

## **"Ten Rules of Fire Endurance Ratings"**

by

**T.Z. Harmathy**

in the May 1965 Edition of *Fire Technology* (35).

### **Harmathy's Ten Rules:**

**Rule 1:** The "*thermal*"<sup>1</sup> fire endurance of a construction consisting of a number of parallel layers is greater than the sum of the "thermal" fire endurance's characteristic of the individual layers when exposed separately to fire.

**Rule 2:** The fire endurance of a construction does not decrease with the addition of further layers.

**Rule 3:** The fire endurance of constructions containing continuous air gaps or cavities is greater than the fire endurance of similar constructions of the same weight, but containing no air gaps or cavities.

**Rule 4:** The farther an air gap or cavity is located from the exposed surface, the more beneficial is its effect on the fire endurance.

**Rule 5:** Increasing the thickness of a completely enclosed air layer cannot increase the fire endurance of a construction.

**Rule 6:** Layers of materials of low thermal conductivity are better utilized on that side of the construction on which fire is more likely to happen.

**Rule 7:** The fire endurance of asymmetrical constructions depends on the direction of heat flow.

**Rule 8:** The presence of moisture, if it does not result in explosive spalling, increases the fire endurance.

**Rule 9:** Load-supporting elements, such as beams, girders and joists, yield higher fire endurance's when subjected to fire endurance tests as parts of floor, roof, or ceiling assemblies than they would when tested separately.

**Rule 10:** The load-supporting elements (beams, girders, joists, etc.) of a floor, roof, or ceiling assembly can be replaced by such other load-supporting elements which, when tested separately, yielded fire endurance's not less than that of the assembly.

---

<sup>1</sup> The "thermal fire endurance is the time at which the average temperature on the unexposed side of a construction exceeds its initial value by 250 degrees F. (121 C.) when the other side is exposed to the "standard" fire specified by ASTM Test Method E119.