

DOMESTIC  NON-DOMESTIC

## SUBMITTAL: PROTECTIVE FUSION BONDED EPOXY (FBE)

(Current revisions for all noted Standards apply)

Tyler Union Waterworks standard applied coating thickness for protective fusion bonded epoxy (FBE) is 6 to 8 mil and our FBE is NSF61, NSF-372 and Annex G approved. Tyler Union Waterworks FBE water works fittings are coated internally and externally in accordance with the applicable requirements of ANSI/AWWA C116/A21.16. Section 4.3.2 of the ANSI/AWWA C116 standard provides that FBE mil thickness in the joint area shall not have a coating of less than 4 mil. Additionally, the standard advises it may be necessary to establish a limit for the maximum applied thickness in the joint areas.

Tyler Union Waterworks upon request at time of order placement, can provide FBE fittings with increased mil thickness. However, FBE thickness greater than 6 to 8 mil may interfere with the pipe to fitting fit and inhibit the sealing for a leakproof joint. For these reasons, Tyler Union Waterworks does not provide warranty for FBE lined and coated fittings with greater than 8 mil thickness in the joint area.

Tyler Union Waterworks FBE is tested and approved per Underwriters Laboratories UL262. Testing of FBE involves immersing coated parts in four aqueous solutions at 158°F and evaluate for blistering during 90 day continuous exposure period. The solutions are distilled water, 2% sodium chloride in distilled water, distilled water with a pH adjusted to 4.0 using potassium hydrogen phthalate, and distilled water with pH adjusted to 10.0 using sodium carbonate. Tyler Union Waterworks FBE is also tested for blister resistance when immersed in acid, alkali, alcohol, and hydrocarbons at room temperature over 90 days. Additional test data and recommended exposures for Tyler Union Waterworks FBE is as provided in Tables 1 thru 3.

The ANSI/AWWA C116/A21.16 standard describes the use of protective fusion bonded epoxy coatings as being utilized for the interior and exterior surfaces of ductile or gray iron fittings supplied for “water systems”. Section 1.1 of the standard specifically provides that the standard does not cover instances where coatings are agreed upon by purchaser and manufacturer for sewer or other special applications. Though not always recommended for use in \*\*Sewer systems; FBE coated and lined fittings may be used in sewer applications conveying materials conforming to the properties as provided in Tables 2 and 3 on page 2.

TABLE #1			
TEST	METHOD	CONDITIONS	RESULT
<b>Abrasion Resistance</b>	ASTM D4060	CS-17 wheels, 1000 cycles, 1 kg load	32 mg loss
<b>Adhesion</b>	ASTM D3359 - Method A	X-cut and tape	5A
<b>Adhesion</b>	ASTM D3359 - Method B	Crosshatch and tape	5B
<b>Gloss, 60°</b>	ASTM D523	N/A	70-85
<b>Humidity Resistance</b>	ASTM D2247	1000 hours at 100°F	No blisters or rusting
<b>Impact</b>	ASTM D2794	N/A	Pass 40 inch-lbs. direct
<b>Pencil hardness</b>	ASTM D3363	N/A	Pass 4H
<b>Salt Spray</b>	ASTM B117	1000 hours	No blisters or face rust, no scoreline creepage
<b>Water Resistance</b>	AWWA C550	90 days immersion at 70°C	Pass
<b>Weather Resistance</b>	ASTM G154	UVA-340, cycle 4 hrs UV at 60°C, 4 hrs condensation at 50°C	Chalks after 200 hours exposure

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TABLE #2	
Immersion Environments with the following chemicals (ambient temperature)	
Aliphatic Hydrocarbons	Fresh water
Calcium Chloride (10% solution)	Fuel Oil
Calcium Hydroxide (10% solution)	Hexane
Calcium Sulfate (saturated solution)	Kerosine
Calcium Carbonate (saturated solution)	Motor oil
Distilled water	Magnesium Sulfate (saturated solution)
Gasoline (unleaded)	Potassium Acetate (saturated solution)
Diesel Fuel	Soap solutions
Sodium Chloride (5% solution)	Sodium Nitrate (10% solution)
Sodium Hydroxide (5% solution)	Trisodium Phosphate (5% solution)

TABLE #3	
Splash and Spillage Environments against the following chemicals	
Aromatic Hydrocarbons	Butanol
Ethanol	Hydrochloric Acid (5% solution)
Isopropyl Alcohol	Methanol
Sulfuric Acid ( 5% solution)	Toluene
Xylene	

**\*NOTE:**

Due to the prescribed application methods of protective fusion bonded epoxy and the combination of varying fitting diameters, recesses, raised lettering, tapping bosses, and numerous radiused surfaces; the applied thickness of the FBE coating or lining may vary 1 to 2 mils over the coated surfaces of a fitting.

**\*\*NOTE:**

Final determination of the suitability of this product for your application shall be determined by the end user .

Additional types of epoxy coatings are available upon request at time of order placement. Please contact a Tyler Union Waterworks Customer Service representative to discuss the additional coating and lining options that are available.