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Asbestos Is Nearing Its Last Days in Phenolics

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All major suppliers of phenolic molding compounds now agree that it's the end of the line for use of asbestos in their products. Actually, asbestos has been on its way out of the phenolic scene for most of a decade, in response to strict Federal regulations on exposure to asbestos in the workplace and on its use in consumer products. (See PE, Aug. '77, p. 57.) Over the past 8-10 years, three major suppliers of phenolic molding compounds phased out of asbestos: General Electric Co.'s Plastics Div., Durez Div. of Hooker Chemical & Plastics Corp., and Fibreite Corp.—Durez having completed the transition only last year. Now, with even more stringent new governmental standards looming on the horizon, the remaining three major suppliers are following suit. "Although they have heretofore balked at totally eliminating the material from their products, Rogers Corp., Reichhold Chemicals and Plastics Engineering Co. (Plenco) have informed PE that as they develop suitable substitutes they intend to discontinue using asbestos, and hope to do so by the end of this year.

As for the smaller suppliers of phenolic molding compounds, Valite Div. of Valentine-Sugan, Inc., reports that it has adopted a policy similar to Rogers, Plenco and Reichhold. However, spokesmen for Resinoid Engineering Corp., say that they have no plans at the moment to discontinue supplying asbestos-filled products; although the company does supply a few asbestos-free grades, it is reportedly adopting a "wait and see" attitude regarding the proposed new regulations.

It's been difficult to find suitable reinforcing fillers to replace asbestos, say all of the suppliers; glass fiber and various minerals, such as clay, talc, and wollastonite, as well as Processed Mineral Fiber (PMF), a proprietary product of Jim Walter Resources Inc., have been and continue to be the prime candidates. However, all the suppliers say that they have been able to match the cost/performance of asbestos-filled products with their asbestos-free substitutes, grade-for-grade. In fact, say the suppliers, the electrical properties and appearance of parts molded from the asbestos-free compounds are superior to the products they were designed to replace. As is discussed below, the major problem in formulating the asbestos-free products appears in the area of their processability; finding alternative materials that offer comparable ease of molding has been, in the words of one supplier, "not the easiest thing in the world to do."

Spokesmen for Rogers, Reichhold and Plenco are quick to point out that their companies are not involved in what might be construed as a "mud dash" to phase out all use of asbestos; they say they have been pursuing aggressive campaigns to find adequate replacement materials for several years. But these three suppliers also say that they are committed to complying with existing Federal regulations and will continue to honor their customers' requests for asbestos-filled products only until they are unable to meet the standards required by law.

Still, Federal regulations may be on the way. Before examining in detail how the remaining material suppliers are coping with asbestos replacement, here's a look at what is said to be the primary reason for their decision to discontinue using the material—namely, the prospect of stricter governmental regulations that purportedly could all but eliminate its use.

As we have reported in the past (see PE, Dec. '79, p. 78, Jan. '80, p. 109 and Mar. '80, p. 129), many Federal regulatory agencies, including the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), and the Consumer Product Safety Commission (CPSC), have proposed new standards to limit exposure to, and use of, asbestos.

In recent developments, an OSHA-NIOSH work group reportedly has recommended eliminating all new nonessen-

Proposed new Federal regulations may limit exposure to asbestos to 0.1 fibers/cc of air.

tial uses of asbestos from the workplace. Also, the group has recommended that OSHA set a new exposure limit of 100,000 fibers/cubic meter of air (0.1 fibers/cc) measured over an 8-hr period, instead of the 2-million-fiber (2.0 fibers/cc) standard currently in effect. Although the phenolic compound suppliers say that with sophisticated filtration and piping systems they are able to meet the current standard, they feel that meeting the proposed new limit is impossible. The 100,000-fiber standard was suggested because it reportedly is the lowest level that can be detected by optical microscopy, which is said to be the most reliable and economic method of monitoring airborne asbestos. There has been no definite time frame established for implementation of the work group's recommendations, but OSHA spokesmen say they will move "with all deliberate speed" to see that their proposals are passed.

Of equal importance to material suppliers and processors alike are the general orders currently being drawn up by CPSC that will require manufacturers of certain categories of consumer products to submit information on the use of asbestos in specific products that the CPSC believes merit attention. Information required by these orders may include: specific product identification; the function performed by the product; a description of the asbestos used; the location of the asbestos in the product; available test data concerning asbestos-fiber emission from the product; information on the promotion, marketing and use patterns of the product; and information on possible substitutes for the asbestos in the product.

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After the approval of the Commission and the Government's General Accounting Office, the general order reportedly will be sent out directly to manufacturers, possibly by as soon as late July or early August of this year. At that time, manufacturers reportedly will have 90 days to reply. After assessing the response to the orders, mandatory CPSC regulations may include a blanket banning of asbestos from certain products.

Asbestos-filled vs. asbestos-free: Is there a difference? Asbestos has been used in phenolics for two major reasons: 1) the high degree of heat resistance it imparts, and 2) it acts as an excellent processing aid. An additional benefit provided by the material is that acts as an impact modifier because it is a tough, resilient fiber. And the loss of the material (about 15¢-40¢/lb) has been a contributing factor in making it a difficult material to replace.

All of the suppliers agree that they are able to match almost perfectly the heat resistance imparted by asbestos with their asbestos-free products: quantitatively, they say that the performance of their asbestos-free products in this area is 90-98% as good as that of asbestos-filled compounds. However, one supplier notes that there is a slight trade-off in using asbestos-free materials in terms of flammability. An asbestos-filled product reportedly can receive a UL 94V-0

rating at 0.040 in. in standard UL flammability tests; whereas, at the same thickness, an asbestos-free product would receive a UL 94V-1 rating. To obtain a V-0 rating, the specimen reportedly would have to be 0.060 in. thick.

In other performance properties, however, all suppliers say that they have been able to match completely those provided by asbestos. Properties such as dimensional stability, impact strength, and thermal aging (to name just three) are equal to asbestos-filled materials; and, as previously noted, electrical properties and end-product molded appearance are improved in the asbestos-free products.

It is in the area of processability that problems in finding suitable replacement materials crop up. Suppliers and processors have known for years that, owing to the fine-filament structure of asbestos, it acts as a good flow promoter by maintaining uniform viscosity and mold-flow. It reportedly acts like a blotter for the resin and, therefore, is an excellent viscosity-control agent.

The suppliers agree that there has been no problem in finding material formulations to replace short asbestos fiber products. Improvements over the years in machinery designs and material formulations reportedly yield less machine wear, even in products where glass fiber is used. In fact, spokesmen for G.E., Durez and Reichhold say that cycle times have improved with the asbestos-free materials. The asbestos-free materials reportedly provide lower viscosity than those containing asbestos, which means that molders can operate their machines at lower pressure—25-50% less than with asbestos-filled materials—and still obtain the same fast cycle times provided by the stiffer-flowing, fast-

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curing asbestos-filled materials, depending on the application. Using lower pressures reportedly provides not only less machine wear, but reduced energy consumption as well.

Suppliers have found it more difficult to compound around long asbestos fiber products: long-fiber asbestos has been used in applications requiring high impact strength. Longer glass fibers reportedly can provide the same degree of impact strength, but there is a cost penalty. It is estimated that glass fibers can cost up to about 40% more than long asbestos fibers. According to spokesmen for Fiberite, a company that never was big in asbestos, and only used long asbestos rovings at that, they found little or no problems in the processability of long glass rovings when they made the transition away from asbestos over 10 years ago.

All in all, the suppliers agree that they can offer asbestos-free products at the same cost as asbestos-filled products in practically all grades, with only minimal trade-offs in physical properties.

Suppliers' strategies for asbestos-replacement "We did not find any universal substitute," says a Durez spokesman. (Durez began eliminating asbestos in 1977 and completed the phase-out in February 1979.) "It was a product-by-product change, using a variety of materials to develop the same

processability and end-product properties as those provided by asbestos. The transition was difficult. At one time 90% of our phenolic compounds contained some asbestos—today we haven't got a pound on the premises."

Spokesmen for both Durez and G.E. (which discontinued using the material in October of 1972) say that their difficulty in making the transition was compounded by reasons other than processability and property problems. Many of their customers were unfamiliar with handling and molding the asbestos-free products; and, because Federal regulations were not as strict then as they soon may be, customers were unwilling to take the risk. Also, asbestos-filled products were generally more available and economical. What's more, their competitors continued to supply asbestos-filled products and maintained somewhat of a marketing edge.

Now, in light of the proposed new standards, the scenario has changed. Customers reportedly are rushing to use asbestos-free materials. G.E. spokesmen say that the firm's early action has paid off; processors that once balked at using asbestos replacements reportedly are turning to G.E. because of its years of experience in developing asbestos-free products. Here's how the remaining phenolic suppliers are coping with the transition:

Spokesmen for Rogers Corp., suppliers of specialty high-performance grades, say that for the last two years the glass companies have been manufacturing new glass-fiber products designed to give physical properties closer to those imparted by asbestos; by using the variety of types and sizes of the new glass fibers, researchers at Rogers are confident

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that they can achieve the desired properties. Since glass is abrasive, they reportedly have found it necessary to incorporate proprietary fillers to reduce machine wear. The company's new 800 series of phenolic compounds are glass reinforced and designed to replace asbestos-filled products at the same costs (see *PT*, April '80, p. 33).

Plenoc is also using glass fiber as well as various minerals as replacements for asbestos in its "AF" (asbestos-free) line of phenolic products. Even though company sources feel that the asbestos-free products are completely different materials than asbestos-filled ones (one spokesman said, "to a degree, it's like apples and oranges"), the firm has, to date, matched its asbestos-filled products grade-for-grade with asbestos-free products, at the same price.

Reichhold spokesmen say that they plan to develop henceforth no new grades of asbestos-filled phenolics. The company reportedly has been waiving the 3¢/lb premium that it has charged for its asbestos-filled products to customers willing to subscribe to an exploratory program in which they would agree to investigate Reichhold's asbestos-free products. This program, which has been going on for two years, will be discontinued July 1st; Reichhold customers will pay the full premium for asbestos-filled products after July 1st whether they are in the evaluation program or not.

Federal regulations prompt improved productivity. Spokesman for Rogers Corp. say that since the firm made a significant investment in equipment to comply with existing Federal regulations, productivity has actually improved in its phenolic compound manufacturing. The company has installed a large number sophisticated air filters to keep undesirable materials out of the plant air and the outside environment; the filters reclaim the airborne materials for reprocessing, thus contributing substantially toward recouping the cost of this extra equipment in material savings alone. And, since the plant is said to be a cleaner working environment, workers in the plant are said to be more quality conscious and their productivity has gone up.

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The other suppliers also have experienced increases in productivity, but they tend to attribute them more to improvements in the material formulations and machinery used to compound the asbestos-free products that have evolved over the years.

—Carl Rickland

New Fiberglass Chopper

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flush, external-mix urethane foam spray gun. The company presently offers only an internal-mix, solvent-purge gun for foam spraying and manufactures for OEM use a mechanical-purge gun that's limited to pouring uses. Company sources say the rising cost of solvents and the restrictive handling requirements associated with them make a non-flush system more attractive. The new gun, which will be suitable for both pour and spray, reportedly will have an advantage over existing mechanical-purge foam guns in that it will offer standard paint-spray type nozzles, thus providing greater versatility for spraying either foam or plural-component paints.

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Vertical/Horizontal Extruders

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throughput rates are similar to those of the horizontal unit (Specs were not available.) The screw, bottom driven, extends into the feed hopper, which is a prolongation of the vertical cylinder. The screw section in the feed hopper is easily interchangeable. In order to adapt the screw compression ratio to different bulk densities of the feed material. The resin to be fed is fully exposed to the 360° surface of the screw flights in the hopper, for positive and regular conveyance of even hard-to-feed materials, the company says. The units have been designed for a low overall height, facilitating screw removal. This lower overall height has also eliminated the main objection against vertical extruders of output capacity over 200 lb/hr. Applications for the vertical units include coextrusion, crosshead extrusion, profile extrusion and reclaiming of difficult-to-feed material.

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