

***Hi-Impact 8000 brand Fire-shield
Gypsum Wallboard
5/8" Tapered Edge Type X Core***

***Test #2
Fire inside the wall***

Purpose:

To evaluate fire and smoke behavior of a fire inside a wall constructed with Hi-Impact 8000 wallboard.

Materials used:

1 – 4' x 8' sheet of National Gypsum Hi-Impact 8000 brand Fire-shield Gypsum Wallboard (cut into 2 – 4' x 4' sections)
4 – 4' metal 2" x 4" wall studs
2 – 4' metal top and bottom rail to attach wall studs
Drywall screws
Self tapping metal screws 1/2"
White packing paper

Test Material:

The test was conducted by igniting approximately 4 pieces of packing paper inside a 4' x 4' simulated wall. The paper simulated any burning materials that could fall inside the wall during a structure fire. The wall was constructed using 2 – 4' x 4' sections of Hi-Impact 8000 wallboard mounted to metal stud framing on 16" centers. The pictures of the wall are below:



4' x 4' wall with metal stud framing and Hi-Impact 8000 wallboard mounted to both sides of the wall.



Approximately 4 pieces of white packing paper were ignited inside the wall to simulate burning materials that have dropped into the wall during a structure fire.

Test Process:

The wall was placed in an upright position on a flat surface. A hole on one of the end studs was enlarged to be able to position the paper inside the wall. This could also simulate any alterations to the studs by construction personnel. Also 4 holes were placed in the top rail of the wall to simulate any pipe or electrical chases that may be added by construction personnel. The paper, approximately 4 pieces, was placed in the wall and ignited using an ordinary lighter. The fire was allowed to burn inside the wall for approximately 20 minutes from the point of ignition. At the end of the burning period, the fire was extinguished using a 5-gallon pump can, through the holes in the metal studs. After the fire was extinguished, one side of the Hi-Impact 8000 Wallboard was removed to evaluate how the wallboard reacted to the fire.

Test Results & Findings:

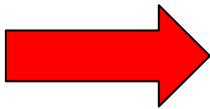
Packing paper was ignited inside the wall issuing a light white smoke condition. After approximately 2 minutes, the smoke color changed to black. 4 minutes after ignition of the paper, the Lexan backing of the wallboard was burning, issuing a heavier black/gray smoke. The smoke color and condition changed again to a heavy purple/gray color 1 minute later. After approximately 6 minutes from the point of ignition, heavy fire and smoke were issuing out of the end stud that the fire was started. Also, heavy smoke was pushing from every opening of the test wall. After approximately 1 minute of heavy fire and smoke, the conditions changed to a very heavy push of pink/gray smoke with no fire. The smoke was coming out of the vent holes a dark gray color and as it hit the outside air, it would change to a bright pink. After a few more minutes, a white colored smoke began issuing along with the gray and pink. During this time frame, the conditions would alternate from heavy fire issuing from the end stud, to very heavy pink/gray smoke issuing from the same area. Melted Lexan was noted coming from the bottom of the test wall. Upon completion of the burn time, the fire was extinguished using water from a 5-gallon pump can. The water extinguished the fire with no problems.

After extinguishment, one side of the test wall was removed to evaluate the amount of fire spread inside the wall. The fire completely consumed 1 full bay of the Lexan backing between the stud spaces where the fire was started. The fire then traveled through the pipe chases in the stud to the next bay, consuming the top ½ of the 2nd stud space. It was noted that some of the Lexan that had melted down was starting to ignite the bottom of the wall in the 2nd stud space. The 3rd bay in the test wall suffered very minor damage if any at all.

Temperature Recordings:

Temperature recordings were taken using a heat sensor, from the outside of the test wall approximately 12 minutes after the point of ignition. The recordings are as follows:

**Fire started
here**



Too hot to record on heat sensor	153.3 Degrees	93.7 Degrees
	Temp. not recorded	66.6 Degrees
212 Degrees	74 Degrees	62.8 Degrees
1 st bay	2 nd bay	3 rd bay

Conclusion:

In conclusion, it was demonstrated that the Lexan backing contributed to the fire spread within the wall. The Lexan backing also created a heavy and multiple colored smoke condition during the burn phase of the test.

Additional Photos:



Test Performed & Photos Taken By:

Firefighter/Paramedic Sean Murphy – Roberts Park Fire Protection District
Firefighter/Paramedic Don Huenecke – Roberts Park Fire Protection District