

## Accepted Manuscript

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PII: S0263-8223(17)32632-6

DOI: <https://doi.org/10.1016/j.compstruct.2018.01.094>

Reference: COST 9334

To appear in: *Composite Structures*

Received Date: 15 August 2017

Revised Date: 23 December 2017

Accepted Date: 30 January 2018

Please cite this article as: Carlos, T.B., Rodrigues, J.P.C., de Lima, R.C.A., Dhima, D., Experimental analysis on flexural behaviour of RC beams strengthened with CFRP laminates and under fire conditions, *Composite Structures* (2018), doi: <https://doi.org/10.1016/j.compstruct.2018.01.094>

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# Experimental analysis on flexural behaviour of RC beams strengthened with CFRP laminates and under fire conditions

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## Abstract:

Carbon fibre reinforced polymer (CFRP) laminates have been used on strengthening reinforced concrete, steel and timber members due to their excellent flexural performance, lightness, ease of application and corrosion resistance. However, in a fire, other detrimental factors may arise due to the high thermal exposure. This paper presents the results of an experimental investigation on the flexural behaviour of reinforced concrete (RC) beams strengthened with CFRP laminates in fire conditions. The main objective was to assess the behaviour in fire of the strengthening system on the beams thermally insulated with different fire protection systems. Fire resistance tests on beams protected with sprayed vermiculite-perlite (VP), expanded clay aggregates (EC) or ordinary Portland cement (OP) based mortars, were carried out. The tests carried out under the present research were innovative because unlike the ones conducted by other authors the beam in testing and its supports were completely inside the furnace. Furthermore, the testing beam supported a concrete slab that tried to simulate its interaction with the surrounding building structure. The results showed above all that the beams with passive fire protection materials provided an integrity of their resistance for long periods of fire exposure, especially the ones protected with VP mortar.

**Keywords:** fire, concrete, beam, CFRP strengthening, protection system, experimental tests

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