

Silk Fibre: What Silk Is, Its Properties and How It Is Made

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In one paragraph

Silk is a natural protein fibre spun by silkworms, the caterpillars of certain moths, to build their cocoons. EU law defines it as “fibre obtained exclusively from silk-secreting insects” (Regulation (EU) No 1007/2011, Annex I). Most silk comes from the domesticated mulberry silkworm, *Bombyx mori*, whose cocoon is one continuous filament of 600 to 1,500 metres (FAO). The filament is two strands of the protein fibroin glued together by a second protein, sericin, which is boiled off to give silk its soft lustre. Silk is strong for its fineness, takes dye brilliantly and holds 11% moisture, but sunlight, perspiration, alkali and chlorine bleach damage it. The world made about 97,000 tonnes of raw silk in 2024, more than half of it in China and most of the rest in India (International Sericultural Commission).

At a glance

Source: FAO, Silk reeling and testing manual, section 2.3 and table 8; alkali, CAMEO; allowance, Regulation 1007/2011, Annex IX.

Property	Value
Filament length per cocoon	600–1,500 m, 80% reelable
Tenacity	3.6–4.8 g/den for a single bave; raw silk 2.6–4.8 g/den; degummed silk stronger than raw
Wet strength	“decreases about 20 percent when wet and regains its original strength after drying”
Elongation at break	18–23% (raw silk)
Density	Raw silk 1.32–1.40 g/cm ³ ; degummed 1.30–1.38
Moisture regain	11%, “the accepted moisture regain coefficient for silk”; EU allowance 11.00%
Heat	White silk starts to yellow after 15 minutes at 110 °C; disintegrates at about 170 °C
Light	“Continuous exposure to light weakens silk faster than cotton or wool”
Chemicals	Hydrolysed by acid more than by alkali, least between pH 4 and 8; chlorine “attacks fibroin more vigorously than does sodium hypochlorite”; damaged even by weak alkali such as soap
Electricity	“a poor conductor of electricity”, so it builds static

Key figures and their sources

- Cooking softens the sericin so the filament unwinds; “Range of total length is from 600 to 1 500 m of which 80 percent is reelable while the remainder is removed as waste” (FAO).
Source: FAO (fao.org)
- FAO’s worked example uses a renditta of 9 for multivoltine cocoons and a silk percentage of 17 for bivoltine cocoons, about 5.9 kg of cocoons per kilogram of silk (FAO).
Source: FAO (fao.org)
- The amount of sericin ranges from 19 to 28 percent according to the type of cocoon” (FAO); measured on the whole cocoon, sericins are “25-30% of the total silkworm cocoon by weight” (Rockwood and colleagues, Nature Protocols, 2011).
Source: Rockwood and colleagues, Nature Protocols, 2011 (pmc.ncbi.nlm.nih.gov)

- Muga, “This golden yellow colour silk”, comes from *Antheraea assamensis*; “Assam accounts for more than 95% of the muga silk production”, the rest from neighbouring north-eastern states and Cooch Behar (CSB, muga).
Source: CSB, muga (csb.gov.in)
- On the care label, two dots, 160 °C, is the “wool/silk/polyester/viscose” setting (GINETEX symbol index).
Source: GINETEX symbol index (clevercare.info)
- In India, “Silk Mark is a Quality Assurance Label, which signifies that the product to which it is affixed is made of pure silk”, for yarn, saris, dress materials and furnishings “made up of 100% Natural silk” (Ministry of Textiles, via PIB, 2022).
Source: Ministry of Textiles, via PIB, 2022 (pib.gov.in)
- The International Sericultural Commission puts world raw silk production at 97,351 tonnes in 2024 (provisional): China 50,500 and India 41,121, together about 94% (ISC; this page’s arithmetic).
Source: ISC (inserco.org)
- “Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu and Jammu & Kashmir ... together accounts for 92 % of country’s total mulberry raw silk production” (CSB).
Source: CSB (csb.gov.in)

Diagrams



Reeling silk by hand in Japan, from *Silk: its origin, culture, and manufacture* (1911). Internet Archive Book Images, Flickr, no known copyright restrictions.



Drawing filaments from cooked cocoons. Image: Pixabay.

Test yourself

Ten questions on this topic. Answer them without looking, then check on the last page.

1. How does EU law (Regulation (EU) No 1007/2011) define silk?
2. What are the four stages in the life cycle of the silkworm?
3. Why are cocoons dried or steamed before silk is reeled?
4. What is renditta in the silk trade?
5. What are the two proteins of the silk filament, and which one is the gum?
6. How is sericin removed from silk in degumming?
7. What is the accepted moisture regain of silk?

8. By how much does silk's strength decrease when wet, according to FAO?
9. How does the cross-section of wild silks differ from that of *Bombyx mori* filaments?
10. What did the International Sericultural Commission give as world raw silk production in 2024?

Answers

Each answer is stated in the article; the section to read again is named after it.

1. **Fibre obtained exclusively from silk-secreting insects.**
See: Opening
2. **Egg, caterpillar, pupa and moth.**
See: The silkworm and its cocoon
3. **To kill the pupa, because a newly emergent moth pierces the shell and makes the cocoon useless for raw silk.**
See: The silkworm and its cocoon
4. **The kilograms of fresh cocoons needed for one kilogram of raw silk.**
See: How silk is reeled
5. **Fibroin, covered by the gum sericin.**
See: What silk is made of
6. **By boiling the fibres in soapy water or a dilute alkali.**
See: What silk is made of
7. **11%.**
See: Properties of silk
8. **About 20 percent; it regains its original strength after drying.**
See: Properties of silk
9. **Wild silks are flat and ribbon-like with an oval to rectangular section; Bombyx mori filaments are triangular.**
See: Wild silks: tasar, eri and muga
10. **97,351 tonnes (provisional), with China 50,500 and India 41,121.**
See: Where silk is produced

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