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In its simplest form the new fire test provides for two ratings RESTRAINED and UNRESTRAINED. Under its provisions portions of a building can be considered restrained while other portions of the same building could be unrestrained.

Temperature limitations have been established for all beams and floor assemblies but a time factor has been introduced which provides that in the testing of beams in the restrained condition the temperature of the steel shall not exceed 1100° F. average or 1300° F. maximum at any point for at least one hour or for one half of the classification period. A Restrained beam then could be rated at 4 hours if it sustained its design load for 4 hours and the limiting temperatures were not exceeded for 2 hours.

In the case of Unrestrained beams the temperature limitations cannot be exceeded during the entire classification period. A 4 hour Unrestrained beam then would have to be protected with sufficient material to prevent a temperature rise exceeding the 1100° F average or 1300° F. maximum at any point for the full 4 hours.

Obviously the Unrestrained beam requirements are much more severe, and except for a 100° difference in temperature are similar to the present San Francisco, Los Angeles and the Uniform Building Code requirements.

Floor and Roof Assembly Tests have also been revised. They must be fully loaded and carry the load for the full time period. Temperature transmission through the floor or roof cannot exceed 250° F. average or more than 325° F. at any point. Cotton waste

on the unexposed side cannot ignite from passage of hot gas or flame. This portion of the test procedure has not been changed but a new element has been added. The beam supporting the floor or roof assembly is now considered an integral part of the assembly. The requirements for the beams in restrained or unrestrained floors or roofs is identical to those outlined previously for beams only.

In unrestrained floors or roofs one other provision has been added. The temperature of the steel from which the deck is fabricated cannot exceed 1100° F. during the entire classification period.

Column tests have not been changed. Failure is based on temperature and occurs when temperatures exceed 1000° F. at any quarter section of the member or 1200° F. at any single point. The same test procedure and temperature limitations are applicable to both steel and concrete construction.

The whole test procedure has been further complicated by failure of the E-5 Committee to define RESTRAINT in realistic terms. It reads as follows "Floor and Roof Assemblies and individual beams in buildings shall be considered restrained when the surrounding or supporting structure is capable of resisting substantial thermal expansion throughout the range of anticipated elevated temperatures. Constructions not complying with this definition are assumed to be free to rotate and expand and shall, therefore, be considered as unrestrained."

This language is so broad and so vague that many feel that only the structural engineer who designed the building can determine what is restrained or unrestrained. There are even those who insist that such a determination cannot be made realistically; that fire loading changes in structures and who can say what is "substantial thermal expansion" or "anticipated elevated temperatures". It is this group who have for practical purposes rejected the "RESTRAINED" criteria and will use the more practical "UNRESTRAINED" condition.

The next few years will be difficult and risky for everyone concerned but it will be particularly so for those who are bidding and are doing the field application.

There is reason to believe that there will not be agreement among Code Authorities on the subject. Some will adopt the new criteria others will reject it. There will be varying time schedules for adoption or rejection even by communities operating under the same basic code.

Extreme caution plus reliance on qualified material manufacturers representatives will be necessary until some of the unresolved issues are settled.