Proponent : Larry Wainright, representing Structural Building Components Association (Iwainright@qualtim.com) requests Approve as Modified by this Public Comment.

Modify as Follows:

2015 International Residential Code

R302.13 Fire protection of floors. Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member as defined by performance equivalent to 26 minutes using ASTM E119 standard fire endurance testing with a superimposed load simulating a maximum load condition (i.e. 100% design load). Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

1. Exceptions:

- 1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.
- 2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
- 3. Portions of floor assemblies shall be permitted to be unprotected where complying with the following:
 - 3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m^2) per story
 - 3.2. Fireblocking in accordance with Section R302.11.1 is installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.

Commenter's Reason: The committee reason for disapproval says, "The committee believes that dimensional lumber is providing ample time to allow for evacuation of the occupants of a dw elling before floor collapse". Based on the UL testing submitted with the original proposal, the committee is saying that a time of 7 minutes 4 seconds is sufficient time for the occupants to evacuate. Based on the SBCA testing submitted with the original proposal, trusses installed with strongbacks tied back to the structure, which is a typical detail used in the field, provided 6 minutes 54 seconds of protection. This is a statistically insignificant difference in the times to failure betw een trusses and 2x10s.

Further, the SBCA testing show ed that 2x10 dimensional lumber failed with a complete collapse of the structure, w hereas the truss tests were stopped at the 6:54 mark due to deflection in the trusses. The truss system did not collapse into the furnace as show n by the follow ing picture post ASTM E119 test:



Furthermore, UL's 2012 report (<u>Underwriters Laboratory report (link is external</u>), <u>http://www.globalfireresearch.com/reports/research/download/125_470e3478d56e271c69124678a9941298</u>)</u> provides affirmation that R302.13 should be changed as recommended as follows:

Section 7.1 Starting at Bottom of Page 51 and all of Page 52 for context

All of these experiments were started with a flaming ignition. The average collapse times of all of the engineered floor systems were prior to the arrival of the fire service with the 50th percentile response time of 5 minutes (9 minutes total including 4 minutes to begin the response). All of the engineered floor system experiments, including the maximum times to collapse occurred prior to the arrival of the 90th percentile response time of 11 minutes (15 minutes total including 4 minutes to begin the response). The average collapse time of the dimensional lumber floor system experiments also occurred at the time of the arrival of the fire service with the 90th percentile response which emphasizes the importance of protecting all types of flooring systems, including dimensional lumber. Regardless of the unprotected floor system type no factor of safety can be assumed, doubling the average collapse time of all of these experiments still results in a collapse time. It is important to note that these times are when the fire service would arrive to begin their operations, not the time it takes to mitigate the incident.

UL states the following on page 67:

9. Summary of Findings:

Basement fires are challenging and dangerous. Firefighters can be in a position where they are operating above the fire and in some cases without knowing it. When above a basement fire with an unprotected wood floor assembly a number of challenges exist. Often the fire service has no idea how long the fire has been burning, no information on the type of floor system and no means of assessing the structural integrity of the floor system. There are little if any warning signs of collapse so it is very important to understand the hazards associated with a basement fire because the consequences of falling through a floor into a basement fire are pinnacle. To increase fire fighter safety UL accomplished several objectives with this research project.

UL states the following on page 3 & 68 on collapse times and page 64 section 8.1 on "exception 4" as follows:

 Collapse times of all unprotected wood floor systems are within the operational time frame of the fire service regardless of response time.

Based on the collapse times from these experiments there is little to no safe operating time for firefighters in a structure with an unprotected dimensional lumber floor system.

dimensional lumber even though its dimensions were actually smaller. While the fire service suggests that the factor of safety provided by older dimensional lumber was acceptable the experimental results show that new dimensional lumber is significantly different in terms of performance under fire conditions. Protecting the dimensional lumber as well as engineered lumber floor systems in future code requirements would eliminate this fire performance change in dimensional lumber and provide a more reasonable factor of safety for the fire service.

Finally, UL states the following with respect to the wording of equivalence (i.e. ...or equivalent on the underside of the floor framing member.....) on page 65:

8.2. Equivalence

Another code implication is the definition of "equivalent" as used in the following section, "Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch gypsum wallboard membrane, 5/8 inch wood structural panel membrane, <u>or equivalent</u> on the underside of the floor framing member." Two different products, utilizing two different technologies, were tested to see if they provide equivalent protection to an engineered floor system with ½ in. gypsum wallboard. The benchmark for this equivalency is interpreted to be approximately 26:45 which is the approximate performance of the three engineered floor systems experimented with ½ in. gypsum board protection (Table 26).

Assembly	Protection	Collapse Time
Engineered I joist (12 inch deep)	None	6:00
Engineered I joist (12 inch deep)	1/2 inch regular	26:45
	gypsum wallboard	
Parallel chord truss with steel gusset	1/2 inch regular	29:15
plate connections (14 inch deep)	gypsum wallboard	
Parallel chord truss with glued	1/2 inch regular	26:45
connections (14 inch deep)	gypsum wallboard	
Engineered I joist (12 inch deep)	Spray applied fire	8:40
	retardant coating	
Engineered I joist (12 inch deep)	Spray applied	17:50
	intumescent coating	

Table 26.	Collapse times o	f engineered i	lloor systems wi	ith protection	technologies

This evidence, which was not available when the current provisions were written, clearly show that the code as written increases the risk of life safety to firefighters and emergency responders, when unprotected 2x10s are used. As UL clearly states, the consequences of falling through the floor into a basement fire are pinnacle. Currently the code language expectation is a 15-minute membrane and as UL states this should result in roughly 26 minutes of performance.

Since 1992 it has been well known that unprotected 2x10s perform in the 10-minute range or less.

Given all the facts that have been known and the above set of facts, when the first firefighter falls through a 2x10 or any other non-26-minute performing floor into a basement fire and is severely burned or dies, what will the ICC body of code development decision maker's answ er for this be?

The simple act of including 1/2" gypsum on all floor assemblies removes this question and all the risk attached to this code provision.