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Effects of different environmental conditions on the mechanical characteristics of a structural epoxy

Patrícia Silva, Pedro Fernandes, José Sena-Cruz, José Xavier, Fernando Castro, Delfim Soares, Vítor Carneiro

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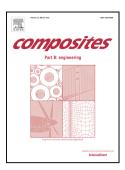
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ACCEPTED MANUSCRIPT

1	EFFECTS OF DIFFERENT ENVIRONMENTAL CONDITIONS ON THE MECHANICAL
2	CHARACTERISTICS OF A STRUCTURAL EPOXY
3	Patrícia Silva ^a , Pedro Fernandes ^a , José Sena-Cruz ^{a*} , José Xavier ^{b,c} , Fernando Castro ^d , Delfim Soares ^d ,
4	Vítor Carneiro d
5	^a ISISE, University of Minho, Department of Civil Engineering, Guimarães, Portugal
6	^b INEGI, Porto, Portugal
7	^c CITAB, University of Trás-os-Montes and Alto Douro, Vila Real, Portugal
8	^b INEGI, University of Porto, Faculty of Engineering, Porto, Portugal
9	^d CT2M, University of Minho, Department of Mechanical Engineering, Guimarães, Portugal
10	*Corresponding author
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12	Abstract: With the aim of characterising a commercially available epoxy adhesive used for fibre-reinforced
13	polymers strengthening applications, when submitted to different environmental conditions, mainly thermal
14	(TC), freeze-thaw (FT), and wet-dry (WD) cycles and immersion in pure (PW) and water with chlorides (CW)
15	for periods of exposure that lasted up to 16 months, an experimental program was carried out. Several
16	methodologies were used in its characterization, mainly the scanning electron microscope (SEM), dynamic
17	mechanical analysis (DMA), standard tensile tests (STT) coupled with digital image correlation (DIC). In
18	general the results revealed that the chemical composition was not affected by the environmental conditions.
19	Nevertheless, it was verified through DMA and STT that the modulus of elasticity and tensile strength of the
20	epoxy adhesive increased in the TC, while the specimens submitted to PW and CW faced a high degradation in
21	terms of its mechanical properties. Eventually, the glass transition temperature (T_g) was not affected by the
22	environmental conditions, apart from the specimens subjected to TC and FT, presenting a higher and lower $T_{\rm g}$
23	respectively, when compared with the reference specimens.
24	
25	Keywords: A. Thermosetting resin; B. Chemical properties; B. Mechanical properties; D. Thermal analysis;
26	Durability.
27	

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