

C1Bar Testing - October 20, 2015

ACI Required Tests (ACI 440.6)	Standard to Achieve	Test Reference #	Tested On	Tested By	Date	Result	Unit
Fiber content	ACI: > 55% by volume	ASTM D3171	#3	Benmokrane <sup>1</sup>	Jan 2015	78.6	%
Glass transition temp	ACI: > 212 °F, > 100 °C	ASTM E1356, D3418	#3	Benmokrane	Jan 2015	248 (120)	°F (°C)
Cross-sectional area	ACI: #3, 0.11 in <sup>2</sup>						inches <sup>2</sup>
Maximum outside diameter	ACI: #3, 0.375 in						inches
Guaranteed tensile strength	ACI: > 110 ksi	ASTM D3916, D7205	#4	Issa <sup>2</sup>	Aug 2014	182	ksi
Tensile modulus of elasticity	ACI: > 5700 ksi	ASTM D3916, D7205	#4	Issa	Aug 2014	8332	ksi
Tensile strain	ACI: > 1.2%	ASTM D3916, D7205	#4	Issa	Aug 2014	2.26	%
Shear strength (perpendicular to bar)	ACI: > 18 ksi						
Bond strength (pull-out test)	ACI: > 1.4 ksi, CSA: > 8 MPa	ACI 440.3R-B.3	#3	Benmokrane	Apr 2015	14.2	MPa
Moisture absorption at 112 °F	ACI: < 1.0%						%
Alkaline resistance (85 days in high pH alkaline @ 60°C)	Not established	ACI 440.3R-B.6	#3	Benmokrane	July 2015	no corrosion	observation
Longitudinal wicking / void content	Not established						
Bend radius	Not applicable	-	-	-	-	-	-
<b>Additional Tests (not specified by ACI 440.6)</b>							
Density S.G.	Standard 2.1 g/cm <sup>3</sup> for all FRP rebar					2.1	g/cm <sup>3</sup>
Fiber mass loss	Not established			In-house	Oct 2015	11	%
Transverse thermal expansion coeff	CSA: 22.3 °F x 10 <sup>-6</sup> (40 x 10 <sup>-6</sup> °C <sup>-1</sup> )	ASTM E831	#3	Benmokrane	Jan 2015	16.7 (30)	°F x 10 <sup>-6</sup> (°C x 10 <sup>-6</sup> )
<b>Interlaminar shear strength</b>							
Ultimate load (as-received)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	3.3	kN
Ultimate load (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	3.0	kN
Ultimate load (as-received)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	8.3	kN
Ultimate load (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	8.3	kN
Shear strength (as-received)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	31.5	MPa
Shear strength (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	28.1	MPa
Shear strength (as-received)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	43.5	MPa
Shear strength (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	38.8	MPa
<b>Transverse shear strength</b>							
Ultimate load (as-received)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	17.8	kN
Ultimate load (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	18.6	kN
Ultimate load (as-received)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	37.8	kN
Ultimate load (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	35.5	kN
Shear strength (as-received)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	125.4	MPa
Shear strength (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#3	Benmokrane	July 2015	131.0	MPa
Shear strength (as-received)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	148.9	MPa
Shear strength (alkaline solution 85 days @ 60°C)		ACI 440.3R-B.6	#4	Benmokrane	July 2015	139.8	MPa
Failure load (longitudinal tensile strength)		ACI 440.6M-13	#3	Benmokrane	Apr 2015	29.9	kN