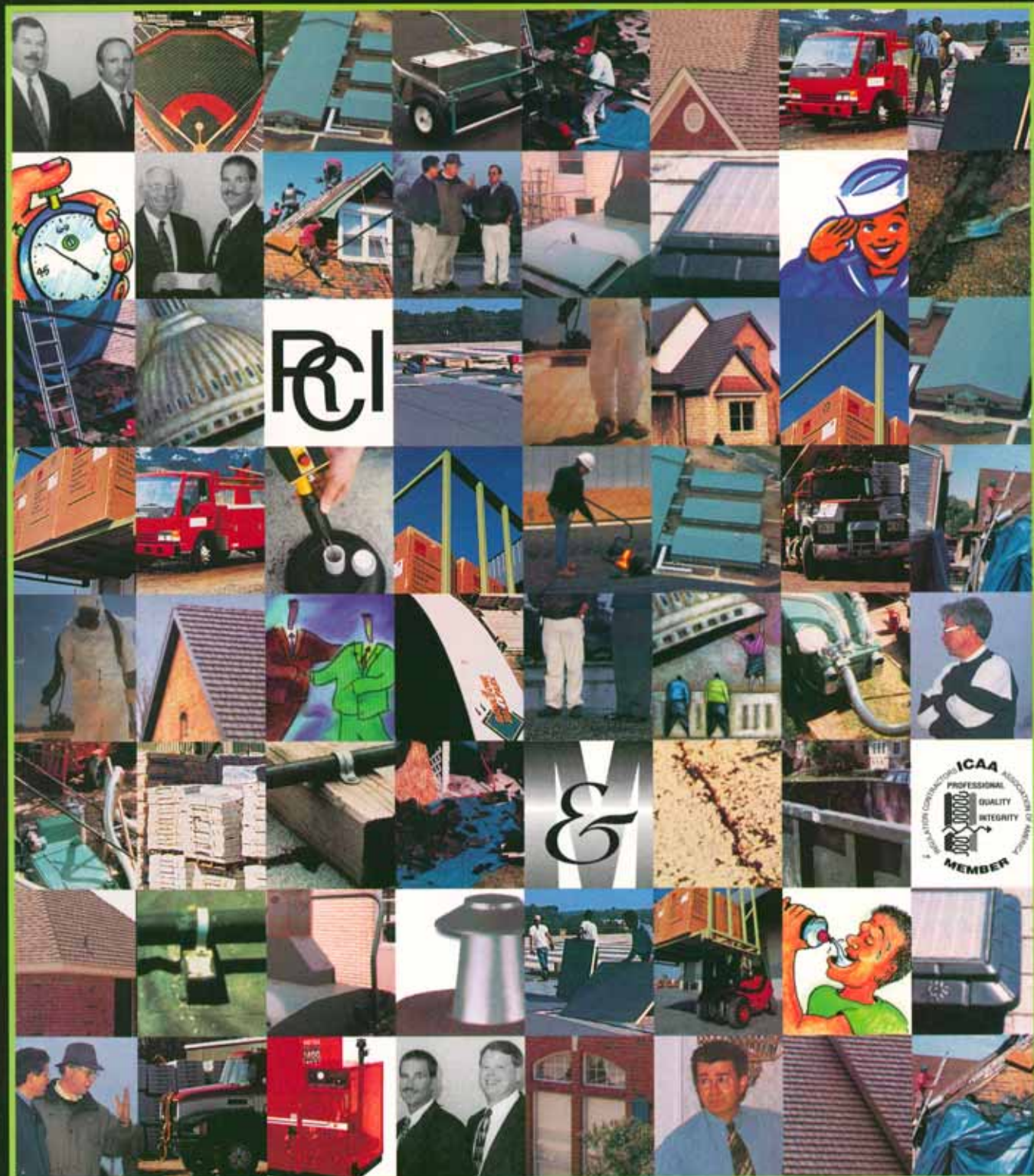


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## ROOFING and BUILDING INSULATION Guide

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# MINIMIZING ODORS & FUMES

## Guidelines for controlling fumes and odors during the application of bituminous roof materials

by Karl Schaack

**T**he installation of roofing materials utilizing heated bitumens has been performed for many years in the past and is anticipated to be for many more years to come. A concern for many is the introduction and/or exposure to aromas/odors during the heating or application of the bitumen. Several precautions, procedures, and types of equipment can be used during these processes that can minimize and, possibly, alleviate the effects of odors on the building occupants, general public and workers.

### Work Guidelines

There are several guidelines that can be implemented during this process that can assist in the control and reduction of fuming and/or odor production during the heating and/or application of bitumen. Several of these guidelines are basic knowledge and general good work habits but are often overlooked.

1. Use the proper size kettle to heat the bitumen. When a certain production (amount of roof to be installed) or use of bitumen is anticipated, a kettle of sufficient capacity should be utilized. Use of an undersized kettle will most likely result in overloading the kettle with excessive quantities of bulk pieces of bitumen and "turning up the heat" on the kettle to melt the bitumen quicker in order to keep up with production. Proper project planning and use of a properly sized kettle will allow for more gradual incremental

heating increases during the initial firing of the kettle and consistent lower proper temperatures throughout the heating time frame.

2. The kettle used for heating bitumen should be in good working condition. Operable and calibrated thermometers should be used with a regular routine of verifying temperatures by the operator. The kettle should have thermostatic heating controls and circulating devices for the molten bitumen. These instruments allow for a more thorough heating of the molten bitumen within the kettle and eliminate hot/cold spots. The exterior shell of the kettle should be kept free of bituminous accumulations. As the kettle heats up, these deposits will begin to be-

come molten and emit fumes. The lid on the kettle should be close-fitted and remain closed, except when performing necessary functions (adding solid bitumen pieces, skimming debris off surface of molten bitumen, for example). An improperly fitted lid will allow fumes and heat to escape, requiring increased heating to achieve proper temperatures.

3. Work personnel should allow ample time for gradual firing of the kettle prior to the actual time when the bitumen is needed. The kettle and bitumen should be brought slowly up to the desired temperature. The bitumen should not be heated above the recommended temperatures (finished blowing temperature for



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asphalt or max heating temperature for coal tar).

4. Moisture that may collect within the tanker should be removed prior to firing of the kettle. Moisture that may collect on top of the bitumen kegs should also be removed prior to placing the solid bitumen pieces in the kettle. Introducing moisture during the heating process creates excessive, unnecessary fuming.

5. The kettle should be positioned at the periphery of the subject building away from intakes, louvers, windows and doors that are located in adjacent building walls. The placement of kettles in courtyards or other enclosed areas should be avoided. If kettles are positioned adjacent to operable windows/doors, these units should be temporarily barricaded and use avoided. The opening and closing of doors/windows can create a suction effect and draw the fumes into the building. If possible, the kettle should be positioned downwind from the structure so winds may carry fumes away from the building. Use of large industrial fans positioned adjacent to the kettle may redirect the fumes away from the building, but often can cause swirling wind effects that allow fumes to carry backward.

6. Insulated piping, luggers, mopcars or other bitumen dispensing devices can be used to minimize heat loss at the roof

**... certain precautions can be implemented to avoid odor infiltration.**

level which will allow for constant lower and proper heating at the kettle. Bitumen is often overheated to compensate for heat loss due to ambient air temperatures, poorly operating equipment, or distance to point of application.

7. Use of tankers, which have a pre-determined quantity of molten bitumen, alleviates the need for kettles and subsequently the opening of the kettles to load kegs/pieces of solid bitumen. Tankers are self-contained units that produce less detectable fuming compared to individual kettles.

8. At the rooftop elevation and during the bitumen application, certain precautions can be implemented to avoid odor infiltration. Louvers on building walls or intakes on rooftop mechanical equipment can be temporarily concealed with polyethylene (plastic) sheeting. Temporary vertical extensions can be constructed and fitted onto intakes to draw "clean" air from above the fumes. Equipment can be scheduled and systematically shut down during the application process. Other roof openings such

as gravity vents or non-functioning/operating ventilators also can be sources of odor migration as the "negative" interior building pressure can draw in outside air if specific conditions are present.

**Equipment**

Several types of equipment are available to reduce odor. These apparatus are based on either incineration or filtration methods.

Reeves Roofing Equipment Co., Helotes, Texas, supplies the Afterburner and Safety Loader, which are adapted to traditional kettles. The Afterburner is a steel tubular device that is fitted onto the top and middle of the kettle lid and functions similar to a flue. A propane-fueled burner is connected to the base of the Afterburner. As the bitumen is heated, the fumes within the tank migrate upward into the "flue" whereupon they pass by the burner. The burner reportedly burns off 81 percent of the particulate matter and 77 percent of the hydrocarbons from the fumes. The "incinerated" air is then emitted through the top of the Afterburner into the atmosphere.

The Safety Loader is an enclosed rotating drum device that is fitted onto the front of the kettle lid. The Safety Loader has a door that, when opened, reveals a shelf on which bitumen pieces are placed. After placing the bitumen pieces on the shelf, the door is closed, and a crank is turned that rotates the shelf, which in turn deposits the solid pieces into the molten bitumen. This device alleviates the need to raise the kettle lid. Both of these devices should be installed on each lid of a multi-lid kettle.

Garlock Equipment Co., Plymouth, Minn., manufactures the Fume Guard Asphalt Fume Elimination System, which is a self-contained unit mounted on a portable trailer. This system also operates on the incineration basis. The unit is connected to a kettle via flexible hoses. Fumes that are created in the kettle during the heating process are drawn from the kettle with a suction fan into the cabinet. The drawn material (gaseous mixture of gases, oils, smoke and particulates) is mixed

*(more on next page)*



*The Afterburner burns off 81 percent of the particulate matter and 77 percent of the hydrocarbons from the fumes.*

## **Tankers produce less detectable fuming compared to individual kettles.**

with clean air and then subjected to elevated temperatures, approximately 1,500 F. The aromatic elements are reportedly "burned off" and the warmed, new air is discharged out an exhaust vent. Independent test results indicate the Volatile Organic Compounds (VOCs) and Polynuclear Aromatic Hydrocarbons are reduced to a non-detectable limit by either sensory or mechanical measurement means.

National Tool and Equipment Inc., Boardman, Ohio, in conjunction with Aerocology Inc., developed the "FRS-6000" Fume Recovery System. The FRS-6000 is a series of various types of filters contained on a trailer. A flexible hose connects to a specially fabricated kettle lid and to an intake port on the FRS-6000. A compressor on the FRS-6000 draws the air/fumes from within the kettle lid through the flexible hose and into the filter chamber. The air is drawn through the series of filters and emitted with 99 percent of the particulate matter removed.

The filters are changed at various times, depending on the filter type, bitumen type, and time of use. A total of three hoses can be connected to the apparatus. Two hoses can be connected to two kettles or one kettle and one tanker with the third hose positioned at the roof level where the bitumen is deposited from the pipe and into a lugger. The customized kettle lid has an outwardly swinging door at the front in which to load the pieces of bitumen into the kettle. This door can be opened with very little, if any, emission of fumes.

Air Purification of Houston manufactures a similar product – the Enviro Pro BURVOC Fume Removal System. This device is a self-contained unit mounted on a portable trailer. The unit operates on a multi filtration system and reportedly will produce 99.97 percent clean air after the filtration process.

Other apparatus have been utilized to attempt to eliminate the detection of fumes. One is a mist-

ing apparatus that is typically set up adjacent to the kettle. A mist is produced and emitted into the fumes produced from the kettle. Contained within the mist are water-based particles that become "attached" to the minute particles within the fumes and disperse and "mask" these elements which are the odor creating elements.

The droplets develop an electrostatically charged film which attract the offensive odor-causing molecules. The molecules then attach to the droplets and become neutralized by oils contained within the droplets. The oils contained within the droplets are natural, non-toxic and generally non-threatening to the environment.

### **Material Selection**

Insulation boards can be secured to the substrate with mechanical fasteners or adhered to the substrate with either cold process bituminous based or spray foam based adhesives. Sheet materials also can be applied using cold process based adhesives or torch applied methods. Although heating of bitumen is not used with these alternatives, other concerns are present which include odors associated with solvents in the adhesives and fire related issues with the torch applications.

Although those in the roofing industry normally do not associate odor control with asphalt, students, patients, and the general public typically do not or cannot differentiate between the two and both are considered disruptive if odors are detected. **CG**



*The FRS-6000 draws the fumes through the flexible hose and into the filter chamber where 99 percent of the particulate matter is removed.*

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