Special Report: Fire Hazards and Access Flooring
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Fire hazards in data processing facilities have become a major topic of discussion in the industry. Access flooring design has been a part of this discussion. Until recently, most people focused in on the fuel contribution factor of access flooring. Now, the complete thermal properties of systems are being considered. This paper discusses fuel contribution and these thermal properties.

ASTM E136, the test that UBC Standard 4-1 designates for noncombustibility, states that the test does not apply to laminated products, however, under Applicable Documents it identifies ASTM E84 (Surface Burning Characteristics of Building Materials) as the document that applies. So currently, the only procedure we have from UBC or ASTM as a standard combustibility test procedure for laminated products is ASTM E84.

Computer Environments, Inc. steel encased wood-core floor panels have been tested per this document to have a flame spread of 5. The flame spread test has a range of 0 (asbestos) to 100 (dry red oak), so this means that our panel's flame spread rating is within 5% of asbestos, lower than most Class A construction materials.

In addition, it is very easy to get entrapped in the "noncombustible" issue with respect to access flooring and ignore the reality of a fire within the computer room. The aspect of heat transfer is sometimes forgotten with respect to life safety. In the first critical minutes of a fire, evacuation is the first major concern, then extinguishing the fire.

Consider the heat transer through wood-core panels versus the all-steel or aluminum panels in the table below:

| Panel Type | Thermal Conductivity, (Btu/hr ft—+—+˜—+2 o˜F/in.) |
|---|---|
| Steel-Encased Wood-Core | 1.2 |
| All-Steel Panels | 314.0 |
| Aluminum Panels | 1,560.0 |

The steel-encased wood-core panel insulates against heat 262 times better than steel and 1300 times better than aluminum. This allows added time to extinguish the fire before it causes damage and/or added time to evacuate as the following reveals:

The enclosed —Fig. 1 - Time-temperature curves further compares the surface temperature of access flooring when subject to heat from below. After three (3) minutes, the top of the core-encapsulated panel was only 60$^{o}$F, while the steel panel had already reached 240$^{o}$F, an unbearable walking temperature with standard footwear. After six (6) minutes, the top of the core-encapsulated panel was only 65$^{o}$F, while the steel panel had risen to over 500$^{o}$F, a temperature that is high enough to melt rubber, high pressure laminate, vinyl and plastic molding and wire insulation. After ten (10) minutes, the all-steel panel had a

surface temperature of almost 850°F, but the steel-encapsulated wood core panel was only 70°F. (One can imagine what the surface temperature of the highly conductive aluminum would be.)

Detection and extinguishing systems generally do not activate immediately and due to the very short time it takes for a steel (or aluminum) panel to become unbearably hot, the dangers of toxic gases emitted by melting rubbers, plastics, vinyl and other materials can be more dangerous to personnel than the actual flame. Some toxic gases are invisible, tasteless and odorless which can cause death without alarm. In an environment where there are many plastics and vinyls present, such as a typical computer room, it is imperitive to be able to evacuate or stop the fire before meltdown.

The further risk is that personnel could not re-enter the area after evacuation to extinguish the fire. This leaves the fire free to spread over the entire area causing great losses. Should the fire department or sprinkler system extinguish the fire, water damage would further increase the losses.

There are trade-offs to be considered when designing any construction component. The steel-encased wood-core panel design appears to be the best in life safety, losses and fire prevention. I/we have never received a report, written or otherwise, of steel-encased wood-core floor systems contributing to a fire.