



HANNA RUBBER COMPANY

# Types of Rubber

## Nitrile Butadiene Rubber (NBR)

**Nitrile Butadiene Rubber (NBR), also known as Buna-N or NBR rubber, is a synthetic copolymer composed of acrylonitrile (ACN) and butadiene monomers. It was first developed in the 1930s as an oil-resistant alternative to natural rubber.**

### Physical Properties of NBR

**Oil and Chemical Resistance:** NBR's chemical structure provides it with excellent resistance to oils, fuels, and many other chemicals. This resistance increases with a higher acrylonitrile content in the polymer.

**Abrasion Resistance:** NBR has good resistance to wear and abrasion, making it suitable for applications where parts are exposed to friction or physical stress.

**Temperature Resistance:** NBR has a wide operating temperature range, typically between -40°C and 120°C (-40°F to 248°F), although its performance may deteriorate at higher temperatures. Special formulations of NBR can be designed to withstand higher or lower temperatures.

**Tensile Strength:** NBR has moderate tensile strength, typically in the range of 10-30 MPa, depending on the formulation. This strength can be increased by reinforcing the material with fillers or additives.

**Elongation at Break:** NBR generally has a high elongation at break, ranging from 200% to 600%, making it a flexible and stretchable material.

**Gas Permeability:** NBR has low gas permeability, which makes it useful for applications where sealing against gases is required.

**Compression Set:** NBR has a moderate compression set, which means it can return to its original shape after being compressed. This property is essential for maintaining effective seals in dynamic applications.

### History of NBR

NBR was first developed in the early 1930s as a result of the increasing demand for oil-resistant rubber materials. The United States, Germany, and Japan were among the first countries to manufacture NBR, with companies such as Bayer, DuPont, and Zeon Corporation leading the production efforts. NBR's widespread use in the automotive industry started in the 1940s, as it was found to be highly effective in sealing and gasket applications.

The development and improvement of NBR continued over the years, with the introduction of hydrogenated nitrile butadiene rubber (HNBR) in the 1980s, which provided better resistance to heat, ozone, and other environmental factors. Further advancements in NBR technology have led to the creation of various formulations tailored to specific applications and industries.



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Today, NBR remains a critical material in many sectors, including automotive, aerospace, oil and gas, food processing, and construction, due to its unique combination of properties and cost-effectiveness.

Nitrile Butadiene Rubber (NBR) is marketed under various trade names by different manufacturers. Some of the most common trade names for NBR include:

## Trade Names

**Buna-N:** Buna-N is one of the earliest and most widely recognized trade names for NBR. It was coined by Bayer, a German chemical company, and is derived from "Bu" for butadiene, "Na" for sodium (symbolizing the polymerization process), and "N" for nitrile.

**Perbunan:** Perbunan is another trade name for NBR used by Lanxess (formerly part of Bayer). It is derived from "PERmanent BUTadiene Nitrile Acrylonitrile" rubber, emphasizing the durability of the material.

**Nipol:** Nipol is a trade name for NBR products manufactured by Zeon Corporation, a Japanese chemical company. They offer various grades of Nipol NBR, designed for specific applications and industries.

**Krynac:** Krynac is a trade name used by Arlanxeo, a leading synthetic rubber company, for their NBR products.

**Europrene N:** Europrene N is a trade name used by Versalis, an Italian chemical company, for their NBR products.

**Synthos NBR:** Synthos, a Polish chemical company, markets their NBR products under the Synthos NBR trade name.

These trade names represent NBR products from different manufacturers and may have slight variations in properties, depending on their specific formulations. It is essential to consult the technical data sheets and consult with manufacturers to determine the most suitable NBR product for a given application.