Computer Models
For
Fire and Smoke

Model Name: COMPF2

Classification: Zone model

Very Short Description: Simple zone model for single-compartment, post-flashover fires.

Modeler, Organization: Vytenis Babrauskas, Fire Science and Technology Inc.

Users guide: Babrauskas, V., COMPF2 – A Program for Calculating Post-Flashover Fire Temperatures (Tech Note 991). [U.S.] National Bureau of Standards (1979).

Technical References: 1. Babrauskas, V., and Wickström, U.G., Thermoplastic Pool Compartment Fires, *Combustion and Flame*, 34. 195-201 (1979)

2. Babrauskas, V., and Williamson, R.B., Post-Flashover Compartment Fires – Application of a Theoretical Model, *Fire and Materials*, 3. 1-7 (1979).

3. Babrauskas, V., and Williamson, R.B., Post-Flashover Compartment Fires: Basis of a Theoretical Model, *Fire and Materials*, 2. 39-53 (1978).

4. Babrauskas, V., A Closed-Form Approximation for Post-Flashover Compartment Fire Temperatures, *Fire Safety Journal*, 4, 63-73 (1981).

5. Thomas, G. C., Fire Resistance of Light Timber Framed Walls and Floors [Ph.D. dissertation] (Fire Engineering Report 97/7), University of Canterbury, New Zealand (1997)

Validation References: 1. Babrauskas, V., Fire Endurance in Buildings [Ph.D. dissertation], University of California, Berkeley (1976).

2. Feasey, R., Post-Flashover Design Fires (Fire Engineering Report 99/6), University of Canterbury, New Zealand (1999). also #2 in General References

Availability: Available on request from W.D. Walton, National institute of Standards and Technology or from Prof. A. Buchanan, University of Canterbury.

Price: gratis

Necessary Hardware: Model was originally designed to run on mainframe computers. The code available currently from National Institute of Standards and Technology has been slightly updated to run on IBM PCs. However, the PC version does not incorporate built-in plotting routines. Users typically import output data to spreadsheets.

Computer Language: ANSI FORTRAN/66

Size: About 1800 lines of source code; about 115 kB for the .EXE file.

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Detailed Description:

The mode tracks a fire in a single compartment. The fuel can be wood or plastic cribs, liquid or plastic pools, or tabular data input from tests of commodities. Apart from gas and wall temperatures, the model also outputs the heat flow terms. The fluid flow is handled by Kawagoe-type equations; this results in good accuracy for post-flashover fires only. The intended applicability of the model is as an aid for making fire endurance computations, where a long post-flashover period is seen and details of the period prior to flashover do not need to be modeled very closely. The model is very efficient to run. Failure to converge has only been noted for cases where physically unrealistic values of thermophysical properties are specified. The model has been compared against data from a large number of fires and does not show systematic bias. It has been used most commonly as the basic fire model for subsequent thermostructural calculations of load-bearing assemblies.