

 THE DOW CHEMICAL COMPANY	BRENNTAG MID-SOUTH INC KENNESAW BRANCH 3200 MOON STATION RD KENNESAW GA 30144-2767 B-682951 V-100160 Ship From: PLAQUEMINE po/pg PLAQUEMINE Louisiana, United States																																																
Certificate of Analysis Product Number 00000360603 Product Name PuraGuard™ Propylene Glycol USP/EP ✓ Delivery No. 810290055 / 000010 Order Number 106504877 Shipping Units 20366.506 KG Date Shipped 2017-05-01 (YYYY-MM-DD) Shipment No. 29661999	Customer Information Customer Name BRENNTAG MID-SOUTH INC Customer PO number 700571 ✓ Customer Product Code 682951 Container ID 51096 Specification Number 000000133084																																																
Batch Number D207H51L15 Seal Number 889582, 889583, 889584, 889585, 889586, 889587, 889588, 889589, 889590, 889591, 889462, 889463, 889464, 889465, 889466, 889467, 889468, 889469, 889470, 889471, Expiration Date 2019-05-01 (YYYY-MM-DD) Manufacturing Date 2017-05-01 (YYYY-MM-DD) Quantity 20366.506 KG Net Weight 44900.496 LB Manufacturing Plant PLAQUEMINE po/pg Manufacturer Address 21255 LA HWY 1 South PLAQUEMINE Louisiana 70764-5125	CUSTOMER _____ PO # _____ CODE # _____ LOT # <u>144461377123</u> BOL # _____																																																
<p>It is hereby certified that the material indicated above has been inspected and tested in accordance with the conditions and requirements of the contract or purchase order and, unless agreed otherwise conforms in all respects to the specification relevant thereto and it meets all requirements of the current United States Pharmacopoeia, current Food Chemical Codex, current European Pharmacopoeia and current Pharmacopoeia of Japan.</p>																																																	
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IMPORTANT: All information provided is believed to be accurate and complete. The data provided is representative of the product quality on the date of analysis for the lot number indicated. This certificate of analysis may not include all of the constituents of the product. Persons using this information should make their own determination regarding its suitability for their particular application. This certificate of analysis shall not in any way limit or preclude the operation and effect of the applicable terms and conditions of sale.

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M Water Content	%	-	0.200	0.006	Current USP
M ID Test A	-	-	-	Pass	Current USP
matches IR scan					
ID Test B	-	-	-	Pass	Current USP
Limit of Ethylene Glycol					
ID Test B	-	-	-	Pass	Current USP
Limit of Diethylene Glycol					
ID Test C	-	-	-	Pass	Current USP
Matches GC Scan					
M Acidity	ml	-	0.05	0.01	Current EP
M Boiling Point	°C	184	189	186	Current EP
M Clarity	-	-	-	Pass	Current EP
M Color	-	-	-	Pass	Current EP
M Heavy Metals	ppm	-	5.0	< 5.0	Current EP
O Melting Point	°C	121	128	126	Current EP
M Oxidizing Substances	ml	-	0.20	0.04	Current EP
0.05M sodium thiosulfate					
M Reducing Substances	-	-	-	Pass	Current EP
M Refractive Index		1.431	1.433	1.433	Current EP
@ 20degC					
M Relative Density		1.035	1.040	1.038	Current EP
@ 20/20degC					
M Sulfated ash	%	-	0.0100	0.0010	Current EP
Water Content	%	-	0.200	0.006	Current EP
Assay	%	99.80	-	99.95	Current FCC
M Acidity	-	-	-	Pass	Current FCC
Appearance	-	-	-	Pass	Current FCC
clear & colorless					
M Distillation, IBP	°C	185.0	-	185.0	Current FCC
M Distillation, DP	°C	-	189.0	188.2	Current FCC
O Lead (Pb)	ppm	-	1.0	< 1.0	Current FCC
M Identification	-	-	-	Pass	Current FCC
matches IR scan					
M Residue on Ignition	%	-	0.0070	0.0024	Current FCC

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M Specific Gravity @ 25/25degC	1.035		1.037	1.036	Current FCC
Water Content	%	-	0.200	0.006	Current FCC
M Acidity	-	-	-	Pass	Current JP
M Arsenic	ppm	-	2.0	< 2.0	Current JP
M Chlorides	%	-	0.007	< 0.007	Current JP
M Distilling Range 184 - 189 degC	% vol	95	-	97	Current JP
M Glycerine (Odor)	-	-	-	Pass	Current JP
M Heavy Metals	ppm	-	5.0	< 5.0	Current JP
O Melting Point	°C	174	178	175	Current JP
M Odor	-	-	-	Pass	Current JP
M Residue on Ignition	%	-	0.0050	0.0023	Current JP
M Specific Gravity @ 20/20degC	1.035		1.040	1.038	Current JP
M Sulfate	%	-	0.002	< 0.002	Current JP
Water Content	%	-	0.500	0.006	Current JP
Acidity as acetic acid	%	-	0.0020	0.0001	DOWM 101370
Appearance clear, free of suspended matter	-	-	-	Pass	Visual
Chlorides	ppm	-	1.0	< 1.0	DOWM 101867
Color, Pt-Co	-	-	10	2	ASTM D5386
Dimer, Trimer & Higher Polymers	%	-	0.100	0.053	DOWM 100687
Ethylene Glycol	%	-	0.0080	< 0.0080	DOWM 100687
Diethylene Glycol	%	-	0.0080	< 0.0080	DOWM 100687
Odor practically odorless	-	-	-	Pass	Olfactory
M Spec. Grav. @ 20C	1.0376		1.0389	1.0380	ASTM D4052
Iron	ppm	-	0.30	0.04	ASTM E394
Note 1: Values reported for Assay, Ethylene Glycol and Diethylene Glycol under USP and for Assay under FCC are obtained using the validated equivalent Dow GC Method DOWM 100687.					

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M:Quarterly Sample O:Annual Sample	
Plant Quality Coordinator For inquiries please contact Customer Service or local sales ® Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow	

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