

## Insulation Fire Hazards on Farms

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**B**oth rigid board foam and sprayed-on plastic foam insulation present serious fire problems when installed as an exposed finished in farm buildings. Cellular plastic insulation is routinely sold with product literature that warns that the material is combustible and must be covered with a thermal barrier. Building codes in urban areas generally prevent this type of insulation from being left as an exposed interior finish but fire codes are not applicable in rural areas, and some farmers and rural builders may be tempted to leave the thermal barrier off as a cost saving measure. Many insurance companies that sell farm policies require policy holders to upgrade buildings with exposed foam insulation by either covering the foam insulation with a thermal barrier or removing it completely, but not all farm buildings are insured.

Cellular plastic insulation foams are most often developed from plastic polystyrenes, polyurethanes, and polyisocyanurates. If ignited by a sufficiently

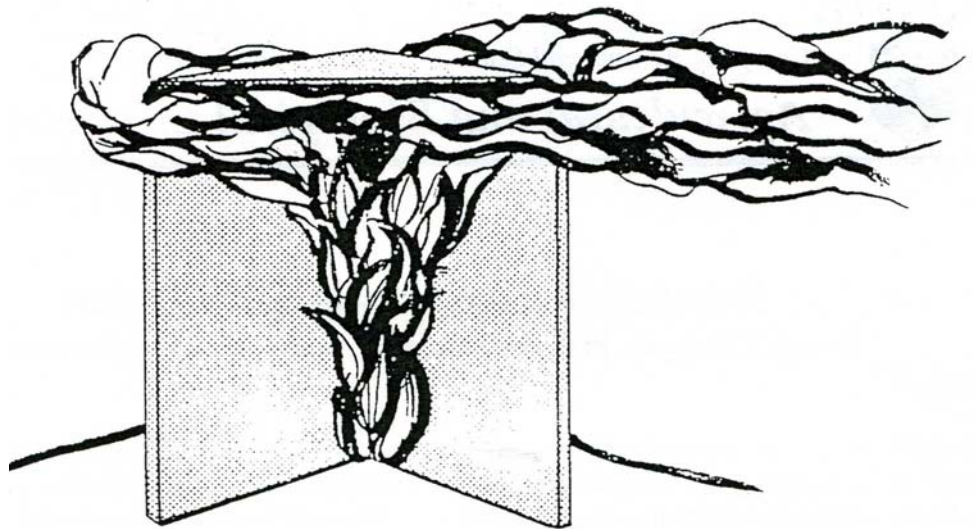
intense ignition source, the insulation foam will begin to melt and add to the fire by spreading flame, and will generate intense heat, dense smoke, and combustible products which may be toxic. There are many different foam materials with widely different flammability, but under certain conditions all of these materials will burn. Even self-extinguishing foams burn (or else they could not self extinguish under certain situations). Cellular plastic foam insulation has been involved in millions of dollars of losses to potato and apple storages, swine houses, poultry plants and other livestock housing.

### Flame Spread

A yardstick for determining the suitability of certain materials for specific interior finishes in buildings is called flame spread. Examples of flame spread ratings given to various materials are listed below:

Interior Finish Material	Flame Spread Rating
Asbestos-cement board	0
1/2 in. or 5/8 in. gypsum wall board (dry wall)	15
1/2 in. treated (fire retardant) exterior plywood	20-25
Red oak lumber	100
Untreated exterior plywood (various thicknesses)	75-200

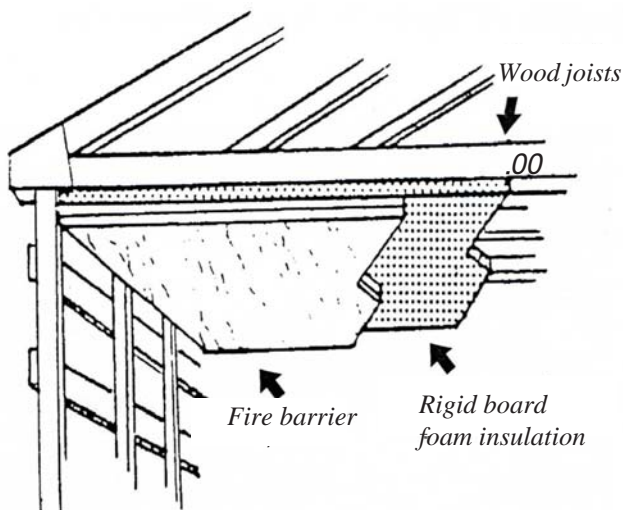
Flame spread tests of rigid plastic insulation boards show flame spread ratings ranging from 25-2500, depending on the position of the board (horizontal or vertical, surface or corner) and the ignition source. However, in most cases the insulation flashed over (became fully involved by fire) in slightly over one minute. This indicates two things: one, that the insulation does allow rapid flame spread and secondly, that exposed foamed insulation can burn at such a rapid rate that evacuation of a building lined with this type of insulation is nearly impossible. Experience has shown that these fires have spread with alarming speed, resulting in clouds of black dense smoke and devastating loss.



*Exposed plastic foam insulations can become burning infernos within seconds.*

## Fire Barriers

A fire barrier is designed to keep heat away from the insulation so that it doesn't ignite and flashover. The fire barrier might also allow time for extinguishing the fire or to evacuate animals and equipment. Remember, through, that once exposed insulation ignites, accumulations of toxic gases and flashover may occur within seconds. There are three principles to keep in mind when considering covering exposed foam insulation:



*Use fire barriers to prevent flashover of fires involving exposed cellular plastic foam insulation.*

- The barrier must stay in place during heat buildup. A gypsum board (dry wall, "sheet rock," or equivalent) nailed through foam board into wood framing is probably better than a barrier board fastened by glue that could crack.
- The barrier should prevent the insulation from heating to more than 250°F above ambient temperature for 15 minutes after the fire ignites. Gypsum board is more effective than corrugated metal or metal facing, since metal conducts heat of the fire directly to the foam, resulting in melt down.
- Barriers must be placed on both sides of foam insulation when used as ceiling insulation. That is, a barrier must be placed over the interior ceiling side and over the uninhabited space.

Following are possible methods of covering exposed insulation in your buildings:

- 1/2 inch gypsum board nailed in place over the insulation.
- 1/2 inch fire retardant plywood. Fire retardant plywood is not usually in stock, but can be ordered from most lumber yards. Make sure the pieces fit tightly and all gaps are sealed. Ordinary exterior plywood will provide some flame spread protection for the foam, however, the plywood itself may burn, thus exposing the insulation.
- 1/2 inch cement based mixture (gypsum-sand or gypsum-vermiculite) applied on the plastic foam insulation. Durability of this treatment depends on the competency of the applicator, so always check on jobs already completed by the applicator.
- Spray-applied thermal barriers listed by UL (Underwriters Laboratory) or FM (Factory Mutual).

A few additional points about plastic insulation and fire barriers that all farmers should understand:

- ☐ Some plastic foams melt at temperatures as low as 270°. This may be as little as 180°-200° over room temperature.
- ☐ Adding insulation to a building results in holding more heat in the structure during a fire, permitting greater heat buildup on wood or other flammable materials.
- ☐ Most plastic foam insulation boards burn quickly at low temperatures with the same heat release and flame spread as at high temperatures. This is different from most material that start burning slowly and increase their burning rate as time and temperature increases.
- ☐ Flame retardant additives decrease the possibility of foams catching fire from contact with a small fire source, such as a torch or overheated electrical wire. But a larger source of fire will ignite exposed “flame retardant” foams.
- ☐ A fire test on plastic foams under controlled

conditions and blueprint specifications is quite different from what may occur with foam in place for years, subject to aging, mechanical damage, building modifications, moderate maintenance, and other changes that normally occur during product lifetime.

- ☐ If you are adding a fire barrier to exposed foam insulation, be sure the fire barrier is conducive to the environment it will be exposed to. For example, plywood barriers would be used in swine confinements rather than gypsum board due to moisture problems and possible physical damage.
- ☐ Asbestos is a known carcinogen. If asbestos-cement board is used as a fire barrier and boards must be cut for fitting, wear a respirator approved for asbestos dust. During sawing, fibers are likely to be jarred loose from the bonding substance and become airborne. Currently, there is no known “safe” level of asbestos dust, so respiratory protection is crucial.

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