

SYMPOSIUM ON FIRE TEST METHODS

INTRODUCTION

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Many new building materials and construction systems are being developed each year, with the result that architects, engineers, and the agencies concerned with fire protection are continually seeking new information on the fire resistance of such materials and systems. A better understanding of the various fire test procedures and the significance of the results of such tests will be very helpful in promoting the development of new fire-resistant materials and systems and will lead to a better appreciation of the accepted fire resistances of existing materials.

There are two broad classes of fire tests. One is concerned with the surface flammability and rate of flame spread of surface finishing materials as determined by use of the large tunnel furnace method developed by the Underwriters' Laboratories. To simplify this method, the Forest Products Laboratory developed a much smaller tunnel furnace which has been found very useful, and the National Bureau of Standards developed a radiant panel method for measuring surface flammability. These later methods are especially helpful in research and development work, due principally to the use of smaller specimens and the reduced personnel involved.

The second class of fire tests is concerned with the duration of resistance

to a standard fire exposure of the various structural elements of a building such as walls, floor and ceiling constructions, beams, and columns. Any load-bearing type of construction is usually subjected to its design load during the test, although for some elements such as protected steel columns its temperature is observed and taken as a measure of its fire resistance.

During actual fires within a building the thermal expansions that develop have an effect upon the structural action of the building elements and especially upon the floor system. The standard test procedure gives some recognition to this by requiring the use of a restraining frame around the test panel. This frame tends to develop continuity at the edge of the panel but in many instances the test panel is designed as a simple span. As a result of the continuity, the load capacity of the system is increased and the duration of the fire to cause failure is greater than it would be for a simple-span system. This condition presents a problem to provide the axial restraint resulting from the thermal expansions but not to introduce a moment restraint which is not developed in the actual structure. Studies of this problem have been conducted by the Portland Cement Assn. and it is hoped that it will receive further attention.

If a fire department has jurisdiction over the building that is on fire, the fire fighters will usually be able to apply

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hose streams of water to the fire within perhaps a half hour to an hour after it begins. As the action of the hose stream causes erosion, impact, and severe cooling effects which usually cause some damage to the structure, a standard hose-stream test is required by some standard test procedures and its effect is evaluated. For this test the duration of the fire before applying the hose stream, the water pressure, the duration of the hose-stream test, and other details of the test are specified in the standard procedure.

The building code authorities and fire officials are vitally concerned with the

fire test methods used for evaluating fire resistances of building elements and in the results of tests on specific types of construction. Many of the minimum resistances for various service conditions, and several types of construction to provide that resistance, are included in typical building codes.

This symposium of nine papers by specialists in their respective fields covers the many aspects of fire testing mentioned in the previous paragraphs. It should serve as a broad base for an understanding of the many problems related to fire testing and the use of test results derived therefrom.