

## **ANTICORROSIVE LIQUID NANOCOMPOSITION (ALNEC-LRC)**

**Anticorrosive Liquid NanoElastomer Composition (ALNEC-LRC)** is protective lining products that function superiorly relative to rubber products that they replace. **ALNEC-LRC** is a cost-effective and functional solution for rubber-coating applications. Conventional rubber coatings of polychloropropene (Neoprene), polysulfide (Thiokol), polyurethane and other rubber materials lack the ability to provide reliable protection over extended periods of time. In addition, these coatings require adhesive substrates commonly considered unsafe due to the organic solvents present in the compounds.<sup>[1]</sup>

With value-added design and engineering flexibility, **ALNEC-LRC** have the ability to effectively cover hard to reach places, successfully coating the complex surfaces of such areas as the mesh of sieves otherwise considered impossible to coat with conventional rubber sheets. With increased chemical resistance, **ALNEC-LRC** maintain material integrity by assuring long-term durability and effective corrosion protection. In addition to high performance properties, material production of **ALNEC-LRC** meet environmental safety standards further elevating **ALNEC-LRC** as advanced products that outperform conventional rubber coatings and coverings. **ALNEC** offer cost-benefit factors based on anticorrosion reliability and application functionality that satisfy the demands of the high-performance coating industry.

### **Application**

With superior chemical resistance and functionality, **ALNEC-LRC** will replace conventional sheet rubber linings commercially available in thickness of 2.5 to 4.0 mm. **ALNEC-LRC** will offer more effective solutions for the even surfaces normally covered with rubber sheets. The even surfaces to which many layers of rubber sheets are usually glued will be covered with **ALNEC-LRC** which will provide more effective solution with the same chemical resistance. **ALNEC-LRC** can be easily applied using such simple coating techniques as brushing, rolling, spraying, flooding or dipping. Unlike conventional rubber sheet and liquid rubberizing compounds, **ALNEC-LRC** are most efficient in protecting the intricate shared and perforated parts of pumps, fans, centrifuge rotors, small-diameter pipes and outlets, shut-off and control valves, stirrers and many other complex parts. With an extensive range of applications, **ALNEC-LRC** can be used in various industries:



***Chemical Industry:***

- Linings made from **ALNEC-LRC** will protect the intricate surfaces of filtered centrifuges, ventilators and air ducts cleaning systems from blended acids solutions, vapors of HCl, HF, salt solutions and oxides of nitrogen, chlorine and bromine;
- Parts coated with **ALNEC-LRC** are operating in oxalic acid working conditions up to 95-100°C;
- **ALNEC-LRC** will effectively protect vacuum pumps from vapors of HCl and scrubbers from NiCl<sub>2</sub>;
- Sheet-steel cylinders of gas collectors coated with **ALNEC-LRC** will find protection from H<sub>2</sub>S and vapors of HF;

***Agricultural Industry:***

- **ALNEC-LRC** will protect pickle pipelines from solutions of KOH and NaOH and tanks from corrosive liquid complex fertilizers;

***Automobile Industry:***

- Coating the bottom of automobiles with **ALNEC-LRC** will provide a protective barrier against chloride salts, sea water and abrasive attacks;

***Marine:***

- **ALNEC-LRC** can be used in a wide variety of marine applications where protection from corrosive salts is necessary;

***Other:***

- **ALNEC-LRC** can be used as a protective lining to line mixing tanks used in the manufacturing of synthetic rubber providing protection from corrosive H<sub>2</sub>SO<sub>4</sub>;
- Refrigerant bottom boxes using **ALNEC-LRC** will be protected from HF vapors.

### Properties of ALNEC-LRC

**ALNEC-LRC** are based on linear low-molecular polybutadiene rubber. The materials are available in single or double compositions, depending on the intended area of application and type of rubber base used. The single packed **ALNEC-LRC** are low-viscous thixotropic solvent-free compositions, making them safe to handle. They have a shelf life that is virtually unlimited at temperatures between +20°C to +30°C. The double-packed **ALNEC-LRC** are a high-viscous composition intended as a thick-layer covering up to 2.5 mm. Before application, a vulcanizing paste is introduced into the composition to activate preliminary curing in the ALNEC layer at temperatures between 20°C to 25°C, forming rubber-like vulcanite. The formed coating is then brought to hot vulcanization, which imparts chemical resistance, endurance and adhesion to the finished covering. The main properties of **ALNEC-LRC** include

- Tensile strength: to 25 MPa
- Ultimate operating temperature: to 95°C
- Adhesion to steel in tear-apart test: to 11.5 MPa
- Hardness to durometer TM-2: 80-90  
(arbitrary units)

The results of laboratory testing prove that **ALNEC-LRC** coverings display excellent resistance to aggressive chemicals of the following strengths :

- sulfuric acid: 10-70%
- hydrochloric acid: 10-37%
- hydrofluoric acid: 5-20%
- phosphoric acid: 0-80%
- alkalis, benzene, mineral oils, decarbonized water and solutions of inorganic salts of nonoxidizing nature: 20-40%

It is possible to customize ALNEC-LRC for increased chemical resistance using special additives.

**Data Sheet for ALNEC-LRC**

Property	Units	Data
<i>Liquid composition</i>		
Color	—	Yellow-gray White Black
Viscosity	Pa*c	80 to 280
Method of Coating	—	Brushing Spraying Dipping
Condition of vulcanization • heat carrier • temperature	°C	Without pressure Hot dry air 100 to 150
ALNEC-LRC consumption per 1mm of coating thickness	Kg/m <sup>2</sup>	0.9 to 1.0
<i>Coating after vulcanization</i>		
Volumetric shrinkage	%	3.2 to 4.5
Tensile strength	MPa	20 to 30
Adhesion strength with steel: • by tear test • by scaling test	MPa N/M	20 to 32 175 to 400
Shore hardness (“D”)	%	1.5 to 2
Impact strength	N*m	> 5
Thermal expansion	%	1.5 to 2
Heat resistance to adhesion joint	m <sup>2</sup> /c	(0.4 to 4.8)*10 <sup>-14</sup>
Cyclic stability (up to exfoliation) temperature cycle from -20°C to 100°C	Cycles	> 90
Lifetime of coating (δ = 2mm) in 30% sulfuric acid and hydrochloric acids at 20°C	Years	4.00 to 5.3

**Applications of the ALNEC-LRC Materials**

Exposure to	% Solution	Exposure at temperature °C
<i>Acids</i>		
Nitric Acid (HNO <sub>3</sub> )	10	20
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	70	20
	50	60
Hydrochloric Acid (HCl)	35	20
Hydrofluoric Acid (HF)	40	20
Acetic Acid (CH <sub>3</sub> COOH)	50	20
Phosphoric Acid (H <sub>3</sub> PO <sub>4</sub> )	80	80
<i>Oils</i>		
Transformer	—	60
Automobile		
Spindle		
Piston		
<i>Salt and Alkalis</i>		
Zinc Sulfate (ZnSO <sub>4</sub> ) & Aluminum Sulfate Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	20	60
Sodium Chloride (NaCl) & Potassium Chloride (KCl)	20	60
Potassium Nitrate (KNO <sub>3</sub> ) & Potassium Chromate (K <sub>2</sub> CrO <sub>4</sub> )	10	60
Sodium Hydroxide (NaOH)	40	20
Potassium Hydroxide (KOH)	35	20
<i>Organic Solvents</i>		
Acetone (CH <sub>3</sub> COCH <sub>3</sub> )	40	20
Stoddard Solution (white spirits)	—	20
<i>Alcohols</i>		
Ethyl (CH <sub>3</sub> CH <sub>2</sub> OH)	—	20
Butyl (CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> OH)		20