

### **FIRE PROTECTION HISTORY-PART 244: 1919 (FIRE RESISTIVE BUILDING CONSTRUCTION/S. H. INGBERG)**

By Richard Schulte

The twenty-third Annual Meeting of the National Fire Protection Association was held in Ottawa, Canada in May, 1919. Among the topics discussed at this meeting were the requirements for "Grade B" office buildings. The following are comments on the proposal for the provisions for "Grade B" office buildings submitted by S. H. Ingberg:

***"Written Discussion by Mr. S. H. Ingberg.  
(Associate Physicist, Bureau of Standards, U.S.)"***

*Referring to the section on "Columns," sentence in the second paragraph reading, "or the columns may be provided with such other protection to meet the four-hour fire test"; also the first paragraph under "Floor and Roof Construction" reading, "Floor and' roof construction shall consist of a series of steel or reinforced concrete beams with interposed arches or slabs or girderless floors of such material and construction as shall meet the requirements of the four-hour fire test," the fire test referred to is that of the test specifications as revised last year when the fire period was increased 25 per cent to provide a nominal factor of safety. As I understood it, there was no intention at the time that actual required fire test periods for given occupancies should be increased, but rather that the one-hour, two-hour, four-hour, etc., protection should be taken as directly applicable to actual occupancy hazards. From a recent conversation with Mr. Robinson I gain that this was also his understanding with reference to the revision made.*

*Office occupancies, along with those of hotel, apartment and residence, form one of the lighter hazards from the fire standpoint, the maximum duration of a fire in any one story, or effective portion of a story, being generally taken as one hour, and even considering light mercantile or storage occupancy on the ground floor, and possible future changes of occupancy for the whole or portion of the building, it appears that a requirement of two-hour protection for all load-carrying structural members, which implies a test fire of two and a half hours' duration, would take care of all exigencies. The floor loads for which office buildings are designed are too light to allow of any change to heavy manufacturing, merchandising or storage-occupancy.*

*Relative to the four-hour protection and floors specified in the Committee report of this year, there has been little experience either in fire tests or in building practice with constructions meeting this requirement, which implies a five-hour fire. It is reasonable to suppose that a large number of floors that will stand a four-hour fire will fail before the end of the fifth hour under the higher temperature exposure. The loading requirement of the revised specifications results in as high stresses (assuming a high proportion of live to dead load) as those obtaining in tests made under the old specifications.*

*Indications are that the requirement as drafted will preclude from use for one or more of the structural portions whole classes of material that today are in general use for the purpose, and that the remaining classes will only partly fill the requirements because of variations in the fire-resistive qualities within each, due to varying mineralogical composition. While there should be no hesitancy about discarding inferior material where the same does not serve the purpose for which it is proposed to use it, the reason for the rejection should be clearly and fully justified.*

*Developments in building construction aiming to secure material and design that are very much superior to the run of non-fire-resistive construction in general, use, and with which they have some promise of being able to compete, should be encouraged by allowing them opportunity for application in locations where they can meet the probable fire exposure. I believe a wholesome encouragement of development along these lines in all classes of fire-resistive material will aid greatly in attaining general predominance for a better type of building construction, which is the one thing for which we are all working.*

*My criticism of the test requirement of the present specification also applies to those for the Grade A office and apartment buildings and Grades A and B buildings (residence), republished last year and to which the new fire test specifications were retroactively applied.*

*(Signed) S. H. Ingberg.”*

Clearly, Ingberg recognized the connection between building occupancy and fire severity by 1919. Later, Ingberg conducted extensive research on the concept of the connection between fire loading in buildings and fire severity.

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**Source:** “*Proceedings of the Twenty-Third Annual [NFPA] Meeting*”, Ottawa, Canada, 1919.

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