

*ENCYCLOPEDIA OF PLASTICS,
POLYMERS, AND
RESINS*

VOLUME II

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POLYMERS, AND
RESINS***

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Compiled by

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PREFACE

This encyclopedia is an attempt to coordinate and unify practical information on plastic, polymer, and resin trademark products. These categories overlap, i.e., plastics are a subset of polymers, and resins are often, but not always, polymers. However, it has been our aim to give the user of this compilation fingertip availability to a large quantity of essential information about these products. This three-volume compendium has been made possible through the cooperation of the major national and international plastic, polymer, and resin manufacturers.

The information provided here has been gleaned from thousands of brochures, technical bulletins, and data sheets, but the extent of the information provided for each product has been limited by the amount of data given to us by the manufacturers. Whenever possible and/or appropriate, we have given the chemical description, applications, form and color, general, mechanical, thermal, and electrical properties of each product.

With the state of technological growth in these industries constantly increasing, this encyclopedia should serve as an important tool for chemists, engineers, and salespeople here and abroad.

We want to extend our thanks to Roberta Dakan for her tireless efforts in helping make this encyclopedia as accurate and consistent as possible.

It should be noted that when the temperatures of properties such as viscosity, density, solubility, etc. are not included, a standard temperature of 25 C is to be assumed. The information in this publication is reliable to the best of our knowledge. We would appreciate being informed of any errors or omissions so that these can be integrated into subsequent editions of this encyclopedia.

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ABBREVIATIONS

@	at
ABS	acrylonitrile-butadiene-styrene
aq.	aqueous
ASTM	American Society for Testing Materials
avail	available
B.P.	boiling pt.
BS	British Standards
BS&D	backwashed, settled, and drained
Btu.	British thermal unit
C	Centigrade
Cal	calories
cc.	cubic centimeter
CC	closed cup
CD	cross direction
charact.	characteristics
chem.	chemical
cm	centimeter
COC	Cleveland Open Cup
coeff.	coefficient
comp.	compound
compr.	compressive
conc.	concentrated
conduct.	conductivity
const.	constant
cps	centipoise or cycles per second
defl. or deflect'n	deflection
dg.	decigram
dielec.	dielectric
DIN	Deutsche Industrie Normen
dissip.	dissipation
distort.	distortion
DMF	dimethylformamide
DOT	Department of Transportation
DWV	drain, waste, and vent
elec.	electrical
elong.	elongation

EPDM	ethylene propylene-diene monomer
esp.	especially
EVA	ethylene vinyl acetate
exp.	expansion
F	Fahrenheit
FAA	Federal Aviation Agency
FB	free base
FDA	Food and Drug Administration
flamm.	flammability
flex.	flexural
F.P.	freezing point
ft	foot
g	gram
G	giga
gal	gallon
gen'l.	general
gr.	gravity
GRP	glass-reinforced polyester
h	hour
HAF	high abrasion furnace carbon black
HB	horizontal burning
HC	hydrocarbon
hyd.	hydroxyl
hydrog.	hydrogenated
Hz	hertz
ICC.	Interstate Commerce Commission
ignit.	ignition
in.	inch
incl.	including
insol.	insoluble
insul.	insulation
J	joule
k	kilo
kg.	kilogram
l.	liter
lb	pound
LDPE	low density polyethylene
m	milli or meter
M	mega
max.	maximum
MC	megacycle
MD	mold direction or machine direction
MDA.	methylene disalicylic acid

mech.	mechanical
med.	medium
MEK	methyl ethyl ketone
mfg.	manufacturing
mg	milligram
MIBK	methyl isobutyl ketone
MIL	Military Specifications
min.	minute
min.	minimum or mineral
misc.	miscellaneous
mm.	millimeter
mo	months
MOCA	methylene-bis-orthochloroaniline
mod.	modulus
M.P.	melting point
m.w.	molecular weight
N	Newton
no.	number
NR	natural rubber
OC	open crucible
OR	operating room
oz.	ounce
Pa.	Pascal
pbw	parts by weight
pcf	pounds per cubic foot
PET	polyethylene terephthalate
PMCC	Pensky-Martens Closed Cup
pH	hydrogen-ion concentration
phr	parts per hundred parts of resin or rubber
pkgs.	packages
PPD	piperidine pentamethylene dithiocarbamate
psi	pounds per square inch
pt.	point
PU	polyurethane
PVAc	polyvinyl acetate
PVC	polyvinyl chloride
PW	potable water
quat.	quaternary
qt.	quart
R&B	Ring & Ball
ref.	refractive or reference
resist.	resistance or resistivity
r.h.	relative humidity

rpm	revolutions per minute
R.T.	room temperature
s.	second
SAN	styrene-acrylonitrile polymer
sapon.	saponification
SBR	styrene-butadiene elastomer
soften.	softening
sol.	solubility or soluble
sol'n.	solution
sp.	specific
spec.	specification
SS	stainless steel
S/S	step by step
std.	standard
S/T	short time
str.	strength
surf.	surface
TCC	Taggart Closed Cup
TD	transverse direction
temp.	temperature
tens.	tensile
TDI	toluene diisocyanate
therm.	thermal
THF	tetrahydrofuran
TOC	Taggart Open Cup
trans.	transitional
UL	Underwriter's Laboratory
USDA	Unites States Department of Agriculture
uv.	ultraviolet
V	volt
visc.	viscosity
vol.	volume
W.E. or W. Elec.	Western Electric
wk	week
wt.	weight
yrs	years
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
≈	approximately equal to
μ	microns

The following products which are included in this volume are registered with the U.S. Patent Office.

Hefron®	Mylar®
Heloxy®	NeoCryl®
Hercolyn®	NeoLyn®
Hercotac®	NeoRez®
Hercules®	NeoVac®
Herrox®	Norchem®
Hetron®	Nordel®
Hexcel®	Norsorex®
Hostaflon®	Noryl®
Hostaform®	Papi®
Hostalen®	Parlon®
Hycar®	Pawn®
Hypalon®	Paxon®
Hysol®	Peem®
Inkovar®	Pentalyn®
Interflo®	Peregal®
Kapton®	Permaflex®
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Kingsolve®	Piccodiene®
Klucel®	Piccofyn®
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Kolima®	Piccomer®
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Lamal®	Plasdone®
Lewisol®	Pluracol®
Lexan®	Polectron®
Lucite®	Polylite®
Lustran®	Poly-Pale®
Lustrex®	Polypenco®
Marlex®	Polyset®
Mercaptate®	Poron®
Migralube®	Presto-Foam®
Mira-Glos RT®	Profax®

H

HB500/1S Film. Hercules Inc.

Chem. Descrip.: Saran-coated (one side) balanced polypropylene film

Category/Applications: For applications requiring optimum gas-barrier properties, high strength, and outstanding flex-crack resistance; used in meat, cheese, and coffee packaging, lidding stocks, and in pouch packages for drink mixes, breakfast snacks, powdered items, and condiments

Form: Film in 100-gauge thicknesses, and in widths through 56 in.

Ref.: Products catalogue

Heloxy MK-107. Wilmington Chem. Corp.

Chem. Descrip.: Diglycidyl ether of cyclohexanedimethanol

Category/Applications: Moderate visc. reduction of epoxy resins without loss of physical properties; excellent creep resistance; used in casting, laminating, tooling, potting, electrical, adhesive, and grouting applications

Form: Color (Gardner): 2 max.

Gen'l. Prop.: Sp. Gr.: 1.09–1.11; Visc.: 60–70 cps; Flash Pt.: 245 F

Ref.: Tech. summary chart

Heloxy MK-116. Wilmington Chem. Corp.

Chem. Descrip.: 2-Ethylhexyl glycidyl ether

Category/Applications: Nontoxic, non-irritating substitute for butyl glycidyl ether; low level volatility suitable for elevated temp. cure; used in casting, tooling, potting, laminating, and other applications where low visc. is required

Form: Color (Gardner): 1 max.

Gen'l. Prop.: Sp. Gr.: 0.90–0.92; Visc.: 1–3 cps; Flash Pt.: 192 F

Ref.: Tech. summary chart

Heloxy WC-7. Wilmington Chem. Corp.

Chem. Descrip.: Glycidyl ether of a mixture of C₈–C₁₀ alcohols

Category/Applications: Water-white substitute for butyl glycidyl ether; efficient diluent; low level of volatility; used in flooring, casting, tooling, laminating, potting, coatings, etc.

Form: Color (Gardner): 1 max.

Gen'l. Prop.: Sp. Gr.: 0.88–0.91; Visc.: 3–7 cps; Flash Pt.: 215 F

Ref.: Tech. summary chart

Heloxy WC-8. Wilmington Chem. Corp.

Chem. Descrip.: Glycidyl ether of a mixture of C₁₂–C₁₄ alcohols

Category/Applications: Similar to Heloxy WC-7 but not as efficient a diluent; offers very low level of volatility

Form: Color (Gardner): 1 max.

Gen'l. Prop.: Sp. Gr.: 0.88–0.91; Visc.: 5–10 cps; Flash Pt.: 224 F

Ref.: Tech. summary chart

Heloxy WC-61, WC-61-01. Wilmington Chem. Corp.

Chem. Descrip.: Butyl glycidyl ether

Category/Applications: Offers max. visc. reduction with min. loss of properties; increases the degree of impregnation of resin systems, and the level of filler loading; used in electrical, laminating, casting, tooling, flooring, and coatings

Form: Color (Gardner): 1 max.

Gen'l. Prop.: Sp. Gr.: 0.92-0.94; Visc.: 2 cps max.;

Ref.: Tech. summary chart

Heloxy WC-62. Wilmington Chem. Corp.

Chem. Descrip.: o-Cresyl glycidyl ether

Category/Applications: Low volatility reactive diluent; allows the level of filler loading in epoxy resins to be increased; reduces the tendency of epoxy resin to crystallize; used in flooring, low visc. casting, laminating, and decoupage

Form: Color (Gardner): 2 max.

Gen'l. Prop.: Sp. Gr.: 1.07-1.09; Visc.: 5-10 cps; Flash Pt.: 225 F

Ref.: Tech. summary chart

Heloxy WC-63, WC-63-01. Wilmington Chem. Corp.

Chem. Descrip.: Phenyl glycidyl ether

Form: Color (Gardner): 2 and 1 max. respectively

Gen'l. Prop.: Sp. Gr.: 1.07-1.09; Visc.: 4-7 cps; Flash Pt.: 236 and 230 F respectively

Ref.: Tech. summary chart

Heloxy WC-65. Wilmington Chem. Corp.

Chem. Descrip.: p-tert-Butyl phenyl glycidyl ether

Category/Applications: Low volatility reactive mono-epoxide ether; moderate dilution efficiency with epoxy resins; used in casting, tooling, and laminating

where low volatility levels are desired, and in flooring

Form: Color (Gardner): 3 max.

Gen'l. Prop.: Sp. Gr.: 1.01-1.03; Visc.: 20-40 cps; Flash Pt.: 199 F

Ref.: Tech. summary chart

Heloxy WC-67. Wilmington Chem. Corp.

Chem. Descrip.: Diglycidyl ether of 1,4 butanediol

Category/Applications: Efficient diluent permitting high filler loading and offering a low level of volatility; used in casting, laminating, tooling, potting, and electrical applications

Form: Color (Gardner): 2 max.

Gen'l. Prop.: Sp. Gr.: 1.09-1.12; Visc.: 12-18 cps; Flash Pt.: 204 F

Ref.: Tech. summary chart

Heloxy WC-68. Wilmington Chem. Corp.

Chem. Descrip.: Diglycidyl ether of neopentyl glycol

Category/Applications: Max. visc. reduction of epoxy resins with min. loss of properties; low level of volatility; used in casting, laminating, tooling, potting, electrical, flooring, high solids coatings, and decoupage

Form: Color (Gardner): 2 max.

Gen'l. Prop.: Sp. Gr.: 1.04-1.08; Visc.: 12-17 cps; Flash Pt.: 275 F

Ref.: Tech. summary chart

Heloxy WC-69. Wilmington Chem. Corp.

Chem. Descrip.: Diglycidyl ether of resorcinol

Category/Applications: Modified resin systems exhibit extremely good strength characteristics and low degree of shrinkage; used in structural adhesives

Form: Color (Gardner): 6 max.

Gen'l. Prop.: Sp. Gr.: 1.20-1.22; Visc.: 300-500 cps; Flash Pt.: 163 F

Ref.: Tech. summary chart

Heloxy WC-8002. Wilmington Chem. Corp.

Chem. Descrip.: 27% dimer-trimer acid modified epoxy resin

Category/Applications: Resin with improved flexibility, adhesion, and exterior durability; used in general maintenance coating, pigmented marine finishes for exterior durability and water resistance, and for corrosion-resistant finishes and coatings

Form: Color (Gardner): 14 max.

Gen'l. Prop.: Sp. Gr.: 1.11–1.13; Visc.: 6000–11,000 cps (@ 100 F); Acid Value: < 0.2; Stability: Cured systems exhibit outstanding abrasion and water resistance

Ref.: Tech. summary chart

Heloxy WC-8004. Wilmington Chem. Corp.

Chem. Descrip.: 37% dimer-trimer acid modified epoxy resin diluted with 13% BGE

Category/Applications: Resin providing flexibility and improved impact strength; used in high peel strength adhesives, thermal shock resistant coatings for low temp. applications, and electrical potting and encapsulation

Form: Color (Gardner): 10 max.

Gen'l. Prop.: Sp. Gr.: 1.03–1.06; Visc.: 30,000–70,000 cps; Acid Value: < 0.2; Stability: Cured systems exhibit good hydrolytic stability

Ref.: Tech. summary chart

Heloxy WC-8005. Wilmington Chem. Corp.

Chem. Descrip.: Concentrated adduct of liquid epoxy resin and synthetic butadiene acrylonitrile rubber containing 40% of the elastomer

Category/Applications: Resin which improves adhesion, peel, resistance to bending stress and fatigue, and low-temp.

flexural properties, and increases toughness, flexibility with maintained HDT, resistance to crack propagation and to impact; used in high peel strength adhesives, structural laminates, coating and adhesives, corrosion-resistant coatings, specialty applications, FRP parts and pipe

Form: Color (Gardner): 12 max.

Gen'l. Prop.: Sp. Gr.: 1.07–1.09; Visc.: 500,000–1,000,000 cps; Acid Value: < 0.5

Ref.: Tech. summary chart

Heloxy WC-8006. Wilmington Chem. Corp.

Chem. Descrip.: Concentrated adduct of liquid epoxy resin and synthetic butadiene acrylonitrile rubber containing 40% of the elastomer

Category/Applications: See Heloxy WC-8005

Form: Color (Gardner): 8 max.

Gen'l. Prop.: Sp. Gr.: 1.06–1.08; Visc.: 170,000–230,000 cps; Acid Value: < 0.2

Ref.: Tech. summary chart

Heloxy WC-8018. Wilmington Chem. Corp.

Chem. Descrip.: Similar to Heloxy WC-8006 but diluted with a DGEBA liquid resin to a ready-to-use form; 8% elastomer content

Category/Applications: See Heloxy WC-8005

Form: Color (Gardner): 6 max.

Gen'l. Prop.: Sp. Gr.: 1.13–1.15; Visc.: 25,000–45,000 cps; Acid Value: < 0.2

Ref.: Tech. summary chart

Heloxy WC-8024. Wilmington Chem. Corp.

Chem. Descrip.: 37% dimer-trimer acid modified epoxy resin diluted with 13% MK-116