VENTILATION PROCEDURE

WHY VENTILATE?

As water-based coatings dry/cure, they release liquid water into the atmosphere through evaporation. The atmosphere around the coating therefore becomes laden with water vapor and eventually totally saturated with water vapor such that it cannot hold any more moisture vapor. This is commonly known as 100% Relative Humidity (RH), which means the air has become 100% saturated with humidity and evaporative drying is no longer possible.

When the atmosphere around the drying coating approaches 70% RH, the drying process is slowed to the point where it may compromise the coating curing process and ventilation will be required in order to exhaust the moisture-laden air from the vicinity around the coating so that dry air, with a lower relative humidity, can be introduced and the evaporative drying of the liquid coating can continue.

This is a common occurrence in closed areas such as unvented attics. These areas will require mechanical, negative-pressure, cross ventilation during the spraying and drying period. Mechanical, negative-pressure, cross ventilation is the ONLY effective method of ventilating closed or confined spaces where coatings must be applied to ensure proper drying.

For ventilation, it is important to ensure you create negative pressure (vacuum) in the enclosed spray area to evacuate water vapor and any off-gassed components of either the SPF insulation system or coating to exterior, unoccupied space.

RELATIVE HUMIDITY VS. HUMIDITY

Humidity, referred to as Absolute Humidity, is the amount of water vapor in the air. Relative Humidity is the amount of water vapor in the air verses the amount of water vapor the air can hold. Relative Humidity depends upon the temperature of the air. The air acts like a sponge and absorbs water through the process of evaporation. Warm air is less dense and therefore the molecules are further spread apart allowing more moisture between them. Cooler air causes the molecules to draw closer together limiting the amount of wa- ter the air can hold. Relative Humidity, expressed as a percent, measures the current Absolute Humidity *relative* to the maximum for that temperature. A device to measure humidity is called a Psychrometer

ENVIRONMENTAL CONDITIONS & DRYING

Proper ambient air-movement, proper substrate and coating temperatures, and low humidity are necessary for proper adhesion and drying of the coating. The following example illustrates the drying potential of 10,000 ft.^{3} of air at various temperatures:

- 90 °F air can evaporate 2.6 gal of water
- 40 °F air can evaporate 0.5 gal of water

FireShell® coatings are approximately 68% solids which mean each five-gallon pail of coating contains roughly 1.5 gallons of water that must be evaporated from for the coating to dry and cure.

As a reference, an attic in a 1,600 ft.^{2} house with a gable roof that has an 8/12 pitch will have an attic volume of approximately 10,600 ft.^{3}. Based on the above illustrations, conditions in this attic would need to be extremely dry with an interior temperature

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more than 90 °F prior to coating application to be assured of proper drying of one five-gallon pail of coating.

Lower temperatures or humidity levels over 70% RH in the attic prior, during, or after application would hinder drying of the coating and could produce lingering odors due to the slow evaporation of the liquid components.

Minor odors are emitted from the coating as it dries like those found in low-odor latex paint. Under specified drying conditions these odors are quickly dissipated and do not cause any lingering issues.

To avoid problems associated with improper drying of the coating always observe Application Procedures and product recommendations.

HOW TO VENTILATE AN ENCLOSED SPACE

The following procedure outlines a negative pressure ventilation technique that will help ensure proper drying of your coating.

- ☐ Review and observe all application parameters, product limitations & recommendations on the technical data sheet to ensure the work environment is suitable for the application of coating.
- ☐ Inspect the foam substrate to ensure it is dry, clean and secured to its substrate.
- ☐ Use a “supply” blower to draft fresh exterior air to one end of the enclosed space via a hose from the non-occupied exterior.
- ☐ Ensure the supply air flows across the immediate vicinity of the spray operation.
- ☐ Use an “exhaust” blower to evacuate the stale, moisture laden air from the opposite end of the enclosed space through a hose to the exterior of the building.
- ☐ The exhaust blower must have a larger air volume output than the supply blower to ensure the enclosed space is maintained at a negative pressure in relationship to the surround area.
- ☐ Do not arrange the ends of the hoses where the supply air is drafting air from the exhaust hose.
- ☐ Do not exhaust the stale air into any living space or garage area. It must be exhausted to a safe uninhabited open area.
- ☐ Place a filter over the exhaust hose to avoid spreading overspray.
- ☐ Ensure the lengths of supply and exhaust hoses and filter do not restrict the air movement.
- ☐ Constant monitoring of humidity and temperature is necessary until coating has dried thoroughly to ensure the spray environment remains within the application parameters specified on the coating technical data sheet. If the humidity exceeds 70% RH during the drying period while using mechanical, negative-pressure, cross-ventilation, then mechanical dehumidification may be required as supplementary drying aid until the coating is thoroughly dry.

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Fire Technology To A Higher Power™

TECHNICAL BULLETIN

DO NOT USE PROPANE, KEROSENE, OR DIESEL COMBUSTION HEATERS TO HEAT A CLOSED SPACE.

Burning fuels like this in a confined space depletes oxygen and can create a dangerous buildup of toxic gasses including CO and CO^2. Always observe OSHA and NIOSH regulations for using heaters in confined or closed spaces.

In addition, the process of burning fuels such as kerosene, propane, or diesel adds significant amounts of water vapor to the environment, which furthers hinders the evaporative drying process

Whole-house ventilation blower and hose assembly. These items are available at many industrial supply and safety stores and online including Northern Tool and Equipment, (www.northerntool.com)

Uninsulated, flexible HVAC duct may be used for ducting the air into and from the workspace as a convenient and inexpensive alternative to the hose assembly shown.

A hand-held temperature and moisture meter like the Fluke 971 shown is an ideal instrument for monitoring the workspace environment to ensure it is within acceptable spraying and application parameters. This instrument is available from several online sources.

If mechanical dehumidification is required to enable drying. A standard household or commercial dehumidifier like the Ebac RM85 shown can be used until the coating is thoroughly dry. Typically, mechanical dehumidification will be required continuously for several days after coating application and units like the one below are often available for rent at an industrial rental store or can be purchased online.

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