

Nitrile Rubber, Buna n & NBR Rubber

Nitrile Butadiene Rubber, also known as Buna N, Nitrile Rubber & NBR.

Nitrile rubber is a kind of synthetic rubber which is made by emulsion polymerization of butadiene and acrylonitrile with good properties of aging resistance & oil resistance, especially alkane oil. The Density of Nitrile Butadiene Rubber is  $0.95 \sim 1.0 \text{ g/cm}^3$

丁腈 (jǐng) 橡胶 Nitrile Butadiene Rubber 是由丁二烯和丙烯腈经乳液聚合法制得的一种耐油(尤其是烷烃油)、耐老化性能较好的合成橡胶。Nitrile Butadiene Rubber,不同叫法: Buna N, 或者 Nitrile Rubber 等。丁腈橡胶密度:  $0.95 \sim 1.0 \text{ g/cm}^3$

Nitrile Rubber & NBR Properties:

Nitrile rubber is one of the most representative rubber in the comprehensive properties of oil resistance, physical mechanical properties and chemical resistance, and it can be used to satisfy various applications if you knows it well:

Advantages: Excellent oil resistance, good wear resistance, good temperature resistance & good adhesiveness

Disadvantages: Poor low-temperature & ozone resistance, Poor insulation, and low elasticity

优点: 耐油性极好, 耐磨性较高, 耐热性较好, 粘接力强。

缺点: 耐低温性差、耐臭氧性差, 绝缘性能低劣, 弹性稍低。

Nitrile Rubber Oil resistance: NBR is a synthetic rubber that is resistant to oil (especially alkane oil) and has good aging resistance. NBR has excellent oil resistance which is superior to natural rubber, chloroprene rubber and styrene butadiene rubber. In general rubber, NBR's resistance to benzene, petroleum base oil and nonpolar solvents (such as mineral oil, liquid fuel, animal and plant oil and solvent) is much superior to the performance of nonpolar rubber, like NR, SBR, IIR, CR, while NBR isn't resistant to polar solvents and polar oil.

耐油性: NBR 是耐油(尤其是烷烃油)、耐老化性能较好的合成橡胶, NBR 具有优异的耐油性, 优于天然橡胶、氯丁橡胶和丁苯橡胶。在通用胶中, NBR 橡胶耐苯、石油基油类及非极性溶剂(如耐矿物油、液体燃料、动植物油和溶剂)的性

能远优于 NR、SBR、IIR 等非极性胶,也优于极性的 CR,但丁腈橡胶不耐极性溶剂和极性油。

Buna N & Nitrile Rubber Ozone Resistance : the disadvantage of NBR is that it is not resistant to ozone and aromatic, halogenated hydrocarbon, ketone and ester solvents.

耐候耐臭氧：丁腈橡胶的缺点是不耐臭氧及芳香族、卤代烃、酮及酯类溶剂，不宜做绝缘材料。

Nitrile Rubber temperature resistance: the content of acrylonitrile (%) in nitrile rubber can be divided into 5 kinds: 42 ~ 46, 36 ~ 41, 31 ~ 35, 25 ~ 30, 18 ~ 24, etc. The more acrylonitrile content in NBR, the better the oil resistance it'll be, but the cold tolerance will decrease accordingly. It can be used for long time in the air of 120 °C or in the oil of 150°C.

Long-term Working Temperature: -20°C~100°C

The Lowest Working Temperature: -50°C

The Highest Working Temperature: 120°C (in the air), 150°C(in the oil)

耐温：丁腈橡胶中丙烯腈含量(%)有 42~46、36~41、31~35、25~30、18~24 等五种。丙烯腈含量越多，耐油性越好,但耐寒性则相应下降。它可以在 120°C 的空气中或在 150°C 的油中长期使用。

长期工作温度： -20~100 度 Long-term Working Temperature

最低温度： -50 度 （玻璃化温度）

最高工作温度： 120 度 （空气中），150 度（油中）

### The Relation between Property and ACN Content of NBR

ACN Content of NBR	High ↑	Low
Heat Resistance	↑	
Ozone Resistance	↑	
Glass Transition Temperature	↑	
Oil Resistance	↑	
Air tightness	↑	
Insulativity	↓	

Wear Resistance	↑
Density	↑
Elasticity	↓
Self-adhesiveness	↓

In addition, NBR also has good water resistance, air tightness and good adhesion performance.

### Nitrile Rubber & NBR Application

For the good property of oil resistance, NBR is widely used in various oil resistant rubber products, a variety of oil resistant gaskets, washer, sleeve, seal, gasket, casing, soft hose, plastic roller, plastic cable materials, etc. NBR material has become an indispensable material in automotive, aviation, petroleum, photocopying industry.

广泛用于制各种耐油橡胶制品、多种耐油垫圈、垫片、套管、软包装、软胶管、印染胶辊、电缆胶材料等，在汽车、航空、石油、复印等行业中成为必不可少的弹性材料。

NBR also has good chemical stability and processing performance, with its structure of acrylonitrile content in the relative density increases, and vulcanization-speed up, improvement of tensile strength, the resilience & cold resistance would decline. Due to the cyano in NBR is easy to polarize, so dielectric property will reduce, which is also a semiconductor rubber. NBR can be divided into 5 kinds according to its ACN content, the most widely used compounds have a Nitrile (ACN) content of approximately 32% and are known as “Medium Nitrile”. Compounds having approximately 50% ACN content are known “High Nitrile” these are usually specified for use with Hydrocarbon fuels. Compounds having approximately 18% ACN content are known “Low Nitrile” these are usually specified for use with Low temperature applications.

NBR 耐化学稳定性好,加工性能良好,随着其结构中的丙烯腈含量其相对密度增大,硫化速度加快,拉伸强度性能提高,但回弹性能下降,耐寒性变差。由于 NBR 中的氰基容易电场极化,因而介电性能下降,是半导体橡胶。NBR 可以按 ACN 含量的高低,分为超高、高、中高、中和低丙稀腈 5 类。

With the development of automobile industry, people have higher requirements about oil resistance, heat resistance, Chemical causticity resistance of sealing material which are used in automobile fuel and lubricating system & the engine. For a long time, Automobile industry has been used NBR which has good oil resistance, but due to its own shortness, can only be long-term used under working temperature of 120 °C; Moreover, due to the poor performance of ozone resistance and radiation resistance, it can not meet the sealing requirements of motor vehicles such as automobiles.

Hydrogenated nitrile rubber (HNBR) is a hydrogenated product of nitrile rubber. It not only has good oil resistance, ozone resistance, abrasion resistance and chemical corrosion resistance, but also has a good compression set, heat resistance and low temperature resistance, can be used as raw material of seal products which require high performance.

随着汽车工业的发展，人们对汽车燃料和润滑系统以及发动机所用的密封材料如橡胶的耐热、耐油、耐各种化学品腐蚀等性能提出了苛刻的要求。长期以来，汽车工业一直使用耐油性较好的丁腈橡胶，由于其自身的缺陷，只能在 120°C 以下长期使用；而且，因耐臭氧、耐候和耐辐射性能较差，满足不了汽车等机动车辆对发动机的密封要求。氢化丁腈橡胶(HNBR)是丁腈橡胶的加氢产物。它既具有良好的耐油、耐臭氧、耐磨和耐化学品腐蚀性，又具有良好的压缩永久变形、耐热和耐低温性能，可用于制造苛刻条件下使用的密封制品。