

## RETROFIT APPLICATION GUIDE

### UNVENTED ATTIC

The following are suggestions for best practices from various sources. Each Company is responsible for its own individual Safety, HCP and PPE programs. Always follow all fire and building codes and equipment manufacturer's manuals, labels, and listings.

#### OBJECTIVE

To convert a conventional vented attic to an unvented attic as described in IRC Section R806.5.

This application particularly benefits:

- Homes with extensive ductwork and HVAC equipment in the attic space
- Homes with difficult to insulate features such as numerous skylights, pot/can lights or a split-level attic design

Huntsman Building Solutions' spray polyurethane foam (SPF) has been used in unvented attic assemblies for over 40 years. These systems continue to perform very well and generate substantial energy savings. For best results, and consideration of specific issues with respect to your building, it is recommended that you consult a trained BPI or RESNET rater before and after the retrofit.

AutoCAD drawings for these assemblies are attached. If there are any questions regarding the retrofit application, please contact the Huntsman Building Solutions Building Science/Engineering Department.

#### Set Customers' Expectation Early

Vacate occupants and pets during and after application according to Product Specific Re-Occupancy times. These guidelines require specific ventilation rates (air changes per hour) for a minimum time after the completed application, before the building can be safely reoccupied. The guidelines can be found on the HBS website.

Before beginning, discuss the project with the homeowner including all health and safety considerations. Instruct the homeowner to remove all portable personal belongings from the work area. Verify that there are no moisture problems in the space. If in doubt have the area reviewed by a Professional Engineer.

#### Removal of Existing Insulation

HBS spray foam insulation shall be spray applied directly to the underside of the roof deck and in direct contact with framing materials. HBS spray foam should not be applied over existing insulation materials.

Insulation and any vapor retarder on the attic floor shall be removed to allow for heat and moisture transfer through the ceiling. This will allow the unvented attic space to become an indirectly conditioned space.

#### To Prevent Moisture Problems

Application of SPF to the underside of the roof deck creates a semi-conditioned space in the attic. Removal of existing attic floor insulation is important to avoid creating an area for potential condensation at the ceiling/floor of the attic. Moisture accumulation may lead to mold, odors, and poor indoor air quality.

#### To Ensure a Proper Air Seal

SPF is not only insulating the building envelope but is air sealing the structure as well. Existing insulation on the floor of the attic can impede achieving a proper air seal at the eaves, the most critical entry point in a structure.

### To Reduce Odors and Improve Indoor Air Quality

Existing insulation is often full of dust, and debris, and possibly rodents or other pests. The attic floor must be vacuumed prior to spraying to remove these potential contaminants. Leaving these contaminants in a sealed attic may create odor problems, that become noticeable by the occupants. Removal of existing insulation is important for the improvement of indoor air quality with fewer contaminants in the air.

### Thermal and Ignition Barriers

Building Codes require foam plastic insulation to be separated from the interior of the building by an approved 15-minute thermal barrier. This shall be ½" gypsum wallboard or equivalent thermal barrier material. In some applications, like attics and crawl spaces, where access is limited to the service of utilities, the thermal barrier can be omitted, and the foam may be covered by an ignition barrier. HBS has also conducted testing to show that SPF applied in a qualified unvented attic can be left exposed without an ignition barrier covering. Each HBS SPF product has a specific code compliance report which outlines the requirements for use of alternate thermal barriers, ignition barriers or leaving the foam left exposed. Please call the Huntsman Building Solutions Engineering/Building Science Department with any questions.

### Living Space

Regardless of the requirements for the foam plastic insulation to be covered by a thermal or ignition barrier in the attic space, it must be separated from the living space below by a thermal barrier material. Typically, a ½" gypsum ceiling (floor of attic) provides this requirement. If an unrated ceiling assembly is in place, it is necessary to coat the insulation in the attic with a thermal barrier coating.

### Attic Used for Storage

If the attic is used for storage the insulation would need to be covered with a thermal barrier, such as ½" gypsum or an approved intumescent coating. Typically this means there is wood decking (plywood or OSB) on the attic floor, in areas that are not required to access the mechanical equipment.

### HVAC and Ventilation Considerations

Leakage of conditioned air from ductwork is no longer escaping to the outside in an unvented attic application. Air leaks from ducts are now contained within the conditioned space. By reducing energy loss from the home, the HVAC system may now be somewhat oversized. An oversized HVAC system can short cycle because the system operates much less to maintain the desired temperature. In a hot/humid climate, it can cool the air before it has the chance to remove the moisture, resulting in elevated relative humidity and discomfort at the very least.

Therefore, it is important that an HVAC contractor inspects the system and determines if any changes are required. A blower door test is recommended to determine the air infiltration rate of the building after the retrofit has been completed. The HVAC Contractor can use the blower door test data to determine whether the size of the existing HVAC system needs to be changed or whether additional dehumidification or ventilation is required.

With an unvented attic, the increased airtightness of the building may require the need for mechanical ventilation. A blower door test can be used to determine the natural ventilation rate of the building. This will provide the data required by the HVAC Contractor to make their recommendations. A BPI or RESNET professional can help to make this assessment.

### Combustion Appliances

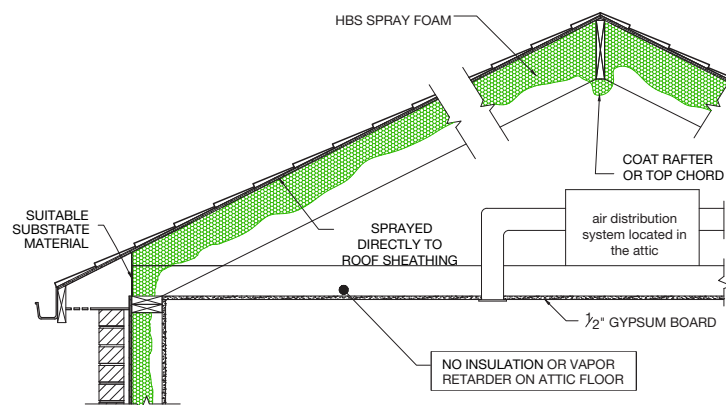
Conventional, naturally aspirated combustion appliances are not able to operate safely within an unvented attic because they draw combustion air from the unvented attic space. Either sealed combustion or power-vented, high-efficiency equipment is needed. A preliminary and post-installation safety inspection of all combustion appliances must be completed whenever changes to the building envelope and/or heating system are part of the work scope.

### Heat Emitting Devices

Always refer to the manufacturer's information of the heat emitting device for verification of safe distance. The maximum service temperature for most HBS spray foams (open or closed cell) is 180°F (82°C). Always refer to specific product Technical Data Sheet (TDS) for confirmation. HBS spray foams should not be used in direct contact with chimneys, flues, steam pipes, recessed lighting or other heat emitting devices. A minimum 3" separation distance is recommended.

## STEP-BY-STEP GUIDELINES for the Huntsman Building Solutions Contractor

1. Prior to removal of existing insulation, ensure all workers are wearing proper PPE as set up by your company's Safety and PPE Guidelines.
2. Existing insulation must be removed from the floor of the attic before spray foam is applied. The area can be vacuumed or, if contaminated/hazardous, cleaned using method(s) specified by an occupational hygienist.
3. Make sure all exhaust fans are ducted to the outside of the area to be sealed with spray foam.
4. Place tarps or polyethylene on floors leading to the work area. Remember to consider the area the spray rig is going to be located (Spill Hazard). Seal any openings to separate the work area from the rest of the building. Typical methods could include taping polyethylene tarps over the openings with overlapping flaps that permit access by laborers.
5. Place warning signs on the attic access door (hatch), restricting entry to the attic space to workers wearing the prescribed full PPE. At a minimum, warning signage should state: "CAUTION: Spray foam is being applied, personal protective equipment required, otherwise do not enter – No Smoking – No Eating".
6. Shut down and seal off HVAC openings in the work area to prevent migration of contaminants to other areas of the building. Don't forget to unseal and restart the HVAC system prior to re-occupancy after the SPF has fully cured and the work area has been ventilated according to the product's specific ventilation rates.
7. Care should be taken to block the vents at the perimeter of the attic as well as any ridge or off-ridge vents. Install blockers slightly beyond eave/wall plate to prevent spray foam from exiting through the vent.
8. Place a suitably sized exhaust fan capable of providing required Air Changes per Hour from the work area, such that it vents directly to the exterior away from the building and begin exhausting air from the space.
9. Ensure Sprayer and Helper are wearing full Personal Protective Equipment (PPE) including a Supply-Air Respirator (SAR) with full-face protection (hood or full-facepiece type) and chemically resistant gloves and full-body protection to prevent skin contact as directed by the company's Safety and Hazard Communication Program.
10. After testing spray equipment outside the building, bring hose and gun into the work area by a direct route.
11. Apply spray foam as required (as per contract) to:
  - Provide specified thickness to underside of the roof deck.
  - Provide insulation to ensure continuous contact to the top plate of exterior walls for continuity of the air barrier.
  - Seal rough openings around the attic access door (hatch) and other penetrations. Use kit foam if required.
12. Apply Ignition Barrier/ Thermal Barrier coating on areas required by Building Code.
13. Clean up any debris in the work area and remove surplus material and all spray equipment (guns, hoses, coating sprayers etc.) while wearing PPE.



- NOTES:
1. THE UNVENTED ATTIC ASSEMBLY AS PER THE INTERNATIONAL RESIDENTIAL CODE, SEE SECTION R806.5.
  2. REFER TO PRODUCT SPECIFIC CODE COMPLIANCE REPORTS FOR THERMAL BARRIER, IGNITION BARRIER AND EXPOSED FOAM REQUIREMENTS.
  3. FOR ADDITIONAL INFORMATION CONTACT THE HBS BUILDING SCIENCE / ENGINEERING DEPARTMENT.

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