

Research and technology supporting your decisions

In this issue...

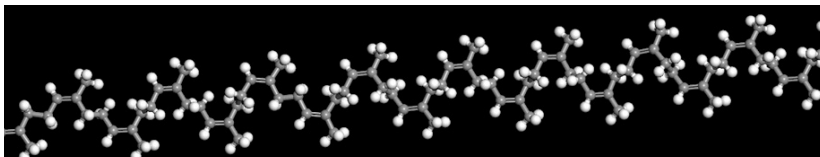
Find out how we've duplicated everything you like about latex and eliminated everything you don't!

Fooling Mother Nature

Natural rubber latex, made up primarily of the polymer isoprene, has long been the gold standard in barrier protection in medical gloves. Technology has finally enabled us to produce a synthetic polyisoprene with all of the advantages of nature's product but without the proteins and allergens of natural rubber latex.

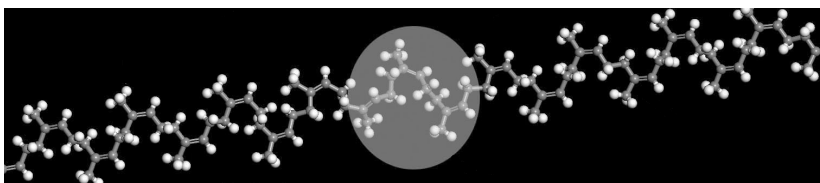
Natural rubber can be obtained from hundreds of species of plants, with the *Hevea brasiliensis* tree the most outstanding source. In addition to the polymer isoprene, this plant product contains a number of other components and impurities, such as latex proteins, carbohydrates, lipoids and inorganic salts.

This model illustrates the molecular structure of the natural rubber latex polymer polyisoprene.



The properties of synthetic polyisoprene are nearly identical to those of natural rubber. The synthetic polymers are alternatives for the natural product and are often preferred because of their greater uniformity and consistency.

This model illustrates the nearly identical molecular structure of synthetic polyisoprene (structural difference highlighted).



You don't see much difference? You won't be able to feel the difference either.

Our Esteem® synthetic surgical gloves are formulated with synthetic polyisoprene using a unique and proprietary manufacturing technology.

Comparison of properties of synthetic and natural rubbers^{1,2,3}

Polymers used for medical gloves must have certain key characteristics. To provide a high-quality glove on a consistent basis, it is critical that a polymer formulation is designed and engineered to meet all of these requirements.

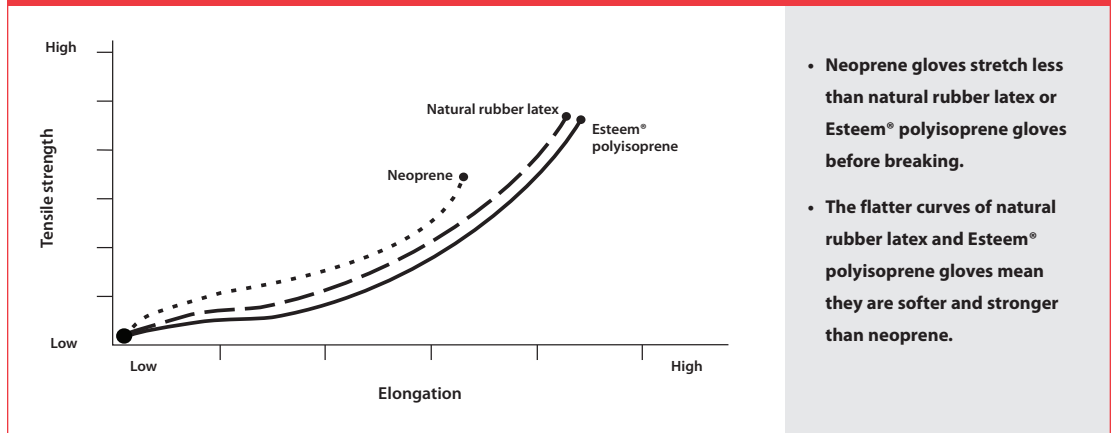
The following charts compare the key properties of neoprene, natural rubber latex and synthetic polyisoprene glove materials. They illustrate the similarity of Esteem® gloves to natural rubber latex and their superiority to neoprene.

The generic term neoprene denotes the rubberlike polymers and copolymers of chloroprene. Neoprenes were the first synthetic rubbers developed in the United States. Discovered in the laboratories of the University of Notre Dame and developed by E.I. du Pont de Nemours and Company, neoprene has been widely used because of its inherent tensile strength, elongation and wear properties. However, these properties are still not on par with natural rubber latex and, like many synthetic polymers, neoprene can feel stiffer and less comfortable than natural rubber latex.

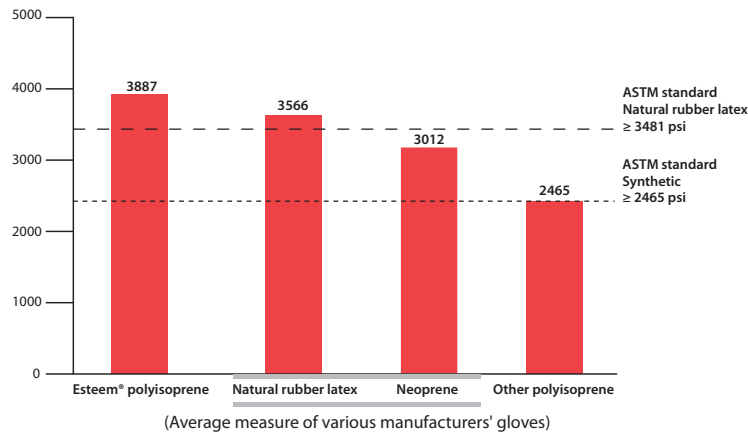
Properties	Neoprene	Natural rubber latex	Polyisoprene
Tensile strength	medium	high	high
Tear resistance	medium	high	high
Elongation	medium	high	high
Conformance to hand	good (over time)	good (immediate)	good (immediate)
Softness (tensile stress – lower is softer)	medium	low	low
Tactile sensation	good	excellent	excellent
Natural rubber latex allergens/proteins	no	yes	no

Tensile strength relates to material strength. The measure reflects how much force is required to stretch a sample of glove until it breaks. A higher tensile strength implies a stronger glove. Elongation relates to a material's elasticity. A glove with a higher elongation will stretch more before breaking.

Tensile strength and elongation

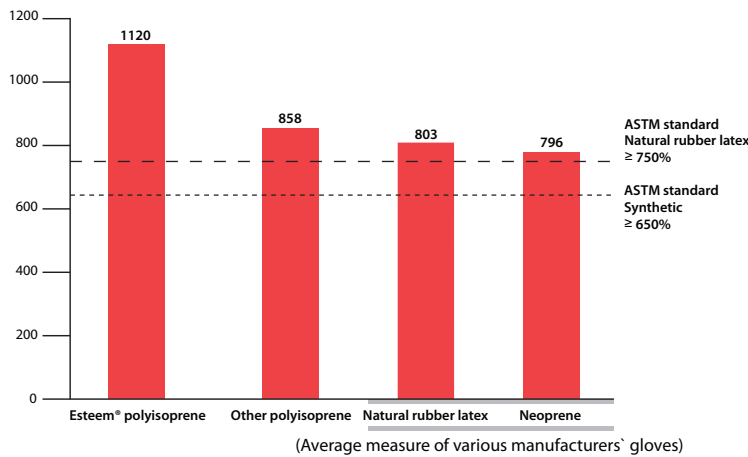


Tensile strength (psi)



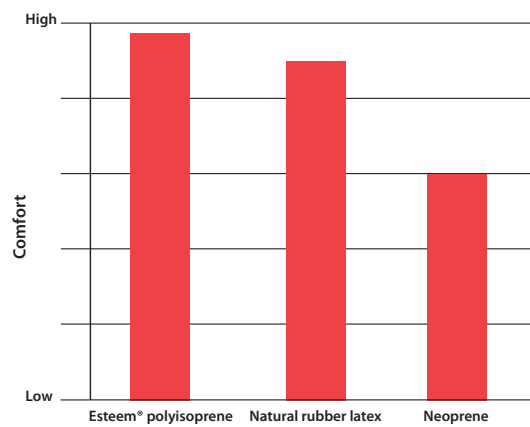
- Esteem® polyisoprene gloves are comparable in tensile strength to natural rubber latex and have greater tensile strength than neoprene.
- The tensile strength of Esteem® polyisoprene gloves exceeds the ASTM standard for both natural rubber latex and synthetic.

Elongation %



- Esteem® polyisoprene gloves have greater elasticity than competitive neoprene gloves.
- Esteem® gloves' elongation exceeds the ASTM standard for both natural rubber latex and synthetic.

Comfort and conformance



- Esteem® synthetic surgical gloves immediately conform to your hand for an extremely soft, comfortable fit comparable to natural rubber latex.

Conclusion

Esteem® polyisoprene surgical glove possesses favorable “latex-like” properties, specifically high tensile strength and low tensile stress (modulus). The polyisoprene compound formulation was specifically engineered to emulate the desired features of natural rubber latex (i.e., strength and barrier, elasticity, softness and conformance to hand). Cardinal Health’s computer-controlled, proprietary compounding process maximizes the glove’s physical properties, providing consistent protection and performance for health-care workers and patients.

References

1. F.W. Billmeyer, Jr., *Textbook of Polymer Science*, 3rd ed., John Wiley & Sons, New York, 1984.
2. Robert Francis Mauser, ed., *The Vanderbilt Rubber Handbook*, 3rd ed., R.T. Vanderbilt Company, Inc., Norwalk, CT, 1987.
3. M. Morton, *Rubber Technology*, 3rd ed., Chapman and Hall Publishing Company, New York, 1995.

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Cardinal Health
Glove Products
1500 Waukegan Road
McGaw Park, IL 60085

www.cardinal.com/gloves