



DECLARATION OF PERFORMANCE No. 0480

1. Unique identification code of the product-type: **GeoSteel SRG**
(GeoSteel G600 and Geocalce F Antisismico/Geocalce FL Antisismico/Geolite/Geolite Magma)
2. Intended use/es: **The SRG kit is suitable for strengthening and seismic upgrade of clay, tuff, natural stone masonry and reinforced concrete elements and structures.**
3. Manufacturer: **Kerakoll S.p.A Via dell'Artigianato, 9 - 41049 Sassuolo (MO) Italia**
4. System/s of AVCP: **System 2+**
5. European Assessment Document: **EAD 340275-00-0104, January 2018**
European Technical Assessment : **ETA-19/0325 of 13/07/2022**
Technical Assessment Body: **ITC CNR**
Notified body/ies: **ITC n°0970**
6. Declared performance/s:
 - Characteristic value for tensile strength and tensile strain
 - Average value for modulus of elasticity

Essential characteristics	Performance
Reaction to fire	Class A1
GeoSteel G600 – Geocalce F Antisismico/Geocalce FL Antisismico/Geolite/Geolite Magma	See Annex A

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by: **Romano Sghedoni (legal representative)**

At Sassuolo, on 29/07/2022



Annex A – GeoSteel G600-Geocalce F Antisismico /Geocalce FL Antisismico/Geolite /Geolite Magma

Essential characteristics		Performance		
		Average Value		Characteristic value
Direct Tensile Strength - Ambient				
Tensile strength (σ_u)		GL	2871 MPa	2697 MPa
Strain (ϵ_u)			1,65 %	1,38 %
Stress-strain curve (E)	Elastic modulus of stage A		2065 GPa	827 GPa
	Stiffness modulus in stage C		190 GPa	150 GPa
Tensile strength (σ_u)		GCF	2969 MPa	2798 MPa
Strain (ϵ_u)			1,81 %	1,42 %
Stress-strain curve (E)	Elastic modulus of stage A		1246 GPa	956 GPa
	Stiffness modulus in stage C		195 GPa	160 GPa
Direct Tensile Strength – maximum service temperature				
Tensile strength ($\sigma_{u, 80}$)		GL	2374 MPa	1939 MPa
Strain ($\epsilon_{u, 80}$)			1,24 %	1,09 %
Stress-strain curve ($E_{1, 80}; E_{3, 80}$)	Elastic modulus of stage A		1453 GPa	-(1)
	Stiffness modulus in stage C		191 GPa	150 GPa
Tensile strength ($\sigma_{u, 80}$)		GCF	2075 MPa	817 MPa
Strain ($\epsilon_{u, 80}$)			1,16 %	0,49 %
Stress-strain curve ($E_{1, 80}; E_{3, 80}$)	Elastic modulus of stage A		2225 GPa	-(1)
	Stiffness modulus in stage C		179 GPa	163 GPa
Interlaminar shear strength (τ)	G600 + GL		2.93 MPa	1.21 MPa
	G600 + GCF		1.45 MPa	0.65 MPa
Lap tensile strength (σ_{lap})	Tested Overlap length $l_{lap} = 300 \text{ mm}$	GL	2675 MPa	2471 MPa
		GCF	2783 MPa	2434 MPa
Bond strength on substrate CONCRETE: pull-off test (f_h) G600+GL	ambient		2.83 MPa	-
	Water	1000 h	f_h 2.75 MPa $f_{h, ret}$ 97 %	-
		3000 h	f_h 3.24 MPa $f_{h, ret}$ 115 %	-
	saltwater	1000 h	f_h 2.89 MPa $f_{h, ret}$ 102 %	-
		3000 h	f_h 3.43 MPa $f_{h, ret}$ 121 %	-
	alkali	1000 h	f_h 2.95 MPa $f_{h, ret}$ 104 %	-
		3000 h	f_h 3.68 MPa $f_{h, ret}$ 130 %	-



Essential characteristics			Performance	
			Average Value	Characteristic value
Bond strength on substrate CLAY: pull-off test (f_h) G600+GCF	ambient		1.47 MPa	-
	Water	1000 h	f_h 2.22 MPa $f_{h,ret}$ 152 %	-
		3000 h	f_h 2.32 MPa $f_{h,ret}$ 158 %	-
	saltwater	1000 h	f_h 1.85 MPa $f_{h,ret}$ 126 %	-
		3000 h	f_h 2.28 MPa $f_{h,ret}$ 156 %	-
	alkali	1000 h	f_h 2.74 MPa $f_{h,ret}$ 187 %	-
		3000 h	f_h 2.68 MPa $f_{h,ret}$ 183 %	-
	Bond strength on substrate TUFF: pull-off test (f_h) G600+GCF	ambient		0.35 MPa
Water		1000 h	f_h 0.50 MPa $f_{h,ret}$ 144 %	-
		3000 h	f_h 0.41 MPa $f_{h,ret}$ 117 %	-
saltwater		1000 h	f_h 0.56 MPa $f_{h,ret}$ 162 %	-
		3000 h	f_h 0.46 MPa $f_{h,ret}$ 131 %	-
alkali		1000 h	f_h 0.42 MPa $f_{h,ret}$ 120 %	-
		3000 h	f_h 0.45 MPa $f_{h,ret}$ 128 %	-



Essential characteristics			Performance	
			Average Value	Characteristic value
Bond strength on substrate CONCRETE: single-lap shear test G600+GL	ambient		P_{max} 10143 N P_{deb} 8683 N $\sigma_{lim,conv}$ 2357 MPa	P_{max} 7865 N P_{deb} 4799 N $\sigma_{lim,conv}$ 1827 MPa
	Water	1000 h	P_{max} 10574 N P_{deb} 10040 N $P_{max\ ret}$ 104 % $P_{deb\ ret}$ 116 %	-
		3000 h	P_{max} 10682 N P_{deb} 9727 N $P_{max\ ret}$ 105 % $P_{deb\ ret}$ 112 %	-
	saltwater	1000 h	P_{max} 11008 N P_{deb} 10048 N $P_{max\ ret}$ 109 % $P_{deb\ ret}$ 116 %	-
		3000 h	P_{max} 8597 N P_{deb} - $P_{max\ ret}$ 85 % $P_{deb\ ret}$ -	-
	alkali	1000 h	P_{max} 11946 N P_{deb} 10939 N $P_{max\ ret}$ 118 % $P_{deb\ ret}$ 126 %	-
		3000 h	P_{max} 11594 N P_{deb} 10872 N $P_{max\ ret}$ 114 % $P_{deb\ ret}$ 125 %	-



Essential characteristics				Performance		
				Average Value	Characteristic value	
Bond strength on substrate CLAY: single-lap shear test G600+GCF	ambient			P_{max} 10158 N P_{deb} 8504 N $\sigma_{lim,conv}$ 2360 MPa	P_{max} 7606 N P_{deb} 4152 N $\sigma_{lim,conv}$ 1767 MPa	
	Water	1000 h	P_{max} 9632 N P_{deb} 8728 N $P_{max ret}$ 95 % $P_{deb ret}$ 103 %	-		
		3000 h	P_{max} 7803 N P_{deb} 6416 N $P_{max ret}$ 77 % $P_{deb ret}$ 75 %	-		
	saltwater	1000 h	P_{max} 8946 N P_{deb} 8315 N $P_{max ret}$ 88 % $P_{deb ret}$ 98 %	-		
		3000 h	P_{max} 8577 N P_{deb} 8238 N $P_{max ret}$ 84 % $P_{deb ret}$ 97 %	-		
	alkali	1000 h	P_{max} 8727 N P_{deb} 7217 N $P_{max ret}$ 86 % $P_{deb ret}$ 85 %	-		
		3000 h	P_{max} 8917 N P_{deb} 7693 N $P_{max ret}$ 88 % $P_{deb ret}$ 90 %	-		
	Bond strength on substrate TUFF: single-lap shear test G600+GCF	ambient			P_{max} 7488 N P_{deb} 6322 N $\sigma_{lim,conv}$ 1740 MPa	P_{max} 6855 N P_{deb} 4297 N $\sigma_{lim,conv}$ 1593 MPa
		Water	1000 h	P_{max} 7378 N P_{deb} 6859 N $P_{max ret}$ 99 % $P_{deb ret}$ 109 %	-	
			3000 h	P_{max} 8183 N P_{deb} 7200 N $P_{max ret}$ 109 % $P_{deb ret}$ 114 %	-	
saltwater		1000 h	P_{max} 7493 N P_{deb} 7305 N $P_{max ret}$ 100 % $P_{deb ret}$ 116 %	-		
		3000 h	P_{max} 6669 N P_{deb} 6313 N $P_{max ret}$ 89 % $P_{deb ret}$ 100 %	-		



	alkali	1000 h	P_{max} 7277 N P_{deb} 6375 N $P_{max\ ret}$ 97 % $P_{deb\ ret}$ 101 %	-
		3000 h	P_{max} 7221 N P_{deb} 6601 N $P_{max\ ret}$ 96 % $P_{deb\ ret}$ 105 %	-
Bond strength on substrate NATURAL STONE: single-lap shear test G600+GCF	ambient		P_{max} 11801 N $P_{deb}^{-(2)}$ $\sigma_{lim,conv}$ 2742 MPa	P_{max} 10636 N $P_{deb}^{-(2)}$ $\sigma_{lim,conv}$ 2471 MPa
Pull out from substrate CONCRETE: (failure mode FR) G600+GLM	ambient		$\sigma_{pull-out}$ 2525 MPa $\delta_{pull-out}$ 7,2 mm	-
	Water	1000 h	$\sigma_{pull-out}$ 2549 MPa $\delta_{pull-out}$ 5.30 mm $\sigma_{pull-out\ ret}$ 101%	-
		3000 h	$\sigma_{pull-out}$ 2634 MPa $\delta_{pull-out}$ 7.81 mm $\sigma_{pull-out\ ret}$ 104 %	-
	saltwater	1000 h	$\sigma_{pull-out}$ 2491 MPa $\delta_{pull-out}$ 7.40 mm $\sigma_{pull-out\ ret}$ 97%	-
		3000 h	$\sigma_{pull-out}$ 2340 MPa $\delta_{pull-out}$ 5.20 mm $\sigma_{pull-out\ ret}$ 93%	-
	alkali	1000 h	$\sigma_{pull-out}$ 2712 MPa $\delta_{pull-out}$ 6.04 mm $\sigma_{pull-out\ ret}$ 107 %	-
		3000 h	$\sigma_{pull-out}$ 2522 MPa $\delta_{pull-out}$ 5.50 mm $\sigma_{pull-out\ ret}$ 100 %	-



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Pull out from substrate CLAY: (failure mode FR) G600+GCFL	ambient		$\sigma_{\text{pull-out}}$ 2709 MPa $\delta_{\text{pull-out}}$ 7,7 mm	-
	Water	1000 h	$\sigma_{\text{pull-out}}$ 2555 MPa $\delta_{\text{pull-out}}$ 6.94 mm $\sigma_{\text{pull-out ret}}$ 94 %	-
		3000 h	$\sigma_{\text{pull-out}}$ 2510 MPa $\delta_{\text{pull-out}}$ 6.28 mm $\sigma_{\text{pull-out ret}}$ 93 %	-
	saltwater	1000 h	$\sigma_{\text{pull-out}}$ 2575 MPa $\delta_{\text{pull-out}}$ 7.70 mm $\sigma_{\text{pull-out ret}}$ 95 %	-
		3000 h	$\sigma_{\text{pull-out}}$ 2542 MPa $\delta_{\text{pull-out}}$ 7.12 mm $\sigma_{\text{pull-out ret}}$ 94 %	-
	alkali	1000 h	$\sigma_{\text{pull-out}}$ 2593 MPa $\delta_{\text{pull-out}}$ 7.19 mm $\sigma_{\text{pull-out ret}}$ 96 %	-
		3000 h	$\sigma_{\text{pull-out}}$ 2642 MPa $\delta_{\text{pull-out}}$ 7.30 mm $\sigma_{\text{pull-out ret}}$ 98 %	-
	Pull out from substrate TUFF: (failure mode FR) G600+ GCFL	ambient		$\sigma_{\text{pull-out}}$ 2503 MPa $\delta_{\text{pull-out}}$ 8,3 mm
Water		1000 h	$\sigma_{\text{pull-out}}$ 2803 MPa $\delta_{\text{pull-out}}$ 8.32 mm $\sigma_{\text{pull-out ret}}$ 112 %	-
		3000 h	$\sigma_{\text{pull-out}}$ 2730 MPa $\delta_{\text{pull-out}}$ 8.06 mm $\sigma_{\text{pull-out ret}}$ 109 %	-
saltwater		1000 h	$\sigma_{\text{pull-out}}$ 2480 MPa $\delta_{\text{pull-out}}$ 8.34 mm $\sigma_{\text{pull-out ret}}$ 99 %	-
		3000 h	$\sigma_{\text{pull-out}}$ 2665 MPa $\delta_{\text{pull-out}}$ 7.70 mm $\sigma_{\text{pull-out ret}}$ 106 %	-
alkali		1000 h	$\sigma_{\text{pull-out}}$ 2557 MPa $\delta_{\text{pull-out}}$ 7.62 mm $\sigma_{\text{pull-out ret}}$ 102 %	-
		3000 h	$\sigma_{\text{pull-out}}$ 2616 MPa $\delta_{\text{pull-out}}$ 7.48 mm $\sigma_{\text{pull-out ret}}$ 105 %	-

GL = GeoLite; GCF = Geocalce F Antisismico

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Essential characteristics		Performance				
			Average value	Characteristic value		
Freezing and Thawing	Direct tension	GL	Tensile strength $\sigma_{u,FT}$	2561 MPa	2423 MPa	
			Strain $\epsilon_{u,FT}$	1,55 %	1,36 %	
			Stiffness moduli E_{1FT}	NPA	NPA	
			Stiffness moduli E_{3FT}	183 GPa	163 GPa	
				Inter shear strength (τ_{FT})	3.61 Mpa	2.73 Mpa
		GCF	Tensile strength $\sigma_{u,FT}$	2832 MPa	2709 MPa	
		Strain $\epsilon_{u,FT}$	1,80 %	1,57 %		
		Stiffness moduli E_{1FT}	NPA	NPA		
		Stiffness moduli E_{3FT}	199 GPa	173 GPa		
			Inter shear strength (τ_{FT})	1.54 MPa	1.03 MPa	
Retained properties	GL	Tensile strength $\sigma_{u,FT,ret}$	89%	-		
		Stiffness moduli $E_{1FT,ret}$	NPA	-		
		Stiffness moduli $E_{3FT,ret}$	97%	-		
		Inter shear strength ($\tau_{FT,ret}$)	123 %	-		
	GCF	Tensile strength $\sigma_{u,FT,ret}$	95%	-		
		Stiffness moduli $E_{1FT,ret}$	NPA	-		
		Stiffness moduli $E_{3FT,ret}$	103%	-		
		Inter shear strength ($\tau_{FT,ret}$)	106%	-		
Water resistance	Direct tension (1000 h)	GL	Tensile strength $\sigma_{u,w}$	2532 MPa	2377 MPa	
			Strain $\epsilon_{u,w}$	1,61 %	1,31 %	
			Stiffness moduli E_{1w}	NPA	NPA	
			Stiffness moduli E_{3w}	217 GPa	178 GPa	
				Inter. shear strength (τ_w)	3.81 MPa	2.95 MPa
				Lap tensile ($\sigma_{lap,w}$)	NPA	NPA
		GCF	Tensile strength $\sigma_{u,w}$	2528 MPa	2489 MPa	
			Strain $\epsilon_{u,w}$	1,92 %	1,61 %	
			Stiffness moduli E_{1w}	NPA	NPA	
			Stiffness moduli E_{3w}	246 GPa	166 GPa	
				Inter. shear strength (τ_w)	1.04 MPa	0.70 MPa
				Lap tensile ($\sigma_{lap,w}$)	NPA	NPA
Direct tension (3000 h)	GL	Tensile strength $\sigma_{u,w}$	2806 MPa	2705 MPa		
		Strain $\epsilon_{u,w}$	1,57 %	1,39 %		
		Stiffness moduli E_{1w}	NPA	NPA		
		Stiffness moduli E_{3w}	281 GPa	239 GPa		
			Inter. shear strength (τ_w)	4.92 MPa	3.85 MPa	
			Lap tensile ($\sigma_{lap,w}$)	NPA	NPA	
Retained properties (1000 h)	GL	Tensile strength $\sigma_{u,w,ret}$	88 %	-		
		Stiffness moduli $E_{1w,ret}$	NPA	-		
		Stiffness moduli $E_{3w,ret}$	115 %	-		
		Inter. shear strength ($\tau_{w,ret}$)	130 %	-		
			Lap tensile ($\sigma_{lap,w,ret}$)	NPA	-	
Retained properties (3000 h)	GCF	Tensile strength $\sigma_{u,w,ret}$	85 %	-		
		Stiffness moduli $E_{1w,ret}$	NPA	-		
		Stiffness moduli $E_{3w,ret}$	127 %	-		
		Inter. shear strength ($\tau_{w,ret}$)	72 %	-		
			Lap tensile ($\sigma_{lap,w,ret}$)	NPA	-	
Retained properties (3000 h)	GL	Tensile strength $\sigma_{u,w,ret}$	98 %	-		
		Stiffness moduli $E_{1w,ret}$	NPA	-		
		Stiffness moduli $E_{3w,ret}$	149 %	-		
		Inter. shear strength ($\tau_{w,ret}$)	168 %	-		
			Lap tensile ($\sigma_{lap,w,ret}$)	NPA	-	



		GCF	Tensile strength $\sigma_{u, w, ret}$ Stiffness moduli $E_{1, w, ret}$ Stiffness moduli $E_{3, w, ret}$ Inter. shear strength ($\tau_{w, ret}$) Lap tensile ($\sigma_{lap, w, ret}$)	87 % NPA 103 % 136 % NPA	-
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GL = GeoLite; GCF = Geocalce F Antisismico

Refined

Essential characteristics	Performance				
			Average value	Characteristic value	
Saltwater resistance	Direct tension (1000 h)	GL	Tensile strength $\sigma_{u, sw}$ Strain $\epsilon_{u, sw}$ Stiffness moduli $E_{1, sw}$ Stiffness moduli $E_{3, sw}$ Inter. shear strength (τ_{sw}) Lap tensile ($\sigma_{lap, sw}$)	2819 MPa 1,59 % NPA 189 GPa 3.94 MPa NPA	2622 MPa 1,31 % NPA 162 GPa 3.10 MPa NPA
		GCF	Tensile strength $\sigma_{u, sw}$ Strain $\epsilon_{u, sw}$ Stiffness moduli $E_{1, sw}$ Stiffness moduli $E_{3, sw}$ Inter. shear strength (τ_{sw}) Lap tensile ($\sigma_{lap, sw}$)	2712 MPa 1,92 % NPA 229 GPa 0.62 MPa NPA	2639 MPa 1,63 % NPA 197 GPa 0.44 MPa NPA
		GL	Tensile strength $\sigma_{u, sw}$ Strain $\epsilon_{u, sw}$ Stiffness moduli $E_{1, sw}$ Stiffness moduli $E_{3, sw}$ Inter. shear strength (τ_{sw}) Lap tensile ($\sigma_{lap, sw}$)	2933 MPa 1,57 % NPA 182 GPa 3.73 MPa NPA	2765 MPa 1,33 % NPA 161 GPa 3.19 MPa NPA
		GCF	Tensile strength $\sigma_{u, sw}$ Strain $\epsilon_{u, sw}$ Stiffness moduli $E_{1, sw}$ Stiffness moduli $E_{3, sw}$ Inter. shear strength (τ_{sw}) Lap tensile ($\sigma_{lap, sw}$)	2542 MPa 1,77 % NPA 184 GPa 1.28 MPa NPA	2470 MPa 1,55 % NPA 160 GPa 0.77 MPa NPA
	Retained properties (1000 h)	GL	Tensile strength $\sigma_{u, sw, ret}$ Stiffness moduli $E_{1, sw, ret}$ Stiffness moduli $E_{3, sw, ret}$ Inter. shear strength ($\tau_{sw, ret}$) Lap tensile ($\sigma_{lap, sw, ret}$)	98 % NPA 100 % 135 % NPA	-
		GCF	Tensile strength $\sigma_{u, sw, ret}$ Stiffness moduli $E_{1, sw, ret}$ Stiffness moduli $E_{3, sw, ret}$ Inter. shear strength ($\tau_{sw, ret}$) Lap tensile ($\sigma_{lap, sw, ret}$)	91 % NPA 118 % 43 % NPA	-
	Retained properties (3000 h)	GL	Tensile strength $\sigma_{u, sw, ret}$ Stiffness moduli $E_{1, sw, ret}$ Stiffness moduli $E_{3, sw, ret}$ Inter. shear strength ($\tau_{sw, ret}$) Lap tensile ($\sigma_{lap, sw, ret}$)	102 % NPA 96 % 127 % NPA	-
		GCF	Tensile strength $\sigma_{u, sw, ret}$ Stiffness moduli $E_{1, sw, ret}$ Stiffness moduli $E_{3, sw, ret}$ Inter. shear strength ($\tau_{sw, ret}$) Lap tensile ($\sigma_{lap, sw, ret}$)	86 % NPA 95 % 88 % NPA	-

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Alkali resistance	Direct tension (1000 h)	GL	Tensile strength $\sigma_{u, alk}$ Strain $\epsilon_{u, alk}$ Stiffness moduli $E_{1, alk}$ Stiffness moduli $E_{3, alk}$ Inter. shear strength (τ_{alk}) Lap tensile ($\sigma_{lap, alk}$) NPA	2917 MPa 1,66 % NPA 187 GPa 4.18 MPa NPA	2755 MPa 1,47 % NPA 156 GPa 3.45 MPa NPA
		GCF	Tensile strength $\sigma_{u, alk}$ Strain $\epsilon_{u, alk}$ Stiffness moduli $E_{1, alk}$ Stiffness moduli $E_{3, alk}$ Inter. shear strength (τ_{alk}) Lap tensile ($\sigma_{lap, alk}$)	2713 MPa 2,15 % NPA 218 GPa 0.62 MPa NPA	2604 MPa 1,76 % NPA 170 GPa 0.53 MPa NPA
	Direct tension (3000 h)	GL	Tensile strength $\sigma_{u, alk}$ Strain $\epsilon_{u, alk}$ Stiffness moduli $E_{1, alk}$ Stiffness moduli $E_{3, alk}$ Inter. shear strength (τ_{alk}) Lap tensile ($\sigma_{lap, alk}$)	3007 MPa 1,67 % NPA 186 GPa 3.61 MPa NPA	2855 MPa 1,47 % NPA 160 GPa 2.55 MPa NPA
		GCF	Tensile strength $\sigma_{u, alk}$ Strain $\epsilon_{u, alk}$ Stiffness moduli $E_{1, alk}$ Stiffness moduli $E_{3, alk}$ Inter. shear strength (τ_{alk}) Lap tensile ($\sigma_{lap, alk}$)	2627 MPa 1,88 % NPA 207 GPa 1.59 MPa NPA	2519 MPa 1,59 % NPA 169 GPa 1.23 MPa NPA
	Retained properties (1000 h)	GL	Tensile strength $\sigma_{u, alk, ret}$ Stiffness moduli $E_{1, alk, ret}$ Stiffness moduli $E_{3, alk, ret}$ Inter. shear strength ($\tau_{alk, ret}$) Lap tensile ($\sigma_{lap, alk, ret}$)	102 % NPA 99 % 143 % NPA	-
		GCF	Tensile strength $\sigma_{u, alk, ret}$ Stiffness moduli $E_{1, alk, ret}$ Stiffness moduli $E_{3, alk, ret}$ Inter. shear strength ($\tau_{alk, ret}$) Lap tensile ($\sigma_{lap, alk, ret}$)	91 % NPA 112 % 43 % NPA	-

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Essential characteristics	Performance				
				Average value	Characteristic value
Alkali resistance	Retained properties (3000 h)	GL	Tensile strength $\sigma_{u, alk,ret}$ Stiffness moduli $E_{1, alk,ret}$ Stiffness moduli $E_{3, alk,ret}$ Inter. shear strength ($\tau_{alk,ret}$) Lap tensile ($\sigma_{lap, alk,ret}$)	105 % NPA 98 % 123 % NPA	-
		GCF	Tensile strength $\sigma_{u, alk,ret}$ Stiffness moduli $E_{1, alk,ret}$ Stiffness moduli $E_{3, alk,ret}$ Inter. shear strength ($\tau_{alk,ret}$) Lap tensile ($\sigma_{lap, alk,ret}$)	89 % NPA 107 % 109 % NPA	-
Alkali soil resistance	GL	Direct tension (1000 h)	Tensile strength $\sigma_{u, soil}$ Strain $\epsilon_{u, soil}$ Stiffness moduli $E_{1, soil}$ Stiffness moduli $E_{3, soil}$	2744 MPa 1.61 % 1301 GPa 175 GPa ₁	2414 MPa 1.07 % 716 GPa 150 GPa ₁
		Retained properties (1000 h)	Tensile strength $\sigma_{u, soil,ret}$ Stiffness moduli $E_{1, soil,ret}$ Stiffness moduli $E_{3, soil,ret}$	96 % 63 % 92 %	-
	GCF	Direct tension (1000 h)	Tensile strength $\sigma_{u, soil}$ Strain $\epsilon_{u, soil}$ Stiffness moduli $E_{1, soil}$ Stiffness moduli $E_{3, soil}$	2687 MPa 1.49 % 1576 GPa 186 GPa	2169 MPa 0.89 % 790 GPa 162 GPa
		Retained properties (1000 h)	Tensile strength $\sigma_{u, soil,ret}$ Stiffness moduli $E_{1, soil,ret}$ Stiffness moduli $E_{3, soil,ret}$	91 % 127 % 96 %	-
Dry heat resistance	GL	Direct tension (1000 h)	Tensile strength $\sigma_{u, heat}$ Strain $\epsilon_{u, heat}$ Stiffness moduli $E_{1, heat}$ Stiffness moduli $E_{3, heat}$	2817 MPa 1.73 % 1379 GPa ₁ 194 GPa ₁	2560 MPa 1.49 % 677 GPa ₁ 172 GPa ₁
		Retained properties (1000 h)	Tensile strength $\sigma_{u, heat,ret}$ Stiffness moduli $E_{1, heat,ret}$ Stiffness moduli $E_{3, heat,ret}$	98 % 67 % 102 %	-
		Direct tension (3000 h)	Tensile strength $\sigma_{u, heat}$ Strain $\epsilon_{u, heat}$ Stiffness moduli $E_{1, heat}$ Stiffness moduli $E_{3, heat}$	2778 MPa 1.37 % 2069 GPa ₁ 215 GPa	2247 MPa 0.63 % 22 GPa ₁ 166 GPa
		Retained properties (3000 h)	Tensile strength $\sigma_{u, heat,ret}$ Stiffness moduli $E_{1, heat,ret}$ Stiffness moduli $E_{3, heat,ret}$	97 % 100 % 114 %	-
	GCF	Direct tension (1000 h)	Tensile strength $\sigma_{u, heat}$ Strain $\epsilon_{u, heat}$ Stiffness moduli $E_{1, heat}$ Stiffness moduli $E_{3, heat}$	3102 MPa 1.53 % 1233 GPa 221 GPa	3056 MPa 1.43 % 551 GPa 196 GPa
		Retained properties (1000 h)	Tensile strength $\sigma_{u, heat,ret}$ Stiffness moduli $E_{1, heat,ret}$ Stiffness moduli $E_{3, heat,ret}$	104 % 99 % 114 %	-



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		Direct tension (3000 h)	Tensile strength $\sigma_{u, heat}$ Strain $\varepsilon_{u, heat}$ Stiffness moduli $E_{1, heat}$ Stiffness moduli $E_{3, heat}$	3133 MPa 1.75 % 1232 GPa; 197 GPa	3017 MPa 1.49 % 175 GPa; 175 GPa
		Retained properties (3000 h)	Tensile strength $\sigma_{u, heat, ret}$ Stiffness moduli $E_{1, heat, ret}$ Stiffness moduli $E_{3, heat, ret}$	106 % 99 % 102 %	-
Fuel resistance	GL	Direct tension	Tensile strength $\sigma_{u, fuel}$ Strain $\varepsilon_{u, fuel}$ Stiffness moduli $E_{1, fuel}$ Stiffness moduli $E_{3, fuel}$	1209 MPa 1.30 % NPA 81.9 GPa	1040 MPa 1.04 % NPA 70.9 GPa
		Retained properties	Tensile strength $\sigma_{u, fuel, ret}$ Stiffness moduli $E_{1, fuel, ret}$ Stiffness moduli $E_{3, fuel, ret}$	42 % NPA 43 %	-
	GCF	Direct tension	Tensile strength $\sigma_{u, fuel}$ Strain $\varepsilon_{u, fuel}$ Stiffness moduli $E_{1, fuel}$ Stiffness moduli $E_{3, fuel}$	809 MPa 1.44 % NPA 70.9 GPa	617 MPa 0.61 % NPA 52.2 GPa
		Retained properties	Tensile strength $\sigma_{u, fuel, ret}$ Stiffness moduli $E_{1, fuel, ret}$ Stiffness moduli $E_{3, fuel, ret}$	27 % NPA 36 %	-
Creep behaviour related to the adhesion on substrate	Substrate: concrete	Displacement vs time (tabular)		0.023 mm	-
		Maximum load $P_{max, creep}$ Bond capacity $P_{max, creep}$	8898 N 8268 N	- ⁽¹⁾ 8268 N	
	Substrate: clay	Displacement vs time (tabular)		0.010 mm	-
Substrate: tuff	Maximum load $P_{max, creep}$ Bond capacity $P_{max, creep}$		8154 N 7605 N	5402 N 7605 N	
	Displacement vs time (tabular)		0.007 mm	-	
Tensile strength after long term actions (creep) - GL	100 h	Direct tension	Tensile strength $\sigma_{u, creep}$ Strain $\varepsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	2994 MPa 1.72 % 221 GPa	-
		Retained properties	Tensile strength $\sigma_{u, creep, ret}$ Stiffness moduli $E_{3, creep, ret}$	104 % 117 %	-
	500 h	Direct tension	Tensile strength $\sigma_{u, creep}$ Strain $\varepsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	3027 MPa 1.94 % 209 GPa	-
		Retained properties	Tensile strength $\sigma_{u, creep, ret}$ Stiffness moduli $E_{3, creep, ret}$	105 % 110 %	-
	1000 h	Direct tension	Tensile strength $\sigma_{u, creep}$ Strain $\varepsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	3001 MPa 1.72 % 215 GPa	-
		Retained properties	Tensile strength $\sigma_{u, creep, ret}$ Stiffness moduli $E_{3, creep, ret}$	105 % 113 %	-
	4000 h	Direct tension	Tensile strength $\sigma_{u, creep}$ Strain $\varepsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	3007 MPa 1.63 % 223 GPa	-
		Retained properties	Tensile strength $\sigma_{u, creep, ret}$ Stiffness moduli $E_{3, creep, ret}$	105 % 118 %	-

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Essential characteristics	Performance					
				Average value	Characteristic value	
Tensile strength after long term actions (creep) - GCF	100 h	Direct tension	Tensile strength $\sigma_{u, creep} \geq$ Strain $\epsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	2702 MPa 1.48 % 218 GPa	-	
		Retained properties	Tensile strength $\sigma_{u, creep,ret}$ Stiffness moduli $E_{3, creep,ret}$	91 % 112 %	-	
	500 h	Direct tension	Tensile strength $\sigma_{u, creep}$ Strain $\epsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	2725 MPa 1.58 % 210 GPa	-	
		Retained properties	Tensile strength $\sigma_{u, creep,ret}$ Stiffness moduli $E_{3, creep,ret}$	92 % 108 %	-	
	1000 h	Direct tension	Tensile strength $\sigma_{u, creep}$ Strain $\epsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	2858 MPa 1.52 % 217 GPa	-	
		Retained properties	Tensile strength $\sigma_{u, creep,ret}$ Stiffness moduli $E_{3, creep,ret}$	96 % 111 %	-	
	4000 h	Direct tension	Tensile strength $\sigma_{u, creep}$ Strain $\epsilon_{u, creep}$ Stiffness moduli $E_{3, creep}$	3014 MPa 1.68 % 224 GPa	-	
		Retained properties	Tensile strength $\sigma_{u, creep,ret}$ Stiffness moduli $E_{3, creep,ret}$	102 % 115 %	-	
	Tensile strength after low number of cycles (seismic behaviour)	GL		Tensile strength $\sigma_{u, seismic}$ Strain $\epsilon_{u, seismic}$ Stiffness moduli $E_{1, seismic,ret}$ Stiffness moduli $E_{3, seismic,ret}$	3004 MPa 1.78 % 2080 GPa 200 GPa	2910 MPa 1.65 % 452 GPa 170 GPa
		GCF		Tensile strength $\sigma_{u, seismic}$ Strain $\epsilon_{u, seismic}$ Stiffness moduli $E_{1, seismic,ret}$ Stiffness moduli $E_{3, seismic,ret}$	3063 MPa 2.00 % 1218 GPa 193 GPa	3024 MPa 1.92 % 549 GPa 188 GPa
	Tensile strength after high number of cycles (fatigue actions)				NPA	
	Mechanical properties of fabric	5 cords		Ultimate stress $\sigma_{u,f}$ Ultimate strain $\epsilon_{u,f}$ Mean elastic modulus E_f	3124 MPa 2,06 % 190 GPa	2942 MPa 1,54 % 142 GPa
8 cords		Ultimate stress $\sigma_{u,f}$ Ultimate strain $\epsilon_{u,f}$ Mean elastic modulus E_f	3087 MPa 2,07 % 195 GPa	2889 MPa 1,67 % 161 GPa		
8 cords		concrete + GL clay + GCF tuff + GCF natural stone+ GCF	$\epsilon_{lim,conv}$	1,21 %	0,94 %	
			$\epsilon_{lim,conv}$	1,21 %	0,91 %	
Tensile strength on bent fabric	Straight fabric		$\sigma_{u,f,straight}$ $\sigma_{u,f,straight+sw1000}$ $\sigma_{u,f,straight+sw3000}$	3118 MPa 2965 MPa 2535 MPa	2959 MPa 2794 MPa 2416 MPa	
	Bent fabric		$\sigma_{u,f,bent}$ $\sigma_{u,f,bent+sw1000}$ $\sigma_{u,f,bent+sw3000}$	2652 MPa 2330 MPa 2165 MPa	2416 MPa 2195 MPa 2006 MPa	

GL = Geolite; GCF = Geocalce F Antismico

- (1) value not determinable due to the high dispersion of results
- (2) Rupture of fibres was observed outside the bonded length