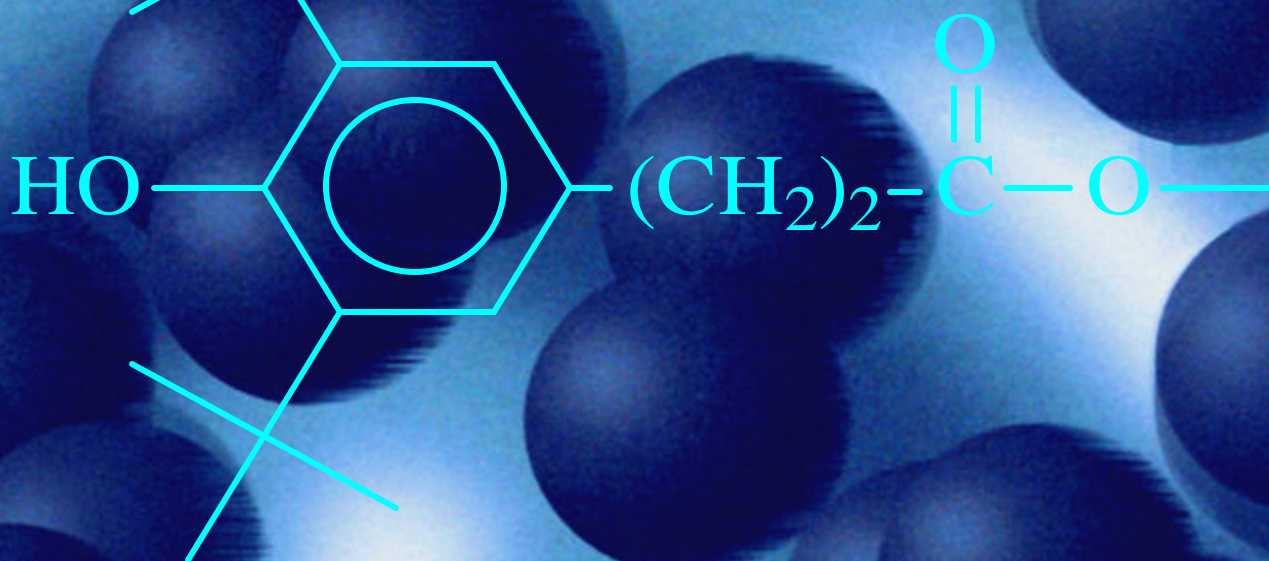


# NAUGARD<sup>®</sup> XL-1

Antioxidant and  
Metal Deactivator

**Crompton**  
Uniroyal Chemical

*Finding better  
solutions.*



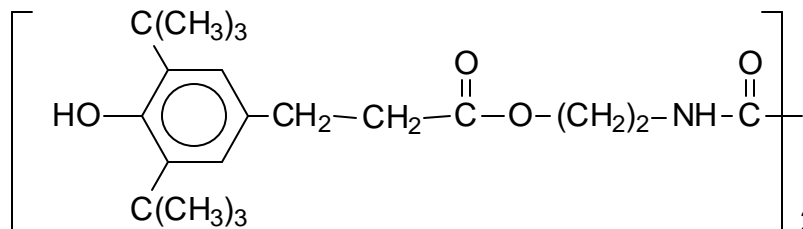
Crompton Corporation, Uniroyal Chemical products and services [www.cromptoncorp.com](http://www.cromptoncorp.com)

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25 Erb Street, Elmira, Ontario, Canada N3B 3A3 (800) 265-2157 (519) 669-1671 FAX (519) 669-1924

## NAUGARD® XL-1

### Antioxidant and Metal Deactivator



### 2,2'-Oxamidobis [ethyl-3-(3,5-di-*t*-butyl-4-hydroxyphenyl) propionate]

Naugard XL-1 is a unique antioxidant that incorporates a metal deactivation function in the same product. This product may be used where there is interference from metallic ions such as from residual polymer catalyst, inorganic pigments or mineral filled polymers. It is also unique in that it is FDA compliant for use in many polymers. This material is used in a wide variety of styrenic and olefinic polymers, including ethylene propylene copolymers and terpolymers (e.g. Royalene® EPDM).

### FEATURES

- FDA Compliant.
- Dual Function antioxidant and metal deactivator
- Non-discoloring for color critical applications.
- Synergist with other antioxidants.

### TYPICAL PROPERTIES

Appearance:	White to off-white powder.
Specific Gravity:	1.12
Melting Range:	170-180 °C (330-356 °F)
Molecular Weight:	697 Daltons
Solubility at 20 °C:	

Solvent	Grams/100 ml
Xylene	104
Chloroform	35
Acetone	10
Styrene	2.0
Methanol	1.6
Hexane	<0.1
Water	<0.1

### **FDA STATUS**

Naugard XL-1 is allowed by the FDA for use in food packaging applications, in accordance with regulations, as printed in Title 21, Section 178.2010 U.S. Code of Federal Regulations.

- Adhesives
- Acrylonitrile-butadiene-styrene copolymers
- Chlorinated isobutylene-isoprene
- Ethylene-vinyl acetate copolymers
- Nitrile rubber modified acrylonitrile-methyl acrylate polymers
- Olefin polymers
- Polycarbonate
- Polystyrene and rubber modified polystyrene
- Rigid polyvinyl chloride
- Styrene block polymers
- Vinyl chloride plastics with methacrylate butadiene-styrene copolymers
- Vinylidene chloride homopolymers and copolymers.

### **STORAGE AND HANDLING**

This product may be stored up to three (3) years in sealed containers. Containers should be stored in cool, dry areas. Keep containers sealed when not in use. Annually, a Uniroyal representative should be consulted before using remaining material.

Work areas should be sufficiently ventilated to minimize dust exposure. Closed handling systems should be protected against possible dust explosions, and dust accumulation on building or equipment surfaces should be avoided.

Personal contact should be avoided. Impervious gloves and goggles should be worn when handling. In the absence of adequate ventilation, a NIOSH-certified dust cartridge respirator should be used.

Refer to the Material Safety Data Sheet for additional information.

### NAUGARD XL-1 IN MINERAL-FILLED EPDM

Royalene® 552	100
Zinc Oxide	5
Mistron Vapor Talc	60
Hydral 710 Hydrated Alumina	70
Sunpar 2280 Paraffinic Oil	40
Sunproof® Junior Wax	2
Di-Cup 40KE Peroxide	7
Antioxidants	As Indicated

Antioxidants, 1.5 phr each	Naugard 445 and AO-1	Naugard XL-1 and DLTDP
<b>Initial Physical Properties</b>		
<b>Cured 2 min. at 204°C (400°F)</b>		
200% Modulus, MPa	5.3	4.7
(psi)	(770)	(680)
Tensile Strength, MPa	10.8	12.1
(psi)	(1560)	(1750)
Elongation, %	480	580
<b>Aged 7 days at 158°C (316°F)</b>		
Tensile Strength, % Retained	75	91
Elongation, % Retained	66	89
<b>Aged 14 days at 158°C (316°F)</b>		
Tensile Strength, % Retained	49	73
Elongation, % Retained	5	29
<b>Aged 30 days at 149°C (300°F)</b>		
Tensile Strength, % Retained	74	79
Elongation, % Retained	40	51
<b>Aged 30 days at 135°C (275°F)</b>		
Tensile Strength, % Retained	78	76
Elongation, % Retained	69	63

#### FOOTNOTES

Naugard 445 is 4, 4'-bis (alpha, alpha-dimethylbenzyl) diphenylamine.

AO-1 is mixed 4,5-methyl-2-mercaptobenzimidazole.

Naugard DLTDP is dilauryl thiodipropionate.

Royalene® 552 is an EPDM with 76/24 E/P ratio, 4.6% ENB and 50 Mooney\*.

\* measured at 125°C (257°F).

## NAUGARD XL-1 IN BLACK-FILLED EPDM BELT COMPOUND

Royalene® 580-HT	100
Hypalon 40	5
Zinc Oxide	20
N650 Carbon Black	60
Antimony Trioxide	5
Sunpar 2280 Paraffinic Oil	20
Sunproof® Junior Wax	2
Di-Cup 40KE Peroxide	7
Naugard® DLTDP Antioxidant	1
Other Antioxidants	As Indicated

Other Antioxidants, 2.0 phr each	Naugard 10	Naugard XL-1
<b>Initial Physical Properties</b>		
<b>Cured 30 min. at 166°C (331°F)</b>		
200% Modulus, MPa	7.0	7.2
(psi)	(1020)	(1040)
Tensile Strength, MPa	15.3	14.9
(psi)	(2220)	(2160)
Elongation, %	400	390
Hardness, Shore A	70	70
<b>Aged 3 days at 175°C (347°F)</b>		
Tensile Strength, % Retained	73	70
Elongation, % Retained	70	69
Hardness, Points Change	+12	+10
<b>Aged 7 days at 175°C (347°F)</b>		
Tensile Strength, % Retained	51	50
Elongation, % Retained	45	44
Hardness, Points Change	+11	+11
<b>Aged 12 days at 175°C (347°F)</b>		
Tensile Strength, % Retained	42	38
Elongation, % Retained	18	18
Hardness, Points Change	+15	+14

### FOOTNOTES

Naugard 10 is Tetrakis [methylene (3,5-di-t-butyl-4-hydroxyhydrocinnamate)] methane.  
 Royalene® 580-HT is an EPDM with 53/47 E/P ratio, 2.8% ENB and 60 Mooney\*.

\* measured at 100°C (212°F).

## NAUGARD XL-1 IN BLACK-FILLED CHLORINATED POLYETHYLENE

Tyrin CPE 0136	100
N990 Carbon Black	100
Trioctyl Trimellitate	40
Magnesium Oxide, high activity	10
Aldehyde-Amine Accelerator	1
Echo S Thiadiazole Curative	1
Antioxidants	As Indicated

Antioxidants, 2.0 phr each	<b>Naugard 10</b>	<b>Naugard 445</b>	<b>Naugard XL-1</b>
<b>Initial Physical Properties</b>			
<b>Cured 20 min. at 160°C (320°F)</b>			
200% Modulus, MPa	4.6	4.8	4.7
(psi)	(660)	(700)	(680)
Tensile Strength, MPa	13.3	13.3	13.1
(psi)	(1930)	(1930)	(1900)
Elongation, %	585	545	575
Hardness, Shore A	63	64	64
<b>Aged 3 days at 149°C (300°F)</b>			
Tensile Strength, % Retained	93	90	92
Elongation, % Retained	48	54	55
Hardness, Points Change	+9	+9	+8
Antioxidants, 2.0 / 1.0 phr each	<b>Naugard XL-1 and DLTDP</b>	<b>Naugard XL-1 and Naugard P</b>	<b>Naugard 445 and DLTDP</b>
<b>Initial Physical Properties</b>			
<b>Cured 20 min. at 160°C (320°F)</b>			
200% Modulus, MPa	4.6	4.5	4.7
(psi)	(660)	(650)	(680)
Tensile Strength, MPa	12.3	12.4	12.8
(psi)	(1790)	(1800)	(1860)
Elongation, %			
Hardness, Shore A			
<b>Aged 3 days at 149°C (300°F)</b>			
Tensile Strength, % Retained	97	98	88
Elongation, % Retained	60	58	58
Hardness, Points Change	+8	+8	+11

**FOOTNOTE** Naugard P is tris (nonylphenyl) phosphite.

The information contained herein is correct to the best of our knowledge. Your attention is directed to the pertinent Material Safety Data Sheets for the products mentioned herein. All sales are subject to Crompton's standard terms and conditions of sale, copies of which are available upon request and which are part of Crompton's invoices and/or order acknowledgments. Except as expressly provided in Crompton's standard terms and conditions of sale, no warranty, express or implied, including warranty of merchantability or fitness for particular purpose, is made with respect to the products described herein. Nothing contained herein shall constitute permission or recommendation to practice any invention covered by a patent without a license from the owner of the patent.