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Polymer Selection Guide

Typically, rollers are covered with elastomeric compositions to allow the creation of a uniform pressure zone know as a “nip”. To assure that the nip region remains constant; the properties of the roll covering must be stable and not degrade with use. The selection of the roll covering must take into account the physical properties of the covering originally (i.e. static) as well as the properties of the covering in use (i.e. dynamic). Also an effective covering must not change appreciably in use, as determined by the environment (e.g., chemical/solvent exposure and operating temperatures), as well as the dynamic properties of the roll covering.

The roller industry uses the widest range of elastomers over any other segment of the rubber industry. This guide was put together to give a brief overview of what properties the different materials have and the basic elements to look at when deciding what polymer is best for your application. It is not the intention of the guide to serve as a replacement for your sales engineer, but as an educational tool to understand and discuss polymer selection.

Physical Property Definitions

Hardness Range – Shore A: An arbitrary numerical value that indicates the resistance to indentation of the indentor point of the durometer. It is probably one of the most fundamental properties.

Abrasion Resistance: The surface loss of a material due to frictional surfaces

Tear Resistance: The resistance to tearing or cutting under stress

Load Bearing: The ability of a material to withstand large loads without fracturing, tearing, or throwing the roll covering

Hysteresis: The difference between the work input and the work output in a cycle of extension and retraction. This can also be defined as energy loss. This can be measured by set, creep(hardness going up), and heat buildup.

Resistance to Denting: The ability of the roll covering to resist denting when pressure from a hard substrate is relieved.

Maximum Service Temperature: The temperature at which a material can survive.

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Ozone Resistance: Ozone is simply an extremely active form of oxygen, which attacks the backbone of many elastomers. Ozone is natural present in the environment and its level varies in concentration, depending upon many different conditions. Also, ozone is produced by electrical equipment, like an electric motor. Ozone attack resembles random cracks of a dried up river bed.

Resiliency: A measure of a materials ability to dissipate energy. It is also defined as a materials ability to fully recover from deformation.

Polymer Grading System

5 = Excellent

4 = Above Average

3 = Average

2 = Below Average

1 = Poor

Poylomer Selection Chart

	Natural Rubber	Nitrile	Carboxylated Nitrile	Hydrogenated Nitrile	Neoprene	EPDM	CSM	SBR	Silicone	Fluroelastomers	Ester Urethane	Ether Urethane
Physical Properties												
Hardness Range Shore A	35-99	20-95	50-95	70-95	20-95	20-95	40-90	30-95	47-90	60-90	0-100	30-100
Abrasion Resistance	5	3	5	5	3	4	4	3	1	2	5	5
Tear Resistance	5	3	5	5	4	3	4	3	1	3	5	5
Load Bearing	5	4	5	5	4	3	5	4	1	3	4	4
Hysteresis	5	2	1	5	4	2	2	3	5	2	5	5
Resistence to Denting	5	3	2	3	2	3	2	3	5	3	3	3
Max. Service Temp. (F)	212	250	275	320	250	350	300	250	500	500	212	212
Ozone Resistance	1	1	1	5	3	5	5	1	5	5	4	4
Resiliency	5	3	2	4	4	4	3	5	1	3	4	4
Solvent Resistance												
Acids	3	2	2	3	3	5	2	3	4	5	1	1
Caustics	3	3	3	4	4	5	2	3	4	5	1	1
Paraffinic Hydrocarbons	1	5	5	5	3	1	3	1	2	5	5	2
Aromatic Hydrocarbons	1	3	3	3	2	2	2	1	3	5	5	1
Chlorinated Hydrocarbons	1	1	1	4	1	1	1	1	3	5	2	1
Water	5	4	3	4	3	5	3	5	4	4	2	3
Ketones	5	2	2	2	3	5	3	4	3	1	3	1
Alcohols	5	5	4	5	4	5	4	5	4	2	4	3
Esters	5	1	1	1	3	5	3	4	3	2	2	1