



**ASADENE<sup>TM</sup>**  
**TUFDENE<sup>TM</sup>**  
**ASAPRENE<sup>TM</sup>**

Butadiene Rubber (BR)  
Solution-Styrene Butadiene Rubber (S-SBR)

**AsahiKASEI**

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#### **Introduction**

ASADENE™, TUFDENE™ and ASAPRENE™ have high designing freedom of polymer structure.

We can provide grades with various styrene content and microstructure attained by well-utilized solution polymerization technology.

Further, we have developed and commercialized “E series (modified SBR)” introduced with a functional group and added them to our line-up.

Major applications of ASADENE™, TUFDENE™ and ASAPRENE™ are for final products after vulcanization and for impact modification by finely dispersing them in plastics at a polymerization.

In vulcanized rubber applications, they are widely used in various applications such as tire, industrial goods and footwear.

In plastic modification applications, they are widely used to improve impact resistance such as in HIPS (high impact polystyrene).

# 1. Vulcanized Rubber Applications

ASADENE™, TUFDENE™ and ASAPRENE™ are mainly used for tire, industrial goods and footwear applications. We can provide grades with various styrene content and microstructure.

We can also provide modified grades introduced with a functional group, which already have high reputation in the application of silica filled tire for fuel economy type.

## Vulcanized Rubber Applications:

### ASADENE™, TUFDENE™ and ASAPRENE™ Grades List

Grade Name		Styrene Content (%)	Mooney Viscosity* <sub>1</sub>	Oil* <sub>2</sub> (phr)	Features
BR	ASADENE™ NF35R	0	35	—	Superior wear resistance, low temperature characteristics and groove crack resistance, along with good processability
SBR	TUFDENE™1000	18	45	—	Superior wear resistance, resilience, low temperature characteristics and groove crack resistance
	TUFDENE™2000R	25	45	—	Good balance in tensile strength, wear resistance resilience and fluidity in processing
	TUFDENE™2003	25	33	—	Low mill shrinkage and good fluidity in processing
	TUFDENE™2100R	25	78	—	High green strength and low compression set. High loading is possible.
	TUFDENE™3830	33	65	37.5	Superior balance in rolling resistance, wet skid, and low temperature characteristics. Medium vinyl content.
	TUFDENE™3835	35.5	53	37.5	Superior dry and wet skid resistances suitable for high performance tread tire. Medium vinyl content.
	TUFDENE™4850	40	42.5	50	
	ASAPRENE™303	46	45	—	Low mill shrinkage. High hardness and bright color compounds
	ASAPRENE™1205	25	47	—	Low mill shrinkage and good fluidity in processing. Bright color compounds
	ASAPRENE™ 6500P	65	60* <sub>3</sub> )	—	High hardness compounds. Superior transparency suitable for bright color compounds. Good roll processability
E series (Modified SBR)	TUFDENE™E580	35.5	69	37.5	Modified SBR having superior grip performance, low rolling resistance, wear resistance and low temperature performance especially in silica filled applications. Suitable for tire applications.

\*<sub>1</sub>) ML(1+4)100°C \*<sub>2</sub>) Oil:low PCAoil (SRAE) \*<sub>3</sub>) ML(5+4)100°C

## 2. Plastic Modification Applications

ASADENE™, TUFDENE™ and ASAPRENE™ are mainly used to improve impact resistance such as in HIPS (high impact polystyrene). They have features of superior hue and low gel content. We can provide grades with wide range of solution viscosity.

We can also provide standard grade ASADENE™ and ASAPRENE™ suitable for high gloss HIPS and transparent HIPS, in response to customers' needs.

### Plastic Modification Applications:

#### ASADENE™ and ASAPRENE™ Grade List

Grade Name		Styrene Content (%)	Solution Viscosity *1) (mPa·s)	Mooney Viscosity ML(1+4)100°C	Applications
BR	ASADENE™ 35AE	0	85	33	General HIPS
	ASADENE™ 55AE	0	170	55	General HIPS
BR	ASAPRENE™ 700A	0	44	37	High Gloss HIPS
	ASAPRENE™ 720AX	0	25	40	High Gloss HIPS, Mass ABS
	ASAPRENE™ 730AX	0	35	47	High Gloss HIPS
SBR	ASAPRENE™ 610A	15	10	—	Mass ABS
	ASAPRENE™ 625A	35	22	—	Transparent HIPS, Mass ABS
	ASAPRENE™ 670A	39	34	—	Transparent HIPS, Ultra High Gloss HIPS

\*1) 5% Styrene solution viscosity (25°C)

### 3. Important Notes and Precautions

All information, data, and values contained herein are given as a representation in good faith of results obtained by the indicated test methods and of data, information, and documents currently available to Asahi Kasei Corporation (hereinafter "AK"), for use only as a basic guide to grade selection for various applications and not as any explicit or implied warranty or guarantee of any nature, and may be revised in accordance with changes in product properties and new findings or knowledge. It is the responsibility of the user to determine the safety and suitability of ASADENE™, TUFDENE™ and ASAPRENE™ (hereinafter collectively "BR and SBR") for the intended use, purpose, and application.

#### Safe handling and use

Always observe the following general precautions and consult the Material Safety Data Sheets (MSDS) issued by AK before handling or using BR and SBR and investigate and determine by testing in advance of the safety and suitability of any addition or mixing of any other resins, additives, or other materials. It is the responsibility of the user to determine the safety and suitability.

##### **Hot and molten polymer**

Avoid inhalation and eye or skin contact with any gas generated in heating or melting BR and SBR and with the hot or molten polymer. Employ local ventilation and protective gear, including chemical goggles and protective gloves, during any heating or melting operation.

##### **Combustibility**

BR and SBR are flammable and must be kept strictly away from heat, spark, and flame during handling and storage. In the event of its combustion, carbon monoxide and other toxic combustion gases may be generated; extinguish with water or with foam or a dry chemical extinguisher.

#### Disposal

Dispose in accordance with local and national laws and regulations, by burning in a properly equipped incinerator or by burial in a properly designed landfill site. Note that carbon monoxide and other toxic gases may be generated during incineration. Do not release to sewers, ground, or any body of water.

#### Storage

Store BR and SBR in a cool dark area away from direct sunlight, humidity, and moisture.

#### Molding conditions

Appropriate temperatures and other conditions for the molding and extruding of BR and SBR depend on the resin grade and type used. Consult AK or its representatives for related information.

#### Medical and food applications

Certain BR and SBR grades comply with hygienic standards. For any application involving extended bodily contact, medical devices and containers, or food packaging, contact AK. AK will not be responsible for any problem in connection with or arising out of any use performed without its consent.

#### Patent infringement

AK warrants only that the sale or use of BR and SBR does not in itself infringe any patent or other industrial property right relating thereto, but does not warrant against infringement by reason of its use in combination with other materials or in any process.

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