

BUTYL & HALOBUTYL RUBBERS ITS OVERVIEW

Butyl Rubber –Isoprene Isobutylene Copolymer is called Butyl Rubber in which the Isoprene content is about 0.6 to 3%, which decides the cure reactivity in Butyl Rubber.

Butyl Rubber is classified as per SAE 200 / ASTM D 2000 as **AA / BA**

Butyl rubber is characterized by low rebound property at room temperature and rebound increases with higher temperature.

Butyl rubber vulcanisates gives excellent impermeable property to gases, good Heat ageing properties, good weathering & ozone resistance, Chemical resistance, Acid and Alkali resistance, resistance to Polar oils, animal and vegetable oils, and good low temperature properties.

COMPOUNDING ASPECTS:

ACTIVATORS : Metal oxides (Zinc oxide) & Stearic acid for Sulphur cure.

FILLERS : Medium reinforcing Carbons and White fillers

OILS : PARAFFINIC OIL, DOS(Di-octyl sebacate), Ester type

PROCESS AIDS : Stearate Derivatives, Stearic acids, Zinc soaps, Fatty Alcohol esters, Fattices etc.

ANTIDEGRADANTS : PPD's, QUINONES, WAXES

CURE SYSTEM :
1. Sulphur + Accelerator
2. Sulphur donor systems
3. Dioxime Cure system + Lead oxide
4. Resin Cure system {Phenolic resin (Methylol based) for very high heat resistance (120 to 170 deg.C)}

In order to achieve higher state of cure in the Butyl Rubber, Butyl rubber needs to be heat treated in the internal mixers @ 150–175 deg.C, for 5 minutes using the nitroso {N-dinitrosoaniline or p-dinitrosobenzene} or dioxime compounds (p-quinone dioxime).

Other Compounding Guidance:

C.I. RESIN upto 10 phr improves the hardness of the Butyl vulcanisates considerably without changing the Tensile Strength property of the compound.

BUTYL RUBBER VULCANISATES will undergo Reversion similar to NR in the Sulphur based systems.

BUTYL RUBBER CANNOT BE CURED WITH PEROXIDES, AS PEROXIDES TENDS TO DEPOLYMERISE THE BUTYL RUBBER.

HALO BUTYL (CHLORO BUTYL & BROMO BUTYL):

To increase the cure rate, & to improve the reversion resistance of the Butyl Rubber and the co-vulcanisation with other diene rubbers, butyl rubber is halogenated with Chlorine and Bromine to get CHLOROBUTYL RUBBER & BROMOBUTYL RUBBER.

In Chloro Butyl, the % of Chlorine is around 1.25% while in Bromo Butyl, the % of the Bromine is upto 2%.

Compounding aspects of Halo Butyl:

All the compounding aspects are similar to Butyl Rubber, except the curing:

- Curing System :**
1. Sulphur, Zinc Oxide & Accelerator systems.
 2. Zinc Oxide or Diamine based or Bis-Maleimides
 3. Lead oxide based for Good Hot water / Steam resistance.
 4. Resin cure

Retarder : Calcium Stearate retards curing of Chlorobutyl by zinc Oxide.

Magnesium Oxide is also used to improve scorch safety in CIIR.

In BromoButyl for ZnO curing, MBTS is used as retarder.

Kindly Note : Bromobutyl is more reactive than the Chlorobutyl, and gives higher state of cure. Also Bromobutyl is less sensitive to moisture in the compound and better adhesion properties than the ChloroButyl.

Bromobutyl can be cured by peroxide as well.

Generally Halo butyl rubber is having better DRY HEAT RESISTANCE and Poorer Steam Resistance when compared to Butyl Rubber.

SELECTION GUIDE OF BUTYL & HALOBUTYL GRADES OF M/S. LANXESS:

Butyl Rubber (IIR)

LANXESS Butyl Grade	Level of unsaturation (mol %)	Mooney viscosity (ML(1+8) 125 °C)	Density g/cm ³
Butyl Rubber (IIR) isobutene-isoprene rubber			
LANXESS BUTYL 100	0.90	33	0.92
LANXESS BUTYL 301	1.85	51	0.92
LANXESS BUTYL 402	2.25	33	0.92
LANXESS BUTYL 101-3 (Food grade)	1.75	51	0.92

Halobutyl Rubber (XIIR)

LANXESS Butyl Grade	Halogen content (wt %)	Mooney viscosity (ML(1+8) 125 °C)	Density g/cm ³
Bromobutyl Rubber (BIIR) brominated isobutene-isoprene rubber			
LANXESS BROMOBUTYL 2030	1.80	32	0.93
LANXESS BROMOBUTYL 2040	1.80	39	0.93
LANXESS BROMOBUTYL X2	1.80	46	0.93
Chlorobutyl Rubber (CIIR) chlorinated isobutene-isoprene rubber			
LANXESS CHLOROBUTYL 1240	1.25	38	0.92


APPLICATIONS

PRODUCT		BUTYL TYPE
HEAT RESISTANCE CONVEYOR BELT		BROMOBUTYL
ANTIVIBRATION MOUNTINGS		CHLORO & BROMO BUTYL

<p>ROOFING MEMBRANE</p>		<p>BUTYL</p>
<p>PRINTING ROLL COVER</p>		<p>BUTYL, CHLORO & BROMO BUTYL</p>
<p>CABLES</p>		<p>BUTYL</p>
<p>ELECTRICAL CONDENSOR CAPS</p>		<p>BUTYL</p>
<p>SEALANTS</p>		<p>BUTYL</p>

<p>CHEWING GUM</p>		<p>BUTYL (GRADE LANXESS BUTYL 101-3)</p>
<p>AIR CONDITIONING HOSE</p>		<p>CHLORO BUTYL</p>
<p>SHOE SOLES</p>		<p>BROMO BUTYL</p>
<p>PHARMACEUTICAL STOPPERS, CLOSURES, VIALS, TUBES</p>		<p>BROMOBUTYL</p>
<p>SPORTING BALL BLADDERS</p>		<p>BROMOBUTYL</p>

<p>TYRE CURING BLADDERS</p>		<p>BUTYL</p>
<p>AIR BAGS – RETREADING (HOT –CAPPED)</p>		<p>BUTYL</p>
<p>RETREADING ENVELOPES (COLD-CAPPED)</p>		<p>BUTYL, CHLORO, BROMO BUTYL</p>
<p>WHITE SIDEWALL OF THE TYRE</p>		<p>BROMOBUTYL, CHLOROBUTYL</p>
<p>INNERLINER FOR TUBELESS TYRE</p>		<p>BROMOBUTYL</p>

<p>INNER TUBE</p>		<p>BUTYL</p>
<p>PROTECTIVE CLOTHING</p>		<p>BUTYL, BROMO, CHLOROBUTYL</p>

Please Note :

All the Butyl and Halobutyl grades shown in the selection guide is manufactured by

M/S. **LANXESS**
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