
Prepolymers for Polyurethane Elastomers,
Having High Abrasion Resistance

SANPRENE P Products

Preface

SANPRENE P products are prepolymers for polyurethane elastomers developed by using our original technology.

By reacting these products with curing agents such as 3,3'-dichloro-4,4'-diamino diphenyl methane (MOCA), and a mixture of 1,4-butanediol and trimethylolpropane, elastomers having high abrasion resistance, high mechanical strength and low compression sets can be obtained.

They are widely used as raw materials for elastomers for belts, rollers, solid rubber tires, various machine parts, etc.

We offer a wide range of SANPRENE P products as follows:

Product Name	Appearance (20±5 °C)	Viscosity at 80 °C mPa·s	NCO Content %	Polyol Compositions	Main Applications
SANPRENE P-663L	Pale yellow liquid	1,200	2.8	PTMG*1	Belts Rollers Solid rubber tires Machine parts
SANPRENE P-665		410	6.2		
SANPRENE P-7315	Pale yellow solid	1,600	6.3	PEA*2/PCL*3	

*1 Poly(oxytetramethylene)glycol

*2 Poly(ethylene adipate)diol

*3 Poly(caprolactone)diol

Note: The values are representative.

1. Temperature—Viscosity Curve of SANPRENE P Products

Figure 1 shows the relationship between the temperature and the viscosity of SANPRENE P products.

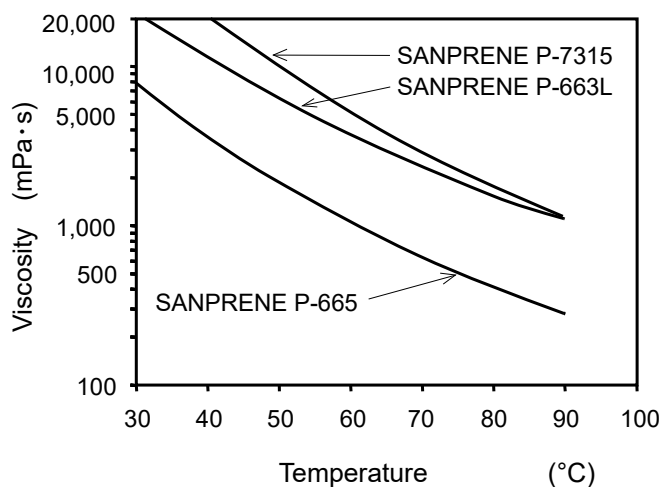


Figure 1. Temperature—Viscosity Curve of SANPRENE P Products

2. Examples of Standard Molding Conditions of Elastomers and Pot Life

Table 1 shows examples of standard molding conditions and pot life (usable period) when elastomers are molded using SANPRENE P products.

Table 1. Examples of Standard Molding Conditions of Elastomers and Pot Life

Product Name	Curing Agent	Mixing Proportion (pbw) *		Mixing Temperature °C		Curing Conditions		Setting Time min	Pot Life ** min
		Main Component	Curing Agent	Main Component	Curing Agent	Molding	After Molding		
SANPRENE P-663L	A	100	8.0	80	120	16 hours at 100 °C	7 days at 25 °C	80	27
SANPRENE P-665		100	17.7	80	120			20	6
SANPRENE P-7315	B	100	6.4	100	40	15 hours at 115 °C		60	12

Curing agent A: 3,3'-Dichloro-4,4'-diamino diphenyl methane (MOCA)

Curing agent B: A mixture of 1,4-butanediol and trimethylolpropane (the mixing ratio is 85 : 15 by weight)

* Parts by weight

** Time required for the viscosity of each mixture to reach 30,000 mPa·s (measurement at reaction temperature) immediately after being mixed.

3. Standard Molding Process of Elastomers

An example of a standard molding process of elastomers with manual processing is shown below.

- A. Heat main components and curing agents to mixing temperatures.
- B. Coat the mold with a releasing agent and heat the mold to the curing temperature.
- C. Measure the main components and curing agents according to the predetermined mixing proportion, pour them into a tank and mix uniformly.
- D. Remove bubbles from the mixture, if present, by reducing the air pressure.
- E. Pour the mixture into the mold, within the pot life, and close it.
- F. Allow the mixture to cure in the mold for the predetermined time at the predetermined temperature. The molded material can be removed from the mold after setting time has elapsed.
- G. Finish curing for the predetermined time at the predetermined temperature.

Please change molding processes depending on the conditions. For example, if machines equipped with storage tanks for main components and curing agents, metering pumps and mixing heads are used, the process of removing bubbles should be in the tanks.

Precaution Against Mishandling

- Use protective eye wear, gloves and masks when SANPRENE P products, curing agents and these mixtures are being handled.
- Bubbles in these products, curing agents and these mixtures may cause defective moldings of elastomers. Prevent the bubbles from occurring or remove the bubbles from the mixtures.
- The higher the amount of the mixture, the higher the temperature because reaction heat is accumulated. As a result, pot life may also be shorten.

Particularly, when large amounts of these products and curing agents are mixed in batchwise operation, the curing temperature rises too high due to the heat accumulation, and resulting elastomers may not exhibit a required physical property.

Mold these mixture using molding equipment and molds which do not cause problems including heat accumulation.

1. Viscosity Characteristics of the Mixture of Main Components and Curing Agents

Figure 2 shows examples of viscosity characteristics of the mixture containing each of the SANPRENE P products as a main component and MOCA as a curing agent.

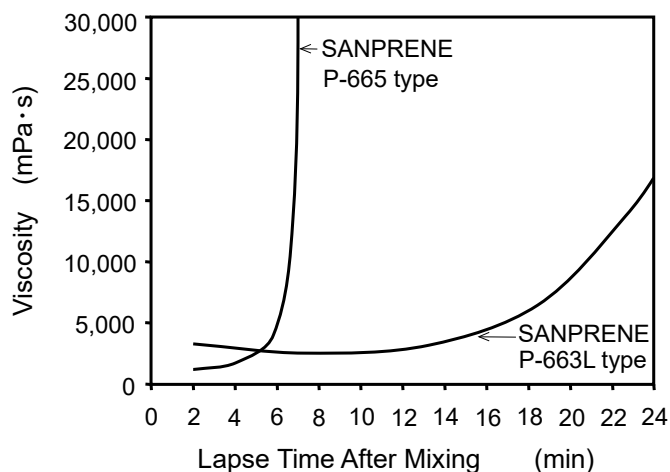


Figure 2. Examples of Viscosity Characteristics of the Mixture

Materials and Methods:

Materials:

Samples were prepared by mixing each of the SANPRENE P products described in Figure 2 as a main component and MOCA as a curing agent under the standard molding conditions of elastomers described in Table 1.

Method:

Viscosity of each sample was measured at their reaction temperatures using a B-type viscometer at the predetermined times.

2. Physical Properties of Elastomers

Table 2 shows examples of physical properties of elastomers using SANPRENE P products.

Table 2. Examples of Physical Properties of Elastomers

Product Name	Curing Agent	Hardness ^{*1}	100% Modulus ^{*2}	300% Modulus ^{*2}	Tensile Strength ^{*2}	Elongation ^{*2}	Tear Strength ^{*3}	Resilience ^{*4}	Compression Set ^{*5}	Abrasion Resistance ^{*6}
			MPa	MPa	MPa	%	MPa	%	%	g
SANPRENE P-663L	A	83 ^{*7}	4.2	7.6	29.6	520	6.6	60	20	0.05
SANPRENE P-665		96 ^{*7}	13.0	33.8	43.3	340	8.9	45	23	0.08
SANPRENE P-7315	B	72 ^{*7}	3.9	10.3	33.8	427	5.6	42	26	0.04

Curing agent A: 3,3'-Dichloro-4,4'-diamino diphenyl methane (MOCA)

Curing agent B: A mixture of 1,4-butanediol and trimethylolpropane (the mixing ratio is 85 : 15 by weight)

*1 Measured in accordance with ASTM D2240.

*2 Measured in accordance with ASTM D412.

*3 Measured in accordance with ASTM D624.

*4 Measured in accordance with ASTM D7121.

*5 Measured in accordance with ASTM D395.

*6 Measured in accordance with ASTM D4060.

*7 Shore A hardness

Materials and Methods:

Materials:

Samples were prepared by mixing each of the SANPRENE P products described in Table 2 as a main component and molding elastomers under the standard molding conditions of elastomers described in Table 1.

Method:

Each physical property was measured in accordance with the testing methods for molded materials for thermosetting polyurethane elastomers.

Abrasion resistance was measured under the following conditions using a Taber type abrasion test machine.

Conditions

Weel type: Calibrade H-22

Load: 1,000 g

Number of revolutions: 1,000 revolutions

Important :

Before handling this product, refer to the Safety Data Sheet for recommended protective equipment, and detailed precautionary and hazards information.

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