Limitations Omitted from "A New T-Equivalent Method for Fire Rated Wall Constructions using Cumulative Radiation Energy" by C.R. Barnett, Vol. 17, No. 2, May 2007, pp. 113–127.

As the researchers who developed the Cumulative Radiation Energy (CRE) design methodology described in Barnett's article, we would like to advise that certain applications of the methodology cited by Barnett may not be valid, especially the application of CRE to concrete wall structures (Case D in the article) exposed to a fire more severe than that corresponding to the ISO 834 time-temperature curve. The CRE method was designed to predict insulation failure in building elements that are predominantly of cavity drywall construction. It has not been validated for solid construction when mechanisms other than insulation failure alone will be evident.

The mode of heat transfer through solid construction such as concrete differs from the radiant heat transfer mode through cavity construction. Further, a self-supporting concrete wall can have several failure mechanisms beyond that of failing on the 'insulation' criterion alone. These include spalling, which can prematurely reduce the thickness of the concrete wall slab. Hence, when exposed to a fire more severe than that corresponding to ISO 834, failure could occur earlier than indicated by use of the CRE method. The CRE method is reviewed in its entirety by an upcoming publication in JFPE [1].

The Barnett article, in describing the CRE methodology, references the initial research on cavity drywall construction for which the CRE method is derived [2]. This research stated categorically that 'The radiant exposure area correlation should not be applied to make assessment of structural failure of a load bearing assembly. The method provides good conservative agreement of the thermal mechanisms of an insulation failure, but does not account for other mechanisms involved with structural failure.' This qualification is not identified in the Barnett paper, leading to the possibility that the paper could be incorrectly interpreted and misapplied.

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REFERENCES

1. Nyman, J.F., et al., "Predicting Fire Resistance Performance of Drywall Construction Exposed to Parametric Design Fires – A Review".
2. Nyman, J.F., "Equivalent Fire Resistance Ratings of Construction Elements Exposed to Realistic Fires," Engineering Research Report 02/13, University of Canterbury, New Zealand, 2002.

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