

**GUIDE SPECIFICATION FOR:**  
**NEW CONSTRUCTION**  
**SPRAY-IN-PLACE POLYURETHANE INSULATION FOR**  
**RESIDENTIAL OR COMMERCIAL STUD WALLS, CEILING AREAS, AND**  
**SUB-FLOORS**

**PART 1 - GENERAL REQUIREMENTS**

**1.00 SCOPE**

- A. This system is a sprayable closed cell rigid polyurethane foam insulation system designed to insulate stud walls, ceilings, and sub-floor areas of residential and commercial structures. It also may be used to insulate Controlled Atmosphere (CA) produce buildings, metal buildings, commercial cold storage, and freezer warehouses.
- B. The sprayed insulation product results in a seamless layer bonded to the shear wall and structural members (studs and joists) that cannot shift, settle, or pack, which adds structural integrity to the structure. Its ability to flow behind obstacles and then expand, completely eliminating voids and/or cavities, results in “whole wall” performance which is unequalled. It is permanently bonded to the surfaces to which it is applied. Air leakage throughout the structure is eliminated whereas conventional insulation materials require low performing air barriers. Polyurethane foam insulation generally does not provide an environment for mold or fungi growth. Adhesion to most clean and dry building components is achieved without primers.
- C. Resin Technology Company’s Permax spray systems are environmentally friendly incorporating Honeywell’s Enovate<sup>®</sup> Blowing Agent. Permax Insulation Systems are technologically advanced, sophisticated materials and should only be applied by qualified, experienced spray applicators.
- D. The successful application of foam insulation is dependent upon the experience, technology and common sense of the designer and applicator/contractor. This guide specification

is intended as a starting point for development of more complete specifications for interior foam insulation projects.

## **2.00 QUALITY ASSURANCE**

- A. The foam insulation contractor shall be signatory to the General Contractor's agreement with the owner or shall contract directly with the building owner for this portion of the construction.
- B. Contractor/Bidders shall be pre-qualified as follows:
  - 1. All bidders shall be contractors (or divisions of established insulation or general contracting companies) specifically engaged in the application of spray applied foam insulation. Such bidders (or responsible managing employee of established contracting companies) shall have been engaged in the installation of these systems for not less than 5 years. Each bidder shall have performed at least 5 applications of similar size and type. The applicator shall have installed a minimum of 10,000 square feet of the system specified.
  - 2. The contractor shall be approved or certified by the foam manufacturer as qualified to install the specified system.
  - 3. The contractor shall carry a valid state insulator's license if required.
- A. The manufacturer shall be pre-qualified as follows:
  - 1. The manufacturer shall maintain a minimum of \$5,000,000 product liability insurance on a continuing basis.
  - 2. The manufacturer shall have a minimum of 1,000,000 square feet of successful foam insulation installed with the oldest being a minimum of 5 years old.
  - 3. The manufacturer shall have been in the polyurethane foam materials manufacturing business for a minimum of 10 years.
- B. Inspection

1. Upon completion the building owner, architect, general contractor, and insulation contractor may perform a final inspection to assure that the detail work has been completed in conformance with accepted industry standards and this specification.

### **3.00 SUBMITTALS**

- A. Product Data: Manufacturer's literature on products to be installed.
  1. Technical Data Bulletins or Product Data Sheets for polyurethane foam insulation.
  2. Listing, classification, and approval certifications.
  3. Application guidelines and safety and handling instructions.
- A. Contractors Statement: Written description of procedures to be utilized to insure proper preparation and installation of single component foam sealant at plate lines and windows, caulking, polyurethane foam insulation, ignition barriers, thermal barriers, and clean-up if not detailed on the building plans.

### **1.04 APPROVED SUBSTRATES**

Approved substrates include the following:

- A. Plywood, OSB, and structural lumber
- B. Concrete block and poured in place concrete
- C. Painted steel, galvanized steel, and aluminum panels

### **1.05 MATERIALS, DELIVERY AND STORAGE**

- A. Materials shall be delivered in the manufacturer's original, unopened containers, clearly labeled with the manufacturer's name, product identification, safety information, and batch and lot numbers.
- B. Containers shall be stored out of the weather and out of direct sunlight at temperatures specified by the manufacturer.
- C. Do not store material containers below 50°f.

## 1.06 ENVIROMENTAL CONDITIONS

Weather conditions must be within those listed on the manufacturer's technical data bulletins. If weather conditions change during the application and the stated conditions are not met, the application must be stopped until such time as the specified conditions are met.

## 1.00 SCHEDULING

- A. Foam Insulation requires the masking off of windows and doors to prevent overspray to building components, thus reducing airflow and interior air quality. Other building trades should not be scheduled to work while polyurethane foam insulation is being installed. Once foam application has stopped and masking barriers have been removed, other trades may occupy the structure again.
- B. No welding, soldering, and other "hot work" shall be performed while the polyurethane foam insulation is being installed. Until the drywall or thermal barrier covering has been installed over the foam insulation, it shall be protected from ignition from open flame. A fire watch shall remain on duty after any "hot work" a minimum of 1-hour after termination of such work or until it is determined that no risk of ignition is present.

## PART 2 - PRODUCTS

### 1.0 MATERIALS

#### A. Polyurethane Foam Insulation

Polyurethane insulation shall be a two component polyurethane insulation system formulated for use through airless equipment using Honeywell Enovate<sup>®</sup> Blowing Agent. The product shall be RT-2045-Series as manufactured by Henry Company (dba Resin Technology), Ontario, California (800-729-0795). The product shall exhibit the following typical physical properties.

Density (sprayed in place)	1.8 - 2.0 pcf
Compressive strength	22 - 25 psi
Tensile strength	40 - 50 psi
Shear strength	35 - 45 psi

Closed cell content	93 % min.	
K factor (initial)	0.156	
Water Absorption (gm/cc)	0.025 – 0.020	
Water Vapor Transmission	3.0 – 4.0 perms	
Surface Burning Characteristics;		
ASTM E-84	3"	4"
Flame Spread	25	25
Smoke	400	400

- B. Primers; see Substrate Preparation Section 3.3
- C. Air Barriers; Specified by others. Permax RT-2045- series Polyurethane Foam applied at a minimum thickness of 2 ½-inches is an acceptable air barrier.
- D. Ignition Barriers; Per R314.5.4 Crawl Spaces of the International Residential Code (IRC) 2006 Edition, in crawl spaces where access is only for service of utilities, the foam insulation must be protected against ignition using one of the following ignition barrier materials:
1. 1 ½-inch thick mineral fiber insulation;
  2. ¼-inch thick wood structural panels, plywood;
  3. 3/8-inch thick particleboard;
  4. ¼-inch hardboard;
  5. 3/8-inch gypsum board
  6. 0.016-inch corrosion resistant steel

If required, specific approvals and independent testing shall be reviewed for inclusion in this project. Materials such as Firefree 88 (888-990-3388) or Aldocoat®757 (800-474-6019) may be considered.

- E. Thermal Barrier; Sprayed Cementitious Coating, W.R. Zonolite 3306 or International Cellulose Ure-K; applied at specific thickness to achieve a fire resistance rating of 15 minutes when applied directly over spray applied polyurethane foam insulation.
- F. Can Foam Sealant; such as EnerFoam by Dow Chemical (800-800-3626) or others to fill voids between framing members and trimmers at doors and windows that are too small to be sprayed with the foam gun but still require insulating foam and air barrier protection.

- G. Elastomeric Caulking; a butyl rubber non-skinning, non hardening vapor barrier sealant such as Acoustical Sealant by Tremco (800-321-7906) designed to stop air movement between studs, king studs, and trimmers where voids are paper thin, and for application to junction of floor and bottom plates where seal must not interfere with drywall installation.

## **PART 3 – EXECUTION**

### **1.0 GENERAL**

- A. Comply with all safety instructions and recommendations for installation of polyurethane foam insulation.

The following technical bulletins are available from The Society of the Plastics Industry, Inc. (<http://www.polyurethane.org/prostew.html>):

AX-119: MDI-based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal.

AX-171: Spray Foam Self Defense and Module 11: Health, Safety and Environmental Aspects of Spray Polyurethane Foams and Coatings.

AX-178: PMDI User Guidelines for Chemical Protective Clothing Selection.

AX-197: MDI Transportation Guidelines: Information for Drivers.

### **2.0 PREPARATION**

- A. Verify site conditions, confirm building size and construction details and verify insulation application timing.

### **3.0 SUBSTRATE PREPARATION**

- A. For optimum results, surfaces to receive polyurethane insulation should be clean and dry, free of dirt, oil, loose particles, frost, moisture, and other foreign matter. Primers are rarely used but should be incorporated per the following;

- 5.0 Plywood, OSB, structural lumber; substrates shall be dry and free from contaminants, moisture, frost, and shall not have a moisture content above 15%. Generally a primer for these surfaces is not required. Heating and drying these surfaces during winter conditions generally brings these substrates into compliance. If a primer is used, it shall be Acryprime – Substrate as manufactured by Resin Technology.
- 2.0 Concrete block, poured in place concrete; Concrete must have a minimum 28-day cure and moisture content below 15% to apply foam insulation. Residential footings, stem walls, and basements generally do not require priming. Commercial CA structures, cold storage buildings, and freezer buildings do require an appropriate primer to insure adequate adhesion where the potential of concrete curing agents may have been used. Generally a two-component epoxy primer designed to seal and penetrate to provide adhesion to concrete surfaces such as Resin Technology's Urebond V is recommended.
- 3.0 Painted steel, galvanized steel, and aluminum panels; Check new metal panels for surface oil used in the manufacturing process. This oil must be washed off and the surface clean and dry before priming or foaming. All aluminum and galvanized panels must be primed using a "wash primer" such as Cardinal 4860-420 (323-283-9335) or Sherwin Williams DTM Wash Primer. Washed and dry painted steel panels may not require priming; perform an adhesion test to determine course of action. If a primer is required, Resin Technology Acryprime – Substrate shall be used. Metal panels are susceptible to condensation forming on the ceilings, thus these surfaces must be checked prior to priming or foam insulation application.

B. Substrate and Ambient Air Temperatures

- 1.0 RT-2045-Series Polyurethane Insulation is formulated in two different reactivity profiles to meet varying ambient and substrate temperatures. It may be a requirement to provide supplemental heating when ambient temperatures reach 40°F and below.

Depending on relative humidity and other conditions these products may be applied down to 20°f when adding heat.

- 2.0 Resin Technology does not recommend “flash passes” to very cold surfaces. These passes (1/4” or less) should be avoided. They may result in reduced yield and loss of adhesion when temperatures change. It is recommended that the design thickness be completed each day rather than partial application thickness.
- 3.0 **Caution;** In freezing weather conditions when adding heat to the spray area, it may be a requirement to maintain an elevated temperature during the polyurethane foam insulation cure cycle so that extreme temperature drops to the “green” foam are not experienced (which could cause shrinking or cracking.) **When using fuel fired heating units the exhaust must be vented directly outdoors to prevent unsafe carbon monoxide conditions in the work area.** Electric heating units are recommended.
- 4.0 Climatic Conditions; Moisture in the form of rain, dew, frost, or snow storms can seriously affect the quality and adhesion of the insulating foam to the substrate or itself on new construction projects. Resin Technology does not recommend spraying of RT-2045-Series when the relative humidity (RH) exceeds 85%. When heating the interior of a building, the RH can change dramatically and should constantly be measured.

#### C. Equipment

Equipment for spraying foam shall be manufactured specifically for the application of polyurethane foam. The equipment shall be airless, capable of maintaining a 1:1 volume ratio and have primary and hose heaters (300 feet of material hose maximum allowable to meet mix pressure requirements.) Acceptable application guns shall include Gusmer GX-7, D Gun, GAP Pro, Fusion, Probler and other direct impingement type mixing guns with low output tips in the 15 lb. per minute range.

D. Polyurethane Foam Insulation Application

- 1.0 RT-2045-Series polyurethane foam insulation shall not be applied over CPVC sprinkler piping when pressurized for leak testing. Maximum foam application in a single pass over CPVC piping shall be 2 inches with additional foam applied after a 15 minute cool down.
- 2.0 If the scope of work includes sealing of top and bottom plates, king studs, trimmers, and window and door frames with low rise “can foam”, this work shall be done prior to spray work. Caulking or paper thin joints with non-skinning Acoustical Sealant elastomeric caulking shall be done after all stud scraping and clean-up work to avoid loose particle contamination at these areas.
- 3.0 Preformed eave vents, if specified, shall be installed during the masking and preparation stage of work.
- 4.0 Install protection clearance baffles around heat producing lights and/or heat producing appliances as noted on each appliance. Most new units are designed with this protection. Advise the General Contractor if any conditions of lighting or appliances do not meet required safety conditions for this project.
- 5.0 Install clearance baffles at walls when down-spraying against the drywall ceiling to maintain venting of the attic area. If mineral fiber insulation is used to provide an ignition barrier and/or added thickness, assure that these vents remain open.
- 6.0 Apply RT-2045-Series Polyurethane Insulation in uniform pass thicknesses from 1 inch to 2 inches with a maximum single pass thickness of 3 inches. Full thickness lifts of 2 inches to walls and ceilings will provide maximum yield. Additional lifts may be applied after a brief waiting period. Refer to drawings for proper foam insulation thickness requirements.
- 7.0 Special care shall be taken to seal all penetrations of conduit, piping, coax, romex and other obstructions within the wall or ceiling areas where they pass from wall or ceiling cavity to the next cavity. Dead corners or blocked out framing areas shall be drilled and

foam-filled to eliminate “hot/cold spots”. Areas of excessive blocked out areas shall be reported to the General Contractor for correction.

- 8.0 Excess foam on studs or ceiling joists where drywall is to be installed shall be scraped clean while foam is still “green” to avoid excessive clean-up labor.

E. Vapor Barriers

- 1.0 Vapor Barriers are generally installed by other trades prior to the dry wall installation. Generally the vapor barrier is installed on the predominantly warm side of the wall.

F. Fire Protection and Thermal Barriers

- 1.0 **WARNING: Polyurethane foams will burn when exposed to fire.** Caution during application must be observed and signs posted for other trades. **“Caution Combustible Insulation, No Welding or Hot Work Allowed”**. On a daily basis remove all debris and shavings from the job site leaving a clean work area.
- 2.0 The use of exposed polyurethane foam insulation in interior applications on walls or ceilings presents an unreasonable fire risk unless protected by an approved fire resistant Thermal Barrier with a finished rating of not less than 15 minutes. A code definition of an approved “Thermal Barrier” is a material equal in fire resistance of ½-inch gypsum board.

G. HVAC Considerations;

- 1.0 It is recommended that the HVAC design group be advised that this structure is being insulated with spray-in-place polyurethane foam insulation and its superior performance outlined. In desert climates where air conditioning is called upon to regulate the RH during its run cycle it may be a requirement to down size the tonnage of the equipment to achieve a complete “run cycle” to facilitate this function.

2.0 In desert climates it may be necessary to provide a ventilation system to bring in and mix outside air to maintain healthy air quality.

END