



POLYSTEP[®] HPE

a functional monomer for use in
emulsion polymerization systems

POLYSTEP HPE is a phosphate ester functional monomer for use in emulsion polymerization, consisting of the mono and di-ester of 2-hydroxyethyl methacrylate (HEMA). When incorporated into polymers, **POLYSTEP HPE** improves coating properties in architectural and industrial direct-to-metal (DTM) applications at typical use levels of 1-4% active on total monomer content.

Key Attributes:

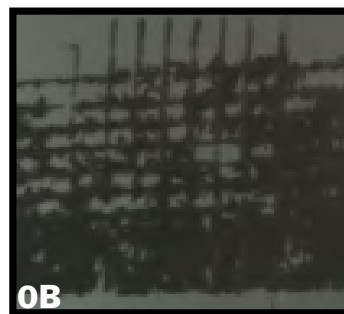
- ✓ Promotes metal adhesion
- ✓ Promotes pigment dispersion such as TiO₂
- ✓ Improves chemical resistance
- ✓ Provides corrosion resistance

Adhesion Improvement

POLYSTEP HPE improves metal adhesion compared to a methacrylic acid (MAA) containing coating.



2% **POLYSTEP HPE***

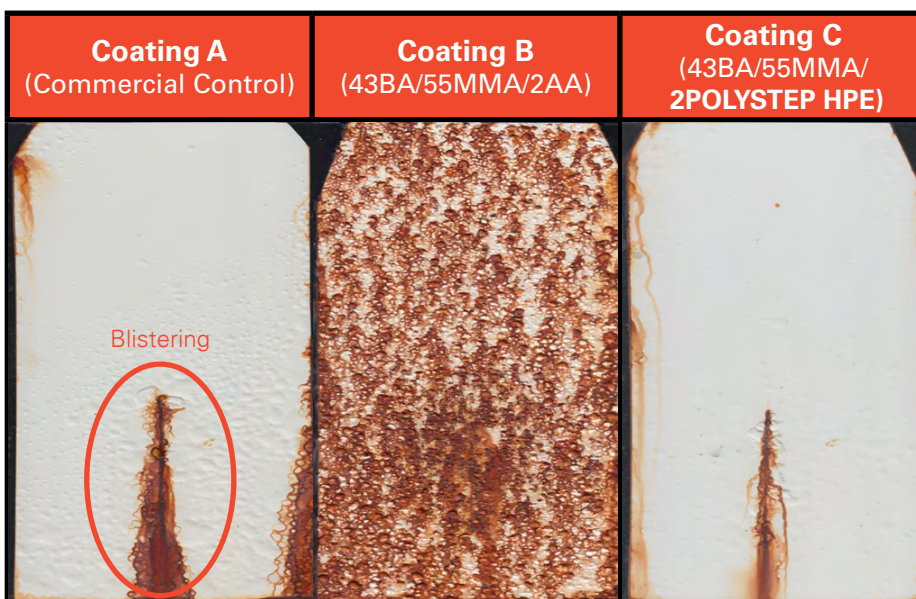


2% MAA

ASTM D3359, on CRS Panels
Styrene-acrylic Coatings; <50 g/L
VOC, PVC = 23%, Tg = 5°C

Corrosion Resistance

Incorporating **POLYSTEP HPE** into the acrylic polymer improves salt spray corrosion resistance compared to an acrylic acid control (Coating B) and provides equivalent resistance to a commercial acrylic latex (Coating A).



BA = Butyl Acrylate MMA = Methyl Methacrylate AA = Acrylic Acid




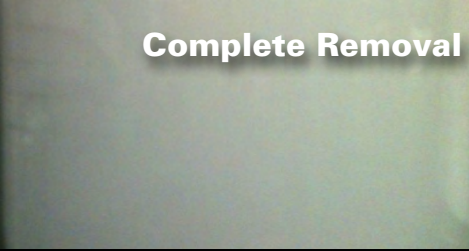
Blister formation is minimized compared to the commercial latex and is influenced by the choice of emulsifier and colloidal stabilizer. For optimal performance, it is recommended that POLYSTEP TSP-16PE30 (arylphenol alkoxyate phosphate ester, free acid surfactant) be used as the primary emulsifier.

ASTM B117, 500 Hours Exposure, 3.1 Mills DFT
Industrial DTM Waterborne Acrylic Latex
Coating; <100 g/L VOC, Tg = 15°C

*All percentages refer to percent active on total monomer content.

Chemical Resistance

POLYSTEP HPE improves chemical resistance compared to an MAA-containing coating.

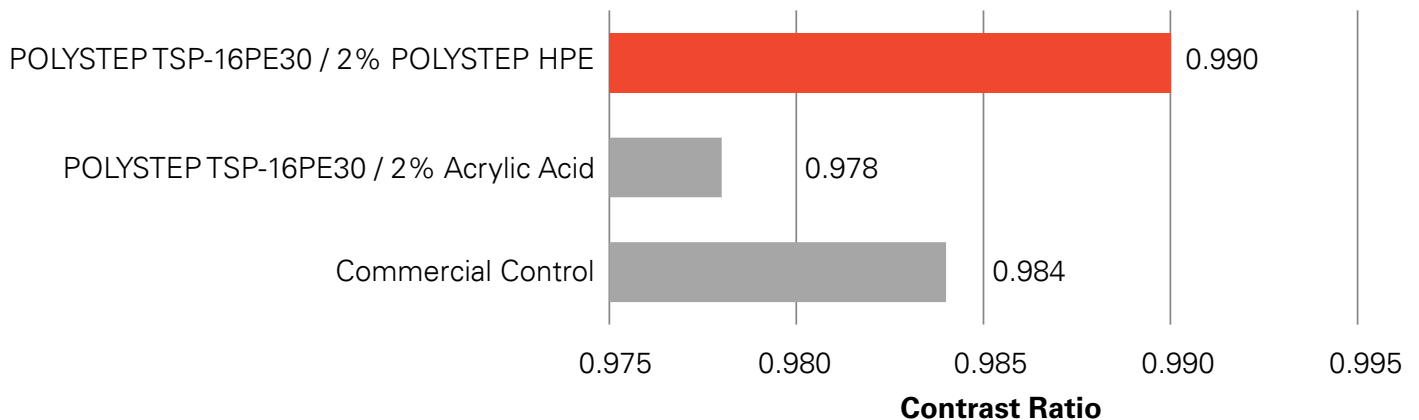
Time in Acetone	2% POLYSTEP HPE	2% MAA
1 hour	Coating Intact 	Coating Degradation 
3 hours (jar gently mixed)	Coating Intact 	Complete Removal 

High gloss white DTM topcoat was applied to cold-rolled steel (2.2 mil wet; 0.5 mil dry) and dried per ASTM standard. The cured coatings were submerged into acetone baths and sealed.

ASTM D2792, modified, solvent & fuel resistance of traffic paints
Styrene-acrylic Coating; 185 g/L VOC, PVC = 18%, Tg = 40°C

Pigment Dispersion

Phosphate esters are known to improve TiO₂ dispersions. Incorporating **POLYSTEP HPE** into the polymer improves TiO₂ interaction efficiency. Data shows that improvements in hiding can be achieved by incorporating **POLYSTEP HPE** into the polymer.



ASTM D2805
Industrial DTM Waterborne Acrylic Coating; <100 g/L VOC, Tg = 15°C
POLYSTEP TSP-16PE30: Arylphenol alkoxylate phosphate ester

2018 © Stepan Company. All Rights Reserved.

POLYSTEP® is a registered trademarks of Stepan Company.

The information contained herein is based on the manufacturer's own study and the works of others and is subject to change without prior notice. The information is not intended to be all-inclusive, including as to the manner and conditions of use, handling, storage or disposal or other factors that may involve additional legal, environmental, safety or performance considerations. Nothing contained herein grants or extends a license, express or implied, in connection with any patents issued or pending of the manufacturer or others, or shall be construed as a recommendation to infringe any patents. STEPAN COMPANY MAKES NO PRODUCT WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR USE, EXPRESS OR IMPLIED, AND NO OTHER WARRANTY OR GUARANTY, EXPRESS OR IMPLIED, IS MADE, INCLUDING AS TO INFORMATION REGARDING PERFORMANCE, SAFETY, SUITABILITY, STABILITY, ACCURACY, COMPLETENESS, OR ADEQUACY. Stepan Company (and its employees, subsidiaries and affiliates) shall not be liable (regardless of fault) to the vendee, its employees, or any other party for any direct, indirect, special or consequential damages arising out of or in connection with the accuracy, completeness, adequacy, furnishing, use, or reliance upon information provided herein. The vendee assumes and releases Stepan Company (and its employees, subsidiaries and affiliates) from all liability, whether in tort, contract or otherwise to the fullest extent possible under the relevant law.

February 2018

