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Farhad Aslani, Jack Klein

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### ACCEPTED MANUSCRIPT

# Assessment and development of high-performance fibre-reinforced lightweight self compacting concrete including recycled crumb rubber aggregates exposed to exposed to elevated temperatures Farhad Aslani<sup>1\*</sup> and Jack Klein<sup>2</sup>

<sup>1\*</sup> Senior Lecturer, School of Civil, Environmental, and Mining Engineering, University of Western Australia,
WA 6009, Australia (corresponding author, e-mail: <u>farhad.aslani@uwa.edu.au</u>),

<sup>2</sup> Master student, School of Civil, Environmental, and Mining Engineering, University of Western Australia,
WA 6009, Australia.

### 9

### 10 Abstract

Recycled crumb rubber is a material created by grinding and commutating used tyres. There 11 is no doubt that the increasing piles of tyres create environmental concerns. The long term 12 13 goal of this paper is to find a means to dispose of the crumb rubber in lightweight selfcompacting concrete (SCC) and still provide a final product with good engineering 14 properties. This paper has considered replacement of natural normal-weight aggregates with 15 crumb rubber aggregates and lightweight scoria aggregate together with the addition of macro 16 fibres which provides a sustainable alternative which assists in minimising the environmental 17 18 damages associated with the disposal of waste tyres. Also, the purpose of this study is to determine the effect of fibres on fresh and mechanical properties in additional to the 19 performance of the concrete after exposure to elevated temperatures. Investigation has been 20 performed after concrete exposure to both room and elevated temperatures. Fibre 21 reinforcement were added to a control mix containing 80% replacement of traditional coarse 22 23 aggregate with lightweight scoria aggregate and 20% replacement of traditional fine aggregate with crumb rubber aggregate. Steel and polypropylene (PP) fibres were explored so 24 as to ascertain the benefits each fibre can provide through a range of temperatures. Nine 25 mixes were prepared; a control mix and four mixes per each fibre with increasing fibre 26 addition. Chemical admixture dosages were adjusted so as to achieve the desired slump flow. 27 Experimental program investigated the fresh properties of the SCC through slump flow, 28

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