

Asphalt Roofing Shingles Recycling: Introduction

Introduction

This fact sheet is an introduction to the recycling of asphalt roofing shingles, or “composition shingles.” It is an overview of shingle quantities, composition, processing, products, and general issues. Other fact sheets and web-based information on specific products made from asphalt shingles is available on the California Integrated Waste Management Board (CIWMB) Construction and Demolition website at www.ciwmb.ca.gov/ConDemo/Shingles/. As landfill availability decreases and tipping fees increase, solid waste generators are becoming more interested in finding alternative ways of managing shingle waste.

Products

Asphalt shingle scrap can be used in a variety of products, including:

- Asphalt pavement (see Asphalt Roofing Shingles in Asphalt Pavement, Pub. #431-97-033).
- Aggregate base and sub-base (see Asphalt Roofing Shingles in Aggregate Base, Pub. #431-97-032).
- Cold patch for potholes, sidewalks, utility cuts, driveways, ramps, bridges, and parking lots. (See Asphalt Roofing Shingles in Cold Patch, Pub. #431-98-013).
- Road and ground cover.
- New roofing.
- Fuel oil.

Quantities

According to the CIWMB’s 2004 Waste Characterization Study, 22 percent of the material disposed in California was from construction and demolition sources. Of that material, approximately 768,000 tons of disposal was asphalt shingles.

To follow-up on the 2004 data, the CIWMB conducted a study in 2005 targeting specific

waste sectors and sub-sectors in four metropolitan areas. This study revealed the following information about disposal from the roofing sub-sector: 26,030.84 tons in San Diego, 182,720.34 tons in Southern California/L.A. Basin, 209,666.54 tons in the San Francisco Bay Area, and 34,050.08 tons in the Central Valley. Shingles comprised approximately 68 percent of the roofing sub-sector.

Shingle Composition

Asphalt roofing shingles are made from felt mats that are saturated with asphalt and small rock granules. These shingles are described as follows:

Asphalt cement—19 to 36 percent by weight. Asphalt used in shingles is considerably harder than asphalts used in pavement.

- Organic shingles contain 30 to 36 percent asphalt.
- Fiberglass shingles contain 19 to 22 percent asphalt.

Mineral filler/stabilizer (limestone, silica, dolomite, etc.)—8 to 40 percent (90 percent is smaller than 0.15 mm, 70 percent is smaller than 0.08 mm.)

Mineral granules (ceramic-coated natural rock, sand-sized)—20 to 38 percent.

Felt backing (mat)—2 to 15 percent. There are two types of mats:

- Organic felt, made with paper (cellulose).
- Fiberglass felt.

Waste Stream Composition

Shingles in the waste stream can be either old or new.

Old Shingles, or “tear-offs.” The majority of waste shingles are tear-offs from re-roofing jobs or demolition debris. The load may contain contaminants such as nails and wood if the underlying plywood is also replaced. Roofs are replaced roughly every 20 years. Old roofs are

often overlaid with new shingles, so some tear-offs contain a 20-year-old layer plus a 40-year-old layer. Twenty to forty years ago, most shingles contained organic mats.

New Shingles, or manufacturer scrap. After most shingles are manufactured, tabs are cut out to shape the shingles for assembly. After this process the leftover tabs, which contain fresh asphalt, are discarded along with new shingles that did not meet quality standards. Today, most new shingles contain fiberglass felt as the backing or mat.

Recycling Process

To prepare shingles for use in new products, the shingles must be ground to a specified size and contaminants must be removed.

Grinding

Grinding may be easier in the winter when the asphalt is more brittle. If the shingles begin to stick together in hot weather, or from the heat of the equipment, spraying with water or blending with sand or gravel may help.

Sizing

Depending on the equipment used, primary grinding may yield 2" or 3"-minus size pieces. Secondary grinding may be required to make smaller pieces if needed; for example, aggregate base may require 3/4"-minus, and asphalt pavement may require 1/2 "-minus or 1/4"-minus.

Grading

Depending on the use, the shingles may have to be sieved after grinding, to conform to grading requirements.

Contaminants

For virtually all uses, contaminants must be removed. Possible contaminants may include:

- Metals, which can be removed by a rotating magnet.
- Wood, which sometimes accompanies shingles when the plywood is also replaced in a re-roofing job. Wood can be removed by hand or floated off in a water flotation unit.

Asbestos

New Shingles

Asbestos is no longer used in the manufacturing process of new asphalt roofing shingles.

Old Shingles

Currently, the incidence of asbestos-containing shingles in roof tear-off jobs is extremely low. However, ongoing health concerns have

prompted further research. The total asbestos content of asphalt shingles manufactured in 1963 is only 0.02 percent; in 1977, it dropped to 0.00016 percent. Due to the practice of covering a worn-out roof with new shingles, there may continue to be a very small amount of asbestos in the shingle waste stream until about 2016.

Current Recycling Assessment Project

The Construction Materials Recycling Association (CMRA) and the Asphalt Roofing Manufacturers Association have launched an assessment project to determine whether or not postconsumer shingles (especially shingles containing asbestos) can be recycled in a manner protective of human health and the environment. For more information visit www.shinglerecycling.org or contact Bill Turley, CMRA, at (630) 548-4510.

Regulations

The agencies regulating asbestos are the U.S. Environmental Protection Agency (U.S. EPA); California Environmental Protection Agency (Cal/EPA)—Air Resources Board (ARB) and Department of Toxic Substances Control; Federal Occupational Safety and Health Administration (OSHA); CalOSHA, and city and county health departments. U.S. EPA and Cal/EPA regulate friable asbestos over 1 percent. OSHA regulates friable and nonfriable asbestos over 0.1 percent. Processors would need to contact these agencies to determine permitting and test monitoring requirements, if any.

Equipment

Most processors improvise by modifying simple equipment. A hammer mill will grind shingles, although it works best with the softer aggregates such as limestone. Following is a partial list of manufacturers that sell equipment that can grind asphalt shingles.

Andela Tool and Machine, Inc.

493 State Route 28
Richfield Springs, NY 13439
(315) 858-0055
www.recycle.net/andela

Astec Industries, Inc.

4101 Jerome Ave.
P. O. Box 72787
Chattanooga, TN 37407
(423) 867-4210
www.astec.com/

Interested in Starting a Business?

Businesses starting or expanding into recycling activities may get financial, technical, marketing, business, and permitting assistance from the

Recycling Market Development Zone (RMDZ) program at CIWMB. Visit the website for more information: www.ciwmb.ca.gov/RMDZ/.

Siting

Siting a shingle recycling plant may require certain State and local permits, such as air, water, zoning, and possibly solid waste.

Air Permits—The local air districts may be concerned about nuisance odors and various emissions and may require processors to spray with water to control dust. Find your local air district on the ARB website at www.arb.ca.gov/capcoa/roster.htm/.

Water Permits—Your regional water quality control district may need to permit the facility depending on feedstock and location. Find your regional water board at www.swrcb.ca.gov/regions.html.

Solid Waste Permits—The CIWMB has a tiered permitting system; several categories will require less than a full permit. Some processing operations may fall under one of these tiers. For more information on C&D regulations, contact your local enforcement agency (LEA). To find the LEA for the project area, see the LEA website at www.ciwmb.ca.gov/LEACentral/LEADirectory/default.asp.

California Manufacturers

All new asphalt roofing shingles manufactured in California are fiberglass-based and are produced at the following plants:

Celotex Corp.: Fremont, Alameda County;
Los Angeles, Los Angeles County

GS Roofing Company, Inc.: Southgate,
Los Angeles County; Wilmington, Orange
County

Owens Corning: Compton, Los Angeles
County

Pabco Roofing: Richmond, Contra Costa
County

GAP Materials Corp: Fontana, San
Bernardino County

Elk Corp: Shafter, Kern County

Related Organizations

Asphalt Roofing Manufacturers Association, 4041 Powder Mill Rd., Calverton, MD 20705. (301) 231-9050, www.asphaltroofing.org/

National Association of Home Builders Research Center, 400 Prince George's Blvd., Upper Marlboro, MD 20774. Contact: Kimberley Meyer, (301) 249-4000, www.nahbrc.org/

More Information

More information can be found on the CIWMB's Construction and Demolition Recycling website: www.ciwmb.ca.gov/ConDemo/.

Free Construction Industry Directory
The Blue Book—Building & Construction, P.O. Box 500, Jefferson Valley, NY 10535-0500. 1-800-431-2584 or (916) 485-3832 (Sacramento contact), www.thebluebook.com

CIWMB Contact

For more information about recycling asphalt shingles, contact C&D program staff at (916) 341-6500 or condemo@ciwmb.ca.gov.