06 Finish and wind

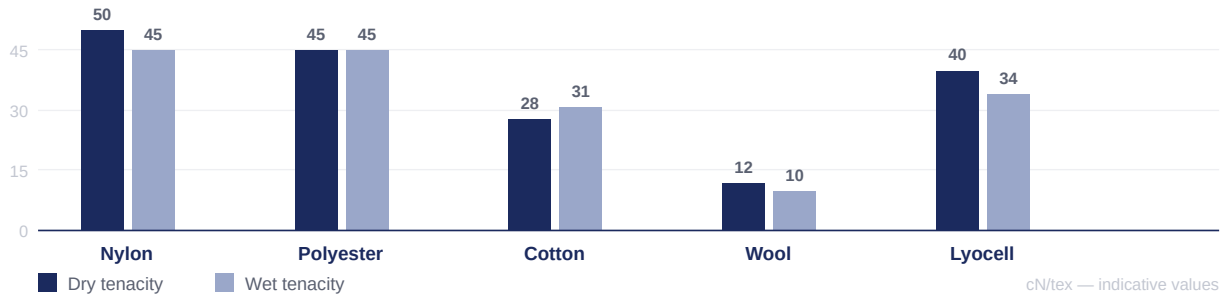
Spin finish, intermingle and precision winding tuned to knitting or warping duty.

| PARAMETER               | NYLON (PA6)                               | POLYESTER (PET)   |
|-------------------------|-------------------------------------------|-------------------|
| <b>Tenacity</b>         | Higher — the ceiling of mainstream fibres | Very high         |
| <b>Moisture regain</b>  | ~4% — dyes deep, feels less plastic       | 0.4%              |
| <b>Dye class</b>        | Acid dyes, rich shades                    | Disperse at 130°C |
| <b>Elastic recovery</b> | Superior — hosiery-grade snap-back        | Good              |
| <b>Price</b>            | Premium over PET                          | Base              |

CHAPTER 03

## What the fibre actually does

Nylon buys the top of the strength and resilience charts — and pays for it in price and sunlight sensitivity.



| PROPERTY                   | TYPICAL VALUE       | COMMERCIAL MEANING                                         |
|----------------------------|---------------------|------------------------------------------------------------|
| <b>Tenacity</b>            | 45–55 cN/tex        | The strongest mainstream fibre; sheer fabrics that survive |
| <b>Elongation</b>          | 25–40%              | High stretch with excellent recovery — hosiery physics     |
| <b>Abrasion resistance</b> | Best in class       | Socks, luggage and workwear that outlast everything        |
| <b>Moisture regain</b>     | 3.5–4.5%            | Enough to dye richly and reduce static vs polyester        |
| <b>Hand</b>                | Smooth, cool, silky | The premium feel in fine deniers                           |
| <b>Dyeing</b>              | Acid dyes           | Deep, brilliant shades — the saree market's favourite      |
| <b>UV resistance</b>       | Moderate            | Yellows and weakens in prolonged sun without stabilisation |
| <b>Melting</b>             | 215°C (PA6)         | Heat-set carefully; lower than PET                         |

**Process caution for your mill.** Nylon's moisture sensitivity runs the whole chain: chip must be dried before melt, packages equilibrated before knitting, and RH controlled at warping — or barre and dye streaks follow. Acid-dye levelness needs disciplined pH ramping.

## CHAPTER 04

# Nylon against the alternatives

A like-for-like view of the fibres competing for the same programme. Ratings are indicative and read horizontally, not as absolute laboratory values.

| PARAMETER               | NYLON              | POLYESTER       | ELASTANE  | SILK          | POLY / NYLON        |
|-------------------------|--------------------|-----------------|-----------|---------------|---------------------|
| <b>Strength</b>         | Highest            | Very high       | Low       | Moderate      | Very high           |
| <b>Stretch-recovery</b> | Excellent          | Good            | Extreme   | Low           | Good                |
| <b>Hand</b>             | Silky, cool        | Engineered      | Rubbery   | The reference | Mixed               |
| <b>Dye depth</b>        | Rich (acid)        | Good (disperse) | Difficult | Rich          | Split-shade effects |
| <b>Price</b>            | Premium            | Base            | Highest   | Luxury        | Mid                 |
| <b>UV stability</b>     | Moderate           | Good            | Poor      | Poor          | Good                |
| <b>Biodegradable</b>    | No                 | No              | No        | Yes           | No                  |
| <b>Recyclability</b>    | PA6 chemical route | Best-in-class   | Poor      | —             | Difficult           |

## The honest trade-off

Nylon costs meaningfully more than polyester and yellows in sunlight — so it wins only where its strength, stretch or hand are the product: hosiery, innerwear, activewear compression and hard-wearing technical fabrics.

## The direction of travel

Premium athleisure is nylon's growth engine — compression tights, sports bras and swimwear specify nylon-elastane by name. Recycled nylon (from fishing nets and waste) is the emerging premium claim.

## CHAPTER 05

# India's nylon market

Indian nylon is a filament story: textile-grade PA6 for sarees, hosiery and knits, plus an industrial segment in tyre cord and fishing. Supply is a mix of domestic producers and imports.

## THE SUPPLY BASE

## Century Enka

INDIA · PA6

A flagship Indian producer across textile filament and tyre cord.

## Gujarat state producers

GSFC &amp; PEERS

Caprolactam and nylon chip anchoring the domestic chain.

## JCT & filament spinners

TEXTILE GRADE

Nylon filament yarn for the saree, hosiery and knitting trade.

## Imports

CHINA · TAIWAN · KOREA

A large share of fine-denier and speciality nylon lands imported; duty matters.

### Athleisure specifies it

Compression, swim and premium leggings are nylon-elastane by tech-pack default.

### Hosiery is built on it

Sheer hosiery and socks exist because of nylon's strength-at-fineness.

### Sarees love the shades

Acid-dyed nylon's brilliant depth keeps it a fixture in the filament saree trade.

### Industrial demand is steady

Tyre cord, fishing nets, ropes and webbing form a stable technical base.

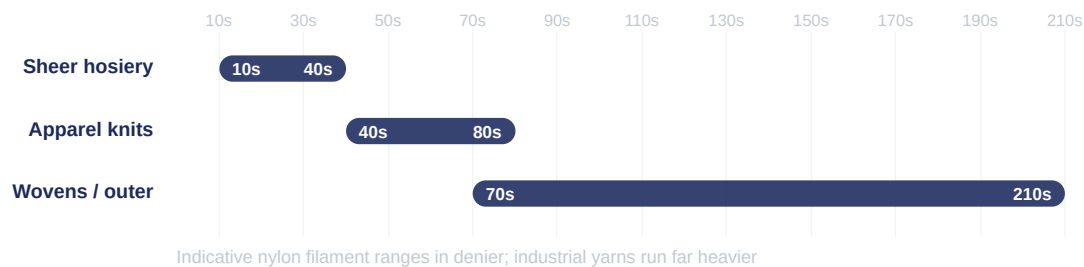
**What this means for the yarn trade.** Nylon buying rewards specification discipline — denier, filament, PA6 vs PA66, dull vs bright, and moisture handling all the way to the knitting floor. We source textile nylon programmes against exact tech-pack requirements.

All company and brand names referenced are the property of their respective owners and are used for identification and informational purposes only; no affiliation or endorsement is implied unless stated.

CHAPTER 06

# 100% nylon yarn: deniers that punch above their weight

Nylon trades by denier like all filament — but its strength lets it go finer than anything else, which is precisely where its premium lives.



| YARN TYPE / SYSTEM      | USUAL RANGE  | WHERE IT FITS                                            |
|-------------------------|--------------|----------------------------------------------------------|
| <b>Fine denier</b>      | 10D – 40D    | Sheer hosiery, innerwear mesh — nylon's unique territory |
| <b>Textured</b>         | 40D – 160D   | Stretch knits, socks, sarees, swim jersey                |
| <b>Flat / FDY</b>       | 40D – 210D   | Wovens, linings, down-proof shells, umbrellas            |
| <b>High tenacity</b>    | 210D+        | Webbing, luggage, ropes, tyre cord                       |
| <b>Covered elastane</b> | By programme | Nylon-covered spandex for hosiery and narrow fabrics     |

## Specification to order

- PA6 vs PA66 stated — heat-set behaviour differs
- Denier / filament and lustre to the tech pack
- Heat-set / dye lot discipline per programme
- Recycled nylon (GRS) where the buyer claims it

## Processing discipline

- Moisture equilibration of packages before knitting
- Acid dyeing with controlled pH ramp for levelness
- Heat-setting below PA6 limits — watch the thermometer
- UV stabilisation for outdoor and swim exposure

## CHAPTER 07

# Blends: nylon as the reinforcement

Nylon enters blends to add strength, stretch partnership or surface — usually as the minority fibre that makes the fabric survive.

| BLEND                 | COMMON RATIOS    | WHAT IT DELIVERS                                      | PRIMARY END USE                   |
|-----------------------|------------------|-------------------------------------------------------|-----------------------------------|
| Nylon / Elastane      | 80:20, 72:28     | The athleisure standard — power stretch with recovery | Leggings, swim, compression, bras |
| Wool / Nylon          | 80:20            | Abrasion armour in soft knits                         | Socks, outdoor knitwear           |
| Nylon / Cotton        | 20:80            | Durability boost to cotton fabrics                    | Workwear, military-style cloth    |
| Nylon / Viscose       | 30:70            | Strengthened drape fabrics                            | Fashion wovens                    |
| Nylon / Polyester     | Split programmes | Two-tone cationic/acid dye effects                    | Fashion shades, linings           |
| Recycled nylon blends | By programme     | Premium circular claim (ECONYL®-type)                 | Swim, activewear, accessories     |



**The commercial logic in one line.** Twenty percent nylon in a sock, a knit or a workwear cloth multiplies its life — nylon is the fibre you add so the fabric survives the customer.

CHAPTER 08

# Where nylon is being used

Nylon concentrates where fabric is thin, stretched or abused — the categories where its premium is invisible in the price and obvious in the wear.



## Athleisure and swim

Nylon-elastane compression, leggings and swimwear — the defining modern category.



## Hosiery and socks

Sheer hosiery exists because of nylon; sock heels and toes depend on it.



## Innerwear

Fine-denier knits, meshes and laces with silk-adjacent hand.



## Sarees and fashion

Acid-dyed filament sarees and brilliant fashion wovens.



## Outerwear shells

Down-proof, wind-resistant light shells and linings.



## Luggage and bags

Ballistic and high-denier nylon — the luggage industry's armour.



## Industrial

Tyre cord, fishing nets, ropes, webbing, parachute.

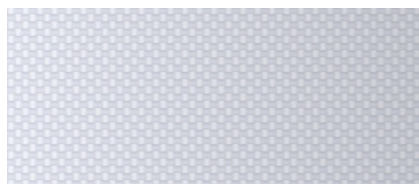


## Technical mesh

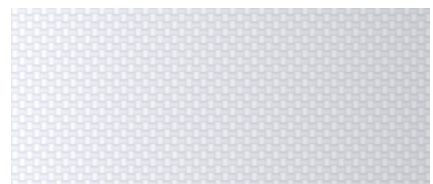
Filtration, medical mesh and precision fabrics.



N/ELASTANE · LEGGINGS



FINE DENIER · HOSIERY



HIGH DENIER · LUGGAGE

**Segment to watch in India.** Recycled nylon in swim and activewear — the ECONYL®-style story commands real premiums, and Indian brands are beginning to specify it.

## CHAPTER 09 · OUR VIEW

# Nylon rides premium activewear and the recycled story

Nylon will stay the smaller, dearer synthetic — and exactly where the Indian market is premiumising, its properties are the specification.

## 01 Athleisure is the engine

Every compression garment and premium legging tech-pack reads nylon-elastane.

## 02 Hosiery holds its franchise

No substitute matches strength at 15 denier; the category is nylon's alone.

## 03 Recycled nylon premiumises

Fishing-net and waste-based PA6 carries the strongest circular story in synthetics.

## 04 Industrial base is steady

Tyre cord, nets and webbing anchor demand through fashion cycles.

## 05 Speciality effects sell

Cationic-acid split dyeing and micro-deniers create fabrics polyester cannot copy.

## What to be realistic about

Price versus polyester caps nylon's share, and UV yellowing needs honest engineering; use it where its physics are the product.



### HOW SHIVPRIYA TEXCHEM CAN HELP

Authorised agent and strategic partner to India's leading spinning mills since 2003, trusted by **2,500+ customers** across polyester, viscose, cotton, PC/PV, fancy and recycled yarns. For nylon and nylon-blend programmes we support mill identification and capability matching, count and blend development, sampling and trial lots, mill-direct commercial terms, and delivery through our pan-India network.

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