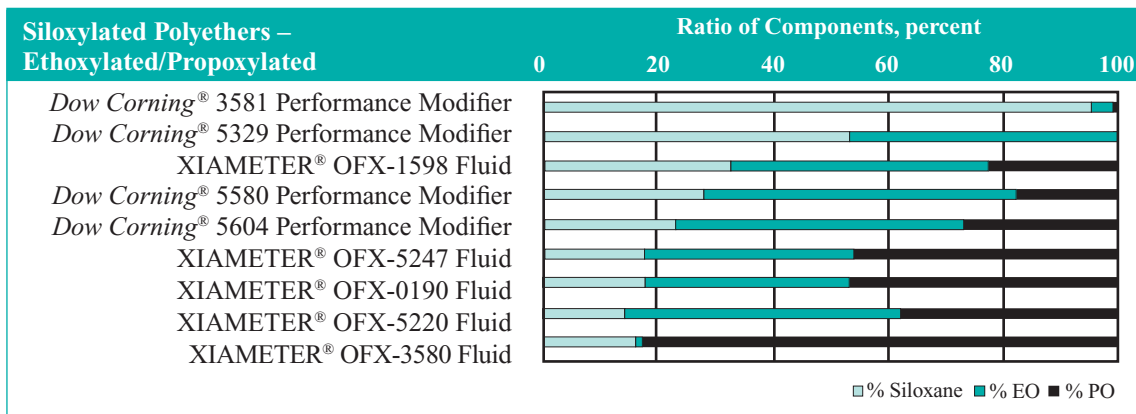


# Siloxylated Polyethers with EO/PO Copolymers

Siloxylated Polyethers – Ethoxylated/Propoxylated	Polymer Type	End Cap	% Siloxane	% EO	% PO	Molecular Weight	Visc., cSt	HLB-EO	CER
Dow Corning® 3581 Performance Modifier	Graft	OH	95	4	1	31,282	7,500	0.9	2.00
Dow Corning® 5329 Performance Modifier	Graft	OH	53	47	1	3,000	360	6.7	0.94
XIAMETER® OFX-1598 Fluid	Graft	OH	33	44	23	9,590	548	7.2	0.52
Dow Corning® 5580 Performance Modifier	Graft	OH	29	58	18	10,026	670	8.5	0.46
Dow Corning® 5604 Performance Modifier	Graft	OH	24	50	26	6,700	300	8.5	0.36
XIAMETER® OFX-5247 Fluid	Graft	OH	18	35	46	27,900	2,305	6.6	0.32
XIAMETER® OFX-0190 Fluid	Graft	OAc	18	34	45	28,300	2,000	6.6	0.31
XIAMETER® OFX-5220 Fluid	Graft	OAc	14	46	38	52,800	1,000	7.4	0.26
XIAMETER® OFX-3580 Fluid	Graft	OH	17	1	83	5,105	312	0.0	1.50

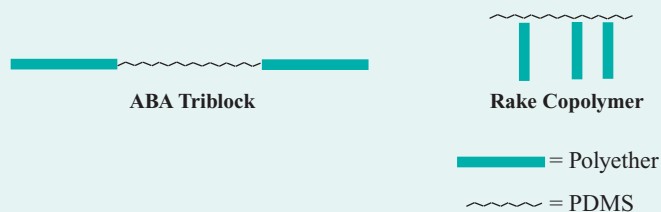


## Major Industries Served

- Adhesives
- Agriculture/Crop Protection
- Cleaners & Detergents
- Engineering Industries
- Mold Release
- Paints, Coatings & Inks
- Paper
- Personal Care
- Polyurethane Foam Additives
- Pressure Sensitive Adhesives
- Textiles & Leathers

## Structures of Silicone Glycol Copolymers

All currently available SPEs are “rake” or “graft” copolymers or ABA block copolymers.



Siloxylated Polyethers – Ethoxylated/Propoxylated	Aqueous Surface Tension, dynes/cm			Aqueous Cloud Point, 1% Weight Solution
	0.10%	0.01%	0.001%	
<i>Dow Corning</i> <sup>®</sup> 3581 Performance Modifier	IS	IS	IS	Insoluble
<i>Dow Corning</i> <sup>®</sup> 5329 Performance Modifier	34.5	42.9	68.6	< Room Temperature
XIAMETER <sup>®</sup> OFX-1598 Fluid	28.6	35.8	54.7	44.0
<i>Dow Corning</i> <sup>®</sup> 5580 Performance Modifier	32.3	36.5	48.6	56.7
<i>Dow Corning</i> <sup>®</sup> 5604 Performance Modifier	30.9	32.3	43.7	51.0
XIAMETER <sup>®</sup> OFX-5247 Fluid	32.1	35.4	44.4	47
XIAMETER <sup>®</sup> OFX-0190 Fluid	30	33.5	44.9	39
XIAMETER <sup>®</sup> OFX-5220 Fluid	29.8	34.1	43.7	39
XIAMETER <sup>®</sup> OFX-3580 Fluid	31.7	39.1	46.5	< Room Temperature

## Siloxylated polyethers (SPEs) are nonionic “surface active agents”

### Emulsifier application considerations:

- HLB = Hydrophile/Lipophile Balance: classic system proposed in 1949 by Griffin. Compares the ratio of oil-soluble to water-soluble portions of the molecule.  $HLB = (\% \text{ Hydrophile by weight of molecule})/5$ .
- CER = Cohesive Energy Ratio: developed by Beerbower & Hill (American Cosmetics and Perfumery; 1972, 87, 85 - 89). Fundamental method based on molecular structure and solubility parameter. More “absolute” than HLB, which is empirical, based on oleic acid (HLB=1) and potassium oleate (HLB=20).
- HLB-CER = HLB calculated using CER value from equation:
  - $HLB = (0.925 - \log CER)/0.0963$
- For silicone/oil emulsions: CER < 1.0 (generally ~0.5)
- For oil/silicone emulsions: CER > 1.0 (generally ~2.0)
- Molecular weight of emulsifier must be relatively high (>10,000)
  - XIAMETER<sup>®</sup> OFX-0190 Fluid for silicone-in-oil emulsions
  - Dow Corning*<sup>®</sup> 3225C Formulation Aid for oil-in-silicone or water-in-silicone emulsions

#### Aqueous Emulsions

Type	HLB	CER
O/W	10 - 18	0.90 - 0.10
W/O	3 - 8	1.5 - 4.0

#### Silicone-Organic Emulsions

Type	HLB	CER
S/O	N/A	0.80 - 0.06
O/S	N/A	1.5 - 6.0

### For further information, reference:

- Silicone Surfactants: Surfactant Science Series, Marcel-Dekker, Volume 86, ISBN #0-8247-0010-4

## Two brands to serve you

Whether you need industry-leading innovation or greater cost efficiency, Dow Corning can help. *Dow Corning*<sup>®</sup> brand solutions are dedicated to meeting your needs for specialty materials, collaborative problem-solving and innovation support. Learn how we can help you at [dowcorning.com/chemicals](http://dowcorning.com/chemicals).

If you need to buy high-quality, standard silicone materials at market-based prices, we can help you achieve that through our Web-enabled XIAMETER<sup>®</sup> brand and business model. Learn more at [www.xiameter.com](http://www.xiameter.com).

## Your Global Connection

Americas +1 989 496 6000  
Europe +49 0611 237 778  
Asia +86 21 3774 7110

[dowcorning.com/ContactUs](http://dowcorning.com/ContactUs)

#### LIMITED WARRANTY INFORMATION – PLEASE READ CAREFULLY

The information contained herein is offered in good faith and is believed to be accurate. However, because conditions and methods of use of our products are beyond our control, this information should not be used in substitution for customer's tests to ensure that our products are safe, effective and fully satisfactory for the intended end use. Suggestions of use shall not be taken as inducements to infringe any patent.

Dow Corning's sole warranty is that our products will meet the sales specifications in effect at the time of shipment.

Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted.

**DOW CORNING SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY.**

**DOW CORNING DISCLAIMS LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

*Dow Corning* is a registered trademark of Dow Corning Corporation.

XIAMETER is a registered trademark of Dow Corning Corporation.

*We help you invent the future* is a trademark of Dow Corning Corporation.

©2002-2011 Dow Corning Corporation. All rights reserved.

Printed in USA

AGP11912

Form No. 26-1149D-01

**DOW CORNING**

*We help you invent the future.*<sup>™</sup>