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# CITY OF LOS ANGELES

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September 19, 2018

Michael Roeling  
BKP Berolina Polyester GMBH+Co KG  
Heidering 28  
D-16727 Velten / Germany

**SUBJECT: APPROVAL OF BEROLINA-LINER-UP AND BEROLINA-LINER-UP HF  
FIBERGLASS REINFORCED ULTRAVIOLET LIGHT CURED-IN-PLACE PIPE  
USING AOC VIPEL L720-LCB ISO-NPG POLYESTER RESIN BR800026**

Dear Mr. Roeling:

Berolina-Liner-UP and Berolina-Liner-UP HF are approved for Citywide Use in the public right of way. This approval is effective today, September 19, 2018, and expires in 4 years. You are required to report any change in the material composition of this product to the City immediately.

All installations must comply with the following materials. The following properties are to be used for design calculations per the City of Los Angeles Structural Manual.

Berolina-Liner UP Design Properties

Resin: .....	AOC VIPEL L720-LCB ISO-NPG
Fiberglass: .....	Advantex E-CR glass
Initial Hoop Tensile Strength: .....	26,500 psi
Long-term (50-year) Hoop Tensile Strength: ...	15,900 psi
Initial Hoop Flexural Modulus: .....	1,215,000 psi
Long-term (50-year) Hoop Flexural Modulus: ..	729,000 psi

Berolina-Liner HF UP Design Properties

Resin: .....	AOC VIPEL L720-LCB ISO-NPG
Fiberglass: .....	Advantex E-CR glass
Initial Hoop Tensile Strength: .....	29,150 psi
Long-term (50-year) Hoop Tensile Strength: ...	24,780 psi
Initial Hoop Flexural Modulus: .....	2,410,000 psi
Long-term (50-year) Hoop Flexural Modulus: ..	2,048,500 psi

The material properties listed above are for the structural wall or "Reinforced Wall" portion of the liner as defined by ASTM D3567, Section 7.3.2, 2017 version. All



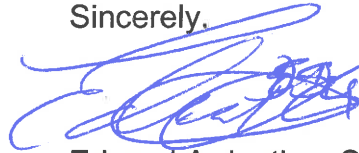
calculations are based on this reinforced wall thickness. For the purposes of contract compliance, the reinforced wall thickness shall be measured by the laboratory using the ASTM D3567 and evaluated per ASTM F2019. The average reinforced wall thickness must meet or exceed the project specifications. The "Surface Layer Thickness" as defined by ASTM D3567 Section 7.3.3 and "Nonreinforced Layers" per Section 7.3.4 shall be measured. Laboratory test reports must contain all information stated in Section 7.5 "Report".

Initial hoop tensile strength is based on limited data from Ramtech Laboratories Report Number 3265, dated December 3, 2013. Please contact my staff if you wish to have this reevaluated.

Berolina-Liner must be installed per the conditions stated in the City of Los Angeles specification Section 02582 and the Deutsches Institut für Bautechnik (DIBt) Approval Number Z-42.3-336, latest version. If there is any conflict between the City of Los Angeles specifications and the DIBt approval, the more stringent shall govern.

This approval will expire on September 19, 2022. You may apply for a four-year extension of this approval 120 days before it expires. Please maintain a copy of this approval for your records. This letter will be required as part of a contractor's submittal package. If you have any questions, please contact Kent W. Welling at (213) 485-5405 or Edward Arrington at (213) 485-1694.

Sincerely,



Edward Arrington, S. E., ENV SP  
Engineer of Design  
Wastewater Conveyance Engineering Division

c.c George Espindola, Bureau of Contract Administration, Materials Control  
Shailesh "Sunny" Patel, Structural Engineering Division