ROOF CORE SAMPLES

INTRODUCTION

In 1953, a fire totally destroyed a General Motors transmission plant in Livonia, MI when it spread under the metal deck. The roof was constructed with a vapor barrier of asphalt (bitumen) and felt applied to the metal deck between the metal deck and insulation. When a fire in a dipping operation heated the metal deck, the asphalt used in the vapor barrier began to drip through seams in the deck and produced a combustible vapor. This condition caused the fire to spread. It was later determined there was approximately 0.9 lb/ft^2 (4.4 kg/m^2) of asphalt and 0.3 lb/ft^2 (1.46 kg/m^2) of asphalt-saturated felt between the metal deck and the insulation.

After the Livonia fire, there were a series of tests called the “White House Tests” that were conducted to determine what causes the fire to spread below the roof covering. The tests determined that there are two main factors which cause the fire to spread. They are the amount of combustible material between the metal deck and the insulation material, and the insulation material.

The test showed the fire would spread if:

- Asphalt adhesive was used, below the noncombustible insulation material, at a rate greater than 0.12 lb/ft^2 (0.59 kg/m^2)
- Combustible insulation were used

The test also showed that if noncombustible insulation or material was directly on the metal deck and combustible insulation were to be installed above, the material above the noncombustible material did not contribute to the spread of fire below the metal deck.

In light of the GM Livonia and other recent major fires that spread below a metal deck, concern about the spread of fire above sprinklers needs to be raised. One major problem of evaluating the potential of the spread of fire in existing buildings, is the lack of knowledge of exactly how the roofing system is constructed and how much combustible material is present between the metal deck and the insulation material. This document covers one method of determining the construction of an existing roofing system.

POSITION

Where the roof construction cannot be determined from installation specifications, take core samples in accordance with ASTM D2829 to determine the combustibility of built-up metal deck roofs.

Follow Section 3 of ASTM D2829 to take core sample, with the following exceptions:

- Section 3.1 directs that any surfacing in the area from which a specimen is to be taken should not be disturbed. It is acceptable to for the contractor to remove some gravel to make the cut.

- Section 3.2 directs the contractor to estimate the mass of bitumen per unit area left on the deck. Have the contractor scrape as much of the bitumen off the deck as possible.

The decision to send the sample to the laboratory depends on what is discovered as the sample is removed. See Table 1 for how to handle the sample.

A roof is considered combustible when there is more than 0.12 lb (54.4 g) of bitumen found between the metal deck and insulation of the 1 ft² (0.09 m²) sample (from either adhesive or roofing felt) or when the material against the deck is a nonlisted insulation.

TABLE 1
Handling Of Roof Core Sample

No laboratory work is needed.	Laboratory work is needed.
• If there is no bitumen on the deck, and the material against the metal deck is noncombustible, e.g., gypsum board, fiberboard, fiberglass insulation or rockwool insulation. • If there is no bitumen absorbed into the insulation, and the contractor can weigh the amount of bitumen scraped off and it is less than 0.12 lb (54.4 g).	• If bitumen has been absorbed into the insulation, the sample with the scraped off bitumen should be sent to a laboratory to determine the exact amount of bitumen in the insulation and scraped off bitumen layer. • If there is no bitumen on the deck, but the material against the metal deck is undetermined, e.g., foam or unknown type of insulation, the sample should be sent to the laboratory to determine the type of insulation and its combustibility.