
ASBESTOS ROOFING FELTS

by R. L. Fricklas

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EDITOR'S NOTE: This article is the fourth in our series on roofing materials, and is presented by Dick Fricklas, one of the country's leading authorities on roofing technology. Mr. Fricklas is the Director of The Built-Up Roofing Systems Institute, a school on roofing technology for architects, engineers and specification writers, sponsored by Johns-Manville. Mr. Fricklas graduated from Hofstra University in 1955 with a M.S. in chemistry, and from Rutgers University in 1972.

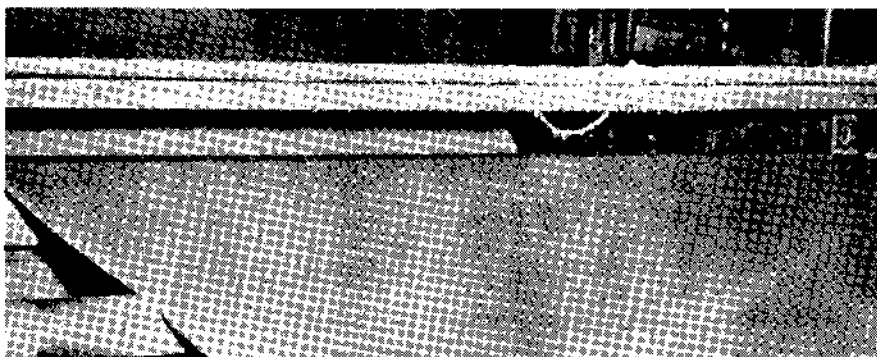
Strength and weather and moisture machinery, etc., cutting, patching, resistance are some of the key formance. How asbestos-based felts perform can best be seen by a review of raw materials and roofing felt production, and an evaluation of roofing specifications and special uses.



Asbestos Ore



Slurry of Fibers in "Beater"

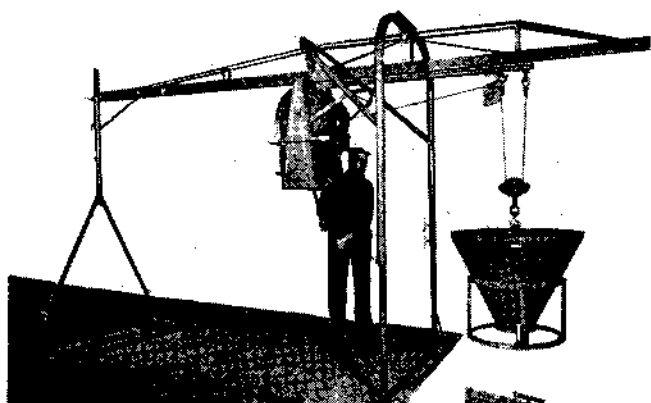


Formed asbestos felt moving towards driers

Asbestos fibers are natural mineral fibers obtained by crushing and refining chrysotile ore. The refined fibers are carefully classified by fiber length, packaged and shipped to roofing plants throughout the world. The fire-resisting properties of asbestos are well known, but high resistance to aging (slow oxidation and rotting) are even more important to good roofing performance. These properties have resulted in many asbestos-based roofs lasting 30, 40 or more years in all climates.

ASTM specification D250 requires that the fiber content of the dry felt contain a minimum of 85% asbestos. Small quantities of organic or glass fibers are frequently added to "bulk" the roofing felt so that it will more readily accept asphalt saturant.

Asbestos felts are made on the same equipment as organic felts. At the roofing plant the dry felt is made on what is essentially a cylinder paper machine. The asbestos fibers are first



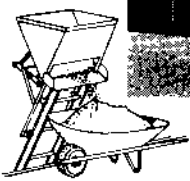
TROLLEY LADDER HOIST HOIST

ROOF MOUNTED Assembled in minutes with self-locking pins — no tools required.

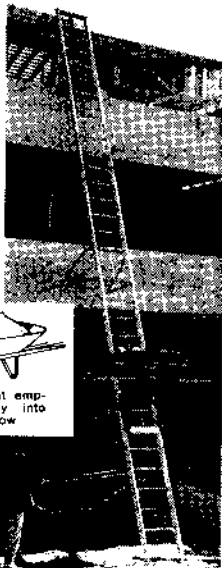
SAFE OPERATION Operator has full control from the roof — stops load at proper height — pulls it straight in between front supports. Overhung boom remains stationary.

Models to handle 400 to 1000 lb. loads on high buildings. Power Unit is equipped with holding brake and a ratchet and pawl which follows load when raising to hold if brake lever is raised by mistake. Electric or gasoline powered.

SELF-UNLOADING Material is discharged over the top of the ladder by operator down below. Models to handle 200 to 400 lb. loads on heavy duty sectional ladders which can be assembled for roof heights between 16' and 44'. Electric or gasoline powered.



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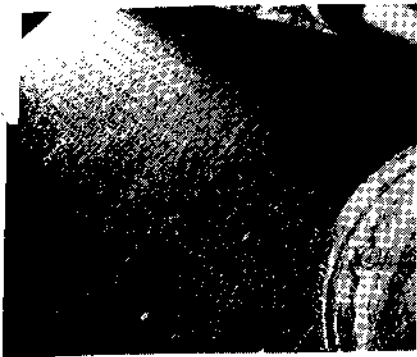
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Perforations in roofing felt.

prepared by "beating", a process which further refines the fibers and wets them.

The resulting slurry of hydrated fibers is fed to a vat, in which a rotating cylinder picks up the fibers and transfers them to a moving belt. As the slurry water is lost, the fibers form a felt.

The felt is dried, slit to width, and is ready for the roofing plant. The common dry felts are shown in Table 1.

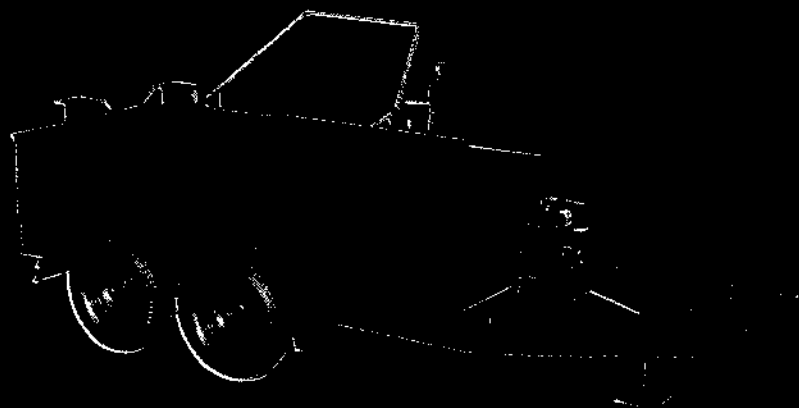
TABLE 1 — DRY ASBESTOS FELTS

<u>Dry weight lbs/100 ft.²</u>	<u>Approx. caliper mils</u>	<u>Typical End Uses</u>
6	16	Wapor Barrier
9	23	Ply Felts
12	30	Cap & Coated Base Felts
15	35	Saturated Base Felts
18	47	Flashing Felts

In the roofing machine, the dry felts are combined with a bituminous saturant, either asphalt or coal-tar pitch. Because the asbestos fibers are solid, they do not require much

bitumen. ASTM and Underwriters Laboratories require a minimum of 40% saturant in asbestos felts, based on dry weight.

Continued on next page



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TABLE 2
STRENGTH OF SATURATED NO. 15 ASBESTOS FELT

Tensile Strength lbs/in (min)		Tear Strength Elmendorf		Nominal Weight lbs/100 ft. 2		
MD*	CD*	MD*	CD*	Felt	Saturant	Product
20	10	240	320	9.5	3.9	13.4

*During the felting process, the rotation of the cylinder causes some directional orientation of the fibers. This explains the greater tensile strength in the machine direction (MD) and tear strength in the cross direction (CD).

Asbestos fibers are inorganic and are unaffected by moisture. The dimensional changes of asbestos felts from ambient to wet conditions are:

MD 0.02%
CD 0.08%

Asphalt saturated roofing felts constitute the major part of built-up roof membranes. Critical properties are: pliability to conform to the substrate, compatibility with the mopping asphalt to insure adhesion, and adequate perforations to vent

entrapped air during mopping. Experience has shown that properly designed and securely attached roof membranes have ample strength to prevent splitting failures.

After being saturated, roofing felts are frequently further processed to achieve special performance properties. The base ply of a roof membrane requires extra toughness to resist puncture from rough substrates and to hold nails. This is accomplished either by coating the felt, applying hard, mineral-stabilized coating grade asphalt to both sides to toughen it, or by using a heavier asbestos roofing felt which is saturated but uncoated.

Several specialty products have been developed using asbestos-based felts.

The most widely used is Reinforced Asbestos Base Flashing. In this case, a heavy (18 lb. dry) asbestos felt, after saturation, is laminated with coating asphalt to a woven cotton cloth. The woven cotton provides tear, wrinkle and puncture resistance, while the asbestos felt acts as a weather-shield. Heavy duty products with woven glass or cotton reinforcement are widely used by roofing manufacturers in critical flashing applications.

A second important proprietary product is a venting base felt. In this case, granules are embedded into the asphalt coating, which is then embossed into a waffle pattern. The waffle side is applied to the deck and provides channels to vent moisture to the atmosphere. The felt is effective for use over insulating concrete, as casting moisture could otherwise be trapped between the structural deck and the roof membrane. The product is also suited to reroof applications, where the old membrane

may harbor trapped water. In this case, the old membrane can be left in place, but should be slashed so the water can escape to the venting channels. This venting base sheet relies on the water resistance of the asbestos fibers.

Another proprietary product is a special light-weight asbestos felt used in vapor barrier systems. Low combustibility allows fire-rated insulated metal deck constructions to be achieved, while the moisture resistance is important in high humidity exposure.

ROOF MEMBRANE SPECIFICATIONS

Asbestos felts can be used in smooth and mineral cap sheet applications, as well as gravel construction. The fire, age and water resistance of asbestos are particularly important in smooth construction, as the membrane does not require heavy bituminous top-pourings and aggregate surfacing for protection.

The advantages of smooth roofing are:

1. Smooth roofs are easy to inspect and repair. Routine inspection can prolong or even double the life of a roof membrane.
2. When deposits of debris require periodic cleaning of the roof surface, smooth roofs are easy to clean.
3. When changes in factory processes require repeated openings in the roof system for vents, conduits, machinery, etc., cutting patching, and reflashings is easy.
4. When a smooth roof reaches the end of its life-cycle, it is easy to reroof directly over it.

Asbestos felts are used in many other roof applications. Flashing systems for cold application use heavy duty asphalt flashing cement, often asbestos-fibrated, and saturated asbestos felt. Asbestos felt strips are used to seal the top of flashings and to strip in metal flanges. In routine maintenance, patches of asbestos felt can be used to seal punctures, splits, or any other type of damage to the membrane or flashings.

The versatility, durability and weather resistance of asbestos roofing are the major reasons they have become more widely used every year.



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