The roofing spec

November 1980 $2.00
National Roofing Contractors Association

NRCA's 2000th Member

2000
Paul Albert
Albert's Roofing Co.
Opa Locka, FL

1991
William B. Riney
Bruce's Tri State Roofing Co.
Owensboro, KY

1992
Russell D. Slade
Slade Bros. Roofing Co.
Coralville, IA

1993
Joe F. Ramirez, Jr.
El Pueblo Rfg. Co.
Tucson, AZ

1994
Stanley C. Smith
Southwest Rfg. Co.
Farmington, NM

1995
Ben Malloy
International Tile & Supply Corp.
Los Angeles, CA

1996
Charles G. Whitley
Dibiten of America Inc.
New Milford, NJ

1997
A.B. Martin
A. B. Martin Roofing
Opa Locka, FL

1998
Peter S. Murton
Murton Industries Inc.
Hialeah, FL

1999
Charles Ball
C & K Roofing Co.
Miami, FL

2001
Reuben Williams
Williams Roofing Co.
Lakeland, FL

2002
Norman L. Parr
Parr Roofing Co.
Gainesville, GA

2003
V. T. Butler
B & B Indus. Inc. of Broward
Ft. Lauderdale, FL

2004
Raymond Packard
Packard Rfg. Co. Inc.
Miami, FL

2005
Rex Wallin
Wallin Roofing Co. Inc.
Deerfield Beach, FL

2006
Allen R. Springer
Al Springer Rfg. Co. Inc.
Miami, FL

2007
Aldo Alvarez
Magic Roofing Inc
Miami, FL

2008
Manuel Sega
Segarra Roo
Hialeah, FL

2009
Bob Pie
Pierce
Miam

20
G

1987
Cliff C. Butterfield
C & C Roofing & Supply
Phoenix, AZ

1988
James Woodson
Chesterfield Rfg. Inc.
Richmond, VA

1989
Daniel D'Alessandro
Vidale Roofing Inc.
Miami, FL

1990
Billy C. Lancaster
Lanco Rfg. Equip. & Supply
Jackson, MS

Walter H. Scott
Scott Rfg. & Repairs
Opa Locka, FL

ng Inc.
, WV

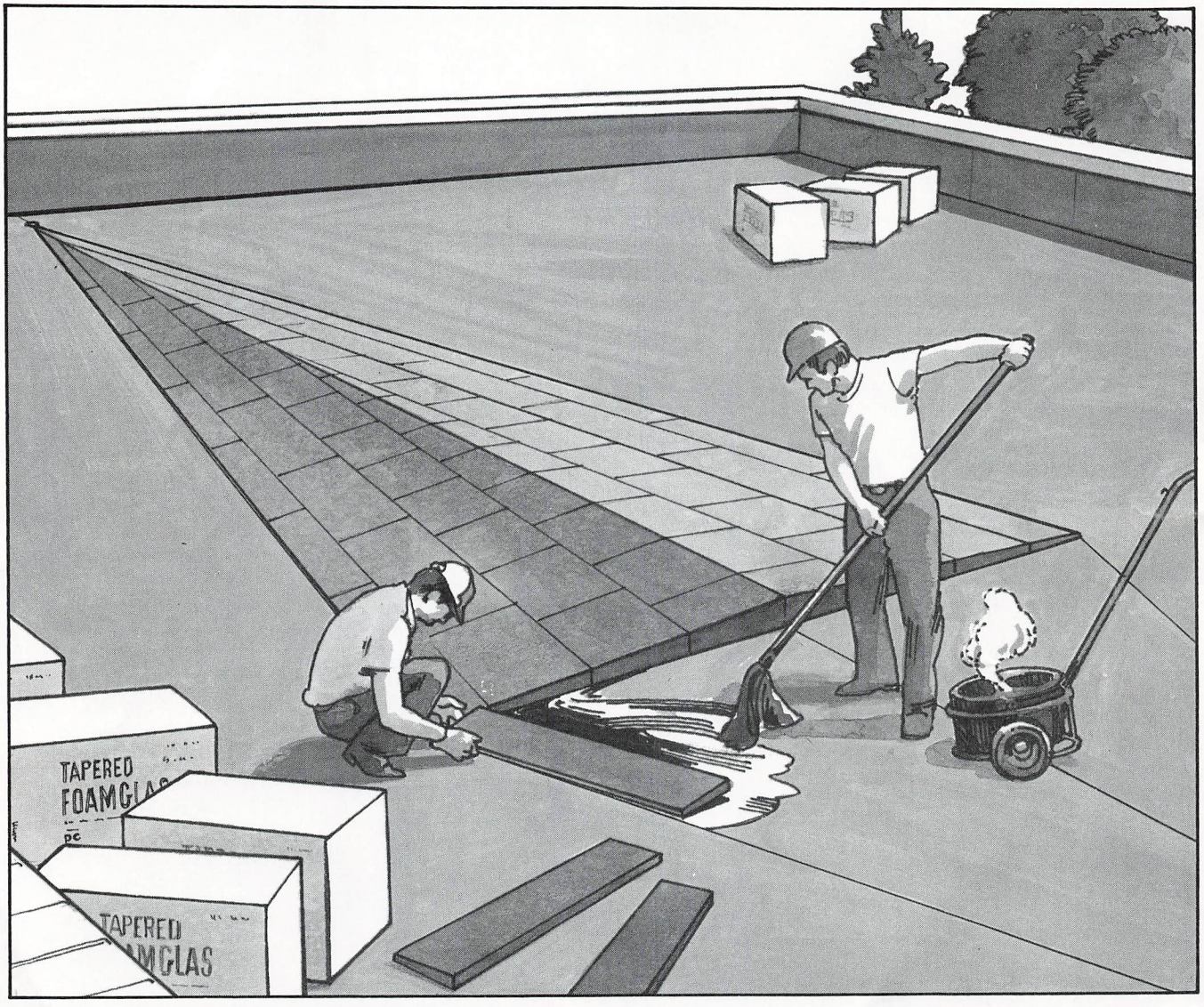
amous
Rfg. & S/M
er City, LA

g Co. Inc.

obert Hays
g. Inc., Elmer
n, AZ

FOAMGLAS® Insulation Tapered Systems

Better for the roofer... again



Now there are new cricket systems to go with Pittsburgh Corning's tapered board systems and tapered block systems. They're all made with FOAMGLAS cellular glass insulation . . . the only totally waterproof, totally noncombustible, dimensionally stable insulation available.

FOAMGLAS Insulation Tapered Systems began with Tapered FOAMGLAS Block with 1/16", 1/8" and 1/4" per foot tapers. Then Tapered FOAMGLAS-Board Insulation was developed in 2' x 4' boards with 1/8" and 1/4" per foot tapers. And, with tapered boards you handle fewer pieces per roof (save lots of labor).

Now we've developed six new cricket systems. They're available in 30-foot to 80-foot lengths in 10-foot increments.

You give us the distance between drains and we ship you the complete system. That's right, all the pieces you'll need, packed and labeled, ready for installation.

Today, there are FOAMGLAS Insulation Tapered Systems to fit any deck and any drain location. We're working to make roofing easier for the roofer with better FOAMGLAS Insulation Tapered Systems. For more information write Pittsburgh Corning Corporation, Marketing Department RF1180, 800 Presque Isle Drive, Pittsburgh, PA 15239, (412) 327-6100.

PITTSBURGH
PC®
CORNING

THE TARBABY DELUXE

100% Cotton Mop Yarn for the Roofing Trade.

New from S & M Manufacturing Co., a yarn manufactured especially for the roofing industry. It's a 100% cotton yarn that is longwearing, more absorbing than anything else on the market, and available in unlimited supply.

This new yarn is made from long-staple cotton, hard twisted, with every strand of the same diameter. These features assure longer wear and a higher resistance to burning.

S & M has this yarn especially made to our specifications so that every order you place will be exactly the same as the previous order. Based on our 21 years experience in manufacturing roofing mops, we think the Tarbaby Deluxe is the best all-round buy in cotton roofing mops today.

Available in throw-away wooden handle mops, interchangable heads, and hanks cut to your specifications.

Send for Our free catalog and price list today.

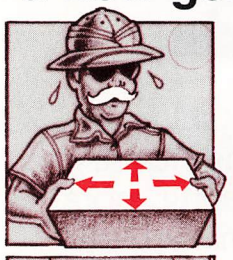
S&M MANUFACTURING CO.

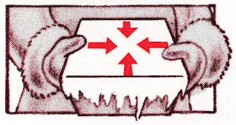
P.O. Box 1637 · CISCO, TEXAS 76437

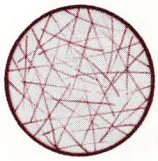
Introducing

TAMKO TAM-GLASS™

a new generation of fiberglass built-up roofing products.



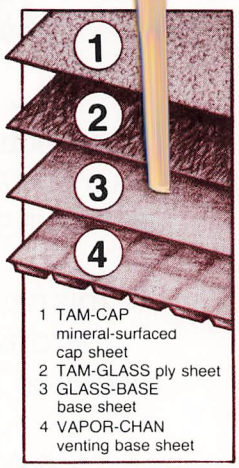




The TAMKO TAM-GLASS Built-Up Roofing System offers all the advantages of conventional fiberglass — plus improved strength and a broader product line.

TAMKO-produced fiberglass mat features improved tensile strength. Unique steps in our manufacturing process give TAM-GLASS fiberglass added strength in the cross-mat direction. The advantage is extra resistance to extreme stresses of thermal shock. And of course, this exclusive construction meets all requirements of ASTM D-2178-76, Type IV.

TAMKO is unique in offering a broader line of fiberglass built-up products. Many companies offer only the fiberglass ply sheet, giving you no choice of base or surfacing options. The TAMKO line includes two base-sheet types, ply sheet, and mineral-surfaced cap sheet.

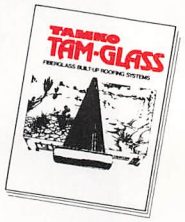


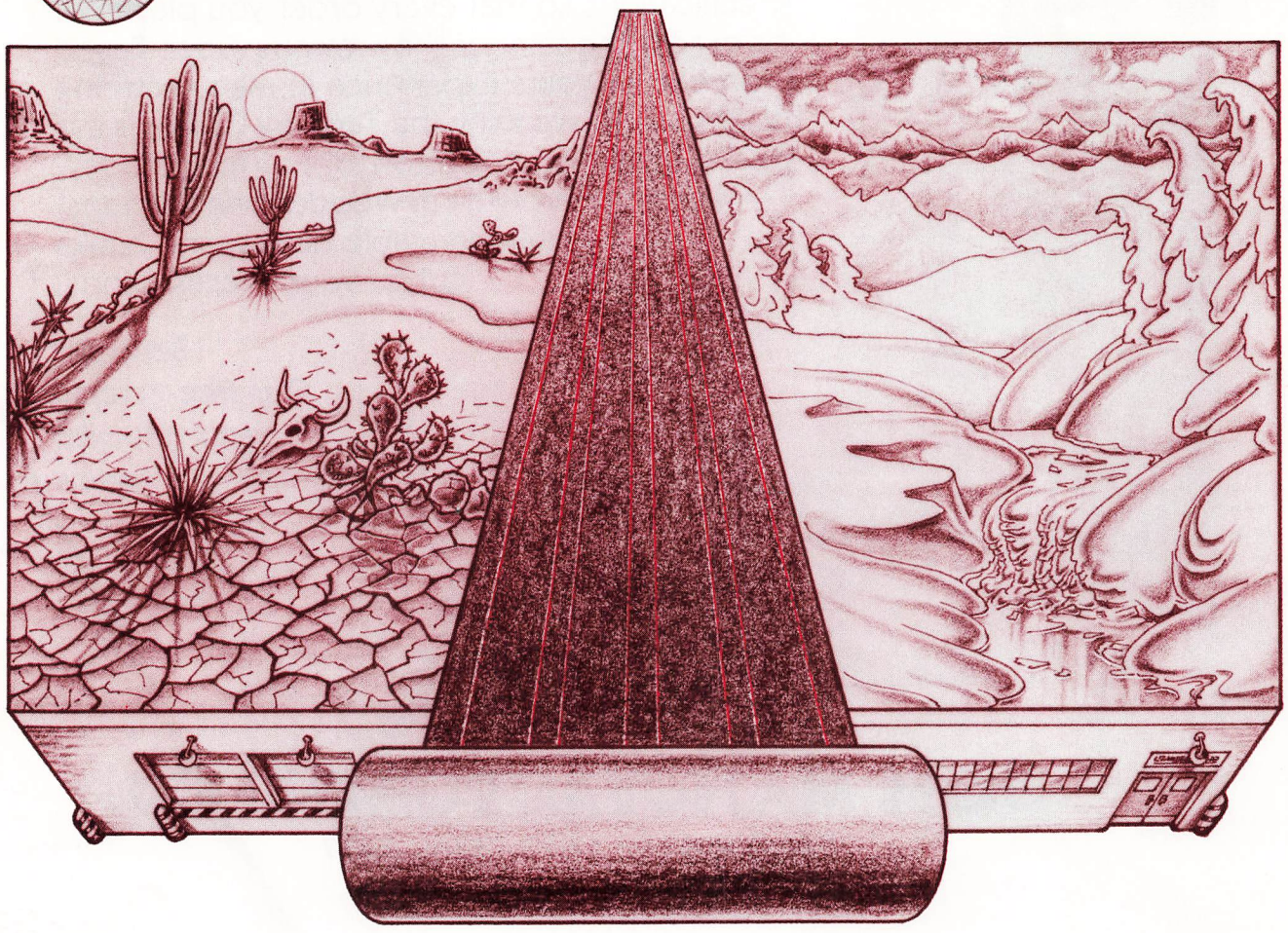
1 TAM-CAP mineral-surfaced cap sheet
2 TAM-GLASS ply sheet
3 GLASS-BASE base sheet
4 VAPOR-CHAN venting base sheet

Plus all the advantages of inorganic fiberglass construction. Light in weight. Superior resistance to rotting, curling, warping, fishmouthing, wrinkling, buckling, blistering, and weather oxidation. In addition, its porosity permits moderate amounts of air and moisture to escape during application.

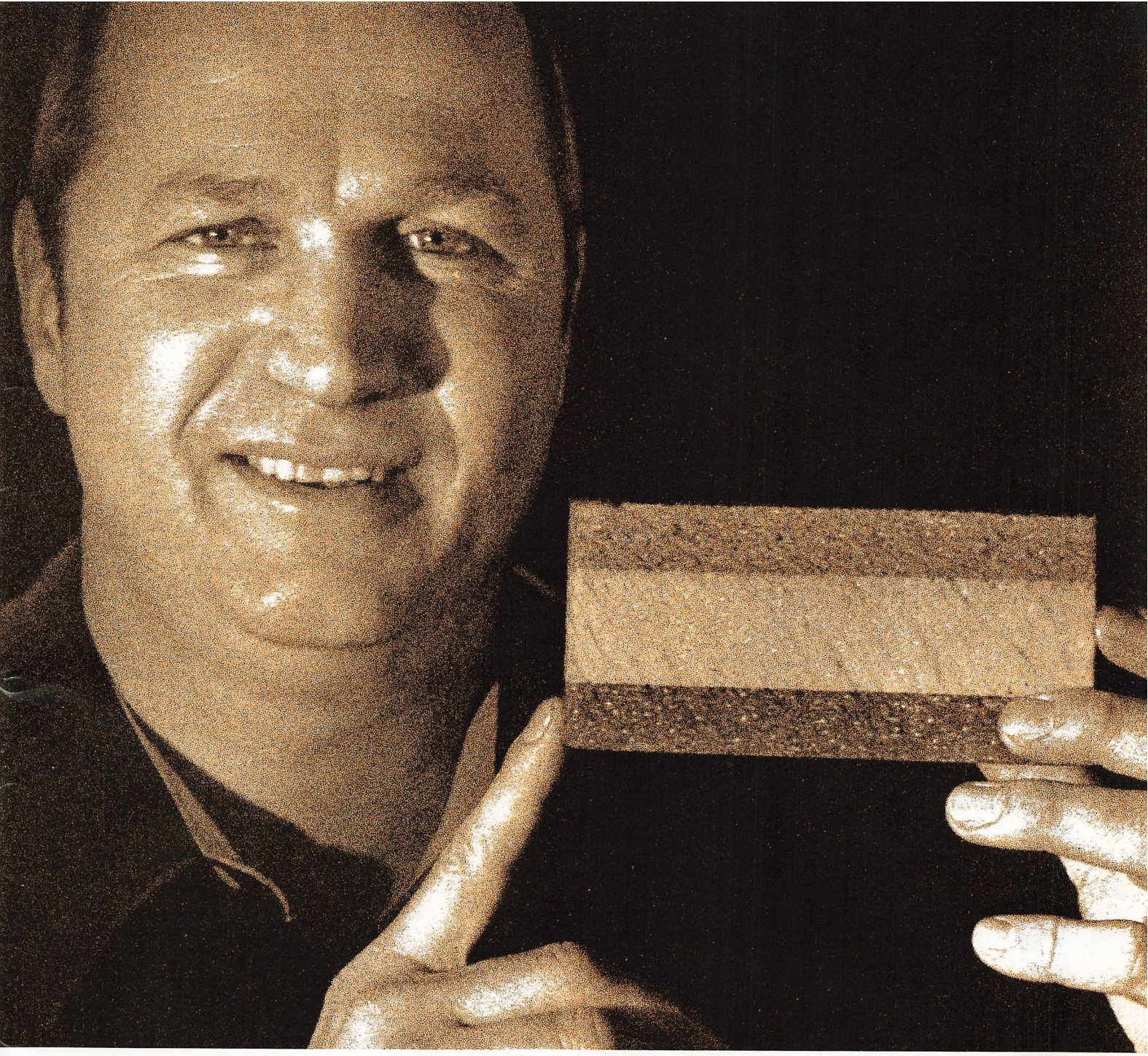
Free 8-page brochure available. Call or write for yours today.

TAMKO TAM-GLASS
FIBERGLASS BUILT-UP ROOFING SYSTEMS





TAMKO Asphalt Products, Inc. P.O. Box 1404, Joplin, Missouri 64801, 417 624-6644, TWX 910-774-4521
Since 1944. The nation's only manufacturer of organic, glass, and polyester base roofing products.



"I figure I save at least $5 to $6 per square with PK Plus®. And I still give the customer the best roofing system he can get."

Monty Moore
Pacific-Rainier Roofing Co.
Seattle, Washington

Monty continues, "Weather is a big factor here in Seattle, and with a factory-produced product like PK Plus I can dry in faster. In addition, because the urethane is bonded top and bottom to Permalite Sealskin, I get the benefits of urethane along with the best possible platform for the BUR."

Top roofers like Monty Moore trust Permalite PK Plus to cut costs over field lamination and still give the customer a product with "C" values proven in thousands of installations under all climatic conditions. As Monty Moore puts it, "I believe in PK Plus. I can sell it."

Grefco, your single source for Permalite® perlite, urethane, perlite-urethane and PK Plus insulation boards. For technical data and free sample write Grefco Inc., Building Products Division, 3450 Wilshire Blvd., Los Angeles, CA 90010.

Permalite®
Insulation Board

grefco GREFCO a subsidiary of
General Refractories Company

Comment

The 2000 Member Milestone

To begin with, and to demonstrate just how astonishing NRCA's recent growth has been, we've now got over 2100 members, which means that over 100 have come in during the month we were preparing this issue's cover story.

But let's not let that bit of good news stand in the way of celebrating NRCA's second millenium.

It is a remarkable achievement, especially to those of us who remember passing the 1000 mark just seven years ago. Very few people were listening to Charlie Raymond then, when he told anyone who would listen that the job of member recruitment had just begun, that for NRCA to be a truly great organization, 1000 members were about half of what was needed.

(Even fewer people, by the way, would contend that the task could have been accomplished without Charlie, or without an incredibly devoted group of volunteers, most of whom comprise NRCA's 2000 Club.)

There are new milestones to be reached, to be sure, but while we're enjoying this most recent one, let's reflect for a moment on why it is so important.

First, it is a concrete demonstration of an astounding period of growth for the industry's association. That growth is reflected in the activities of, and the respect earned by NRCA.

Second, it is true that in associations there is strength in numbers. Two thousand members can carry an awful lot of clout, and any who doubt it should plan to attend the next Construction Industry Legislative Conference.

Third, there is a very healthy snowball effect that starts to take hold. More members mean more services and more effectiveness, which in turn attract still more members. We're feeling that right now, and it's an exciting experience.

Finally, it should not be overlooked that this milestone was reached at a time when business is slow, when other associations are slashing budgets and programs, when it would have been easy to pull back and settle for a policy of holding even. It is a credit to NRCA's leaders that they recognized a unique opportunity: that associations are needed most when times are tough, that roofing contractors aren't looking for help as much when they're turning away business as when they feel their competitors breathing down their necks.

So welcome aboard, Mr. Albert, and all of those who will follow. Number three thousand can't be far behind.

Bill Good

Truck-Crane roofer's package now goes local

GIUFFRE BROS. AND RO CORPORATION JOIN FORCES

The Truck-Crane Roofers Package including a Ford, GMC or International-Harvester truck, RO stinger 100 ft. crane, 5/8 yd. clam, 1½ yd. hopper, pallet fork and 3½ yd. Humpty Dumper, is now available exclusively through 62 RO corporation dealers.

To roofing contractors, this means the Truck-Crane Roofers Package is available locally, eliminating the high cost of delivery and offering local qualified service as well.

You can buy, rent or lease the Truck-Crane Roofers Package from established RO dealers strategically located around the country. All equipment is distributed to dealers directly from the RO factory, and each dealer is staffed with qualified service personnel trained in making the necessary crane modifications to accommodate the roofer accessories.

RO corporation and Giuffre Bros. joined forces to provide the only qualified single source for roofing equipment available anywhere. This system has been incorporated by "blue chip" roofing contractors nationwide, proving that RO and Giuffre have earned the confidence of users through outstanding equipment design.

The accessories were developed by Giuffre Bros. as an integral combination with the RO stinger crane, not a "me-too" with "anybody's" allied attachments. Experience and nationwide user acceptance is testimony to the Truck-Crane Roofers Package success and it's only available through RO dealers.

Contact the RO dealer closest to your company or the Giuffre Bros. at 414- 761-2300, Oak Creek and let them show you the fast, economical, labor-saving way this new roofing system will increase your profit picture . . . he's just a phone call away.

GIUFFRE BROS.
9770 S. Ridgeview Drive
Oak Creek, Wisconsin
(414) 761-2300

Ideas, notes and random thoughts

The NRCA Nominating Committee has begun its task of recommending new officers and directors to be elected at the Phoenix Convention, and it solicits the input of NRCA members in this critical job. A Senior Vice President, three Vice Presidents, and up to 16 Directors will be chosen. Committee chairman is Thomas Manson; committee members are Melvin Kruger, J. Roy Martin, Jr., George Stephenson and Robert Linck. The committee asks that a Data Form, available from the NRCA office, be completed for each prospective officer and director.

A friendly reminder: Hotel rooms are going fast at the co-headquarters (Hyatt and Adams) in Phoenix for NRCA's 94th Convention next February. While we have plenty of rooms in the city for everyone attending, early registrants, of course, get their first choice.

Another friendly reminder: NRCA 1981 dues invoices will be mailed early in December. If you prefer, you can pay your dues on your Convention registration form. For the third consecutive year, there is no increase in your membership dues.

Quotable: Sen. Jesse Helms (R-NC): "Every year Congress raises the level of spending for virtually every government agency. Seldom does Congress ever take a close look at how these agencies spend their money. If the agencies had fewer tax dollars to spend, they would have to reassess their priorities and devote their resources to their most urgent regulatory matters. Trivial regulatory efforts would be abandoned."

A recent poll of American workers by the Gallup Organization showed, among other findings, that:

- 84 percent say they would work harder and do a better job if they were involved in the decisions affecting their work.
- 86 percent are concerned with providing top quality goods and services.
- 88 percent recognize the importance of quality to the consumer.
- 73 percent agree that improved productivity would help reduce the rate of inflation.

Recent NRCA mailings include:

- Convention registration materials
- Mediation Service information
- **Action Information,** October issue
- Project Pinpoint forms
- BUR Conference information
- Technical Conference information
- Warning Line information

Additional copies of each are available from the NRCA office.

Also quotable: columnist James J. Kilpatrick: "When everyone is in charge, no one's in charge and it follows that no person or party can be credited for success or blamed for failure. For those who like things nice and tidy, it's a discombobulating time."

Social Security estimates include the following sobering projections:

- 36 million Americans will receive benefits this year, paid for by $150 billion in Social Security taxes from 115 million workers.
- By 1985, those numbers will rise to 39 million recipients and $262 billion in taxes.
- By 2025, 40 percent of total federal government outlays will go to the 20 percent of the American public over age 65.

Mark your calendars for these upcoming NRCA-sponsored conferences:

December 3: BUR Conference, Dunfey Hotel, Atlanta
December 9: BUR Conference, Omni International Hotel, Miami
January 8-9:Superintendents Conference, Reno
January 15-16: Superintendents Conference, Nashville
February 2-4: Management Education Conference, Boca Raton, Florida

Small business, most studies agree, has been responsible for about half the most significant new industrial products and processes. These studies also show that small firms produce 24 times more effectively in terms of major innovation, for every dollar spent on research and development, than do large firms. Yet, according to a recent study, small firms receive only 3 percent of federal research and development contracts.

And finally, an election-year one-liner from Bob Hope: "Politics is like show business. One day you're drinking the wine, and the next day you're picking the grapes."

BUILDEX ROOFGRIP™/ACCUDRIVE™ SYSTEM

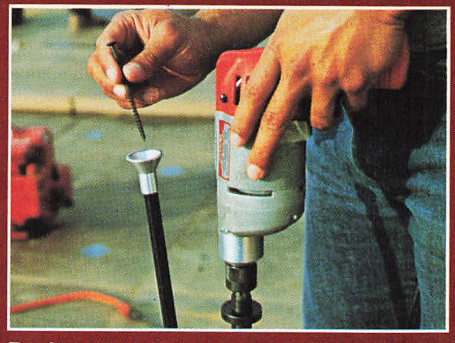
COMPLETE INSULATION FASTENING FOR BUILT-UP ROOFS, AND SINGLE-PLY FULLY ADHERED ROOFS!

The combination of the Roofgrip Plate and Fastener, and the Accudrive Fastening Tool is the most efficient, easiest and fastest roof insulation fastening system in use today.

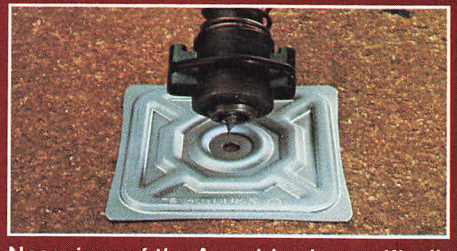
The system is unique because the entire fastening operation is completed while standing . . . which reduces fatigue, backache, and installation time. The system increases driving leverage, insures consistent fastener depth, and improves control of short and long fasteners.

Roofgrip is capable of fastening rigid insulation up to 5½ inches thick, and metal decks through and including 18 gauge in thickness.

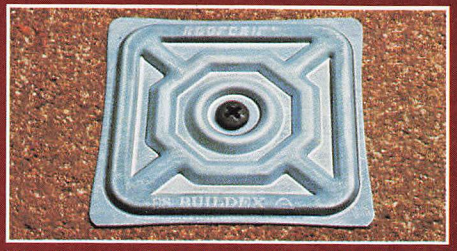
Buildex developed the Roofgrip/Accudrive System because we are constantly . . . "Building Ideas That Work™" . . . for you!



Roofgrip Fasteners are made of heat-treated carbon steel, and feature a Hi-Lo® thread form and Phillips recess in an oval head. Fast feeding into Accudrive Tool while standing saves time and money.



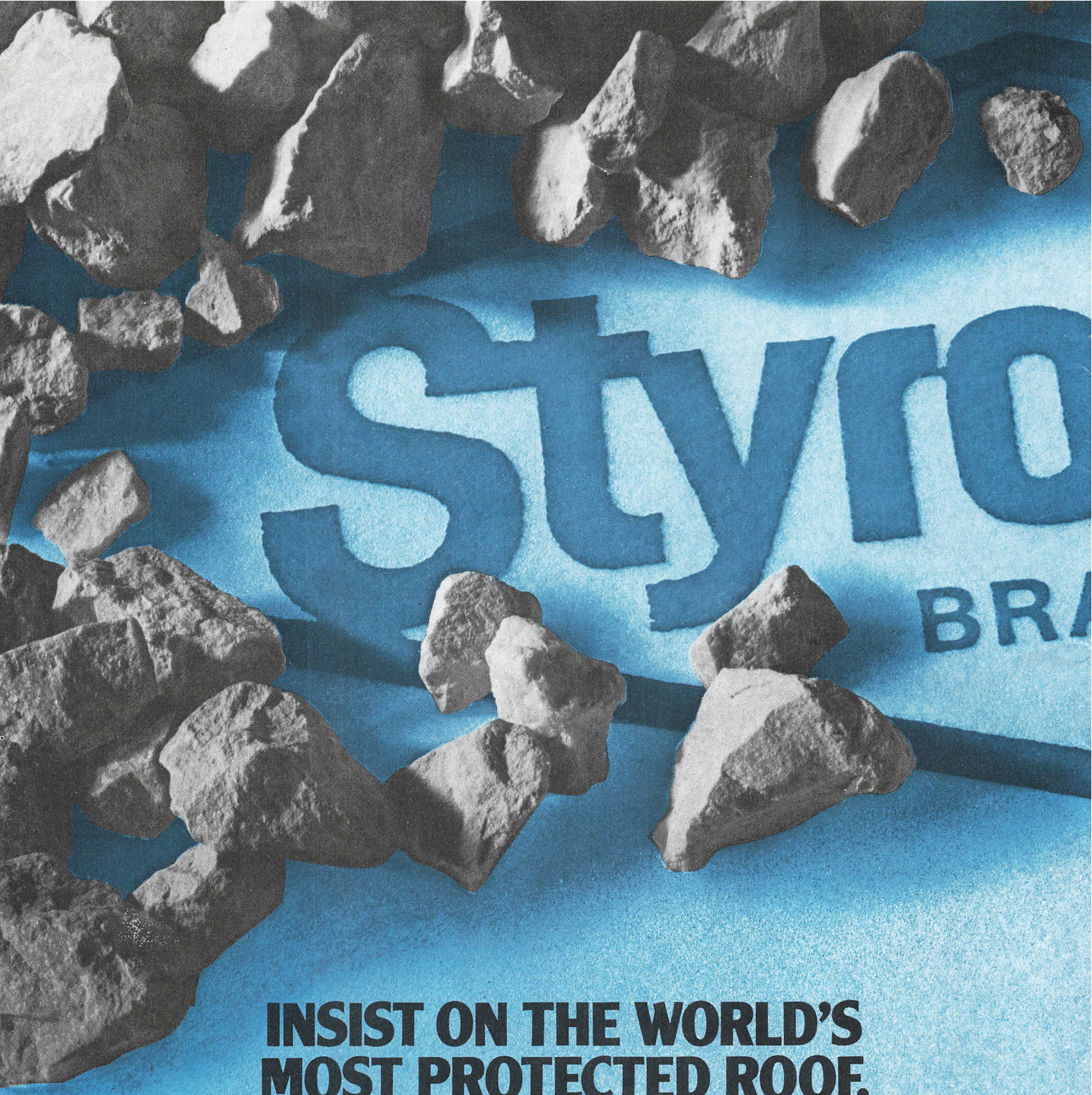
Nosepiece of the Accudrive is specifically designed to fit the Roofgrip Plate. Engage the screwgun, and with average driving pressure you fasten down insulation securely and quickly.



The Roofgrip Plate has unique stiffening ribs that distribute stress over a large area to assure rigidity and provide maximum protection against wind uplift. The plate has a galvanized finish to resist corrosion, and is round-cornered.

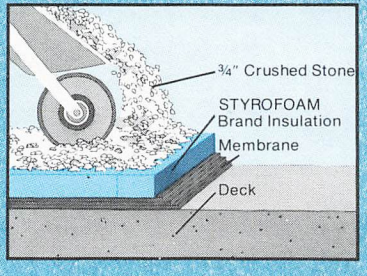
Factory Mutual System Approved

BUILDEX
A DIVISION OF ILLINOIS TOOL WORKS INC.
2500 BRICKVALE DRIVE
ELK GROVE VILLAGE, IL 60007
(800) 323-3333



INSIST ON THE WORLD'S MOST PROTECTED ROOF.

Today's most effective and cost-efficient roof system depends on the unique properties of STYROFOAM* brand insulation. It's the most ideally suited insulation for use on top of a roofing membrane. The high moisture resistance, compressive strength and insulating effectiveness of STYROFOAM shield roof membranes from temperature extremes, protect them against physical abuse, and reduce expensive energy loss.



The Protected Membrane Roof (PMR) was pioneered by The Dow Chemical Company and represents a major breakthrough in roofing technology. Because of the superior performance of STYROFOAM brand insulation in roofing applications, building owners can experience substantial long-term savings due to both decreased maintenance and energy costs.

Before you build, evaluate your roofing alternatives. Let your Dow Representative explain the financial benefits of the PMR system. He has data to support STYROFOAM brand insulation's superior insulating effectiveness and long-term proven performance. You'll see why roof systems incorporating STYROFOAM brand insulation are so widely specified by architects and contractors throughout America, and the world.

Write for more information. The Dow Chemical Company, Dept. L95, STYROFOAM Brand Insulation, Midland, MI 48640.

The Proven Answer

Dow* Styrofoam* BRAND

*Trademark of The Dow Chemical Company

WARNING: STYROFOAM brand insulation is combustible and should be properly installed. For roofing applications it should be provided with an adequate protection. For specific instructions see Dow literature available from your supplier or from Dow.

0-087R

single-ply roofing:
Five reasons why Sarnafil outperforms and outlasts other sheet roofing materials.

1 It won't shrink . . . ever. In conventional, calendered polymeric sheet roofing, longitudinal orientation of the polymer molecules causes shrinkage when the material is exposed to the sun's heat. Not with Sarnafil. It is manufactured by an exclusive process combining plastisol coating with non-woven glass-fiber reinforcement. Calendering is eliminated. In addition, top-grade plasticizers and stabilizers safeguard against embrittlement and shrinkage from aging. Sarnafil is dimensionally stable, and it stays that way.

2 It can't separate or de-laminate. Prolonged exposure to the elements can ruin laminated materials. Plies separate. Protection is destroyed. But not with Sarnafil. This unique non-laminated membrane is a single, homogenous layer with integral reinforcement embedded in the center. It cannot delaminate even under the most severe conditions of temperature, humidity, mechanical stress, or exposure to atmospheric pollutants.

3 It expands and contracts with the structure. Because of the glass-fiber reinforcement, the thermal expansion of Sarnafil closely approximates that of roof decks. When Sarnafil is installed even as a fully adhered membrane, expansion or contraction of the structural deck does not affect either the adhesive bond or the membrane itself. Everything moves at the same rate.

Sarnafil roofing requires no adhesive or sealants at the joints. Material is fused by means of hot-air welding to produce a continuous leak proof membrane.

4 You can use a variety of installation techniques. Sarnafil can be installed in a variety of applications: fully adhered without ballast, loose-laid with ballast, mechanically fastened, and in a protected membrane assembly. Sarnafil is available in a variety of colors besides the standard light gray, and in a variety of thicknesses to accommodate specific conditions, such as walk-on, drive-on, or plant-on roof decks.

5 It can stand years and years of exposure. Sarnafil is so highly stabilized that it can be welded to itself even after years of exposure to solar radiation and weather. So if a new penetration must be made in the membrane even after years of service, a new section of Sarnafil can be hot-air welded to the existing aged sheet with assurance of a watertight seal.

Insist on Sarnafil . . . The only non-shrinking PVC roofing membrane. There's no other single-ply roofing system with the stability, endurance, and reliability built into Sarnafil. It's the ultimate in polymeric roofing membranes. Proven world-wide for almost 20 years under all climatic conditions, with the same basic formulation.

New roof or re-roofing project . . . ballasted or unballasted system . . . big job or small . . . insist on Sarnafil. And be sure. Write for brochure.

Sarnafil ‹U.S.› **inc.**

Canton Commerce Center, Canton, Mass. 02192
Telephone: (617) 828-5400 Telex: 951625

NATIONAL NEWS

Recovery of Construction Continued In August, Says F.W. Dodge

August contracts for new construction totaled $15.1 billion, a gain of 6 percent over the year-ago amount, it was reported by the F.W. Dodge Division of McGraw-Hill Information Systems Company. Although construction activity has been recovering steadily since the recession's low was reached in May, August was the first month in 1980 when contracting for new projects actually exceeded the comparable 1979 value.

The seasonally-adjusted Dodge Index of total construction contract value jumped 30 percent in August, from July's 148 to 192 (1972 = 100). Commenting on the unusually large August increase, Dodge vice president and chief economist George A. Christie said, "The August total of construction contracting was swelled by the inclusion of four electric utility projects with a combined construction value of $2.5 billion—a total greater than all the utility work reported during the previous seven months of 1980."

"The important news concerning August's contract statistics is that even after excluding this $2.5 billion of utility work the rate of contracting showed a seasonally-adjusted improvement over July, extending the recovery of the construction market through its third month," according to Christie.

Nonresidential building contract value, at $4.3 billion, slipped 2 percent below last year's amount for the month. "A decline of 9 percent in commercial and industrial projects was largely, but not entirely, offset by a gain in contracting for schools, hospitals, and other institutional building," said the Dodge economist.

Residential building, which was by far the hardest-hit category of building in 1980's recession, showed further improvement in August as the month's $5.9 billion of contracting recovered to within 17 percent of the year-ago total. As recently as May, 1980 homebuilding was nearly 50 percent below last year's amount, Christie pointed out.

At the end of eight months, the cumulative value of all construction started in 1980 was $94.6 billion, down 20 percent from the $119.0 billion of work begun during the comparable months of 1979.

ABC Urges 4-Day Week

A vigorous campaign to amend a federal law to permit government contractors to work four 10-hour days rather than the present five eight-hour days is being launched by the Associated Builders and Contractors. The proposal is being enthusiastically received, says Kimberly Elliott, assistant director of ABC's government relations department, and she expects approval this year, probably in Congress' post-election session.

The Walsh-Healy Act says government contractors must pay overtime for work in excess of eight hours in any one day. But many employers and the Department of Labor are finding that "flexible time" and "compressed time" lead to productivity gains, Elliott says.

Jim Walter Case Returned To FTC

A federal circuit court vacated a Federal Trade Commission order that Jim Walter divest certain businesses obtained in its 1972 acquisition of Panacon Corp., according to Jim Walter corp., *Wall Street Journal* reported.

The court returned the case to the FTC for reconsideration.

The FTC had filed an antitrust complaint in August 1974 alleging that the Panacon purchase by Jim Walter's Celotex Corp. unit violated section seven of the Clayton Act. The FTC had sought divestiture of five roofing plants and a Canadian asbestos mine.

But the U.S. Fifth Circuit Court of Appeals in New Orleans held that the FTC failed to support by substantial evidence the appropriate geographic market by which the acquisition must be judged as to any anti-competitive effect.

Jim Walter, a maker and seller of homes and building materials, had contended that the acquisition intensified rather than weakened or constrained competition.

Noted Architect To Open RIEI Seminar

The Roofing Industry Educational Institute has announced that the opening speaker for the Tarrytown, New York roofing technology seminar to be held January 19-23, 1981 will be Mr. Gustave R. Keane, FAIA. Keane is a consulting architect, a member of the American Institute of Architects, National Contract Documents Review Board, Building Research Committee, American Society for Testing and Materials, and is listed in Who's Who in America.

Keane has lectured at the National Academy of Sciences, Wisconsin University, PRATT Institute, Cooper Union and many other professional seminars. He is director of the National Board of Accreditation and the Building Research Institute.

He has published a long list of papers, including "Roof Coverings of the Future." The Roofing Industry Educational Institute feels fortunate to have Mr. Keane open the Tarrytown seminar and suggests that regis-

continued

trations be sent in early to avoid disappointment since attendance is limited.

Registrations and additional information may be obtained by contacting:

Susan Mathews, Business Manager
Roofing Industry Educational Institute
6851 S. Holly Circle, Suite 250
Englewood, Colorado 80112
(303) 770-0613

SBA Reconsiders Standards Change

The Small Business Administration (SBA), which wants to adjust its standards for determining which businesses are small and therefore eligible for its assistance programs, is going back to the drawing boards. Proposed new size standards, published by the agency in March, have been discarded and a round of new comments is being solicited. More than 1,500 comments on the original plan convinced the agency that it needs to reconsider a number of elements of the proposal, including the most basic: whether to base size eligibility on a company's income or its number of employees.

In announcing its new solicitation of views, SBA notes that companies in the construction industry are arguing that the "use of an employee rather than an annual-sales measure of size would encourage companies to subcontract work and thus avoid accounting for the actual number of employees involved." Many companies seek the small business designation to become eligible for set-asides, low-interest loans, access to bonding and other benefits.

The whole issue has grown to larger proportions than SBA had anticipated when it opened the door. Even Congress may get involved. A bill now pending would specify that the agency could not "promulgate, amend, or rescind any rule or regulation with respect to size standards prior to March 31, 1981."

Survey Shows Basic Materials Execs Ranked 5th In Total Competition

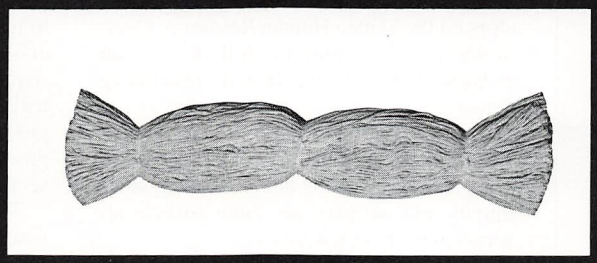
Salary and bonus payments to top management in the basic materials industry increased 9.8 percent to an average of $288,500 in 1979, according to a new survey of executive compensation conducted by Arthur Young & Company for the Financial Executives Institute.

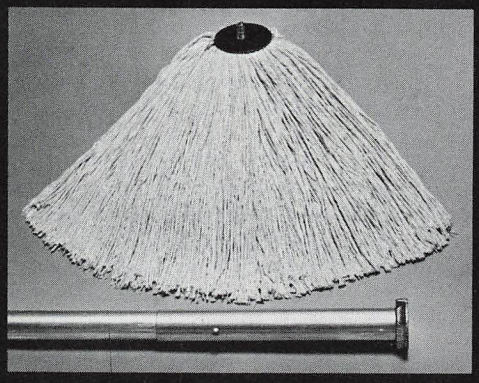
The survey points out that although the basic materials industry ranked sixth in increases total cash compensation, it ranked fifth among 15 industries studies in average total compensation.

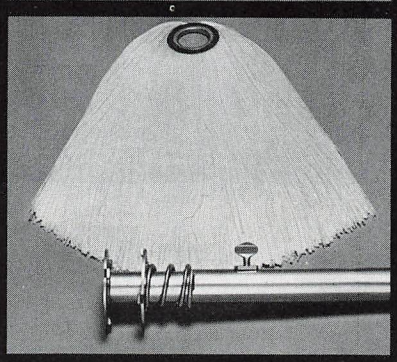
Chief executive officers in the basic materials industry were paid $391,100 in average total compensation in 1979—an increase of 10.4 percent over the previous year, and were ranked fourth among the 15 industries studied.

Chief executives in chemical and petroleum companies averaged the highest total cash compensation in 1979, at $454,200. The second highest paid group of senior executives was in the machinery and fabricated metal products industry, with average total cash compensation of $417,900. The lowest paid CEOs were reported in the utilities area, where average cash compensation was $191,300

QUALITY PERFORMANCE DURABILITY







KING KOTTON OFFERS A COMPLETE LINE OF TOP QUALITY ROOFING APPLICATOR PRODUCTS.

King Kotton offers a complete line of roofing applicator products ranging from the **100% cotton Hanks** to the **BIG YELLOW**, the toughest mops ever made.

From **fiberglass** mops to the **Rollercoaster** mop and rugged **roofing brushes**, **brooms** and **cotton or glass membranes**, King Kotton is sure to have the proper equipment to fill all of your roofing applicator needs.

Only top quality materials go into King Kotton's roofing applicator line insuring the performance and durability that is required of all products carrying our name.

For the name of a distributor in your area or to place an order call us toll free 1 (800) 241-7371. In Georgia call (404) 622-1551.

KING KOTTON®
ROOFING YARN CO.
A Division of Wilen Manufacturing Co.
430 Englewood Ave., S.E., Atlanta, Georgia 30315

Washington Report

NRCA Legislative Update

by William M. Drohan
NRCA Washington Representative

On October 2nd, the 96th Congress recessed in order for the members to return home to campaign for reelection. They are due to return after the election on November 12th, 1980 for a lame duck session to finish work on federal appropriations for executive agencies. In effect, the majority of the legislative work on issues facing the roofing industry has been completed. It is now time to take a look at the effect of the 96th Congress on the roofing industry.

OSHA REFORM

S.2153, "Occupational Safety and Health Improvements Act of 1980," was introduced by Senator Richard Sweiker (R-Pa.). Essentially, this bill would establish a system of performance-based exemptions for employers demonstrating a good safety record.

Legislative hearings were held in April and NRCA submitted comments for the record in favor of this bill. A great deal of discussion was generated in the business and labor communities regarding the concepts embodied in S.2153. Organized labor viewed any attempts at reform as a smoke screen proposed by business that would result in severe weakening of OSHA's enforcement powers. Due to organized labor's heavy lobbying efforts, the majority of Senators on the Senate Human Resources Committee turned against the bill. It was not brought to a vote for fear of resounding defeat.

The issue of OSHA reform will be brought before Congress next year. OSHA reform is a major issue in the entire business community and we may see some positive reforms in the next few years.

SBA PROPOSED SIZE STANDARDS

The Small Business Administration has proposed new size standards for businesses to qualify for small business set-asides. With regard to roofing contractors, the proposal would classify a contractor as "small" if he has less than 50 employees. At present, the current size standard classifies roofing contractors with an annual sales volume of under $5 million as "small."

As a result of the proposed size standards, SBA and the Congress have been innundated with comments. In an effort to assess the situation, Congressman LaFalce, (D- N.Y.) Chairman of the House Subcommittee on General Oversight and Minority Enterprise, held hearings this summer. NRCA presented testimony pointing out the inadequacies of the proposed size standards.

As the result of the oversight hearings, Congressman LaFalce recommended that the SBA rethink their entire proposal. With that criitique in mind, the SBA extended their comment period an additional 45 days to further assess the proposal.

ERISA

This year, NRCA was heavily involved in efforts to pass the "Multi-employer Pension Plan Amendments Act of 1980." Efforts were successful, and President Carter signed the bill into law on September 26th.

Among other provisions, this law will allow a roofing contractor to withdraw from an ongoing pension plan without incurring any withdrawal liability payments.

WORKER'S COMPENSATION MINIMUM STANDARDS

In the 96th Congress two bills, S.420 and H.R.5482, were introduced with the intent to replace the present state system of worker's compensation schemes with a set of required federal minimum standards. This legislation was suported by consumer groups, organized labor, and public interest groups, but was unanimously opposed by all sectors of the business community.

The Members of Congress were not convinced on the need for such a program, and this legislation did not make much progress in the 96th Congress. Organized labor will continue to build its case for this program and will continue to push it before Congress in years to come.

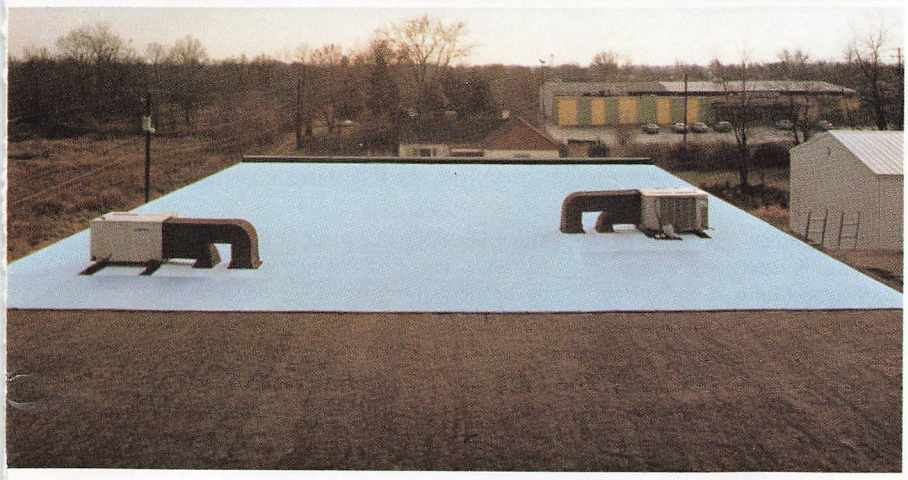
DAVIS-BACON ACT

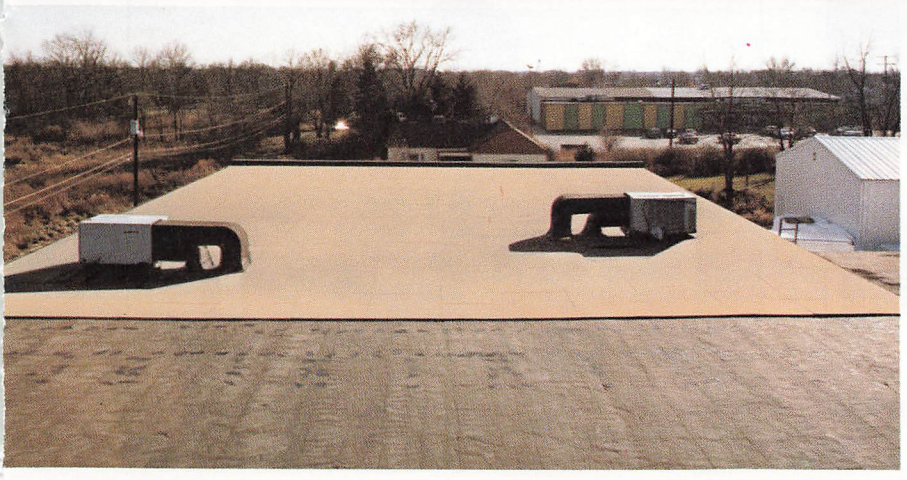
The Davis-Bacon Act has once again been the focus of attention. Organized labor steadfastly supports Davis-Bacon and works to apply it to all new federal construction appropriation bills. Most business groups oppose it as inflationary and work towards repeal.

House and Senate Labor Committees are cool to the idea of Davis-Bacon repeal. The Davis-Bacon statute emanates from these committees and chances for repeal appear to be slim.

This year, Senator Jepsen (R- IA) included an amendment to S.2080, the Public Buildings Construction Act, which would exempt 10 percent of all projects from Davis-Bacon. This amendment was tabled 48-34. The most recent effort at reform is Congressman Robin Beard's (R- TN) House Resolution 9, which asks President Carter to exercise his power and declare a national emergency due to high inflation and suspend Davis-Bacon as an inflation fighting strategy. This Resolution has 20 co-sponsors.

In retrospect, it has been a busy legislative year for NRCA. Although we may not have many tangible victories to point to, we have made our position known on all issues that affect roofing contractors.





ROOF TO ROOF PROOF: YOU GET MORE INSULATION FOR LESS WITH EPS.

Dollar for dollar, you get more roof insulation with EPS than with any other material. Not only more coverage, but better R values, too.

Let's compare roof to roof. Two inches of EPS insulation has a greater R value than one-inch Styrofoam RM, one-inch urethane foam or 15/16″ fibrous glass board, yet costs much less. So, for the same money, you can insulate better, and—as seen in the photos—cover a greater area, too, with EPS.

Sturdy EPS is lightweight, easy to handle and install. And it's readily available from over 175 independent quality manufacturers nationwide in a broad range of sizes, thicknesses, and shapes. You can even get pre-tapered EPS insulation that improves roof drainage while it insulates.

So get the most for your money. Use EPS, the greatest insulation value in roofing.

Get more, spend less with EPS.

MATERIAL	COST/ SQ. FT.*	R VALUE	COVERAGE @ $1195
2″ EPS	23.9¢	7.8	5000 sq. ft.
1″ Styrofoam RM	27.8¢	5.0	4299 sq. ft.
1″ urethane foam	31.9¢	6.2	3746 sq. ft.
15/16″ fibrous glass board	26.6¢	3.8	4492 sq. ft.

*Estimated average manufacturer's published price per square foot based on a random survey of roofing contractors conducted by the Bureau of Building Marketing Research, October 1979. Actual prices may vary.

Expanded polystyrene (EPS) insulation is combustible and should not be exposed to flame or other ignition source.

EPS
EXPANDED POLYSTYRENE INSULATION

ARCO Polymers, Inc.

Subsidiary of Atlantic Richfield Company
Pipeline to plastics.
Manufacturer of DYLITE™ expandable polystyrene.

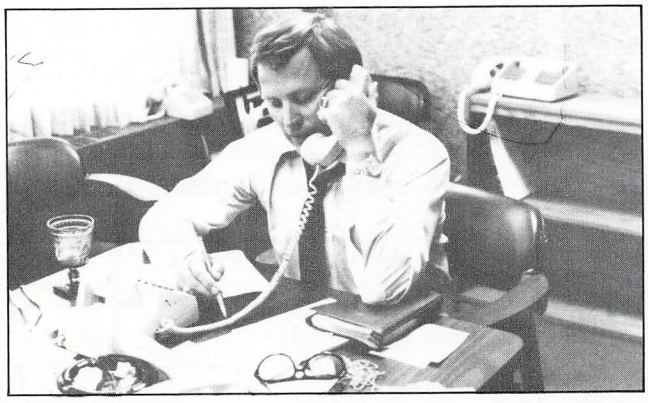
NRCA Welcomes Its 2000th Member

by David Honaker

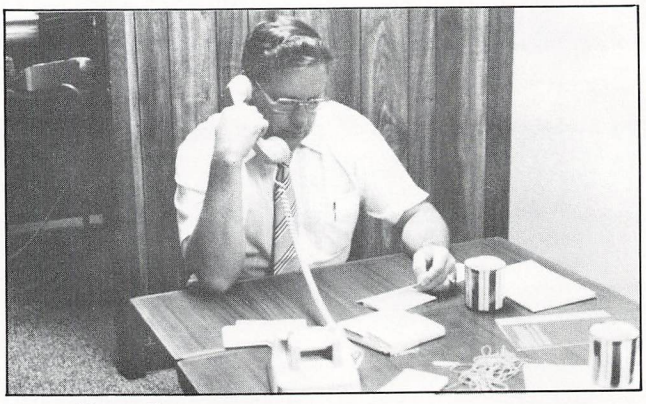
In a spirited effort, NRCA's Phone Team recruited over 100 new members in less than a month—an NRCA record. Leading the team, John Carruth signed up NRCA's 2000th member, Albert's Roofing Company.

Most Successful Phone Days Session Yet
"It might not seem like it, but these Phone Days are hard work," said Charlie Raymond. "You can get sorer talkin' on the phone all day than if you went out and climbed ladders all day instead."

Anyone assuming that recruiting new members by phone is a relaxing endeavor should talk to Wayne Mullis, Charlie Raymond, John Carruth, Joe Rutkoski, Bud Ruff, Steve Krupnik, or Gene Scott, members of NRCA's special Phone Team. They know what it's like to sit in the same chair for hours at a time, calling people they've never met before, repeating the same information at least 100 times, and trying to present the information in a fresh and lively manner to each person, all the while leaving

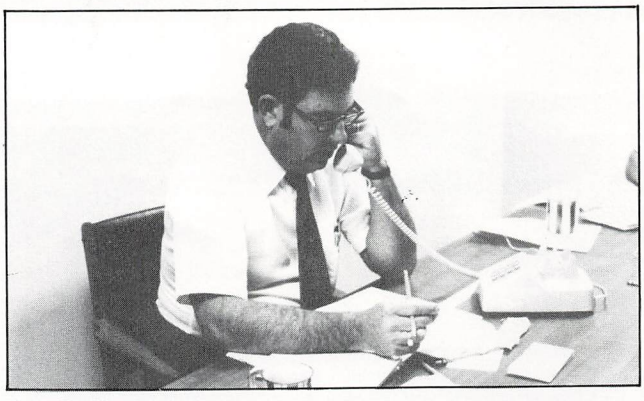


Wayne Mullis
"The work NRCA is doing benefits our members and our industry."



Steve Krupnik
"We are involved in research projects to test new materials and techniques."

Joe Rutkoski
"We are developing college level educational materials for architectural and engineering students."



Bud Ruff
"New apprenticeship training materials and programs are being developed."

their own businesses to operate without them for a few days.

Their reward is the satisfaction of seeing the association grow as a direct result of their efforts and the knowledge that the improvements made in the industry by NRCA will eventually be felt in their own businesses when "it all comes back home."

The most recent session of Phone Days was the most successful session yet held, surpassing the expectations of everyone involved in the event. As Phone Days began on August 18, 1980, NRCA showed a membership count of 1927 members. After two days of phoning prospective members, the team of phone recruiters returned to their businesses and awaited the results of their efforts.

Many of the firms contacted said that they definitely wanted to become members. A larger number said they were definitely interested in becoming members and would like more information. Only a percentage of firms from both groups would actually follow through by sending in their membership applications and dues checks. The follow-up mailings were sent out, the guesswork ended, and the mailman would, in essence, be the judge.

In previous Phone Days sessions, the percentage of actual new members gained was very small, less than 10%, in fact. As Steve Krupnik noted, however, "Each time we do this, we get a little bit better."

The results this time were more successful than anyone had dared to expect. Within one month after the last phone call had been made, 130 new members had sent in their application forms and membership dues, reflecting a 40% return rate and putting NRCA over the 2000 member mark.

"We don't intend to stop here, though," said Gene Scott. "We're meeting again to make follow-up phone calls to all of those who said they were interested in membership but who haven't yet sent in their dues. The follow-up calls are something we haven't done before, and we should be able to gain a considerable number of new members this way."

John Carruth Recruits 2000th Member

Two years ago, when NRCA's membership count registered 1700 members, the NRCA Membership Committee established the 2000 Club, an elite membership recruiting team, named for the next membership milestone at that time, NRCA's 2000th member.

After the August 18th and 19th Phone Days session, as the membership count skyrocketed toward the 2000 mark, the phone recruiters made daily phone calls to NRCA headquarters to keep tabs on the membership count. The competition among the phone recruiters to sign up the 2000th member became intense as the member count moved past 1990. On September 5th an application was received from Albert's Roof-Company in Opa Locka, Florida. Appropriately, the application had been sent in by NRCA Director and long-time membership recruiter John Carruth. NRCA had reached its 2000 member milestone.

That Carruth would recruit the 2000th member was, perhaps, foreshadowed in the first session of Phone Days (August 18) when he kicked off the session on a productive note by delivering the applications and dues checks for three new members. In fact, when the member count passed 1990, John sent in membership applications and dues checks for nine new members in two days.

Carruth is no stranger to membership recruiting, as anyone associated with NRCA well knows. In 1973, he recruited 58 members, and to date for this year, he has personally signed up 39 new members. John sums up his philosophy for recruiting new members by saying, "I just tell a prospective member about what our association has to offer him—the new publications we're putting out, the work our technical committees are doing to improve the industry, our insurance programs, and our long range plans for things like apprenticeship training and testing and research—and that with more members, we can offer more services and make even more improvements in the industry, and the rest is up to him. Everyone I talk to is interested in membership once they find out about the work NRCA is doing. Another important point I've discovered is that a lot of contractors like the feeling of being part of a 'team,' so to speak, so they can call on a fellow member of NRCA for assistance if they need it or work with fellow members to solve problems and see improvements in their area."

NRCA's 2000th Member

NRCA welcomes Albert's Roofing Company of Opa Locka, Florida, as its 2000th

NEW MEMBERS OF THE 2000 CLUB

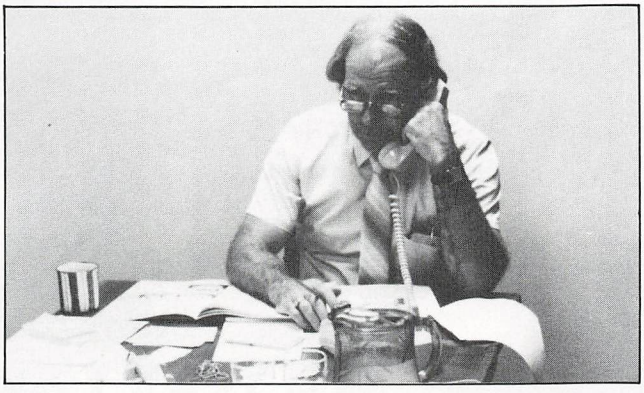
Having signed up 5 new members in a one year period, the following contractors have become the newest members of the 2000 Club:

Steve Krupnik
Krupnik Bros., Inc.
Glen Burnie, MD

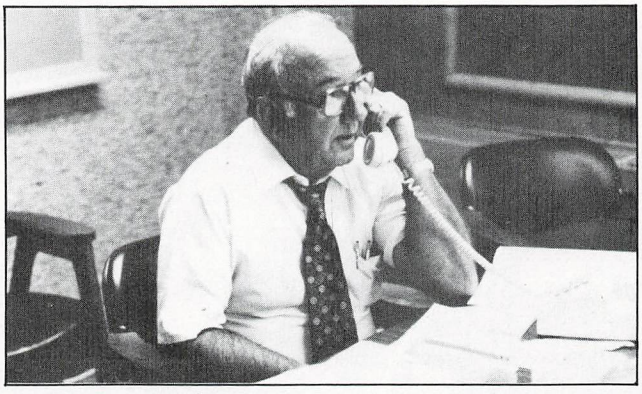
Bob Therrien
Al Melanson Co., Inc.
Keene, NH

Gene Scott
Empire Roofing Co.
Chicago, IL

The 2000 Club has recruited 340 new members since March 1, 1979.



Gene Scott
"Our health and safety committee sponsors regular safety contests."



Charlie Raymond
"Our publications, such as HARK and the forthcoming manual, are valuable contributions to the industry."

continued on page 21

OUR GLASS PLYSHEET HAD TO GO THROUGH SNOW AND HEAT AND GLOOM OF NIGHT BEFORE IT COULD GET TO YOUR ROOF.

GAF'S EXTENSIVE FIELD TESTING GIVES GAFGLAS™ PLY 4 AN EDGE OVER THE COMPETITION.

Gafglas Ply 4, our newest glass roofing product, is now ready for national distribution. But it had to go through all kinds of abuse first. On our roofs, in the great outdoors.

We tested its ability to weather the effects of harsh climate changes. How well it resisted moisture or other harmful elements that could cause premature failures. And made sure it was easy to apply, even under extreme conditions.

This rigid testing ritual is the reason Gafglas Ply 4 has actually exceeded ASTM specification D2178 and UL requirements.

In fact, all our glass built-up roofing products—from our glass vent-plys and standard base sheets to our ply and cap sheets—never leave our hands without being tested both on our roofs and in our labs.

What's more, when you specify GAF Built-Up Roofing products, our highly trained team of experts are at your disposal for technical assistance as well as in-put for job specifications.

So next time you need a glass plysheet, or any glass built-up roofing product, put Gafglas to the test.

Heaven knows we have.

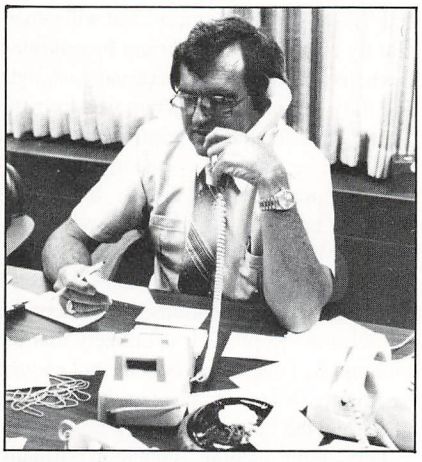
GAF® GAFGLAS™
BUILT-UP ROOFING PRODUCTS

ALL YOUR BUILT-UP ROOFING NEEDS ARE UNDER ONE ROOF.

member. Paul Albert opened Albert's Roofing Company in 1975. His company specializes in reroofing and roof repair. Though his firm is small, Albert does a large volume of work in the Opa Locka area. He prefers to maintain a small firm rather than expand into a larger and more complex operation. He says, "There's plenty of business here for everyone. With a smaller firm, I feel I have more control over our work, and I feel closer to the work itself than if we were a larger company. For me it's important to feel directly associated with roofing. If Albert's expanded, I might not be as directly involved with the work as I am now."

When notified about becoming NRCA's 2000th member, Albert responded, "I'm just glad to join NRCA. I've known about NRCA for a long time. When I talked to John, he showed me how my business could be improved with the publications and services offered by NRCA and how NRCA could be instrumental in helping organize our industry as its membership increases. The organization idea really appealed to me. Organization is the key to the success of any operation, and our industry needs to be better organized than it is now. We also need to educate roofers and designers about roofing and the roofing industry.

With all of the people involved in our industry—the contractors, manufacturers, owners, architects, designers and roofers—we need a control force working to organize all of these people so that we're all working together, in a spirit of competition, to be sure, but with one another instead of against one another, toward a common goal of installing quality roofs at a fair price. NRCA as the national association can be that central force and that's why I feel that joining NRCA is important. I can do my part to help organize the industry by supporting NRCA's activities. And NRCA's work will improve my business, as well."



John Carruth
"We'd like you to become a member of NRCA for as our association grows, we are able to offer more and better services to our members and make more improvements in the roofing industry."

Looking Ahead

Having reached this important 2000th member milestone, NRCA moves on toward its next milestone of 3000 members. That would seem to be a long way off, but as NRCA's reputation spreads, as its membership increases, as the work it is doing begins to make its impact in the industry, perhaps the words of Joe Rutkoski will prove to be prophetic. Rutkoski says, "Once we get the ball rolling, once people begin to see what we're all about, we could expect to see a kind of 'snowball' effect in membership. There are still a lot of firms out there who don't know what we're doing and what we can do. We've really only scratched the surface of our membership potential."

Application Techniques for Glass Fiber Roofing Felts

by Richard Baxter

As glass fiber roofing reinforcing materials for bituminous built-up roofing membranes become more prevalent in the industry, we can anticipate that "problem" jobs will increase. There is usually a direct correlation between a type of material installed and the "problem" rate. I distinguish between "problem" and "failure" since the word failure connotes overall deterioration. The basis for this article is not how roofs fail, but rather how to avoid the installation problems which would eventually contribute to the "failure." Glass fiber reinforcing materials are now available from virtually every major manufacturer of bituminous roofing materials. Every indication is that the glass fiber market share will increase substantially over the next few years—probably until they enjoy approximately 50% of the total reinforcing material market.

Glass fiber roofing materials have become a "commodity" item in distribution channels and in manufacturers' marketing concepts, and less and less application assistance will be available from the manufacturers—not because they wouldn't like to help, but because they can't possibly reach all the contractors and mechanics who will have glass fiber roofing materials available to them for application. The application "do's and don'ts" included in this article are intended to help those contractors who have experienced problems with glass fiber reinforcing materials in the past and those contractors who are unfamiliar with the working and handling characteristics of glass fiber roofing reinforcing materials to better understand the properties of glass fiber felts and avoid some of the pitfalls in the use of these types of material.

Moisture Effects

The concept of the bituminous built-up roof has always been a building up of waterproofing bitumen between the layers of reinforcing plies. In the early days of bituminous built-up roofing, organic sheets provided the main means of reinforcing the waterproofing bitumen. In the evolutionary process of reinforcement development, asbestos felts were introduced as an alternative to organic reinforcing materials which were subject to deterioration from the effects of moisture. A common attribute of the two materials was that both of the reinforcing sheets were inherently water resistant and would not allow the passage of free water through the sheet.

As entrappment of moisture and air between the reinforcing plies resulted in blistering of the roofing membrane, manufacturers introduced "perforation" of the solid sheets to allow the escape of blister-forming gasses. Even perforated organic and asbestos sheets were relatively water resistant and did not altogether solve the problem of interply blistering. The fact that organic and asbestos reinforcing materials turn water made it possible for the roofing mechanic to install the reinforcing materials over non-uniform applications of waterproofing bitumen (e.g. strip mop) without creating an immediate leakage problem. True, one or two years later the roof was so badly blistered that extensive repairs were necessary, however, there was no "immediate" leakage problem. One of the great attributes of glass fiber reinforcing materials is their natural porosity which allows the continuous release of gasses from between the reinforcing plies and results in a homogeneous, reinforced bituminous waterproofing membrane. The incidence of interply blistering in glass fiber reinforced built-up roofing membranes is minimal and is perhaps only likely to occur when the membrane is installed directly over urethane type roof insulation (which is the subject of much controversy at the present time). The natural porosity of glass fiber reinforcing materials is a very desirable property, but it allows no room for error and non-uniform applications of waterproofing bitumen.

If we understand the concept that in the hot or cold applied bituminous built-up roof the waterproofing material is in fact the bitumen which is applied between layers of reinforcing materials, i.e., the plies are incorporated only to stabilize or act as a reinforcing matrix for the waterproofing bitumen, then it is easier to understand why the adequate uniform applications of waterproofing bitumen are absolutely critical to the immediate and long-term performance of glass fiber reinforced built-up roofing membranes. If the naturally porous reinforcing sheet is not sealed completely by the application of the waterproofing bitumen, a glass fiber "filter" is constructed by the roofing mechanic which results in immediate leakage through the roofing membrane. There is no "grace period" while blisters are forming and becoming damaged as there might have been in the application of an organic or asbestos reinforced roofing membrane. The photographs tell the story of why some contractors will experience immediate leakage problems if a great deal of care is not exercised in the application of the waterproofing medium in the construction of glass fiber reinforced built-up roofing membranes.

Overcoming Displacement Problems

If the waterproofing medium is uniformly applied between the reinforcing plies in adequate quantities, there is still the problem of keeping the waterproofing medium in place—or preventing its displacement. In understanding this concept, the glass fiber reinforcing material acts as a stabilizing matrix for the waterproofing bitumen. Even on steep slopes (provided the appropriate grade asphalt is used), it is not likely that the interply moppings will "run" from between the glass fiber reinforcing plies. However, "point-loading" during the time of application will almost inevitably result in forcing the interply moppings from between the reinforcing plies. Glass fiber mats have a substantial (or strong) memory, and will generally try to achieve equilibrium by returning to their original position (usually straight and flat). When the load is removed from the built-up membrane, the reinforcing material will exercise its memory and assume its installed position even though the waterproofing bitumen has migrated away from between the plies at the point of the load. The waterproofing bitumen takes its "set" as it cools leaving a bitumen void between the reinforcing plies. It is unlikely that the bitumen will ever again become hot enough to flow back into its position between the plies, and the "void" lives on.

This "point-loading" condition is usually caused by a mechanic standing on the newly installed roofing membrane for prolonged periods or by leaving wheeled equipment in one place for any length of time on the newly installed roofing membrane. Once the thermoplastic bitumen has taken a "set," it is unlikely that this displacement phenomenon will occur under normal foot and equipment

traffic. It is only during the immediate application phase while the bitumen is cooling from its application temperature of approximately 400 degress F. that this type of damage is likely to be sustained. It is important that the mechanic understand that if he is going to rest or wait someplace that he do so on the insulation or the deck—neither of which are usually subject to the same kind of deformation—until the waterproofing bitumen has had a chance to ''set up'' between the plies. This ''set time'' is obviously a function of ambient temperature and temperature of the bitumen at the point of application. The ''set time'' for steep asphalt may be as little as fifteen minutes at 30 degrees F., but may be as long as forty-five minutes in 90-100 degree F. ambient temperatures under sun load. During this ''set time,'' it is essential that foot and wheel traffic be minimized to insure that interply moppings are not displaced.

This displacement of the interply moppings also occurs with other types of reinforcing materials, but since these materials are capable in themselves of turning water and have only a fraction of the ''memory'' of glass fiber reinforcing materials, immediate leaks are not noticeable. With glass fiber reinforced membranes the leakage is immediately apparent and very often when the phenomenon of bitumen displacement occurs, the finished roofing membrane will leak before the contractor has a chance to complete the job. Locating the source of these ''dripping'' leaks can be a frustrating and difficult task—especially if an aggregate surfacing material has been installed.

Displacement of the interply moppings can occur after the initial application also. This type of dislocation almost invariably occurs in areas where wood or steel sleepers have been installed directly on top of the roofing membrane to act as supports for heavy roof-mounted equipment. If wood or steel sleepers must be set on glass fiber reinforced roofing membranes, it is critical that the load be distributed over as wide an area as possible. It is also a good idea to flash around these sleepers to insure that the flashing provides a bituminous seal around the immediate area of the load to prevent entry of water to the roofing system beneath and immediately adjacent to the source of the load.

Generally, the smaller the roof area, the more difficult it becomes to avoid displacement of waterproofing bitumen from between the reinforcing plies during the time of application. The waterproofing bitumen never has a chance to set up before the bitumen applicator is turned around and running in the other direction. This will almost invariably result in some displacement of the reinforcing material as well as the displacement of the waterproofing bitumen. This becomes a frustrating experience for most roofing mechanics, and the more frustrated the mechanic, the less the chances for a successful application. When working in confined areas, mechanics must learn to allow the bitumen to take a ''set'' before proceeding with the application. In many cases there is other work that can be accomplished while giving the waterproofing medium time to ''set up.''

The ''Floating'' Myth

There has always been a misconception in the trade that glass fiber reinforcing materials ''float.'' Since the specific gravity of glass is substantially greater that that of bitumens, it is physically impossible for glass

continued

fibers to ''float'' in either hot or cold applied bitumens. This concept seems to arise from the fact that glass fiber reinforcing plies will move laterally during the time of application or that they are easily displaced by traffic during application.

Mechanics must get out of the habit of walking on glass fiber felts while ''kicking them in.'' The fastest and surest way to create fishmouths in a glass fiber reinforced membrane is to try to walk behind the roll (it's also a good way to make one's boots much heavier). If the mechanic can master the technique, the best way to avoid most of the problems discussed so far is to set and kick the roll from the insulation or deck side of the roll. Most mechanics complain of difficulty in following the laying lines from the opposite side of the roll, but it can be done. It's just different! The practice of ''backlining'' virtually eliminates the necessity to walk on the newly finished membrane.

Brooming Not Needed

Brooming is a concept that may fade into the sunset as more people come to the conclusion that ''brooming-in'' glass fiber reinforcing materials is not as essential as when using organic or asbestos felts. If the bitumen is close to the proper application temperature, glass fiber felts are enveloped by the waterproofing bitumen without any additional pressure. The original idea behind ''brooming'' of felts was to try to eliminate entrapped air from between the plies. The natural porosity of glass fiber felts makes this concept less essential than with organic or asbestos felts (the exception may be the glass fiber base sheets available from some manufacturers).

Even though disavowing the ageless concept of "brooming-in" may sound like heresy of the first order, most of the things about ''brooming'' glass fiber felts are generally bad. As the waterproofing bitumen envelops the glass fiber mat, the coating asphalt ''remelts'' into the hot bitumen application, and the hot bitumen bleeds through the naturally porous sheet, the bristles on the broom become laden with bitumen and parting agent (from the finished felt). The distribution of the foreign material is never uniform, and within a few minutes the broom head is heavy, unwieldy and is usually displacing interply bitumen under one or possibly two massive accumulations of hardened bitumen.

If your specifications require ''brooming'' of a glass fiber reinforced built-up roofing system, try a 36'' wide squeegee instead of a broom. The squeegee should be ''pulled'' over the felt rather than pushed—the weight of the squeegee head is more than adequate to insure embedment of the plies. The squeegee head can be cleaned of foreign material often without damaging the implement and the end result will be an even pressure of the reinforcing material to achieve maximum contact to the plies with the waterproofing bitumen. ''Squeegeeing'' should replace ''brooming'' when glass fiber reinforcing plies are installed with a feltlayer or on very windy application days when the lighter glass fiber material may be difficult to set. There is little need to ''broom'' or ''squeegee'' when rolls are ''kicked in'' behind bitumen applicators or hand mopping.

"Brooming is a concept that may fade into the sunset..."

Bitumen Quantity

The most common statement from roofing mechanics is that they can't get the quantity of bitumen required by the specifications between the plies. Bitumen quantity between the plies is a direct function of application temperature of the waterproofing bitumen. Most foremen will run the kettle ''a little on the hot side'' since this usually makes application of the bitumen a little easier. By cooling the bitumen to the published EVT (Equiviscous Temperature), or usually 400-425 degrees F. for steep asphalt, more bitumen will stay between reinforcing plies as the roll is kicked out, and the interply moppings will probably ''miraculously'' come within published manufacturers' tolerances. Glass fiber felts can be read like a book by the experienced eye. If the coating asphalt is remelting uniformly as the roll is run out, if droplets of bitumen are showing on top of the ply, if the bitumen is bleeding out from both sides of the roll approximately ½''-1'' and is about the thickness of a nickel, if there is a solid wave of bitumen running in front of the roll about six inches wide and approximately ¼'' thick, and if there are no ''dry'' looking stripes or patches showing on the top of the ply sheet, then chances are very good that the application is acceptably within most published specification tolerances.

Application Temperature of the bitumen is critical to the proper installation of glass fiber reinforced built-up roofing membranes. Since most glass fiber reinforcing material is packaged in five square rolls, larger reservoirs on application equipment are desirable to insure that full runs of 180' are possible without ''stretching'' the available bitumen. Larger dispenser or fices are desirable to maintain productivity and still insure adequate interply moppings. When hand mopping, limit the mop ''throw'' to approximately ten feet for full interply moppings.

Drying In

There are many times when ''drying in'' is necessary before sudden impending inclement weather. In some cases when using organic or asbestos type roofing systems (although most contractors have learned better), this ''drying-in'' was accomplished using a base sheet or one ply of finishing felt. So long as the side and endlaps were properly sealed, the insulation and/or interior of the structure were protected from precipitation damage. Most glass fiber reinforced roofing membrane specifications over roof insulation do not include a base sheet. When the black cloud suddenly appears immediately overhead, there may not be a base sheet or other similarly impermeable material on the job to ''close in'' with.

It takes a minimum of two plies of glass fiber felt to insure that the ''dried-in'' area is watertight. Unless the insulation joints are taped, there will invariably be some minor gaps in the insulation board joints into which the first bituminous mopping will migrate. If one layer of glass fiber reinforcing material is run over the insulation, and the waterproofing bitumen is non-uniform because of migration into the insulation joints, precipitation moisture will filter into the roofing system in these areas. Therefore, it is necessary to use a minimum of two glass fiber reinforcing plies to insure that at least one continuous layer of waterproofing bitumen is in place to turn water.

Water Cut-Offs

For the same reason, water cut-offs cannot be constructed using glass fiber reinforcing materials. Even a surface mopping of hot bitumen will not insure that water will not migrate through some of the more porous areas of the reinforcing material. Nonperforated No. 15 organic felt makes a good cut-off material for closing in at the end of a day's work. It is relatively inexpensive, relatively impermeable, has good handling properties and reasonable puncture resistance to make the tie-in watertight. When using organic reinforcing material for cut-offs, the organic felt should be top-mopped to minimize the possibility of moisture being absorbed overnight.

It is impossible to remove all of the cut-off material which is adhered to the incomplete glass fiber roofing membrane. If the organic material absorbs moisture, when the glass fiber reinforcing plies are installed over the organic felt at the tie-in, there is a

high probability that a longitudinal blister will develop when the glass fiber reinforcing material separates from the moist organic material used for the cut-off. By protecting the organic material with a surfacing of bitumen, the possibility of this phenomenon occurring is minimized.

Flashings And Drains

A great deal of care is required in working glass fiber reinforcing plies around recesses at drains and cants at perimeters and projections. With organic and asbestos reinforcing materials, the roofing mechanic could generally force compliance of the reinforcing material with toe or foot with a reasonable degree of certainty that the reinforcing material would remain in place. When using glass reinforcing material, this is not a reasonable expectation. Glass fiber reinforcing plies must be cut at every change of plane to insure compliance of the material to irregular surfaces.

Even when a great deal of care is exercised, the "memory" of the glass fiber mat will often result in dislocation of the material at hard corners or around projections. It is nearly impossible to keep glass fiber mats in place at hard corners (interior or exterior) using any type of flashing cement. The memory of the glass mat will generally overcome the adhesive properties of the flashing cement and pull loose, resulting in a loose or bulbous flashing. Although the weathering properties of most glass fiber mats are superior, the handling and workability properties of the material for flashings present some difficult problems.

A good alternative to the use of glass fiber materials in flashing type applications is No. 15 asbestos felt and reinforced asbestos base flashing sheets. Although generally weaker in physical properties, the asbestos felts are generally very conformable to irregular surfaces and proper application results in fewer voids or frustrations for the roofing mechanics using glass fiber reinforcing material at hard changes in direction.

"Stripping in" with glass fiber reinforcing materials can also be a frustrating experience for a roofing mechanic inexperienced in the use of this type of material. Glass fiber mats' inability to conform to irregular surfaces will almost invariably result in fishmouths and voids in stripping plies unless a great deal of care is taken during this part of the application. All fishmouths must be physically cut out or the glass fiber mat should be completely cut and restarted at every perceptable change in direction. Obviously, stripping with glass fiber reinforcing materials at an uneven perimeter wall is a task for the truly patient mechanic. Here again, No. 15 asbestos felt provides a good alternative from an application and handling standpoint.

Fishmouths

Fishmouths provide a direct tunnel for water into a shingle-constructed built-up roofing membrane. When constructing a built-up membrane with organic or asbestos reinforcing materials, the mechanic could very often force compliance of the material and eliminate the fishmouths by "stepping" it down into the hot bitumen. The conformability of asbestos felt allowed this method of elimination very tolerably. Some types of organic reinforcement allowed elimination of the fishmouths by this method, but others had enough memory so that the fishmouths returned after a period of time.

Glass fiber reinforcing materials have too much memory to allow fishmouths to be "walked out." The mechanic may step down the fishmouth during the time of appli-

continued

cation only to have it reopen as soon as the waterproofing bitumen gets warm enough to release the glass fiber mat. Fishmouths will occur with a great deal of regularity in glass fiber reinforcing materials since the glass mat is inherently straight and does not tolerate lateral movement during installation.

Any fishmouth, whether it occurs on the exposure or the back side of the felt, should be cut immediately and the two ends embedded into the hot bitumen. A fishmouth on the exposure will form a tunnel for water into the roofing membrane and ultimately into the interior of the building. A fishmouth on the back side of the felt will result in a ridge developing perpendicular to the run of the reinforcing material after approximately two years. The roof should be checked prior to the surfacing application to insure that all fishmouths and voids have been cut and repaired. Fishmouths which are cut after the immediate application of the waterproofing bitumen should have at least one ply of reinforcing material set over the cut in the exposure in hot asphalt.

Surfacings

When constructing an aggregate surfaced roofing system, glass fiber reinforcing plies can be left unglazed and unsurfaced for a substantial period without fear of damage by moisture. Leaving the roof surface exposed accomplishes two very important things: 1) it eliminates the problem of aggregate being tracked by equipment into the new roof application causing voids between the plies, and 2) it allows the roof membrane surface to become hot enough under a direct sun loading to allow release of any entrapped moisture or air from the roofing membrane.

The use of glass fiber reinforcing plies on reroofing applications where an old aggregate-surfaced roof is being removed can be hazardous to a contractor's health. Care must be taken to insure that mop carts are free from aggregate which can be picked up by the mop and can be distributed along with the interply waterproofing bitumen. Even small stones or chunks of debris hold the reinforcing plies apart, creating a void in the waterproofing membrane which will never be closed unless the ply over which it was layed is cut and the object removed. Again the "memory" of the glass reinforcing ply will not allow conformation around any article over which the material is installed. If the ply is cut and the object removed immediately while the interply mopping is hot, the opening will become self healing. If the object is cut out after the interply moppings have set up, one ply of reinforcing material in a solid mopping of asphalt should be installed over the opened void.

Common Sense

What all these warnings boil down to is common good roofing practice for all types of reinforcing material used in the construction of bituminous built-up roofing membranes. Glass fiber reinforcing plies are very forgiving of moisture and have the capabilities of building the best available bituminous built-up roofing membrane, but they are very unforgiving of errors or shortcomings in workmanship.

As with any other type of material, the prudent contractor will select proven materials from reputable manufacturers and shy away from unproven materials or wild claims of unrealistic physical properties. The initial "black eye" for glass fiber reinforcing plies was actually a combination of marginal specifications and a lack of understanding by the roofing contracting community of the inherent limitations of the use of glass fiber roofing products. A lack of understanding of the materials is still prevalent in the field today, but most manufacturers recognize the need for specifications which provide adequate physical properties for the roofing system to perform satisfactorily for a substantial period of time. Beware of "marginal" specifications calling for less than two full interply moppings. If at all possible, sell specifications which include three or four interply moppings. Adding additional plies past the fourth will not necessarily result in a better roofing membrane.

"Failure to use extraordinary caution may result in some very frustrating experiences."

Application Tips

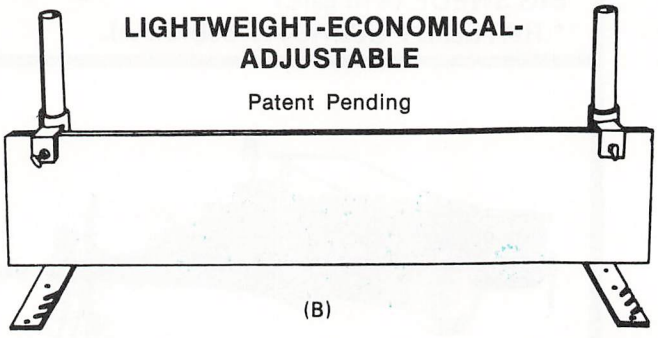
In summary, glass fiber reinforcing material is available today with physical properties which makes it capable of providing good long term service with the minimum possibility of deterioration of the reinforcing material and interply blistering. Most "problems" associated with glass fiber reinforced built-up roofing membranes must be eliminated by precautions in field application. To take full advantage of the capabilities of the glass fiber reinforced built-up roofing membranes, the roofing contractor should:

- Insure that no heavy objects (including bodies) remain in one place for more than a few seconds on the portions of the new roofing membrane where interply bitumen has not yet "set."
- Avoid working back across a newly installed fiber reinforced built-up roofing membrane.
- Insure that all fishmouths are cut and objects causing separation between the reinforcing plies are removed. Patch the areas if the cut is made after the interply mopping has set up.
- Not attempt to "dry in" with less than two plies of glass fiber reinforcing material.
- Not construct water cut-offs with glass fiber reinforcing material.
- Insure that interply moppings are uniform and applied at the nominal rate of 25-30 lbs/100 SF.
- Cut glass fiber reinforcing materials at all changes in plane. Do not attempt to "walk" down fishmouths in areas where the reinforcing material will not lay evenly on a given surface (drain recesses, cants at projections, etc).
- Install aggregate surfacing after completion of the entire roofing system—including flashings, accessory metal, etc.—by total sector if possible. Allow maximum sun exposure to "boil out" any minor areas of entrapped moisture or air.
- Insure that bitumen application temperatures are held relatively constant and are as close to the recommended EVT as possible to insure adequate, uniform interply moppings and good adhesion of the reinforcing plies.
- If "brooming" is required by the specifications, consider the use of 36" side squeegee instead of a bristle broom. Pull the squeegee over the felts from the deck or insulation side of the application process and clean the squeegee head regularly.
- When surfacing smooth roof specifications, apply only enough bitumen to "seal" the top of the glass fiber reinforcing plies.
- Prior to any surfacing application, carefully check the entire roof surface for voids or fishmouths.

Armed with these few precautions, some training of field personnel, and a conscientious look at materials and specifications, most contractors will find their experiences with glass fiber reinforcing materials very pleasant. Failure to use extraordinary caution in field application may result in some very frustrating experiences in chasing "drips" through an entire newly constructed roofing assembly.

Mr. Baxter is President of Carolina Roofing Service, Inc., Monroe, N.C. Among his many industry credentials, Mr. Baxter chairs NRCA's Energy/DOE Committee, and serves on the faculty of the Roofing Industry Educational Institute.

INCREASE PRODUCTIVITY
DECREASE COSTS
SAFELY --- EFFICIENTLY!
WITH P.A.L. PRODUCTS

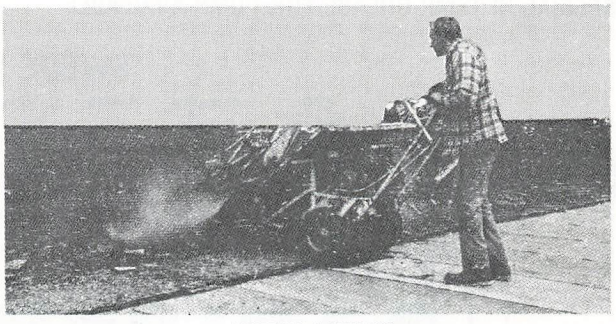


THE TEMPORARY ROOF PARAPET

- Lightweight, easy and fast to install and dismantle.
- Adjustable from dead-level to 10/12 pitch.
- Lower receiver will support toe board or can be adjusted to receive up to 22 inch width of plywood. (See Drawing B)
- Hold debris on roof level.
- Asphalt shingle can be installed over base and when dismantled strike plate and base will release.
- Also can be used for product storage on steep roofs, and roof bracket with working & storage area.

POWER CLAW . . . . .

The Power Claw assures a clean, modern, efficient removal operation to make your re-roofing jobs provide larger profit margins. Power Claws are now operating throughout the country, and has proven itself under the most adverse conditions. Therefore, may we suggest that you ask the Roofer who owns one to attest to the Power Claw's capabilities.



PATENT # 3542433

Write for more information on these P.A.L products . . . . .
"Engineered FOR the ROOFER . . . . . BY a ROOFER."

P.A.L. DEVELOPMENT CORPORATION

P.O. Box #127 **(414) 781-6870** **Butler, Wisconsin 53007**

THE "SWEDE" KETTLES

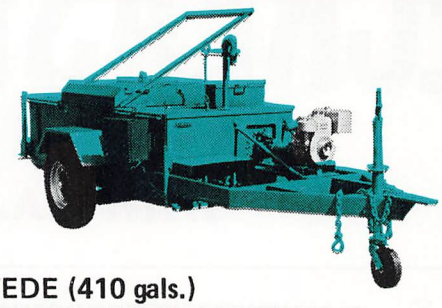
for greater productivity

Buy

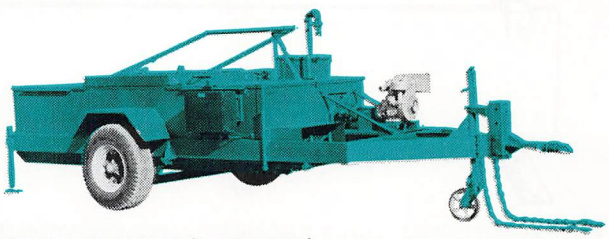
GARLOCK

Green

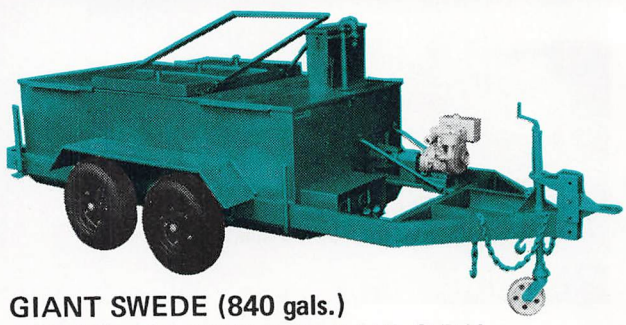
- SPECIAL HEAVY DUTY 10 PLY DAYTON THOROBRED TIRES WITH HEAVY DUTY RIM AND SPOKE WHEEL AND BRAKE DRUM (12 PLY - KING SWEDE)
- ADJUSTABLE TOW HITCH
- NO BURNER WELL - MORE USUABLE HOT - SAVES FUEL - ELIMINATES COLD AIR IN BURNER WELL
- LOADING HEIGHT 38" "BIG SWEDE"
  40" "KING SWEDE"
  48" "GIANT SWEDE"
- EASY ACCESS TO BURNERS - PUMP - ENGINE
- DOUBLE SAFETY CHAINS - WITH SAFETY HOOKS
- STAINLESS STEEL FLUE LINERS - COMPLETE COMBUSTION. NO DIRECT FIRE ON FLUES
- FLANGE MOUNTED PUMP FOR EXTERNAL SERVICING
- PUMP TO 150' PLUS AT FULL CAPACITY
- BREAK AWAY COVER - LEVER ACTION
- ADJUSTABLE SCREW JACK WITH SWIVEL CASTER
- LIQUID 100% AUTOMATIC OR SEMI AUTOMATIC AVAILABLE. (NO BATTERIES OR ELECTRICITY NEEDED)
- VERY HIGH RECOVERY RATE
- SPECIAL HI TEMP GREASE FOR PUMP AVAILABLE



BIG SWEDE (410 gals.)
* RATED BY USERS AT 600 G.P.H.



KING SWEDE (600 gals.)
* RATED BY USERS AT 800 G.P.H.



GIANT SWEDE (840 gals.)
*RATED BY USERS AT 1,100 G.P.H.

SWEDE KETTLE DATA

Model	Capacity (gals.)	LPG Burners	Kerosene Burners	Inside Vat.	Outside Vat.	Tire Size	Loading Ht.	Width Inside	Length Inside	Length Overall	Width Overall	Shipping Wt.
BIG SWEDE	410	GG4400 (2)	KB5454 (2)	12 ga.	14 ga.	8 x 14.5-10 ply	38¼"	46"	96"	178½"	74"	2,440 lbs.
KING SWEDE	600	GG4302 (2)	KB6402 (2)	10 ga.	12 ga.	9 x 14.5-12 ply	40"	53½"	117"	197"	83"	3,258 lbs.
GIANT SWEDE	840	GG4300 (2)	KB6400 (2)	10 ga.	12 ga.	8 x 14.5-10 ply	48"	53½"	118"	197"	83"	4,000 lbs.

MANUFACTURED BY

GARLOCK EQUIPMENT CO.

2601 NIAGARA LANE
MINNEAPOLIS, MINN. 55441
PHONE 612-553-1935

Designing for Solar Collectors

The point at which rooftop equipment supports penetrate or interrupt a roof historically has been one of the most vulnerable areas of the built-up roof. Although flashings that protect these areas represent only a fraction of the entire roof surface, they account for more than their share of problems. Many reports of leaks, paint failure, efflorescence and roof failure can be traced to poor flashing design.

Over the past decade, commercial and industrial rooftops began to be used more and more as equipment platforms. These involved a wide variety of mechanical, heating, air conditioning, plumbing, and electrical equipment, all designed for rooftop installation.

Problems associated with installation of these units are seen as serious, and requiring immediate action. The National Roofing Contractors Assn. (NRCA), in cooperation with equipment manufacturers, has drafted criteria for proper installation of this equipment. Presently, 25 manufacturers certify their equipment as meeting these standards.

NEW CHALLENGES

Solar power has presented roofing and roof deck contractors with a new and distinct challenge—a challenge which may dwarf past difficulties with HVAC equipment: installation of solar collectors on flat built-up roofing assemblies.

These roofs most likely are found on public buildings, schools, hospitals, offices, retail stores and commercial buildings. Many of these buildings qualify for some form of aid for installation of solar systems.

A few months ago, NRCA released a statement warning that improper or inadequate sign of supports, and necessary piping penetrations of solar collectors, could lead to severe roof damage and subsequent leakage. The wide response to this statement revealed the surprising depth of concern over compatibility of collector units and the roofing system.

Questions still remain over many design considerations associated with collector units. Only a detailed study will present us with answers. For now, NRCA recommends that designers treat installation of these systems with extreme delicacy.

While the achievement of compatibility between the roofing system and collector units will be time-consuming, a little extra effort would help prevent a good number of roof leaks. A review of the basics will help prevent a majority of problems associated with any type rooftop equipment installation, including solar equipment.

ROOFING PROBLEMS

Most problems involving rooftop equipment can be attributed to one of the following:

1. Structural framing of the roof deck is not designed to carry the weight of rooftop equipment. This causes decking to deflect—destroying adhesion between deck and insulation. This deflection also can create low areas in the roof, subject to consequent ponding. (Because of the weight of collector assemblies, most designers have calculated carefully loads imposed by solar installations; few problems involving actual structural loads have been reported.)

2. Improper flashing of pipes and electrical conduits that extend through the roof to service the unit is another problem. Again, if these penetrations are not properly designed the membrane can become water-soaked, leading to blisters, splitting, and delamination. (This is the area of greatest concern regarding solar installations, in which the number and nature of penetrations represents a quantum leap beyond anything yet seen on rooftops.)

3. Improper curb design also can allow moisture to penetrate the roofing system. If the unit is not watertight around the roof curb, water can enter the building directly, as well as penetrate the roofing system. (This is an area that is at present of only minor concern. Most solar collector arrays are not mounted on continuous curbs [such as commonly used for HVAC equipment, **Figure 1**], but are installed on legs which are in turn secured to equipment mounting curbs.)

4. The lack of provision for service walkways or adequate inspection space under the equipment is a further concern. Repeated rooftop traffic by maintenance and repair personnel can disturb the gravel or slag layer, exposing the membrane to harmful effects of moisture and the sun. Designers must include provisions for effective walkways, since heavy traffic must be expected on roofs with solar installations. (But these problems can be handled easily and with a minimum of delay by considering architectural effects of the collector assembly and support equipment. For installations in which collectors are mounted on legs, continuous support should be provided [see **Figure 2**]. This design is especially effective in distributing weight, a prime concern because of the aggregate weight of some collector systems.)

Curb Supports

Curb supports for solar collectors also must be designed to deal with movement of the collector array. For example, problems occur if support legs are attached with metal fasteners through a base plate directly to a wood curb. Water easily can penetrate holes caused by fasteners. Also, the back and forth movement caused by wind or heating of the collector array actually can exert enough force to dislodge the fasteners. As the support moves, cap flashing will begin to

continued

FIGURE 1.
Curb Detail For Rooftop Air Handling Units

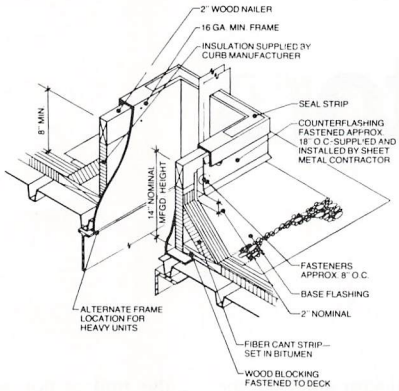


FIGURE 2.
Equipment or Sign Support

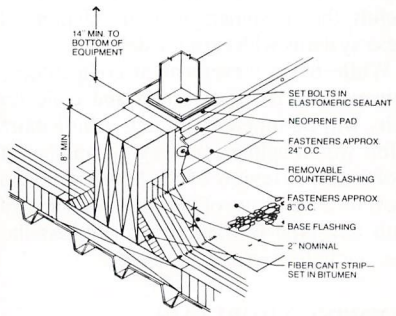
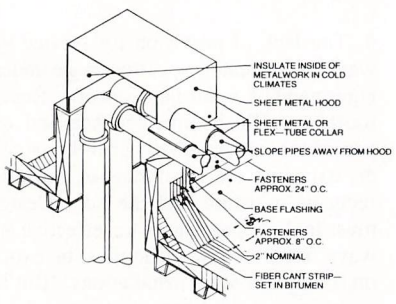


FIGURE 3.
Piping Through Roof Deck



suffer metal fatigue at the edges of the base plate. The importance of using a neoprene pad beneath the base plate cannot be overstated (see Figure 2.) It can act both to seal holes in the curb and to absorb some shock.

In order to reduce costs, designers sometimes specify the use of sleepers to support a retrofit installation of solar collectors. The benefits of such a design are dubious; they will lead only to large-scale roof failure. When loads are applied to sleepers over normal roof insulation, the sleepers will begin to compress the insulation and will sheer the roofing membrane. The end result: leaks, and plenty of ruined, water-saturated insulation.

Another serious problem results from interruption of roof drainage by collector supports. Most "flat" roofs are not completely flat. NRCA has for years recommended designers ensure there be positive slope to the completed roofing assembly to provide adequate drainage. If designers choose to use continuous curbs to support collectors, they unknowingly could cut off drainage. Acting as small dams, the curbs easily can collect substantial areas of ponded water.

Remember, roofing is not waterproofing. No roofing material is designed to withstand constant exposure to significant accumulations of water. The roof easily disintegrates, leaving a mess of blisters, splits, ridges and wrinkles. It is essential that adequate provision be made for proper flashing of all rooftop equipment, including service piping. This is especially true of solar collectors, with their need for numerous pipe penetrations.

Pitch Pans

Pitch pans or pockets are not recommended for any solar installation. These pans and pockets are by their design not intended to be continuously watertight. Frequently, these pans are used to protect penetrations of roof pipes. Any deterioration allows moisture to enter the building and the roof membrane, causing expensive problems for owners and contractors.

Avoiding specification of pitch pockets is made all the more imperative because of the numerous piping penetrations needed by some collector systems. Furthermore, the damaging effect of running hot and cold piping in close proximity through a pitch pocket is rapid and severe.

NRCA suggests designers use other methods for flash piping and similar penetrations, such as provision of metal hoods for all pipe penetrations (see **Figures 3** and **4**). Also, piping should be supported above the level of the roof.

As a rule, pitch pans and pockets require frequent inspection. A great deal of damage can occur before the leak around a pitch pan is noticed. Despite this, many designers are forced by cost pressures to specify the use of pitch pans; they view with reservation NRCA's continuing stand against the use of these construction details.

Collector Placement

Placement of collectors also can lead to problems. There has been some tendency in the field to put collector supports as close as possible to the roof edge in order to make maximum use of the roof. This results, unfortunately, in interference between the two sets of flashings (the collector support flashing and the flashing of the roof perimeter or parapet wall). This can be troublesome both during and after installation and there is a good chance neither flashing will perform effectively.

In those special cases where solar collectors have been mounted on curbs, the roofing contractor is responsible only for watertight connections to the curb of the rooftop units. They cannot be held responsible for water entering directly through the unit. The equipment manufacturer also should be able to guarantee that the seal between the top of the curb and the unit will be watertight (see Figure 1).

Roof maintenance, repair and replacement all must be considered directly in the

solar decision, as must the design of the collector assembly. If design of the equipment calls for support of all or part of the equipment on legs or piers instead of on a curb, special height requirements should be followed (see **Figure 5**). The roofing contractor must be able to get under the equipment to inspect or repair the roof membrane. The higher that collectors, piping, etc., can be mounted above the roof, the easier it is for him to do his job. Also, during the design stage designers must consider the eventual need for roof replacement. If collectors are placed too low to allow use of some mechanized roofing equipment, owners may be faced with a choice between re-roofing the building by hand or disassembling the collector system.

Low-mounted collectors also can act as snow fences, encouraging accumulation of additional snow. Heavy snow loads easily can damage the roof by deflecting the deck and breaking bonds between insulation and membrane within the roofing assembly. Extremely heavy snow loads also can lead to complete structural collapse. An easy way to ensure against such problems is to mount collectors high above the field of the roof.

Installation

The metal work for any equipment mounting must be above the highest water line on the roof, wherever possible. Designers must be careful to separate the fabric or felt of the flashing system from the metal portion of base flashings on curbs or hooded penetrations. Separation is necessary because metal has thermal movement characteristics different from those of felt or fabric. Any differential movement of these two portions is likely to cause tears or cracks in the fabric, the felt, or even the roof membrane itself, if the metal is attached to these materials in any way.

This can be avoided by requiring insertion of a wood nailer to separate metal and fabric. Where this is not possible, the felt should be nailed at intervals as close as three inches on center. With heavier gauge metals or extrusions, the metal should be attached so it is free to move without causing damage to the fabric of the flashing system.

Construction details also should specify use of wood nailers at eaves and at other terminal points of the insulation. These nailers provide protection for the edge of the insulation and anchor the roof against blow-offs. To be effective, they must be anchored securely to the deck system. Because of this, bolting is preferred.

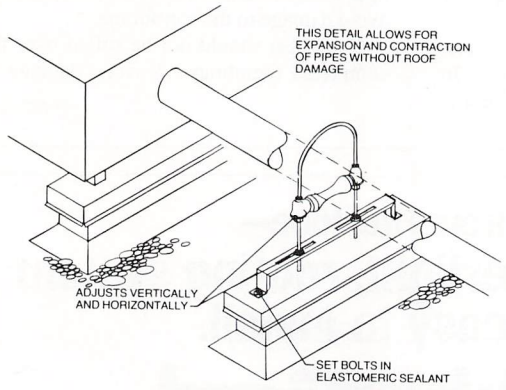
The use of treated wood for nailers also is discouraged. Oils used as a carrier for many common lumber treatments can act as an effective solvent on roofing materials. The damaged bitumen will dissolve in the presence of these oils, and can drip through any crack in the roof deck.

Special care is advised in storing unassembled collectors before construction. In new construction, it would be most desirable to have the collector system completed before any of the roofing work is undertaken. Where this is impossible (or during a retrofit operation) extreme caution must be taken to avoid damage to the membrane.

Units also should not be rolled over the completed membrane. Serious damage to

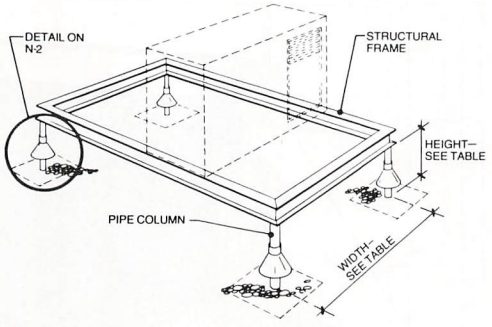
continued

FIGURE 4.
Pipe Roller Support Detail



NRCA REAFFIRMS ITS OPPOSITION TO PIPES AND CONDUITS BEING PLACED ON ROOFS. HOWEVER, WHERE THEY ARE NECESSARY, THIS TYPE OF PIPE ROLLER SUPPORT IS RECOMMENDED.

FIGURE 5.
Mechanical Equipment Stand



WIDTH OF EQUIPMENT	HEIGHT OF LEGS
UP TO 24"	14"
25" TO 36"	18"
37" TO 48"	24"
49" TO 60"	30"
61" AND WIDER	48"

the roof can result, even if no punctures occur. A failure in horizontal shear between the membrane and insulation or deck from these loads may result in a future split failure of the roof. Heavy crates of unassembled equipment can crush insulation and puncture roofing membranes if placed on the roof. Designers must be aware that the roof can be damaged during installation of the collector system.

THE PRE-JOB CONFERENCE

One practice which can help prevent problems associated with installation of solar collectors, and roof problems in general, is the pre-job conference. The American Institute of Architects, Associated General Contractors, and NRCA have recommended jointly that a pre-job conference be required well before construction. This conference should be attended by the owner, architect, general contractor, roof deck contractor, roofing contractor, architectural sheet metal contractor, solar equipment contractor, and a representative of the roofing and roof deck material manufacturers. A record should be made of the meeting and all decisions should be a part of the job record.

While this technique has been used widely for *new* construction, it is a good idea to consider a smaller conference in retrofit of a solar collector system. Such a retrofit conference need only include the designer, owner, roofing contractor, solar contractor, and representatives of the manufacturers of roofing materials and solar collectors. It is important to notify all parties involved in the original construction, since any unauthorized installation could void both the roofing contractor's guarantee and the roofing material manufacturer's bond.

At the pre-job conference, all specifications, details, and application requirements, plus the order of construction operations should be discussed. This not only will prevent future problems, but also will foster an attitude of cooperation. with the results of this meeting in writing, few questions should arise during job operation.

The pre-job conference offers an opportunity to discuss protection of completed work during the construction period, maintenance of the roofing system. The waterproof integrity of the roof should be assured. Thus, construction specifiers can aid in ensuring this integrity by actually writing a requirement for the pre-job conference into building specifications. (Request *"Roofing Highlights," no charge, from NRCA.)*

COSTS OF INDIFFERENCE

Failure to design solar systems in accordance with good roofing practices could well destroy the viability of solar heating and cooling for most non-residential buildings. Expensive roof repairs or complete replacement made necessary by improper design of solar collectors would make it impossible for building owners to recover their investments.

Also, well-meaning designers and contractors could find themselves facing a raft of litigation. Designers must be careful especially in this early period to insist that their installations meet the highest standards of compatibility with the roofing assembly. NRCA presently is working to develop new standards to address some of the special problems associated with solar collector applications on industrial/commercial roofs. For the moment, however, the techniques which have been dealt with briefly in this article represent a good start for any designer.

Mutual understanding, cooperation and education can lead to effective and economical roofing systems. NRCA hopes to assist specifiers in writing adequate roofing specifications to ensure sound and efficient roofs, providing years of trouble-free service to the owner and complaint-free performance for both the contractor and specifier.

NRCA's 94th Annual Convention and Exhibit

Convention Program

Tuesday, February 10
2:00—5:00 pm
Hospitality Center
A program on Phoenix will be presented. Refreshments will be served.

6:30—8:00 pm
Fiesta Welcome Party
Phoenix Civic Plaza
NRCA's President, Bill Kugler, will cut the ribbon officially opening the 1981 Exhibit. Strolling Mariachis will entertain as you enjoy champagne and take a first look at the booths.

Wednesday, February 11
8:00—9:00 am
New Member Breakfast

8:00—9:00 am Past Presidents' Breakfast

9:00 am—12:30 pm
Exhibit Hall Open

12:30—2:30 pm
Opening Luncheon
Keynote Speaker: Charles Kuralt, CBS News Correspondent, presenting "America Behind the Headlines."

2:45—3:45 pm
General Session: A point/counterpoint debate on current issues by political columnists, **James Kilpatrick** and **Shana Alexander.**

4:00—5:00 pm
Exhibitors Meeting
(Exhibitors only)
1982 Booth Selection

4:00—5:30 pm
Concurrent Business Sessions

Thursday, February 12
7:30—9:30 am
Member Breakfast
Speaker: Professor Ben Rogge, Wabash College, Crawfordsville, Ind., presenting "Can Capitalism Survive?"

9:30 am—12:30 pm
Concurrent Business Sessions

10:30 am—12:00 noon
Exhibitor Program
Speaker: Don Vaughn, President of the Trade Show Bureau and Executive Vice President of Freeman Decorating Co.

12:30—5:00 pm
Exhibit Hall Open

6:00—10:00 pm
Evening at Rawhide
An 1880's Western Town will be the scene for haywagon rides and a cowboy style steak-fry.

Friday, February 13
9:00 am—12:00 noon
Exhibit Hall Open

11:00 am—12:00 noon
Reconvened Convention Meeting
This year's event will be a Hawaiian cruise.

12:15—2:15 pm
Awards Luncheon
Presentation of Awards
Speaker: Dr. Laurence Peter, author of "The Peter Principle," presenting "The Peter Principle or Why Things Always Go Wrong."

2:15—2:45 pm
Member Meeting & Elections

3:00—5:30 pm
Concurrent Business Sessions

7:00—8:00 pm
Cash Bar Reception

8:00—12:00 am
Annual Banquet
Presentation of the J. A. Piper Award
Entertainment: Bob Newhart

Register Now

Business Sessions

The European Roofing Experience
Six NRCA members recently toured European countries and studied roofing systems, materials and workmanship. Those who will report their findings in Phoenix are: John Bradford, Burton Karp, Melvin Kruger, Wayne Mullis, Monte Upshaw, and John Zamrzla.

Single-Ply State-of-the-Art
An overview of the newest roofing systems will be presented by noted industry authority, William Cullen, National Bureau of Standards.

How Mediation Can Work For You
Joseph Stulberg of the American Arbitration Association will lead a dramatization of a roof failure dispute, showing the role of the mediator and the advantages of the Roofing Industry Mediation Service.

Why Should I Get Involved In Politics?
Hugh McCahey, of the U.S. Chamber of Commerce, will be joined by a contractor who's been involved, and will offer insights from Washington.

Training & Manpower Development
New opportunities in recruiting and training will be explained by Director Bud Padon and others, who will cover the Job Corps training program, national apprenticeship program, and "Roofing Technology" course developed by the National Roofing Foundation.

Emissions, OSHA, and Worker Health
Dr. Jerome Thomas will present the results of the tests he conducted in different parts of the country to determine whether bitumen emissions violate the law and create health hazards.

How To Manage Your Stress
Practical—and fun—tips for overcoming stress will be presented by Jerry Teplitz, of Virginia Beach, Va.

How to Install Glass Ply Felts
As fiberglass makes its mark, proper application becomes critical, as Richard Baxter, Carolina Rfg. Service, will explain.

How to Install Elasto-Plastic Systems
There may not be mops and burns, but there are special techniques and dangers, as contractors who have been there will explain.

How To Get More Work—When You Need It
As reroofing dominates the marketplace, the lost art of salesmanship makes a comeback. Contractors, Mike Promen, Clark Rfg., Chris Cronin, Knickerbocker Rfg. & Paving, and Mike Beldon, Beldon Rfg. & Remodeling, will share their secrets.

Rap Sessions: For Contractors Only
The always popular sessions will be repeated, with a panel of experts to answer your questions on any roofing related topics.

94th NRCA ANNUAL CONVENTION & EXHIBIT
PHOENIX
FEBRUARY 10-13, 1981

ADVANCE REGISTRATION/ROOM RESERVATION FORM

Name _____ Nickname for Badge _____

Name _____ Nickname for Badge _____

Company Name _____

Address _____ City _____ State _____ Zip _____

Telephone ____/_____

ROOM RESERVATION

Hotel Preferred _____

Second Choice _____

Third Choice _____

Rate Requested $ _____

Room Type _____

Will arrive on Feb. ____ at about ____ a.m./p.m.

Names of persons occupying rooms
(Bracket [ ] those sharing a room)

1. _____
2. _____
3. _____
4. _____

Will depart on Feb. ____ at about ____ a.m./p.m.

RESERVATIONS MUST BE RECEIVED NO LATER THAN JANUARY 9, 1981
ROOMS WILL BE HELD ONLY UNTIL 6 P.M. ON DATE OF ARRIVAL, UNLESS GUARANTEED

ADVANCE REGISTRATION

In order to be Advance Registered, you must fill out the information below AND enclose a check. NOTE: Advance Registration prices are considerably lower than the prices at the Convention. Advance Registration includes a badge, entry to the Exhibit Hall, Welcome Party, and to all Convention sessions, but to **no** meal functions.

Everyone attending the Convention **must** register. Tickets to meal functions may be purchased in advance as a package or individually. NOTE: Advance and package ticket prices are considerably lower than those purchased individually or at the Convention.

Please note the new NRCA policy on refunds:

- No refunds will be given at the Convention.
- 90% Refunds on Advance Registration and tickets will be made until February 4, 1981.
- After February 4, 1981, the only refunds made will be to people who are unable to attend the Convention, provided a request for a refund is received in writing before February 28, 1981. Refunds in such cases will be made for 90% of the purchase price.

Make your check payable to NRCA. Send to: NRCA
1515 N. Harlem, Oak Park, IL 60302

For additional registrants include all pertinent in
mation on a separate page.

CHARGES

Advance Registration (Mandatory)		
NRCA Members	___ @ $ 50 = $ _____	
Non-Members	___ @ $ 75 = $ _____	
Spouses	___ @ $ 25 = $ _____	$ _____
Sub Total		
Tickets		
Complete Regular Package (includes tickets 1-5)	___ @ $125 = $ _____	
Complete Spouse Package (includes tickets 1-6)	___ @ $150 = $ _____	$ _____
Sub Total		
1. Opening Luncheon	___ @ $ 25 = $ _____	
2. Member Breakfast	___ @ $ 15 = $ _____	
3. Evening at Rawhide	___ @ $ 30 = $ _____	
4. Awards Luncheon	___ @ $ 25 = $ _____	
5. Annual Banquet	___ @ $ 55 = $ _____	
6. Spouse Luncheon/ Fashion Show/Tour	___ @ $ 30 = $ _____	
Sub Total		$ _____
GRAND TOTAL ENCLOSED		$ _____

FOR NRCA USE ONLY

Check No.: _____

Date: _____

Amount: _____

By: _____

HOUSING INFORMATION ON PAGE 36

Housing

NRCA's housing block consists of eight hotels. The **Hyatt Regency** and the **Adams Hotels** will serve as co-headquarters. They are located in the heart of downtown Phoenix and are ten minutes away from Sky Harbor International Airport.

NRCA will provide shuttle bus service to and from the Phoenix Civic Plaza and all hotels except the Hyatt, Adams and Ramada Inn—Downtown. All the hotels (except the Hyatt) require a first night's deposit to cover the room charge. The deposit can be in the form of a check or a letter authorizing the use of a major credit card.

Descriptions of each hotel along with its rates are listed below in order of proximity to the Phoenix Civic Plaza.

The **Hyatt Regency** is located directly adjacent to the Phoenix Civic Plaza. It's a luxury hotel built in the Hyatt style with an open atrium and glass elevators. It has shops, rental car and tour facilities, three restaurants, a cocktail lounge, and swimming pool.

Rates: Single $58—$67—$76
Double $68—$77—$86
Suites Parlor & 1 Bedroom $145—$185
Parlor & 2 Bedrooms $185—$250

The **Adams,** located across Second Street from the Hyatt Regency, is just one block from the Phoenix Civic Plaza. The Adams, opened in April, 1975, is a blend of modern convenience and the charm of the Southwest. It has shops, an outdoor pool, putting green, health club, two restaurants and a cocktail lounge.

Rates: Single $60
Double $70
Executive Kings $70—$80
Queen Parlors $100
Suite Parlors $100
Suites Parlor & 1 Bedroom $175
Parlor & 2 Bedrooms $225

The **Ramada Inn—Downtown** is located two blocks from the Phoenix Civic Plaza. A resort style hotel with an especially attractive pool area and nicely decorated rooms, it has a restaurant-pub and coffee shop, and is within walking distance of the Phoenix Civic Plaza.

Rates: Single $40
Double $50
Suites Parlor & 1 Bedroom $110
Parlor & 2 Bedrooms $150

The **Doubletree Inn** is located approximately two miles from the Phoenix Civic Plaza. It is an attractive smaller hotel conveniently located near the Park Central Mall. It has a heated pool and jacuzzi, and a restaurant lounge which specializes in jazz entertainment in the evening.

Rates: Single $56.00
Double $66.00

The **Ramada Inn—East** is an attractive resort hotel located approximately four miles from the Phoenix Civic Plaza. It offers an olympic size swimming pool, two tennis courts, a putting green, championship golf course, courtesy van, restaurants and cocktail lounges.

Rates: Single $34
Double $40
Premier Suites $150
Family Suites $135

Del Webb's Townhouse is located four miles from the Phoenix Civic Plaza. It is a large hotel, yet is known for an intimate atmosphere. It has a large pool and patio area, gift shop, two restaurants, and a cocktail lounge.

Rates: Single $60
Double $60
Petite Suites $70
Parlor & 1 Bedroom $120
VIP Suites $180

The **Century Inn** is located about four miles from the Phoenix Civic Plaza. It is a cozy hotel offering, in addition to its pool and patio, a happy hour with hors d'oeuvres in the cocktail lounge and a complimentary hot breakfast each morning.

Rates: Single $50
Double $55
Suite $70

The **Central Plaza Inn** is located a little over four miles from the Phoenix Civic Plaza. The Central Plaza Inn offers a pool and patio, free in-room movies, courtesy airport service, and a restaurant-pub.

Rates: Single $49
Double $54
Suites $108

Additional information on suites is available by calling the NRCA office.

Notes:

1. All hotels (except the Hyatt) require a check or authorization for credit card use to cover the first night's room charge.
2. You will receive a confirmation directly from the hotel. In order to **guarantee** your room reservation, contact the hotel after receiving your confirmation.
3. All changes in room reservations **must** be made **in writing** through the NRCA office.

Coming Events

NOVEMBER	
2-5	Midwest Roofing Contractors Assn. Convention Indianapolis, Indiana
5-10	Associated Roofing Contractors of Maryland Convention, Miami—Bahamas
12-14	NRCA November Committee Meetings Chicago, Illinois
17-21	Roofing Industry Educational Institute Seminar San Francisco, California
DECEMBER	
5-6	Chicago Roofing Contractors Assn. Convention St. Charles, Illinois
10	NCEC Annual Meeting, Washington, D.C.
JANUARY	
7-9	Superintendents Conference, Reno, Nevada
14-16	Superintendents Conference Nashville, Tennessee
18-21	New York State S/M Rfg. and A/C Contractors Assn. Convention Niagra Falls, New York
19-23	Roofing Industry Educational Institute Seminar Tarrytown, New York
FEBRUARY	
1-5	NRCA Management Education Conference Boca Raton, Florida
10-14	NRCA Annual Convention, Phoenix, Arizona
23-27	Roofing Industry Educational Institute Seminar Orlando, Florida
MARCH	
1-3	Construction Industry National Legislative Conference, Washington, D.C.
16-20	Roofing Industry Educational Institute Seminar Denver, Colorado
19-20	Northeast Roofing Contractors Assn. Convention Boston, Massachusetts
APRIL	
6-10	Roofing Industry Educational Institute Seminar St. Louis, MO
30-May 1	NRCA/NBS Technical Conference—6th Conference on Roofing Technology
MAY	
11-15	Roofing Industry Educational Institute Seminar Detroit, MI
19-21	Roofing Industry Educational Institute 2-day seminar, Denver, CO
30-June 4	Western States Roofing Contractors Association Annual Convention Reno, NV
JUNE	
1-5	Roofing Industry Education Institute Seminar Philadelphia, PA
15-19	Roofing Industry Educational Institute Seminar Denver, CO

Evaluation of Alternative Reroofing Systems

Editor's Note: *This article is part of a report developed by the Construction Engineering Research Laboartory, United States Army Corps of Engineers, Champaign, Ill. We are grateful to Meyer Rosenfield, of CERL, and the other authors for their permission to publish the report here.*

1 INTRODUCTION

Background

Current roofing systems at Army installations are generally short-lived because of existing construction, design, contracting, and operation and maintenance (O&M) procedures. In effect, short-lived roofing has created unacceptably high life-cycle costs.

This situation is, in part, a direct result of onsite, labor-intensive construction of conventional built-up roofing (BUR) systems of low-quality workmanship. To eliminate this problem, the U.S. Army Construction Engineering Research Laboratory (CERL) is attempting to identify new, easy-to-install roofing systems that will improve the performance of Army roofing while reducing life-cycle costs.

Objective

The overall objective of this study is to (1) evaluate innovative roofing systems and materials to determine alternatives to BUR systems, (2) provide a means to improve Army-roof performance and reduce life-cycle costs, and (3) develop guide specifications for selected alternative systems.

The specific objective of this report is to document the review and evaluation investigation phase of this study, and to select alternative systems for further consideration and testing.

Approach

This study is being conducted in the following steps:

1. Survey of literature, manufacturer, and field applications to determine alternatives to BUR systems.
2. Selection of alternative systems for further consideration and testing.
3. Construction and instrumentation of the selected systems at Army installations.
4. Evaluation of test applications, including design, construction, and post-construction performance for 2 years.
5. Development of guide specification criteria.

This report documents Steps 1 and 2, above.

Mode of Technology Transfer

Criteria for application of alternative roofing systems will be included in TM 5-617, *Maintenance and Repair of Roofs,* and guide specifications for use in contracting application of the systems will be included in Real Property Maintenance Activities Guide Specification (RPMAGS) series 37000 and in Corps of Engineers Guide Specifications 07520 and 07540.

2 SURVEY OF ALTERNATIVE ROOFING SYSTEMS

General

Nontraditional roofing systems were evaluated to determine which were suitable for use in reroofing construction and versatile enough to be used in roofing maintenance and repair on the various building types found at Army installations. The systems identified as having the best potential were generally plastics or synthetic rubber elastomers. These materials are the products of recent developments in the plastics industry and may perform better than bituminous membranes. They offer many advantages over traditional BUR systems:[1]

1. Light weight—the various foam- and liquid-applied systems are extremely lightweight.

2. Adaptability—the systems are adaptable to almost any roof slope or substrate material, including architecturally prominent roofs.

3. High elasticity—elastomeric systems have elongation capabilities which can bridge cracks in the substrate and accommodate both thermally and structurally induced movement.

4. Good reflectivity—reflective-coated systems aid in reducing membrane temperature and heat gain within the interior of the structure.

5. Low labor intensity—these systems generally require less effort to install than traditional BUR systems; application is cleaner, cooler, and requires smaller crews.

6. Easy repairability—reroofing or repair is relatively easy and sometimes can be completed without entirely removing the underlying system.

7. Easy insulation—these systems allow insulation to be readily added to existing buildings. In addition, foam systems are inherently insulating, and the insu-

[1] W. J. Rossiter and R. G. Mathey, *Elastomeric Roofing: A Survey,* NBS Technical Note 972 (U.S. Department of Commerce, National Bureau of Standards, July 1978).

[2] J. Keeton, R. Alumbaugh, and E. Humm, *Experimental Polyurethane Foam Roofing Systems,* Technical Note N-1450 (Civil Engineering Laboratory, Naval Construction Battalion Center, August 1976), ADA 031046.

lated roof membrane assembly can often be placed over an existing roof.[2]

8. Compatibility—these systems allow the selection of material properties which are compatible with the local environment; e.g., a system may be selected that is resistant to a chemically hostile atmosphere.

9. Shortage immunity—most systems provide a certain degree of immunity to local asphalt shortages.

Materials

Some alternative roofing systems are proprietary compounds; however, several are now commercially available under generic chemical names such as ethylene propylene diene monomer (EPDM) or polyvinyl chloride (PVC) sheets. The following is a list of materials from which most of the more commonly used systems are manufactured.[3]

1. Acrylic polymers—good resistance to ultraviolet light (UV) and to weathering. Available as one-component liquid systems in a variety of colors.

2. Butyl rubber—resistant to ozone and weathering and has extremely low water vapor and gas permeability. Good resistance to corrosive chemicals, dilute mineral acids, and vegetable oils, but poor resistance to petroleum oils and gasoline. Available both as sheet and two-component liquid systems.

3. Chlorosulfonated polyethylene (commercially known as Hypalon*)—high resistance to ozone, heat, and weathering. Generally resistant to oils and chemical attack but will swell in aromatic and chlorinated solvents. May be formulated in a variety of stable colors. Available in sheet- or liquid-applied systems.

4. EPDM (ethylene propylene diene monomer)—properties are similar to butyl rubber, but exhibits better resistance to weathering and ozone. Not resistant to petroleum oils or gasoline. Available in sheet form, normally black color.

5. Neoprene—good resistance to petroleum oils, solvents, heat, and weathering. Available in liquid- or sheet-applied systems. Sheet systems come in a weathering grade (black) or a nonweathering grade (light colored). The latter must be protected by use of a coating (usually chlorosulfonated polyethylene).

6. PVC and vinyl—resistant to acids, alkalies, and many chemicals. Loss of plasticizers through aging and/or solar exposure can lead to embrittlement and shrinkage. Available as sheet- or liquid-applied systems.

7. Rubberized asphalt—embrittles at temperatures lower than asphalt and can maintain flexibility as low as -15°F (-26°C). Available as an emulsion (water soluble) or as a cutback (cures through evaporation of a petroleum solvent). May be applied hot or cold. Generally should not be used in an exposed situation. May be protected from solar degradation by aggregate surface or by placing insulation above the membrane in a protected-membrane system.

8. Silicone—semi-organic polymers which are resistant to high temperatures and are flexible at low temperatures. Good resistance to oxidation, ozone, and weathering; possess a higher water vapor permeability than other roofing elastomers. Available as one- or two-component liquid-applied systems. Tends to retain atmospheric dirt and may darken in time. Frequently used to protect polyurethane foam from weather degradation.[4]

9. Urethane (polyurethanes) synthetic polymers formed by a reaction between two chemical agents. Many different combinations are possible, and as a result, controlled variance of color, density, and other material properties is possible. Available as a foamed-in-place or liquid-applied system. (Foam is subject to weather degradation unless coated with a protective film.)[5]

Roofing Systems

This study evaluated three systems: sheet-applied, fluid-applied, and foamed-in-place. In addition, some hot- and cold-applied modified bituminous systems were considered. The advantages and disadvantages of these systems are as follows.

Sheet-Applied Systems (Advantages)

1. **Prefabricated.** The primary advantage of sheet-applied systems is the installation labor savings that result from prefabrication of the membrane. In addition, prefabrication enhances quality control because the main element of the roof system—the membrane—is manufactured under controlled conditions away from the construction site where rigorous control is not as feasible.

2. **Lightweight.** Most of the sheet-applied systems (except for the stone ballasted type) are much lighter

continued

[3]W. J. Rossiter and R. G. Mathey, *Elastomeric Roofing: A Survey*, NBS Technical Note 972 (U.S. Department of Commerce, National Bureau of Standards, July 1978).

*Hypalon is a registered trademark of E. I. Du Pont de Nemours and Co., Inc.

[4]*Protective Coatings for Polyurethane Foam Roofing Systems*, Technical Data Sheet 77-12 (Civil Engineering Laboratory, Naval Construction Battalion Center, July 1977).

[5]CPT J. D'Emidio, "Sprayed-Urethane for Roof Repairs," *The Military Engineer*, Vol 450 (July-August 1977), pp 244-246.

in weight than traditional BUR systems.

3. **Easy to repair.** Sheet-applied systems are easy to repair; if the membrane is totally bonded, water will usually enter the building close to the point of damage or failure since there are no interply spaces to channel leaks. The membrane can then be patched with cement and small pieces of membrane material.

4. **Easy to flash and seal.** Sheet-applied systems are comparatively easy to flash and seal at projections with adhesives and elastomeric roofing accessories.

5. **Highly moisture permeable.** Sheet-applied systems display less tendency to blister since some single-ply systems have a fairly high permeability to moisture vapor and, in effect, "breathe." This feature makes the installation procedure less susceptible to inclement weather, and allows certain membranes to be used on wet decks.

6. **Easy to reroof.** Sheet-applied systems can be installed over an existing roof without completely removing the existing roof down to the original substrate.

7. **Reusable membrane.** It may be possible, depending on the condition of the sheet-applied membrane, to reuse loose-laid membranes. In this respect, loose-laid systems seem especially appropriate for temporary roofs where upward expansion of a facility is planned. In such cases, it may be possible to remove and reinstall the roof atop the new addition.

8. **Compound variety.** The material characteristics of sheet-applied systems may be selected to suit certain environmental or climatic conditions; e.g., materials may be selected especially for an industrial environment which requires flexibility at extremely low temperatures.

9. **Versatile and aesthetic.** Sheet-applied systems are versatile and aesthetically acceptable; e.g., buildings with architecturally prominent roofs can use some sheets to install gravel-free ballast, later coating the sheet with a protective film in a variety of colors.

10. **Extensible.** Elastomeric materials, when placed under stress, will elongate and return to their original shape upon removal of the stress. This insures that the membrane will bridge cracks in the substrate and will accommodate some structural movement.

11. **Easy to apply.** There are a variety of ways to assemble and place a sheet-applied membrane: (1) completely bond the membrane to the substrate using bitumen or elastomeric adhesives, (2) mechanically adhere the membrane with nails or fasteners, and (3) lay the membrane loosely, so there is no direct attachment to the substrate.

Sheet-Applied Systems (Disadvantages)

1. **Small safety factor.** Sheet-applied systems offer only a small safety factor since a single membrane layer will almost certainly allow any puncture or failure to cause leakage. Therefore, the success of these systems is critically dependent on competent workmanship which assures that the membrane is properly sealed.

2. **Lack of dimensional stability.** Some membrane materials are not dimensionally stable, and the resultant shrinkage may cause seam or flashing separations.

3. **Inadequate operational statistics.** While various sheet-applied systems have been used in Europe and the United States for approximately 20 years, there has not been enough time to ascertain performance when compared with the 80-year history of BUR systems. Also, material changes occur frequently and a product purchased today may not resemble its counterpart purchased 5 to 10 years ago.

4. **Lack of performance and design criteria.** As a result of limited exposure and a wide variety of materials in use, there are no real standards by which to compare one sheet-applied system with another. The design parameters which must be controlled to insure proper performance are not well known.

Fluid-Applied Systems (Advantages)

1. **Easy to apply.** The membrane is applied as a liquid with either a spray gun or squeegee. Since the liquid flows to a limited degree, it can fill small cracks and cover irregularities in the new substrate or old roof surfaces. Liquids are especially suited for application to concrete and plywood decks.

2. **Self-flashing.** The homogeneous membrane is self-flashing and can be applied continuously from horizontal to vertical surfaces.

3. **Labor savings through smaller crews.** In general, fewer people are required to install a liquid-applied membrane than conventional BUR, and less time is required to complete the installation of a liquid-applied roof.

4. **Extensible.** The elastomeric materials used in fluid-applied systems are capable of elongating, then returning to their original shape. This quality accommodates limited structural movement, though not to the extent allowed by sheet-applied systems. Most elastomerics also offer low-temperature flexibility and

will maintain their integrity at lower temperatures than bitumen-based materials.

5. **Easy to repair and maintain.** Fluid-applied membranes are generally repaired by reapplying the membrane with a spray gun or squeegee.

6. **Compound variety.** Various compounds and materials can be selected to meet such special requirements as compatibility with an underlying material or use in a chemically hostile atmosphere.

7. **Color variety.** Liquid-applied systems are often the best aesthetic choice, since their various compounds are easily colored with pigments. In addition, color keying each layer of a multilayered liquid-system roof can facilitate inspection and quality assurance.

Fluid-Applied Systems (Disadvantages)

1. **Limited substrate suitability.** Liquid systems are best suited for use only on concrete and plywood decks.

2. **Extensive substrate preparation.** The surface upon which the fluid is applied must be smooth, clean, and dry; failure is possible if the substrate is not properly prepared.

3. **Workmanship dependent.** Measurement of the wet thickness is difficult, and in the case of multicoat applications it can be difficult to assure complete coverage. However, this problem can be minimized by using different colored layers.

4. **Limited elongation.** While liquid systems exhibit some elastic properties, they generally cannot accommodate larger cracks nor tolerate structural movement as well as sheet-applied systems.

5. **Highly flammable solvent-based systems.** Some liquid-applied roofs present a substantial fire risk during installation; therefore, adequate safety and ventilation measures must be observed. There is also a risk of toxicity with some systems if installing crews are not protected from fumes and from contact with the components during application.

6. **Lack of long-term exposure performance data and design criteria.**

Foamed-in-Place Systems (Advantages)

1. **Insulation capability.** Since polyurethane foams are good insulators, they can be used to prevent excessive thermal movement in metal buildings by applying them on top of existing roof systems and on exterior

continued

surfaces.

2. **Easy to apply and repair.** Polyurethane foams are multicomponent systems that are applied with a special spray apparatus. Two layers (lifts) are recommended to insure an adequate seal. Damaged areas are repaired by removing failed sections and refoaming.

3. **Easy coverage.** Since the foam forms a homogeneous layer, it can be used to bridge cracks and irregularities in the substrate. The foamed-in-place system is also self-flashing and will seal readily at parapet walls and around projections.

4. **Lightweight.** Because foam systems are much lighter than conventional BUR systems, various densities and thicknesses of foam can be applied to meet many requirements for insulation, impact resistance, or roof traffic.

5. **Direct application to suitably prepared existing roof.** A weathered or damaged roof can, in effect, be stabilized by foam application.

Foamed-in-Place Systems (Disadvantages)

1. **Susceptibility to UV and weather degradation.** After curing, foamed-in-place systems must be coated with silicone rubber, butyl Hypalon, Hypalon mastic, catalized urethane, or other weather/ultraviolet resistant coatings and kept coated throughout the life of the roof to prevent UV- and/or weather-induced degradation.

2. **Low compressive and tensile strength.** A completed foam roof is subject to damage from hail and foot traffic; in some areas, birds and rodents are also capable of causing damage.

3. **Extensive preparation.** To insure proper adhesion, substrates must be thoroughly prepared to receive foamed-in-place systems. Such preparation includes removal of any loose or flaking section of an existing roof.

4. **Flammability.** Since foams are organic, they will burn; however, the full extent of the fire hazard they represent has not yet been determined. In particular, the direct application of foam over metal decks in habitable buildings is actively being researched and is considered an unacceptable use of foamed-in-place systems at this time. Foam roofs may be placed over metal decks if a suitable fire barrier is provided between the deck and the foam layer.

5. **Overspray.** Foam should either be applied when there is no wind or the work should be inclosed by canvas screens or other such systems, since the influence of wind during spraying can (1) make it difficult to control foam thickness, and (2) cause an overspray which can damage adjacent vehicles or buildings.

6. **Irregular surfaces.** Foaming systems do not generally provide an even roof surface. A somewhat uneven surface usually results which contains small depressions and other irregularities where water tends to pond after rain storms; to minimize this effect and other difficulties, such as mentioned in number 5 above, skilled foaming system operators are required.

Summary

Table 1 lists design and installation guidelines for the three major alternative systems reviewed by this investigation.

It is apparent that there are alternatives to traditional methods of roofing that may be suitable for use on Army facilities. However, it is equally apparent that no one system is the best for all applications, making the design/decision process complex. In addition, since elastomeric materials have been used for a relatively short time in the United States, predicting the performance of elastomeric roofing systems is difficult. Frequent changes in material composition of the roofing systems also add to the difficulty of predicting system performance.

3 RESULTS OF SITE VISITS

General

Site visits were conducted to determine if sheet- and fluid-applied and foamed-in-place systems are performing satisfactorily enough to merit full-scale field tests at Army installations. The site visits also provided a means of (1) evaluating the practicality and acceptability of alternative system construction procedures, and (2) field testing construction monitoring techniques. Both previously constructed roofs and roofs under construction were surveyed (see Appendices A and B).

Approach

In-Place Roofing Systems

Seven single-ply, two foamed-in-place, and six liquid-applied roofs in Illinois, New York, Pennsylvania, New Jersey, Tennessee, Louisiana, and Texas were inspected. The general condition of the roofs was determined and photographs made of significant features and distresses. In each case, the owner/user, manufacturer's representative, roofing contractor, or another individual(s) familiar with the history of the roof since its construction was interviewed. The overall performance of the system at the given site was then evaluated. If performance was unsatisfactory, the probable causes were

analyzed to determine if modifying construction details, or other methods, could improve performance. Systems were then selected for consideration for use at Army installations. This selection was based on performance alone, independent of cost considerations, although comparative construction cost information

continued

Table 1
Design and Installation Criteria*

Criteria	Sheet Applied**	Liquid Applied+	Foamed in Place++
Fastening adhesion	•Loose laid •Mechanically fastened •Bonded (adhered)	•Homogeneous bond (spray or squeegee)	•Homogeneous bond (spray)
Laps/splices	•Heat fused •Solvent welded •Solvent and tape (clean lap is essential: overheating or excessive solvent may lead to failure)	•No joints (homogeneous membrane)	•No joints (homogeneous material)
Perimeter	•PVC clad metal •Adhesive bond •Heat fused (all components must be well anchored)	•Self sealing; allow for expansion and differential movement	•Self sealing; allow for expansion and differential movement
Repair of damage	•Use approved patching materials and cements (see manufacturer)	•Clean and recoat with same or compatible compound (see manufacturer)	•Remove damaged foam, dry thoroughly, and refoam
Prefabricated accessories	•PVC clad flashings at curbs for use with PVC. •Adhesives or heat fused at horizontal flanges; counterflash with same materials at edges (see manufacturer)		•Self-flashing, but allow for expansion and/or movement which could cause cracks
Ballast	•Loose laid systems require ballast; with IRMA (PMR) system, place ballast over insulation (stone or concrete pavers)	•Some materials may be suitable for IRMA (PMR) system. Place ballast over insulation. See manufacturer	•No ballast
Coatings	•Some systems use UV-resistant coating on unballasted systems; e.g., Hypalon over neoprene (see manufacturer)	•Some systems are multi-coat. (See manufacturer)	•Coating is essential; should be applied as soon as possible after foaming and replenished throughout life of roof
Bitumen compatibility	•PVC-no asphalt, coal tar pitch, plastic cement, or certain wood treatments •EPDM-no coal tar pitch or plastic cement •Butyl-no petroleum oils	•See manufacturer (many different compounds and formulations are available)	•Generally compatible with asphaltic and coal tar materials; however, adhesion is best on older bituminous materials

Table 1 (cont'd)
Design and Installation Criteria*

Criteria	Sheet Applied**	Liquid Applied+	Foamed in Place++
Installation constraints and substrate	•Low-wind conditions •Clean substrate, no sharp projections •Cold temperature and excessive solvent retard weld time •Moisture permissible with some permeable materials •Clean lap joint essential, especially with EPDM	•Clean, dry substrate •Low-wind conditions for spray applied materials •No foot traffic until membrane is cured •Apply second coat in a direction perpendicular to first	•Clean, dry substrate •Low-wind conditions •Remove flakes, scales; preparation of damaged areas •Two lifts recommended to insure seal
Susceptibility to damage	•Visual discoloration from overheating could be a potential failure point •Cigarette burns must be avoided (also flammable solvent) •Easily damaged by loaded wheeled vehicles	•Gouging or thin coat could lead to premature failure of membrane	•Susceptible to impact damage (hail, tools, etc.) •Possible rodent and bird damage
Use over existing roof	•Most systems may be used over properly prepared existing (see manufacturer) roof; if wet insulation is present, membrane must be vapor permeable to allow drying •If ballast is used, check structural capacity of deck	•Some materials may be suitable. (Manufacturers specify some materials as suitable for use over existing roofs. However, field observations did not support this. See Appendix A.)	•Foam is ideal for retrofit application; substrate must be dry and suitably prepared. (Adds substantial insulation value.)
Slope	•Fully adhered and mechanically fastened systems may be used at greater slopes than loose-laid systems	•No real slope restrictions; most can be applied from horizontal to vertical	•No real slope restrictions; foam can be sprayed on surfaces from horizontal through vertical

*Buyers Guide to Single-Ply Systems," *Roofing, Siding, and Insulation Magazine,* Vol 5 (November 1977), p 67.

**W. J. Rossiter and R. G. Mathey, *Elastomeric Roofing: A Survey,* National Bureau of Standards Technical Note 972 (U.S. Department of Commerce, National Bureau of Standards, July 1978); K. Duchon and J. Parker, *Use and Market Opportunities for Plastics in the Roofing Industry* (SPE 33rd Annual Technical Conference [May 1975]).

+W. J. Rossiter.

++B. V. Jones, *Laboratory and Field Investigation of New Materials for Roof Construction,* REC-ERC-76-4 (U.S. Bureau of Reclamation, Engineering and Research Center PB259635, April 1976).

was collected for each of the three systems being investigated.

Roofing Systems Under Construction

The construction of Navy experimental roofs (see Appendix B) was monitored to collect general data and to evaluate ideas for future Army tests. The construction operations were monitored full time using stop-action photography to provide a condensed, permanent record of the entire construction process. Observers also maintained a daily log of construction activities and related events, and recorded still photographs of the construction as it progressed. Samples of materials used in the roofs were collected, and the roofs' plans and specifications were analyzed to determine if the construction was proceeding according to their requirements.

Summary of Findings

It was determined that (1) most of the single-ply and foamed-in-place roofing systems performed reasonably well, and (2) two of the six liquid-applied roofing systems observed performed satisfactorily (see Appendix A). Based on these findings single-ply and foamed-in-place roofing systems were selected for further consideration through full-scale field applications. Further evaluation is necessary before liquid-applied roofing systems can be selected for use in Army field tests.

The monitoring of the Navy experimental roofs indicated that special provisions for quality control and assurance are required to insure that the test roofs are constructed correctly (see Appendix B).

4 CONCLUSIONS

1. Site surveys confirmed the potential of sheet-applied and foamed-in-place roofing systems as viable alternatives to conventional BUR systems. These systems are generally easier to apply, and some weigh less than conventional BUR. In addition, the foamed-in-place system offers a significant increase in insulation efficiency over conventional BUR.

2. Liquid-applied systems, although versatile, aesthetic, and easily adapted to architectural roofs, have performed unreliably in some cases.

CITED REFERENCES

"Buyer's Guide to Single-Ply Systems," *Roofing, Siding, and Insulation Magazine,* Vol 5 (November 1977).

D'Emidio, CPT J., "Sprayed-Urethane for Roof Repairs," *The Military Engineer,* Vol 450 (July-August 1977).

Duchon, K., and J. Parker, *Use and Market Opportunities for Plastics in the Roofing Industry,* SPE 33 Annual Technical Conference (May 1975).

Jones, B. V., *Laboratory and Field Investigation of New Materials for Roof Construction,* REC-ERC-76-4 (United States Bureau of Reclamation, Engineering and Research Center, April 1976), PB 259635.

Keeton, J., R. Alumbaugh, and E. Humm, *Experimental Polyurethane Foam Roofing Systems,* Technical Note N-1450 (Civil Engineering Laboratory, Naval Construction Battalion Center, August 1976), ADA 031046.

Protective Coatings for Polyurethane Foam Roofing Systems, Technical Data Sheet 77-12 (Civil Engineering Laboratory, Naval Construction Battalion Center, July 1977).

Rossiter, W. J., and R. G. Mathey, *Elastomeric Roofing: A Survey,* NBS Technical Note 972 (U.S. Department of Commerce, National Bureau of Standards, July 1978).

UNCITED REFERENCES

Alumbaugh, R., and J. Keeton, *Investigation of Spray-Applied Polyurethane Foam Roofing System–I,* Technical Note N-1496 (Civil Engineering Laboratory, Naval Construction Batallion Center, July 1977), ADA 043995.

Dupuis, R., *1978 Progress Report on Field and Laboratory Testing of Elastomeric Single-Ply Roof Membranes* (Midwest Roofing Contractors Association, Kansas City, MO, June 1978).

Guide Specification for Military Construction: Elastomeric Roofing, Fluid-Applied for Concrete Roof Decks, CE 220.13 (Department of the Army, Corps of Engineers, Office of the Chief of Engineers, August 1977).

Guide Specification for Military Construction: Elastomeric Roofing, Sheet-Applied for Application Directly on Decks and on Insulation (or Underlayment), CE 220.15 (Department of the Army Corps of Engineers, Office of the Chief of Engineers, December 1977).

Maintenance and Repair of Roofs, Army Technical Manual 5-617 (Departments of the Army, Navy, Air Force, and Marine Corps, January 1974).

November 1980

New Findings in Asphalt Durability

by Robert LaCosse
NRCA Technical Services Manager

Roofing contractors and the roofing industry have been concerned about the effect of overheating and softening point "drop-back" upon the durability of asphalt. There is a general consensus in the roofing industry that overheating of a mopping asphalt should be avoided, but it is sometimes necessary to heat a roofing asphalt above the recommended heating temperature and for longer periods than normally necessary, due to inclement weather or other unusual conditions.

Roofing asphalts are normally produced by air-blowing a soft, specially tailored roofing petroleum flux to the proper consistency for the intended grade. Such asphalts have a tendency to depolymerize or "drop-back" in softening point, becoming softer or lower in melting point when heated in a confined atmosphere such as in a roofing kettle. This phenomenon of "drop-back" has been recognized in the roofing industry for many years. Some producers manufacture roofing grades at the maximum softening point limit of a specification—particularly steep grade roofing asphalt—as they know a "drop-back" will occur in heating the asphalt for application.

Generally, the degree of "drop-back" in softening point is related to the heating temperature, and particularly if heated above the temperature used in air blowing the flux to produce the finished product. Usually, the higher softening point asphalts, such as steep, will experience greater drop-back than softer grades such as dead-level. Also, the longer the heating period, the greater the drop-back in softening point.

Since there did not appear to be any information concerning the overheating and drop-back of roofing asphalt in relation to its durability or performance on a roof, the National Roofing Contractors Association (NRCA) in 1974 decided to undertake a limited investigation.

NRCA obtained the cooperation of the Trumbull Asphalt Company and Mr. Robert Lindquist, Trumbull's Director of Research, in obtaining samples of asphalt for the study. Samples were obtained from Trumbull's Hazelwood, Missouri plant which processes a mid continent crude flux for manufacturing various grades of roofing asphalt. Arrangements were made to obtain samples from the air-blowing still during the course of manufacturing a steep grade roofing asphalt. The first sample was taken at a point where the contents of the still had reached a softening point at the minimum softening point for steep grade. Four additional samples were taken during the course of the blowing until the final product had been obtained which was at the upper limit of the softening point range for steep grade asphalt. A sample was then taken from the trunk transport tanker as material was loaded for shipment to the Stephenson Roofing Company in St. Louis.

Stephenson Roofing Company filled a heating kettle from this shipment. The asphalt was heated for seven hours, during which five and one-half hours of heating was in a confined atmosphere at a temperature of 505-545°F, significantly higher than the usual 450° maximum recommended heating temperature for this grade of asphalt. At the end of the seven hours of heating, samples were taken from the kettle for use in the study. All of the samples were delivered to the Chicato Testing Laboratory, Inc. in Northbrook, Illinois for testing. The penetration and softening point test results on the samples are shown in Table I.

It was decided that the best samples for durability tests would be:

Sample A (First Sample from the air blowing run) which had a softening point at the minimum limit for steep grade (180°F).

Sample E (softening point of 197°F) which represented material from the tanker shipped to the Stephenson Roofing Company and which would normally be the material as delivered to a roofing contractor.

Sample F which was representative of material that had been overheated to develop a "drop-back" from a softening point of 197°F to 183°F, the minimum limit for steep grade roofing asphalt specifications.

Table I
ASPHALT SAMPLES

Sample	Description	Penetration @ 77F ASTM D-5	Softening Point (R & B) ASTM D 2398, °F
A	1st from Blowstill	27	180
B	2nd from Blowstill	24	191
C	3rd from Blowstill	23	194
D	4th from Blowstill	20	199
E	Truck Transport	22	197
F	Over heated	25	183

Twenty-five panels each of Sample A, E and F were prepared using aluminum panels of the type specified for accelerated weathering tests and which measured 2¾" by 5⅞" and were 0.025" thick. The asphalt was applied in the laboratory to the panels to a uniform thickness of 0.025" using guides and draw-down bars. A photograph of the manner in which the panels were prepared is in Figure A and completed panel in Figure B. One set of panels (Sam-

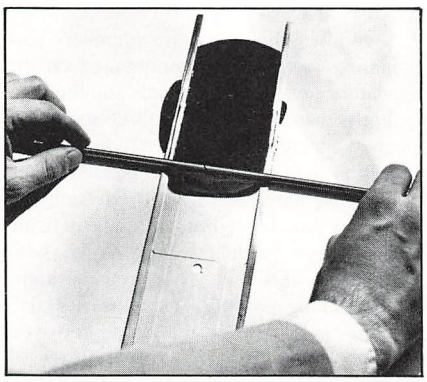


FIGURE A
Preparation of Weathering Panels.

ples A, E and F) was distributed to each of 13 contractor members of NRCA located in various areas of the United States. The members were instructed to expose the panels horizontally or on a roof with a slope

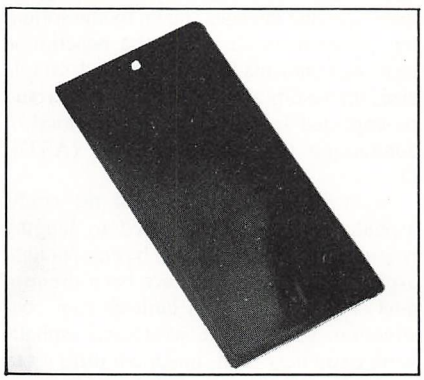


FIGURE B
Prepared Panel.

of less than ¼″ per foot. The members were also requested to periodically monitor panels to detect any significant change in appearance, particularly the formation of etching or crazing of the surface. Mr. Lindquist, of Trumbull Asphalt Company, was also given a set of panels and other sets of panels were exposed on the roof of the Chicago Testing Laboratory in both a horizontal and at a 45° angle exposed to the southerly direction.

The panels were distributed in January of 1975. It was initially planned to recall the panels after two years of exposure, but it The delay was prompted by some reports from the participants that the panels appeared in good condition after two years, did not seem to have any significant deterioration and all panels were essentially similar in appearance. Also, in January of 1977, two sets of panels, one that had been exposed horizontally and one that had been kept in the laboratory cabinet in darkness, were examined. The asphalt removed from these panels was tested for softening point and penetration at 77°F. These results are shown in Table II.

Table II
RESULTS OF TESTS AFTER 2 YEARS EXPOSURE

Asphalt	A	E	F
Softening Point (R-B):			
ASTM D-2398, °F:			
Original	180	197	183
Weathered Panels	225	243	238
Retained in Darkness	187	206	197
Penetration @ 77F:			
Original	27	22	25
Weathered Panels	13	12	12
Retained in Darkness	25	22	22

The softening point of "A" asphalt removed from the panels exposed for two years was still significantly softer than either "E" or "F". Although the original difference in softening points of "E" and was decided to extend the exposure period and members were not requested to return them until January of 1980, which represented five years of exposure to weather. "F" were 14°F, after two years of exposure to weather, there was only a 5°F difference. Also, all of the asphalts on the panels retained in the dark had shown some hardening.

Chicago Testing Laboratory also reported that a visual examination indicated that the panel containing A asphalt (material from the blowing still at 180°F softening point) showed the most signs of weathering, such as formation of hairline cracks and crazing. The panel containing F asphalt (overheated and drop-back to 180°F softening point) had the least sign of deterioration from weathering.

In January of 1980, nine of the thirteen contractor members returned complete sets of panels. One contractor had lost his set due to a fire, two sets were lost due to re-roofing of the contractor's building and one set was removed by tradesmen performing some extensive repair work on a building. In addition to the nine sets returned from contractor members, Trumbull Asphalt's set, which had been exposed vertically rather than horizontally on their building, and the two sets which had been exposed on the Chicago Testing Laboratory

continued

in a horizontal and 45 southerly degree exposure, were included in the examination and testing.

After the panels had been received in the NRCA office in January of 1980, they were submitted to the Chicago Testing Laboratory for examination and testing. The surfaces of the panels were carefully washed with distilled water, and light brushing with a soft fiber brush was used to remove dirt and other foreign material. The panels were then allowed to dry and photographs made of each set. A typical set of panels after five years of exposure to weather is shown in figure C.

After photographing the panels, they were then examined by the Spark-Gap Method in accordance with ASTM D-1670 Standard to determine the failure of the asphalt due to weathering. In this procedure, photographic paper was placed over the surface of the panels and a special Spark-Gap apparatus was slowly passed over the panel. Where cracking or other failure of the asphalt coating has occurred, a spark will be generated by conductance of electricity to the metal panel which will then register on the photographic paper. Dark areas on the photograph indicate areas where the current has passed through to the aluminum panel signifying failure. Generally, when more than 10% of the squares on a grid of $^{3}/_{16}$ inch squares (260 total squares) contain spark-through points, the ASTM Standard states a complete failure has been judged to occur. Typical spark-gap photographs of panels are shown in Figure D. Specimen A would be judged to perform satisfactorily, whereas E and F would have been judged complete failure, although E is considerably worse than F.

After examining the panels under the Spark-Gap procedure, they were then warmed slightly and the asphalt removed with a spatula, heated and poured into softening point rings. The penetration at 77°F test of the material was conducted in the ring and then the softening point of the asphalt was determined in accordance with ASTM D-2398. The results of these tests are given in Table III which also shows the location in which the panels were exposed.

Most of the panels were badly cracked and exhibited severe signs of weathering. The only panels which did not visually appear to have severely cracked or failed were those that had been exposed in West Palm Beach, Florida; Harvey, Illinois; Summit, Illinois (Trumbull Asphalt vertical exposure); and Northbrook, Illinois (Chicago Testing Laboratory, Inc., 45° southerly exposure). An examination of these panels as received showed apparent absence of any severe cracking.

Spark-Gap test evaluation on the panels generally agreed with the visual observation, although the spark did detect considerable cracks which were not visible. Asphalt A of the panels exposed in West Palm Beach, Asphalt A from the panels exposed in Harvey, Illinois, all of the asphalt from the panels exposed vertically in Summit, Illinois and asphalt A exposed horizontally in Northbrook, Illinois were considered satisfactory and not failing due to cracking as evaluated by the Spark-Gap procedure in that less than 10% of the squares on the grid contained dark areas. All other panels would have been judged to have failed due to cracking as evaluated by the Spark-Gap test. However, the degree of failure was much worse in the panels exposed in Lewiston, Maine; Denver, Colorado; Phoenix, Arizona and Corpus Christi, Texas.

In examining the Spark-Gap photographs of the weathered panels, there seemed to be little difference between the panels containing Asphalt E and F. The West Palm Beach exposed panel F asphalt showed slightly more cracking than its companion sample asphalt E. The panels exposed in the Chicago area (Harvey, Summit and Northbrook) showed slightly more cracking in the panels containing asphalt E than in those containing asphalt F. Panels containing asphalt E and F which had been exposed in other areas of the United States were approximately equal in the degree of crack formation between the two asphalts.

Several of the contractor members participating in the study commented on the appearance of the other panels and the general consensus was that panels containing F asphalt appeared to be in slightly better condition than the other two panels.

Tests on the asphalt removed from the panels in this rather limited study indicate that all have hardened excessively, with softening points that are extremely high. The softening points of asphalts A and F were initially almost the same; however, after exposure to almost five years of weathering, the softening point of sample F became substantially higher than that of A. In fact, the asphalt removed from many of the panels showed a softening point for asphalt F to be equal or slightly higher than the softening point of asphalt E which originally was 14 degrees higher than asphalt F. The penetration tests on the asphalt removed from the panels are in fair agreement with the changes shown by the softening point; however, since the penetration tests were not made on a standard sample size, the results are not as precise as would be expected from the standard method of conducting the penetration test (ASTM D-5).

In evaluating the results of the study, asphalt F (material subjected to lengthy heating in the kettle) should be compared to asphalt E which would have been the product shipped for use in built-up roof construction. Most of the weathered asphalts were extremely hard, making it difficult to establish any distinct difference between the two asphalts. However, the results of the Spark-Gap examination of the exposed panels and the slight difference in softening point of exposed asphalts E and F indicate that the durability of this particular steep grade asphalt was not significantly impaired by the extended heating and dropback in softening point.

Table III
Tests on Asphalt Removed from Panels after Five Years Exposure to Weather

	Softening Point (R+B) F			Penetration at 77F		
Asphalt	A	E	F	A	E	F
Exposure Location						
Northbrook, Illinois						
Horizontally	235	270	270	10	7	5
45°	270	285	287	8	7	7
Control Panels	197	218	212	23	18	19
Harvey, Illinois	250	274	284	5	4	2
Summit, Illinois (Vertical)	240	265	270	10	6	8
West Palm Beach, Florida	303	336	338	2	2	3
Billings, Montana	280	298	335	5	2	1
Lewiston, Maine	255	283	297	6	4	4
Anderson, South Carolina	284	315	324	5	7	4
Corpus Christi, Texas	293	*	*	7	*	*
St. Louis, Missouri	278	323	331	6	6	2
Denver, Colorado	297	320	*	6	6	*
Phoenix, Arizona	338	*	*	2	*	*
Original Tests in 1975	180	197	183	27	22	25

* Asphalt had flaked off the panels leaving insufficient quantity for testing.

We're not impressed.

Johns-Manville Fesco® Board roof insulation board has long been a favorite with specifiers and installers. For several reasons.

Thermal efficiency for one. Then there's dimensional stability. Still another is its rigid composition. Its ability to resist compression. To provide a sound, solid substrate for the new built-up roof.

And Fesco Board solves another problem important to the decision to re-roof. It is ideal for correcting slope as well as adding insulation to existing roofs. Fesco Board can be easily applied in multiple layers to build up low spots or to achieve desired R-values with no "shorts" or through joints.

Then, by using an ordinary power lawn rake, Fesco Board can be shaved or tapered to remove irregularities and to achieve positive slope to drain.

Find out more about J-M Fesco Board, the versatile problem solver, performance-proved in almost 30 years of on-the-roof service. For details, consult Sweet's or contact George Constantin, Johns-Manville, Ken-Caryl Ranch, Denver, Colorado 80217, 303/979-1000.

For single-source built-up roofing systems.

JM

Johns-Manville

New Members

CONTRACTORS

- **AAA Roofing Co.**
  873 Sauaker St.
  San Jose, CA 95125
  Ruben Aguilar
- **Able-Warnecke Rfg. Inc.**
  P.O. Box 595
  Downers Grove, IL 60515
  Edward L. Warnecke
- **Acme Roofing Co.**
  4100 McDougal Lane
  Eugene, OR 97402
  Dick Maher
- **Albert's Roofing Co.**
  14658 NW 26 Ave.
  Opa-Locka, FL 33054
  Paul Albert
- **Aroostook Rfg. & S/M Inc.**
  108 Limestone St.
  Caribou, ME 04736
  Emile Lagasse
- **B & B Indus. Inc. of Broward**
  2570 N.W. 4th Court
  Ft. Lauderdale, FL 33311
  V.T. Butler
- **B & J Roofing Inc.**
  5110 Angola Road
  Toledo, OH 43615
  Robert E. Whitman
- **Beaver Enterprises Inc.**
  P.O. Box 19964 Station N
  935 Chattahoochee Ave. NW
  Atlanta, GA 30325
  E.L. Stalnaker
- **A.A. Bert Rfg. Contractors Inc.**
  3610 N.W. 175 St.
  Opa Locka, FL 33056
  Bert Holland
- **Boulerice Rfg. Inc.**
  820 N. 70 Way
  Hollywood, FL 33024
  Al Boulerice
- **Boyles Rfg. & S/M Inc.**
  613 Court St.
  Waynesboro, MS 39367
  Sherman Boyles Jr.
- **E.A. Brown Rfg. Co.**
  P.O. Box 20851
  7364 Mission Gorge Rd.
  San Diego, CA 92120
  Joe M. Castro
- **Builders Custom Rfg.**
  P.O. Box 297
  7202NE 175th
  Kenmore, WA 98028
  Phillip B. Johnson
- **C & K Roofing Co.**
  13201 SW 144 St. E.
  Miami, FL 33186
  Charles Ball
- **Cribbs Inc.**
  P.O. Box 64854
  523 Live Oak Blvd.
  Baton Rouge, LA 70896
  Harvey H. Cribbs
- **Debord S/M & Rfg. Co.**
  P.O. Box 89
  2215 Greenup Ave.
  Ashland, KY 41101
  Norman Debord
- **Charles S. Dell Co.**
  2900 Waterview Ave.
  Baltimore, MD 21206
  George Hodges
- **Divins Rfg. Co.**
  682 Jackson Ave.
  Winter Park, FL 32789
  Edward Divins
- **Duo Corporation**
  P.O. Box 7
  318 Limestone Valley Dr.
  Cockeysville, MD 21030
  Robert E. Otis
- **El Pueblo Rfg. Co.**
  20 W. Sahuaro St.
  Tucson, AZ 85705
  Joe F. Ramirez Jr.
- **Ferber & Osteen Rfg. Co. Inc.**
  P.O. Box 408
  710 SE 9th Place
  Gainesville, FL 32601
  John Ferber
- **Fifth Wall Rfg. Systems (Texas)**
  11126 Jollyville Rd.
  Austin, TX 78759
  Rick Fleming
- **Finley Roofing**
  16926 NW 27 Ave.
  Opa Locka, FL 33056
  Jerry Finley
- **Florida State Rfg. Inc.**
  P.O. Box 600009
  North Miami Beach, FL 33160
  Charles B. Wilson, III
- **Florio-Bell Const. Co.**
  P.O. Box 7
  Middlesex, NJ 08846
  Florio Gentile
- **Friedman Roof Co. Inc.**
  P.O. Box 860
  517 E. Redondo Beach Blvd.
  Gardena, CA 90247
  E.P. Friedman
- **Fulton Rfg. & Insulation Co.**
  P.O. Box 219
  112 Bates
  S. Fulton, TN 42041
  O.C. Walker
- **Dave Gardner Contr. Inc.**
  P.O. Box 294
  300 County Rd.
  Monument Beach, MA 02553
  David R. Gardner
- **Goodrich Rfg. Co.**
  3401 Vassar NE
  Albuquerque, NM 87107
  Nick Sanches
- **Hampden Rfg. Co. Inc.**
  3811 Falls Rd.
  Baltimore, MD 21211
  Anthony De Frank Sr.
- **Jon G. Hawk Inc.**
  P.O. Box 730
  3831 Hawk Rd.
  Pearland, TX 77584
  J.C. Hawk
- **L.C. Heath Rfg. Inc.**
  P.O. Box 5029
  4811 Commerce Dr.
  Newport News, VA 23605
  L.C. Heath
- **Hercules Roofing**
  P.O. Box 15994
  4206 W. Osborne
  Tampa, FL 33684
  Raymond Frisci
- **Heritage Wholesalers Inc.**
  P.O. Box 362
  185 Commercial St.
  Malden, MA 02148
  Harry Langburd
- **Fred W. Hespenheide Inc.**
  Rd #3
  Mars, PA 16046
  Mary T. Hespenheide
- **Hines & Massey Rfg. Inc.**
  P.O. Box 32792
  223 E. Nakoma
  San Antonio, TX 78216
  Charles H. Hines Jr.
- **Intercoastal Maintenance Inc.**
  P.O. Box 7362
  1420 Building
  Baltimore, MD 21227
  M.J. Stern
- **Jaca Brothers Rfg.**
  6881 SW 72 Ct.
  Miami, FL 33143
  Frederich Jaca Jr.
- **K & L Roofing Co. Inc.**
  2402 W. Grant
  Phoenix, AZ 85009
  Richard J. Liasky
- **Frank Kerby & Sons Inc.**
  P.O. Box 160
  218-220 Arch Ave.
  Waynesboro, VA 22980
  Neal L. Willetts
- **Key Coating Corp.**
  738 S. Third Ave.
  Mount Vernon, NY 10550
  Michael Palmiotto
- **Lee County Metal & Rfg. Co. Inc.**
  P.O. Box 06193
  Canal Rd.
  Fort Meyers, FL 33906
  Louis Kennedy
- **Likar Rfg. Co. Inc.**
  644 Third St.
  North Versailles, PA 15137
  John Likar III
- **Lopez Rfg. Service Inc.**
  P.O. Box 1944
  1790 Siringo Rd.
  Santa Fe, NM 87501
  Arthur L. Lopez
- **Magic Roofing Inc.**
  2469 NW 21 Terrace
  Miami, FL 33142
  Aldo Alvarez
- **A.B. Martin Roofing**
  3680 N.W. 135 St.
  Opa-Locka, FL 33054
  A.B. Martin
- **Messersmith Rfg. Inc.**
  P.O. Box 238
  Cullman, AL 35055
  I. A. Messersmith
- **Mock Painting & Rfg.**
  142 Merriman Rd.
  Mooresville, IN 46158
  Douglas Mock
- **Montgomery-Winslow Rfg.**
  P.O. Box 05338
  4448 Palm Beach Blvd.
  Fort Meyers, FL 33905
  Paul H. Winslow
- **Murton Industries Inc.**
  557 W. 27 St.
  Hialeah, FL 33010
  Peter S. Murton
- **National Rfg. Co. Inc.**
  P.O. Box 10083
  5048 Edith NE
  Albuquerque, NM 87114
  Thomas F. Johns
- **Ormsby Roofing Co.**
  14922 Afshari's Circle
  Florissant, MO 63034
  Harold Ormsby
- **Packard Rfg. Co. Inc.**
  2811 S.W. 70 Ave.
  Miami, FL 33155
  Raymond Packard
- **Parr Roofing Co.**
  P.O. Box 896
  Gainesville, GA 30503
  Norman L. Parr
- **Pierce Inc.**
  2701 SW 69 Ct.
  Miami, FL 33155
  Bob Pierce

The following have been approved for NRCA membership between September 1 and October 1, 1980.

- **Pompano Roofing Co. Inc.**
  212 SW 5 St.
  Pompano Beach, FL 33060
  C. W. Clark, Jr.
- **G.A. Porter Rfg. Contr.**
  2500 W. Sligh Ave.
  Tampa, FL 33614
  George A. Porter, Jr.
- **Primo Roofing Co.**
  P.O. Box 392
  121 22nd St.
  Huntington Beach, CA 92648
  Thomas J. Liebherr
- **Professional Roof Services Inc.**
  P.O. Box 4012
  3980 Doniphan Dr.
  El Paso, TX 79924
  Frank W. Ziegler
- **Ra Mar Corp. Rfg. & Materials**
  991 Lonus St.
  San Jose, CA 95126
  Nick Pessasgno
- **Rosner Rfg. Co. Inc.**
  1019 Atlantic Ave.
  Baldwin, NY 11510
  Gerald L. Sollender
- **Roth Brothers of Florida Inc.**
  P.O. Box 15676
  5003 W. Waters Ave.
  Tampa, FL 33684
  Jack Roth
- **Sandron Corp.**
  4420 NW 79 Ave. Suite 1-H
  Miami, FL 33166
  H.W. Slater
- **Schmidt Rfg. Co.**
  P.O. Box 681
  513 2nd Ave. SE
  Miami, OK 74354
  Ed Schmidt
- **Wm. J. Schmitt Inc.**
  201 Murray St.
  Rochester, NY 14606
  Fred Schmitt
- **Segarra Roofing Inc.**
  6868 W. 2nd Ct.
  Hialeah, FL 33010
  Manuel Segarra
- **C.E. Sheppard Rfg. Inc.**
  41 NW 20 Street
  Miami, FL 33127
  Carol E. Sheppard
- **Slade Bros. Roofing Co.**
  212 E. 10th St.
  Coralville, IA 52241
  Russell D. Slade
- **Sam S. Smucker Inc.**
  2133 Rockvale Rd.
  Lancaster, PA 17602
  Leroy S. Smucker
- **Southern Md. Aluminum Products Co.**
  1268 Central Ave.
  Davidsonville, MD 21035
- **Southwest Rfg. Co.**
  P.O. Box 3127
  920 Old Bloomfield Hwy.
  Farmington, NM 87401
  Stanley C. Smith
- **Al Springer Rfg. Co. Inc.**
  890 SW 69th Ave.
  Miami, FL 33144
  Allen R. Springer
- **J.K. Stanley Inc.**
  309 Wall Street
  Lake Villa, IL 60046
  Jim Stanley
- **Tournear Rfg. Co. Inc.**
  910 Hampshire
  Quincy, IL 62301
  Robert S. Tournear
- **Town & Country Rfg. Co.**
  6001 Lakeside Ave. #21
  Richmond, VA 23228
  Robert S. Castorani
- **Tri County Rfg. Contractors**
  412 S. Howard St.
  Robinson, IL 62454
  James T. Duke
- **Tri-City Roofing**
  25041 North Palm
  Hemet, CA 92343
  Bob Wilbanks
- **Tri-Counties Roof & Insulation Co.**
  P.O. Box 301
  330 N. Bridge St.
  Visalia, CA 93277
  Ernie Garrison
- **Tucker Brothers Rfg.**
  14956 S. River Dr.
  Miami, FL 33167
  Elmer Lee Tucker, Jr.
- **Twin City Rfg. & S/M**
  P.O. Box 812
  South Broadway
  Scottsbluff, NE 69361
  Charles E. Schank
- **Waggaman & Brawner Realty Corp.**
  4123 Wisconsin Ave. N.W.
  Washington, DC 20016
  C. Thomas Buckley
- **Olen Waldrep & Sons Rfg. Inc.**
  7901 Taft Street
  Hollywood, FL 33024
  Olen Waldrep
- **Wallin Roofing Co. Inc.**
  1340 SW 34th Ave.
  Deerfield Beach, FL 33441
  Rex Wallin
- **M. Weisman & Sons Inc.**
  19 Fifth Ave.
  Cranston, RI 02910
  Stuart M. Weisman
- **Western Rfg. Co.**
  125 N. 3rd
  Norfolk, NE 68701
  Garry Murren
- **L.J. White Rfg. & Lumber Co.**
  P.O. Box 427
  Sidney, IL 61877
  Louis J. White
- **Williams Roofing Co.**
  420 S. Eastside Dr.
  Lakeland, FL 33801
  Reuben Williams
- **Williford Rfg. & S/M Inc.**
  P.O. Box 824
  609 E. Main St.
  Winnfield, LA 71483
  S.F. Williford

ASSOCIATES

- **A & H Supply Co. Inc.**
  1702 E. Jackson St.
  Phoenix, AZ 85034
  James G. Hornbabe
- **Arizona Diversified Products Inc.**
  22 E. Lincoln St.
  Phoenix, AZ 85004
  Michael V. Koberstein
- **Cant Strip Corp.**
  1510 W. Broadway
  Phoenix, AZ 85041
  Harold Klusmeyer
- **Childers Mfg.**
  P.O. Box 7467
  Houston, TX 77008
  Charles Vranich
- **Dibiten of America Inc.**
  P.O. Box 91
  New Milford, NJ 07646
  Charles G. Whitley
- **Du Pont Company**
  MCD N-2425
  1007 Market St.
  Wilmington, DE 19898
  J.H. Vicary
- **Duro Dyne Corp.**
  120 Route 110
  Farmingdale, NY 11735
  Hilda Ferrari
- **Firestone Industrial Products Co.**
  1700 Firestone Blvd.
  Noblesville, IN 46060
  Sunil Kumar
- **Flex-Shield Corp.**
  P.J. Box 200
  Gilbert, AZ 85234
  Charles O. Carroll
- **Graco Inc.**
  P.O. Box 1441
  60 11th Ave., N.E.
  Minneapolis, MN 55440
  Darlene Swan
- **International Tile & Supply Corp.**
  1288 S. La Brea
  Los Angeles, CA 90019
  Ben Malloy
- **Lucas Specialty Rock & Sand Co.**
  11105 Redwood
  Fontana, CA 92335
  J.W. (Bill) Lucas
- **Luco Mop Co.**
  4164 Chippewa
  St. Louis, MO 63116
  Sam Shalhoub
- **Manchester Ladder Co. Inc.**
  P.O. Box 4455
  Manchester, NH 03108
  David Lyon
- **Mechanization Systems Co. Inc.**
  22991 La Cadena Dr.
  Laguna Hills, CA 92653
  Peter Van Dijk
- **Thompson Rfg. & Supply Co.**
  P.O. Box 747
  Enid, OK 73701
  Hugh H. O'Neil
- **Tosco**
  Lion Oil Bldg.
  El Dorado, AR 71730
  Bill Kock
- **Tropical Industrial Coatings Inc.**
  P.O. Box 444
  Brunswick, OH 44212
  J.F. Byas
- **United Wholesale Co.**
  P.O. Box 11406
  Phoenix, AZ 85061
  Mike Ray

INDUSTRIAL/INSTITUTIONAL

- **Dormitory Authority State of NY**
  Normanskill Blvd.
  Elsmere, NY 12054
  Paul W.F.J. Moran P.E.
- **The Mugar Group Inc.**
  29 Commonwealth Ave.
  Boston, MA 02116
  James R. Walch
- **Spantec Inc.**
  310 SW Forth Ave.
  Portland, OR 97204
  Russell L. O'Connor

INTERNATIONAL

- **Bitumar Inc.**
  11650 Metropolitain East
  Montreal QUE. H1B 1A5
  Keith Carruthers
- **Texsa S.A.**
  Pasaje Marsal 11-13
  Barcelona-4
  Spain
  Gabriel Villalon

...the material difference in single membrane roofing

CoolTop 40

Cooley Roofing Systems' CoolTop 40 is a white, 40-mil. CPE extrusion coated polyester roofing membrane designed for mechanical fastening as a single membrane system (patent applied for).

Installations in place demonstrate the spectral reflective white color of CoolTop 40, offers great advantages in energy savings and aesthetic appearance.

It's the most utraviolet and ozone resistant material available in single membrane roofing. It is highly chemically resistant . . . compatible with most existing materials, including asphalt; usable around many corrosive liquid or gaseous chemicals that may be in the environment.

CoolTop 40 with its combination of thermoplastic resin and its heat set Celanese Fortrel® polyester reinforcement provides long life, high strength puncture resistance and remarkable dimensional stability.

And, the Cooley Roofing Systems' package of mechanically fastening plates, seam sealing systems and flashing materials make it a totally integrated system you can depend on for truly moisture-free protection.

All in all, Cooley Roofing Systems' CoolTop 40 gives you the one best single membrane roofing system available. And it's backed by one company, all the way from membrane design and manufacture to systems supply with a 10 year warranty.

Fortrel® is a trademark of Fiber Industries, Inc., a subsidiary of Celanese Corporation.

Cooley Roofing Systems INCORPORATED

50 Esten Avenue, Pawtucket, Rhode Island 02860
Tel.: (401) 724-0490.

Legal

By McNeill Stokes, NRCA Counsel

NATIONAL ELECTRICAL INDUSTRY FUND DECLARED ILLEGAL

In a comprehensive decision issued September 9, 1980, a federal district court declared the agreement between the National Electrical Contractors Association (NECA) and the International Brotherhood of Electrical Workers (IBEW) which established the National Electrical Industry Fund, to be a **per se** illegal price-fixing agreement under Section 1 of the Sherman Antitrust Act. **National Constructors Association, et. al. v. National Electrical Contractors Association, Inc. and International Brotherhood of Electrical Workers, et. al.,** Civil Action No. HM77-1302, U.S. District Court for the District of Maryland (September 9, 1980).

The antitrust action was filed in August 9, 1977 by the National Constructors Association (NCA) and fifteen construction companies against NECA, the IBEW, the Trustees of the National Electrical Industry Fund and certain personally-named officials of NECA and the IBEW, alleging that the agreement between NECA and the IBEW to establish the National Electrical Industry Fund and require all contractors in the electrical construction industry to make payments into the fund as a part of their collective bargaining agreements with the IBEW violated the Sherman Antitrust Act. After two years of discovery, both the plaintiffs and the defendants filed motions for summary judgment, and plaintiffs The Howard P. Foley Company and Commonwealth Electric Company moved for certification of the action as a class action on behalf of all electrical contractors who are not members of NECA, but who are required to contribute to the National Electrical Industry Fund through their collective bargaining agreements with the IBEW. Also before the court were motions by the defendants to dismiss NCA and certain plaintiff companies who did not directly hire electrical construction labor from the case and motions for summary judgement by both plaintiffs and defendents' with regard to the defendents' counterclaims, which alleged that the plaintiffs' motion for summary judgement, finding that:

> "In the Court's view, the undisputed facts presented in the record show that the defendants' agreement to set up and implement the National Electrical Industry Fund **was** a price-fixing agreement illegal **per se.** The plaintiffs are entitled to summary judgment on that issue, and the defendants' cross motion must be denied." (Emphasis in original)

In reaching that conclusion, the court stated that the starting point for its analysis was the rule of **United States v. Socony-Vacuum Oil Company,** 310 U.S. 150 (1940) that under the Sherman Antitrust Act any combintion or agreement for the purpose of affecting in any way prices in interstate commerce is **per se** illegal. After reviewing undisputed evidence in the case, including documents prepared by the defendants in connection with the agreement to establish the industry fund and the defendants' recorded statements and admissions with regard to the purposes of the industry fund, the court concluded that NECA and the IBEW had agreed to require all companies with IBEW agreements to make payments into the National Electrical Industry Fund, in order to ensure that all contractors employing IBEW labor who are not members of NECA would not enjoy a cost advantage over members of NECA who supported NECA with dues in the amount of 1% of their gross labor payroll. In its opinion, the court states:

> "The undisputed facts . . . establish that NECA and IBEW entered into a written agreement to add a surcharge, determined by a uniform formula, to the cost of procuring **all** contracts with the IBEW in the electrical construction industry. The facts also establish that the purpose of the agreement was to eliminate competition between NECA members and non-NECA members in bidding for projects in the industry. In the Court's view those facts are sufficient to establish a price-fixing scheme which is **per se** illegal . . . " (Emphasis in original)

The court also determined that the NECA-IBEW agreement was not exempt from the antitrust laws under the usual exemption for the activities of labor organizations. The court found that the IBEW's agreement to obtain the National Electrical Industry Fund contributions from non-members of NECA "at the behest of and in combination with NECA" was not protected by the national labor policy and therefore was not exempt from the Sherman Act. The court noted that the labor exemption did not apply if the union combined with a non-labor group to promote the non-labor group's interests, particularly where the union joins what is in essence a business group's scheme to control the marketing of goods or services.

The court also granted the plaintiffs' motion for class certification, finding that the case was appropriate for class action treatment because the class of electrical contractors was sufficiently numerous, the claims of the plaintiffs and the claims of the class members contain common questions of law and fact, and were typical of the claims of the class members, that The Howard P. Foley Company and Commonwealth Electric Company would adequately represent the class members' interests, and that issues common to members of the class predominated over any individual issues. The court also held that the damages recoverable by the class members would consist of the amounts paid so far into the National Electrical Industry Fund, which would be the amount of the overcharge attributable to the defendants' price-fixing agreement. As in all antitrust cases, the class members would be entitled to have treble damages, which may in this case approximate a total of 90 to 120 million dollars plus attorneys' fees.

In the decision, the court also held that the defendants' counterclaims against the plaintiffs should be dismissed, finding that because the National Electrical Industry Fund is illegal, the plaintiffs' refusal to contribute

continued

Legal

to it was proper, and that NCA itself and certain of the plaintiffs who did not directly hire IBEW labor were proper plaintiffs and parties to the case for purposes of injunctive relief, although not damages, and denied the motion of defendants Hogan Electric Company and Miller Electric Company, to dismiss NECA members who had participated in bringing about the national agreement.

The plaintiffs in the action were represented by Ira Genberg and Peter Spanos of Stokes & Shapiro, Atlanta, Georgia; Alan Cirker of Zimmerman & Obadal, Washington, D.C.; and Wilbur Preston of Whiteford, Taylor, Preston, Trimble & Johnston, Baltimore, Maryland.

RECORD-BREAKING HEATWAVE MAY BE BASIS FOR EXCUSABLE DELAY

The record-breaking heatwave which struck much of the nation this last July and August could give rise to a claim for an equitable extension of time under the terms of many construction contracts. Typically, private and government construction contracts contain provisions permitting extensions of time due to unusually severe or abnormal weather conditions encountered on the job. For example, Article 8.31 of the General Conditions of the Standard AIA construction contract provides, in pertinent part:

> "If the Contractor is delayed at any time in the progress of the Work by . . . adverse weather conditions not reasonably anticipatable, . . . then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine."

Most government contracts contain a similar provision. For example:

> "Contractors right to proceed shall not be so terminated nor the Contractor charged with resulting damage if: . . . the delay in the completion of the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, . . . unusually severe weather," (General Provision 5(d), Standard Form 23-A, Government Construction Contract).

Extremely hot weather which is unanticipatable for a particular locality and which can also be shown to have delayed the progress of the contractor's work can be treated just like any other form of adverse weather encountered on the job. The legal and factual considerations will be similar regardless of whether the adverse weather conditions consist of excessive rain, heat or cold.

In most cases, delays due to extreme heat will show up in the form of labor inefficiencies such as failure to meet target deadlines for given units of work. While it may be unlikely that a contractor could justify shutting down a project because of extreme heat, it is quite likely that its workers will nevertheless require more breaks, longer rest periods and will be unable to work at their normal pace during the 100 + degree temperatures. A comparison of the contractor's projected time of performance to its actual time of performance for a given task or unit of work may provide an acceptable method of measuring the time actually lost due to excessive heat. This time may have to be reduced by the number of days that the contractor should have expected to be delayed by other adverse weather conditions which did not occur during the same period, for example, days normally lost due to excessive rainfall. The primary difficulty in substantiating such a claim will be the contractor's ability to present an acceptable and convincing method of computing lost time during periods in which some work was nevertheless performed. The contractor's success in this regard will depend greatly upon its ability to convince the architect or contracting officer that, given the unusual circumstances, some type of time adjustment is obviously warranted. If the contractor has suffered through record-breaking temperatures during the performance of its contract, it should have no trouble in obtaining climatological data from the U.S. Department of Commerce to substantiate the unusual nature of the temperatures for the project location.

Finally, if one believes he may have such a claim, he should notify the appropriate party as soon as possible to satisfy notice requirements and avoid waiver provisions that may appear in the contract.

PUBLIC ACCESS TO CONTRACTOR RECORDS

The question of whether records developed under a project fully funded with federal grants are "agency records" within the Freedom of Information Act (FOIA) was recently decided by the U.S. Supreme Court. **Forsham v. Harris,** 100 S.Ct. 978 (1980). This decision has certain implications for those of you who contract with the federal government.

In **Forsham** the Court found that written data not in the possession of a federal agency are not agency records and are therefore not subject to the FOIA, even though a project is federally funded. Once a federal agency obtains copies of a contractor's records, however, through such means as the bidding process, correspondence, or agency audits,

those contractor documents then become "agency records" within the meaning of the FOIA.

In light of the **Forsham** decision, contractors who are concerned about public access to their records should be careful to submit to government agencies only those documents arguably necessary for contract review and compliance by the agency. While a federal agency has a right to review a contractor's job records, one would be advised to have such a review take place at the jobsite if at all possible, rather than to indiscriminately forward requested copies of documents to the agency. A contractor would also be advised not to open up job files and records to agency officials at the jobsite for unlimited review and copying. Files should be carefully scrutinized prior to an agency review, especially for the purpose of culling out such items as documents prepared by attorneys, correspondence with attorneys and documents containing confidential information, which the government agency arguably does not have the right to review. Once copies of documents and correspondence are in the possession of the agency, those documents arguably become "agency records" subject to the FOIA under the Supreme Court's ruling in **Forsham.**

OSHA WALKAROUND PAY REGULATION HELD INVALID

An OSHA regulation requiring an employer to pay an employee for time spent accompanying OSHA inspectors during walkaround inspections was struck down by the U.S. Court of Appeals for the District of Columbia.

The Occupational Safety and Health Act of 1970 specifically requires employers to permit an employee representative to accompany an OSHA inspector during a work place safety inspection. OSHA then promulgated the regulation declaring that an employer's failure to pay employees for walkaround time was discriminatory. OSHA determined that the regulation was an "interpretive" one, and merely a statement of policy and so issued the regulation without any public proceedings. The Court held that the Act neither prohibited nor compelled pay for walkaround time, so the walkaround pay regulation did more than "fill up the details" of an existing legislative requirement. The rule was struck down as an attempt to exercise legislative power without complying with the notice-and-comment procedures. The Court added that it took no position on whether the government could reissue the same regulation after satisfying the requirements of the Administrative Procedure Act.

Litigation Center Continues Growth and Service

by Patricia Appelhans, Manager
National Roofing Litigation Center

The National Roofing Litigation Center was established two years ago to aid roofing contractors and their attorneys with litigation involving alleged roof failures. Since that time, the Litigation Center has increased its membership to over 350 members. In these two years the Litigation Center has answered over 180 requests, ranging from asbestos felt splitting to wind damage. The most frequent requests were for information on two ply coated sheets, asbestos felt splitting and urethane blistering.

The Litigation Center is constantly updating its files with new information, obtained through various sources. Members are a valuable source of information. After the member's case has ended, the member is asked to send the Litigation Center information from that case. Through this constant exchange of information, the Litigation Center is able to update its files with current case information. It is therefore important that members send information from their case back to the Litigation Center.

Another source of information for the Litigation Center is NRCA's Project Pinpoint, a statistical base of jobs completed and problems encountered. Through Project Pinpoint the Litigation Center is able to determine where the problems are, and most important, where new problems are developing. In this way information packets can be developed before the requests come in. Project Pinpoint also allows the Litigation Center to put roofing contractors in touch with other roofing contractors with the same or similar type of problem.

Information is also gathered through the courts. When the Litigation Center hears of a case that might be beneficial to its members, a letter is written to the clerk of the District Court where the case was tried requesting information about the case. The Litigation Center requests the names of the attorneys for each of the parties, a copy of the docket sheet showing the pleadings which have been filed and the names of any witnesses who have been deposed. The Ligitation Center is then able to determine the specific information wanted and request it from the parties' attorneys.

Typically, a packet of information sent to a NRLC member will include depositions of key personnel: consultants, architects, and manufacturers representatives. Also included in the packet are technical articles on the materials, sample interrogatories, pleadings, other court decisions and sales literature published by the manufacturers. In addition technical information on design considerations is included where relevant.

This information is important to the roofing contractor and his attorney in developing information and litigation techniques which will enable them to defend their interests more successfully. For example, depositions are included in the packet to give members and their attorneys the background and views of potential witnesses.

Sales literature is also included to show what type of performance claims have been made for the product.

NRLC is a separate organization funded by its own members' dues, to aid roofing contractors in dealing with litigation. Membership to the Litigation Center is open to roofing, roof deck, waterproofing contractors, and suppliers in the U.S. and its possessions. The members' annual dues pay for the collection of current case histories, research, and the cost of reproduction and shipping of materials. The yearly dues that the member pays gives him unlimited access to the Center's files for the year.

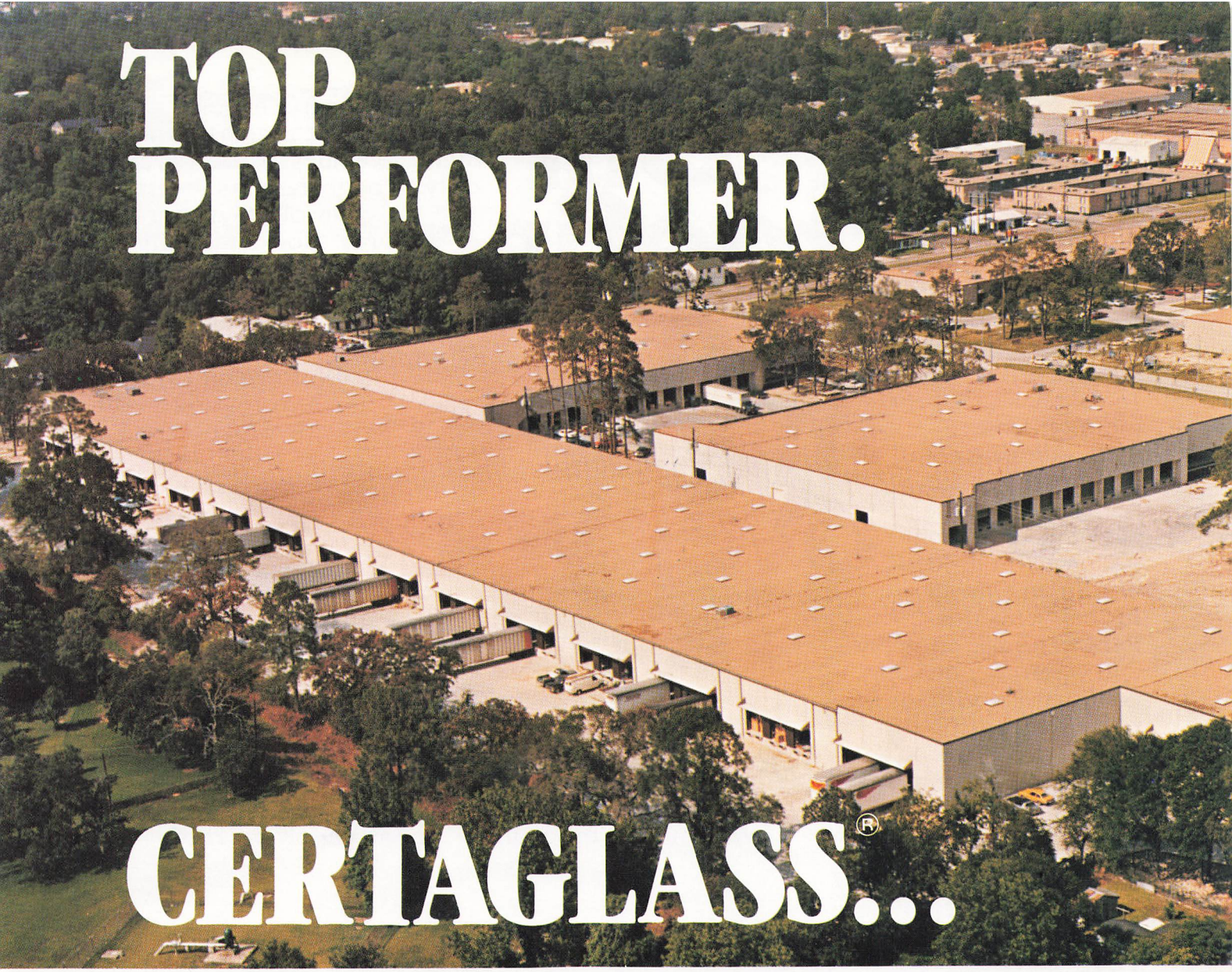
The NRLC Board of Directors is the governing body of the Center. It is the Board's job to establish the policy and direction of the Litigation Center. Recently, the Board of Directors met in Chicago. At this meeting Charlie Raymond of Giffen Roofing Co., Miami, Florida was elected President of the NRLC. Elected Vice-President of the Litigation Center was Richard Willis, of the Wehner Roofing and Tinning Co., Dayton, Ohio, a former President of the Litigation Center. Other current Directors of the NRLC are Richard Zimmermann of Hoge-Warren-Zimmermann Co., Rolling Meadows, Illinois, George Stephenson of Stephenson Roofing Co., St. Louis, Missouri, Kenneth Marshall of Federal Sheet Metal and Roofing Co., Jamaica Plain, Mass., and Paul Morris of Selles and Marquis Roofing Company, Kansas City, Missouri.

Also discussed at this meeting was long term planning of the activities of the NRLC. Under consideration are seminars on current member problems, testing of roofing materials, and possible expansion of research and information to include OSHA problems. A Board of Directors meeting is planned for November to continue to look into these activities.

At the 1981 NRCA Convention to be held in February in Phoenix, Arizona, the NRLC is planning a business session showing a correlation between the NRLC member requests and the NRCA's Project Pinpoint results. Also in the program will be a summary and update of the major lawsuits of the past five years relating to NRLC members problems.

The National Roofing Litigation Center has provided an opportunity for roofing contractors to cooperate with each other in developing information and litigation techniques which will enable them to defend their interests more sucessfully.

For more information on becoming a member, call or write NRLC at (312) 383-6252, 1515 North Harlem Avenue, Oak Park, Illinois 60302, for a brochure and application.



A PROVEN BUILT UP ROOFING PLY SHEET. BUILT ON FIBERGLASS. BACKED BY 5 YEARS OF THOROUGH TESTING.

CertainTeed's fiberglass roofing ply sheet, Certaglass, has met the challenge of 5 years of the toughest field and lab tests, and is now available almost anywhere in the U.S.A.

Built on fiberglass mat reinforced with fiberglass textile yarn, Certaglass has stood up to stresses, strains and sudden temperature changes beyond currently proposed or published BUR performance specifications. It has been used on hundreds of roofs, of all sizes, demonstrating superior weathering and resistance to moisture intrusion every time.

Perhaps best of all, roofers who have worked with Certaglass tell us that it's easy to handle, lays flat and stays flat, and has excellent inter-ply adhesion with no bleed through problems.

Want to put Certaglass to the test yourself? Call your local CertainTeed representative today. Or write on your letterhead.

CertainTeed

CertainTeed Corporation, P.O. Box 860, Valley Forge, PA 19482

Our roofing technique might be over your head

These days when anyone can be a roofer, it's good to know there's a roof system that only a legitimate roofing contractor can apply. Introducing **Paradiene** – the multi-ply system designed exclusively for the hot roofing contractor, with the answers to your basic roofing problems.

Paradiene is composed of an elastomeric asphalt base, allowing 100% elongation with full recovery. So when your building expands **Paradiene** also stretches, and when your building contracts **Paradiene** contracts right back with it. Your days of buckling and splitting roofs are over.

This theory in roof systems is not a "Johnny-come-lately". **Paradiene** has already proved to be superior all over the world. And we know we'll prove this to you.

With millions of squares presently in service, from desert to arctic regions, **Paradiene** continues to retain its elasticity, through the sun's severe ultraviolet rays, thermal shocks, random ponding water and extreme low temperature.

Paradiene is a lightweight system, making it ideal for new or re-roofing. It's applied conventionally, using hot asphalt as the adhesive. And once the roof's on, we guarantee you won't need to service it for up to 10 years. **Paradiene** – the elastomeric system for hot roofing contractors. You know what they say – **if you can't stand the heat, get off the roof.**

Factory Mutual System Approved

siplast®

Arkadelphia, AR 71923
Call Toll-free: 1-800-643-1591
In Arkansas, Call Collect 501/246-8094

News from associate members

Johns-Manville has announced the opening of a new manufacturing facility for the production of fiber glass mat, in Etowah, Tennessee. According to company officials, the 500,000 square foot plant—the largest of its kind in the United States—will employ 200 people to produce fiber glass mat.

The inorganic fiber glass mat produced at the Etowah facility is used in the manufacturing of Johns-Manville's full line of fiber glass shingles for residential and light commercial roofing applications. The fiber glass mat replaces the paper felt base of conventional asphalt shingles, thereby qualifying the J-M fiber glass shingles for UL's Class A fire-resistance rating—the highest attainable.

J-M has completely converted its residential shingles to a fiber glass base believing that the weather-resistance, fire-resistance and longer life of the product offer a superior value to both the new roofing and reroofing markets.

J-M purchased the building and 151 acre property from the Beaunit Corporation and invested approximately $51 million to gear up for fiber glass mat production. This new addition to J-M's manufacturing capabilities is expected to make a significant contribution to the company's continued role as a leader in fiber glass shingle production.

GAF Corporation announces the introduction of Gaflex flexible expansion joint covers, for use in covering expansion joints in building construction.

Gaflex expansion joint covers consist of a rugged, insulated bellows of flexible foam, laminated to a sheet of neoprene, mechanically attached to galvanized metal flanges.

"Gaflex expansion joint covers provide a waterproof seal in building construction, wherever structural expansion joints are required," says Ralph Faruolo, product manager, GAF Corporation. "The flexible bellows compensates for movement in any direction, eliminating stress at joints and providing long lasting watertight protection."

GAF Corporation recommends the use of Gaflex expansion joint covers whenever roof structures changes directions, such as at an L; wherever the direction of the structural framing changes; wherever the roof deck material changes; wherever additions are made to existing buildings; wherever there is a difference in elevation of adjoining decks; and wherever a building exceeds 200 feet in length.

Gaflex expansion joint covers are available in 50 ft. rolls and 10 ft. flat sections, with straight or curved flanges.

Gaflex expansion joint covers can be applied with any built-up roof system, whether hot or cold applied, organic or inorganic, to meet all roof specifications.

The Flintkote Company has announced the appointment of James H. Shedden to the position of president of its Flintkote Building Products Company which has headquarters at Dallas, TX. Mr. Shedden succeeds Monte C. Carpenter who retired Oct. 1, 1980.

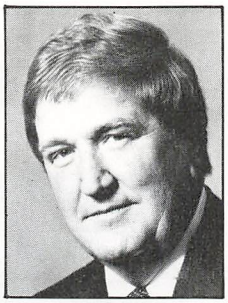
The Flintkote Company, acquired by Genstar Limited in February of this year, is comprised of three companies—Flintkote Building Products Company, Flintkote Stone Products Company and Flintkote Cement and Lime Company. The Building Products Company includes the manufacturing and distribution of roofing, gypsum and floor tile products, as well as the chain of 52 supply centers.

Mr. Shedden was previously president and general manager of Flintkote Supply Company Division and will be succeeded in that position by James C. Murphy. Mr. Murphy was vice president and general manager of the Company's flooring operations before this new assignment. Mr. Shedden came to The Flintkote Company as manager of Flintkote Supply's St. Louis branch in 1974 and has held various positions leading to this promotion. Before joining Flintkote, he was president of Lord & Bushnell Lumber Co., Chicago. He attended Ripon College, Ripon, WI, and the University of Pittsburgh.

Mr. Murphy came to Flintkote in 1977 to head the Flooring Division. Prior to 1977, he was with the GAF Corporation where he was vice president of sales for the Flooring Division. Mr. Murphy attended the University of Texas and is a Certified Public Accountant.

Both Mr. Shedden and Mr. Murphy will be located at the Flintkote Building Products Company headquarters in Dallas (Irving).

Robert C. Baxter has been appointed director of marketing for the Building Materials Division, Organic Materials Group of **Koppers Company, Inc.,** Pittsburgh, PA. He will be responsible for marketing and sales of the Division, which produces and markets roofing and waterproofing systems, maintenance materials and roof insulations.



Mr. Baxter joined Koppers in 1964 and has served in various assignments in international operations and corporate marketing, most recently as manager of commercial development.

A native of Canton, NY, Mr. Baxter holds a Bachelor of Science degree from St. Lawrence University and a Bachelor of Management Engineering degree from Rensselaer Polytechnic Institute.

He resides in McMurray, PA with his wife.

RPM, Inc., Medina, Ohio, manufacturer of specialized protective coatings, announced today that it has signed an agreement to purchase all of the assets of HAARTZ-MASON, INC., Boston, Massachusetts.

Haartz-Mason, Inc. has produced rubber (elastomeric) coated fabric at the same Watertown location for over fifty years. The Company is internationally recognized as a specialist in high performance material designed to meet exact customer specifications.

The HAARTZ-MASON product line supplies the roofing industry with single-ply synthetic rubber membranes. The company, which has annual sales of approximately $8 million, will continue to operate under the leadership of its present management team.

Through a planned expansion at the existing HAARTZ-MASON facility, RPM will better than double its present capacity for the single-ply roofing market, primarily neoprene and EPDM (ethylene propylene diene monamer) systems. GATES ENGINEERING, an RPM subsidiary, a leader in the neoprene single-ply membrane field for the past 30 years, will utilize Haartz-Mason's increased production.

A new descriptive brochure is available on **U.S.M. Weather-Shield** Watertight Roofing Systems, featuring Flexhide® PVC Roofing Membranes.

The four page brochure contains general information and specifications related to

continued

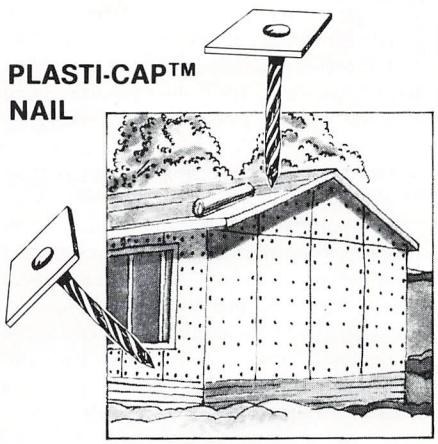
News From Associates

Weather-Shield roofing systems, plus the physical properties and benefits of Flexhide® membranes for guaranteed watertight installations in both reroofing and new construction.

For a copy of the new Flexhide® descriptive brochure, write to: USM Weather-Shield Systems Co., Furnace Street, Stanhope, N.J., 07874. The firm is a subsidiary of United States Mineral Products Co.

National Nail Corporation has announced a new fastener to secure insulation to framing or drying in shingled roofs. The Plasti-Cap Nail, a revolutionary new fastener, is designed and engineered to firmly hold insulation board to wood ro masonry walls or felt down under shingles. An important benefit of the Plasti-Cap Nail is that it is designed to prevent blow-offs.

As fuel prices increased in the past few years, the public became increasingly energy cost conscious. Rigid foam, urethane

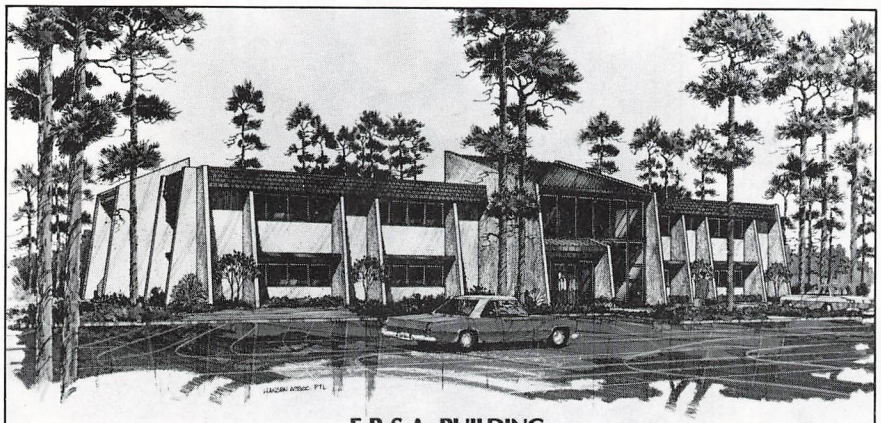


or polystyrene insulation sheathing board grew in popularity for insulating residential homes. With this demand, a new market opened for the large headed cap nail to fasten these products.

Although the Round Top Cap Nail adequately served this new market, its precision and quality standards, established by the roofing industry, were in excess of that demanded by the residential home builder. The contractor requested a large headed cap nail to firmly hold the sheathing board to framing or felt down on roof decks until the siding or exterior wall facing was completed or shingles were applied.

Bob Rodenhouse Jr., Marketing Manager for National Nail, was challenged to meet this new market with a fastener having a large capped head, easy to handle, and inexpensive to purchase and apply. Plasti-Cap was developed and engineered to meet those market objectives. Plasti-Cap features the Ardox Spiral Nail design with a full one inch square co-polymer cap. The cap has no appreciable weight, so freight and handling costs are substantially reduced.

News from affiliates



F.R.S.A. BUILDING

Florida

The Florida Roofing, Sheet Metal & Air Conditioning Contractors Association (FRSA) launched one of its most ambitious projects recently with the groundbreaking for its new headquarters building.

Located in Winter Park, the 15,000 sq. ft. building will house not only FRSA, but long term lease tenants as well. The building has been designed by Lopatka, McQuaig & Associates of Winter Park with the Kincaid Construction Company acting as general contractor.

FRSA is a 600 member state trade association dedicated to the improvement of the industries it represents. Throughout its 58 year history, the organization has fostered high standards, ethical practices, and service to the public.

Illinois

The Illinois Roofing Contractors Association recently held a management seminar in Bloomington, Illinois which was attended by more than 60 roofing contractors. The topics of the day—"The Anatomy of a Law Suit," "Re-Roofing with Conventional Systems," and "Computerizing Your Company" were interesting, and the two computers brought in for the day were objects of captivation for all. This new state organization should be congratulated for the success of this Seminar—the first of many. Current President is Gene Scott of Empire Roofing Company, Chicago.

Michigan

Participation in the 15th Annual Michigan Roofing Contractors Assn. Convention was tremendous. Among the interesting and informative sessions were: Ed Garwood and John Cornelius on "Self-Insurance," Ed Nuttman's presentation on "Construction: Opportunity and Risk," and Robert Harrison's review of NRCA's "Construction Details."

The Grand Traverse City Hilton, Traverse City, Michigan has been selected by the Board of Directors for the 1981 Convention site. The dates for next year are August 5-August 9, 1981.

Minnesota

In August James Bingham was added to the staff of SMARCA of Minnesota. Jim has a degree in industrial relations from the University of Minnesota and is a graduate of the William Mitchell College of Law, St. Paul.

He has experience in labor relations and worked for the U.S. Department of Labor doing research work on ERISA (Employment Retirement Income Security Act). Jim will be working in a multitude of areas, but his primary responsibility will be labor relations.

Jim and his wife Cindy live in Long Lake, Minnesota.

Mississippi

The fourth annual Mississippi Roofing Contractors' Assn. Convention can easily be called a success. When the registration booth shut down everyone had arrived or sent word of when they could be expected.

Saturday morning's meeting found the contractor members electing new officers and directors:

President . . . . . Sid Malone
Vice-President . . . . . Terry Cross
Secretary-Treasurer . . . . . Huey Hill
Executive Director . . . . Frank Lovell

Directors from across the state are: J. L. Brown, Ex-officiate, Greenville; Jesse Quin, Greenwood; Jerry Blakely, Winona; Burt Wheeler, Columbus; Charles Sylvester, Jackson; Doug Burt, Jackson; Sherman Boyles, Waynesboro; Leo Pace, Hattiesburg; Pete Rowell, Columbia; James Cooper, Gulfport; Mike McAdams, Pascagoula.

National Roofing Foundation

BECOME A FRIEND OF THE FOUNDATION

the National Roofing Foundation is a "Friend" of the Roofing Industry—Are You?

The National Roofing Foundation is a non-profit branch of NRCA devoted to improving the roofing industry by developing and funding educational programs and by awarding scholarships.

To perform its work, The Foundation needs the support of industry "Friends" like you. Anyone can become a "Friend" of The Foundation by agreeing to contribute $50.00 yearly to The Foundation. In this way, The Foundation can be assured of a regular income with which to fund the development of educational and scholarship programs.

THE FOUNDATION WORKS FOR YOU

In the past, The Foundation's funds have been used to:

- Create a college level course, entitled "Roofing Technology," which will educate undergraduate architectural, engineering, and design students in the basic theories and practices of built-up roofing...
- Provide scholarships to RIEI seminars for prospective teachers of the "Roofing Technology" course...
- Provide scholarships to students pursuing careers associated with the roofing industry...
- Provide grants for developing audio-visual curriculum materials.

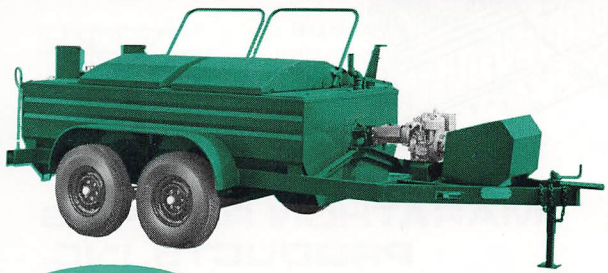
SEND YOUR SUPPORT TODAY

To achieve its goals, The Foundation urges all of those associated with the roofing industry to become Friends of The Foundation by sending a check for $50.00 to: The National Roofing Foundation, Friend of The Foundation Program, 1515 N. Harlem Avenue, Oak Park, IL 60302.

THE FOUNDATION IS YOUR MEANS OF IMPROVING THE ROOFING INDUSTRY!

✸ For Maximum Production..turn to REEVES...

3 Axles-2 Covers-2 LPBurners w/Hi-Lo Controls



1,000 Gallon 'Jumbo' LP Pump Kettle

For flat out performance on big jobs. Remarkable production keeps a full crew busy. Efficient. Profitable. Stop, tail & turn lights standard. Weight (less LP cylinder) 4,250 lbs.

- Semi-Automatic Hi-Lo Controls
- 8 H.P. Briggs & Stratton Engine
- 6 to 1 Reduction Gear
- Electric Brakes on Front Axle

Call Toll Free . . .
Texas 1-800-292-5104
Nat'l. 1-800-531-5606

RK-750 & 650 Gallon 'Mighty' Pump Kettles

These big kettles give you outstanding production with less "downtime". Tandem running gear for stability. Hi-Lo Controls available on LP Models. RK-750 weighs 3200 lbs. RK-650 weighs 3100 lbs.

2 AXLES - 2 COVERS - 2 BURNERS - KERO OR LP

REEVES **ROOFING EQUIPMENT CO., INC.**

(512) 695-3567 • ROUTE 17, BOX 300 • SAN ANTONIO, TEXAS 78228

The **roofing spec**

CLASSIFIED

DRY-APPLIED ROOF LEVELER AND INSULATION
"THERM-O-DECK" is easy to use, providing positive, permanent results in correcting low spots, irregularities, etc., and building up a slope for proper drainage on old or new decks. Insulating "K" factor = 0.46. Simply tamp in place and cover. Shipped anywhere in 75 lb., 4 cu. ft. bags. Write Brouk Co., 1367 S. Kingshighway, St. Louis, Mo. 63110.

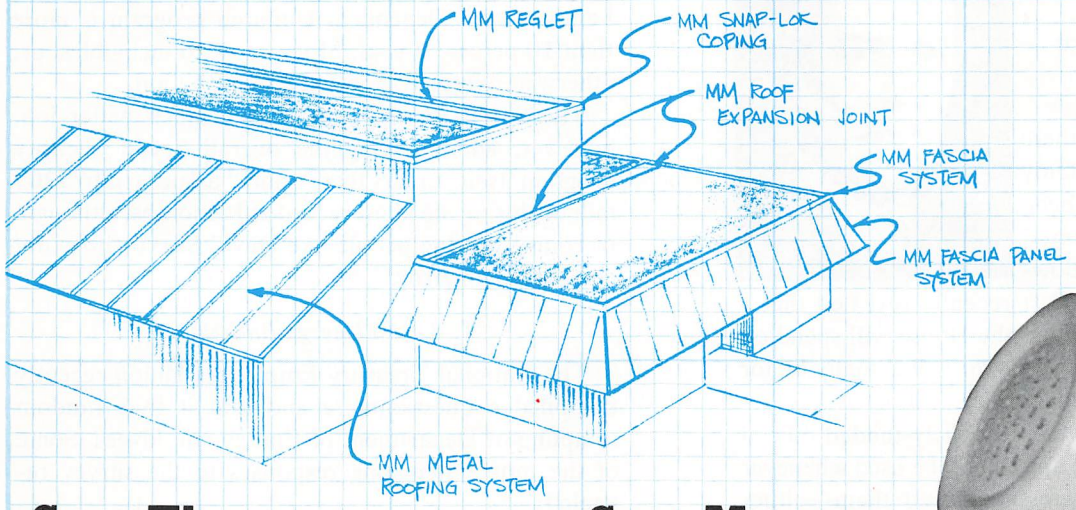
SLATE ROOFS
"A handbook on data on the constructing and laying of all types of slate roofs." Written in 1926 and now reproduced. Completely relevant today. Many details. Send $7.95 to Vermont Structural Slate Co., Inc., P.O. Box 98, Fair Haven, Vermont 05743.

SOUTHERN CALIFORNIA ROOFING COMPANY
Southern California Roofing Company located in Los Angeles County California, is interested in hiring experienced estimators, supervisors and foremen. Estimators should be thoroughly experienced in new and reroofing of commercial buildings. We are looking for top men thoroughly familiar with all phases of government work. Only the very best and top in their fields need apply. Send resume outlining qualifications and salary requirements to: 9623 Imperial Highway, P.O. Box 158, Downey, California 90241, Attention: Harold R. Provin, General Mgr. & Chairman of the Board or James Lawson, President.

MANUFACTURERS REPRESENTATIVES
Established equipment representatives sought to take on Aluminum Feltlayer and asphalt resistant tire. Exclusive areas available. Send resume to M.S.C., Inc. 22991 La Cadena Dr., Laguna Hills, CA 92653—714/586-3832.

Place a classified ad in *Roofing Spec* for 25 cents per word. There is a minimum charge of $10.00. Boxed or display advertisements are available in the classified section for $20.00 per inch (one inch minimum). Ads using blind boxes available at no additional charge to NRCA members, non-members add $5.00 to total order. Send ad copy and payment to: Margaret Pasquini, Advertising Manager, Roofing Spec, 1515 N. Harlem Ave., Oak Park, IL 60302.

You don't have time to shop around for Architectural Metal Systems



Save Time

At MM Systems, we're your one source for the quality architectural metal systems you need. You won't have to waste your valuable time running from supplier to supplier for fascia, coping, expansion joint assemblies, roof and fascia panel systems, reglets—all the metal specialties you need to meet specifications.

Save Labor

Our architectural metal systems come to you complete, ready to put in place. You get a uniform product that fits because it was manufactured exactly to specifications. And, as you know, the more complete the system is, the more you save on installation costs.

Save Money

Quality products, properly installed, mean long life and fewer callbacks. And that means money saved to you. MM products are manufactured of heavier gauge metals in virtually all architectural finishes so you can be sure the metal specialty item you see installed today will be just as beautiful, just as functional, for years to come. And so it will be, if it's an MM System.

Save! Call Toll-FREE

Find out more about the industry's most complete line of architectural metal products. Call toll-free 1-800-241-3460, and ask about our guaranteed estimates. We'll give you the name of your local MM representative and send you a FREE brochure on the products you need. Put MM Systems to work today saving you time, labor and money.

Call your ONE Source TOLL FREE 1-800-241-3460

MM SYSTEMS CORPORATION

LOOK FOR US IN SWEET'S 7.3/MM and 7.2/MM 4520 ELMDALE DRIVE, TUCKER, GEORGIA 30084/PHONE (404) 938-7570

'OFFICE' EXPENSES OFTEN NOT WHAT THEY SEEM

By

Richard L. Lesher
President
Chamber of Commerce
of the United States

Cheer up Virginia, there really is a free lunch. Only on Capitol Hill it's been euphemistically renamed The Official Expense Allowance. *The Washington Post* recently revealed that a fat chunk of the $40 million the House will spend on "office operations" this fiscal year will actually be for cushy perquisites of public service.

The nice thing about these publicly-funded official expenses is that they can apparently be used whenever and wherever our Congressmen need them—either here in Washington, or back at home during one of those "district work periods," which used to be called a Congressional recess. Indeed, in reviewing the 1979 expense records, it's easy to understand why the *Post* likened them to " a great mail-order catalogue of life's amenities," for they include: Rented cars, first class air fares, charter flights, meals in fine restaurants, entertaining of constituents, and tens of thousands of dollars for postage stamps to subsidize personal mailings.

In fairness, many members of the House do not abuse their expense allowances, and the Senate operates under much stricter guidelines for its own allowances.

Sabotaging Social Security

David (Son of Sam) Berkowitz, who is serving 315 years in prison for his grotesque murders of six people, was last reported receiving $300 a month in Social Security payments. Social Security officials say the benefits are virtually automatic and are sent to his estate since he has been declared too mentally ill to hold a job.

Actually, Berkowitz is not alone. By one estimate, Social Security is providing as much as $60 million at taxpayers expense to imprisoned criminals. Who said crime doesn't pay?

All of Which Reminds Me. . . .

The Social Security Administration has admitted that the error rate in welfare payments in the Aid to Families with Dependent Children program is more than 10 percent a year. Money sent to ineligibles, or, otherwise overpaid, now exceeds $1 billion.

The Social Security folks did a much better job, however, administering the overall Social Security program itself. Errors there "only" amounted to $209 million during the latest recorded 12 months, although, of course, paying people like David Berkowitz is not considered an error.

Latest Energy Bulletin

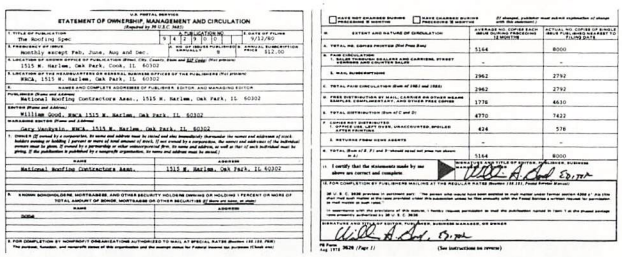
The National Treasury Employees Union recently compiled a questionnaire and sent it to a random sampling of Department of Energy employees. Some of the more interesting responses to the survey revealed:

That 80 percent thought management was poor, or exhibited no leadership; that 94 percent believed DOE is being politicized by the Administration, and that 67 percent were considering leaving their jobs.

A Confession

Sam Brown, director of the federal Action program, recently told a group of Vista volunteers, community organizers and other activists: "Despite our best intentions, the government programs we have supported have unwittingly made the poor dependent and created a new bureaucratic and expert elite that too often denies poor people the opportunity to help themselves.

". . . We have, in short, created a system of helping that encourages the poor to be passive rather than active, dependent rather than self-reliant, recipients rather than producers, (and) clients instead of people proud of their own work."



STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

1. TITLE OF PUBLICATION: The Roofing Spec	A. PUBLICATION NO. 9 4 2 9 0 0 1	B. DATE OF FILING 9/12/80
2. FREQUENCY OF ISSUE: Monthly except Feb, June, Aug and Dec.	A. NO. OF ISSUES PUBLISHED ANNUALLY 9	B. ANNUAL SUBSCRIPTION PRICE $12.00
3. LOCATION OF KNOWN OFFICE OF PUBLICATION (Street, City, County, State and ZIP Code) (Not printers): 1515 W. Harlem, Oak Park, Cook, IL 60302		
4. LOCATION OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS (Not printers): RRCA, 1515 W. Harlem, Oak Park, IL 60302		
5. NAMES AND COMPLETE ADDRESSES OF PUBLISHER, EDITOR, AND MANAGING EDITOR		
PUBLISHER (Name and Address): National Roofing Contractors Assn., 1515 W. Harlem, Oak Park, IL 60302		
EDITOR (Name and Address): William Good, RRCA 1515 W. Harlem, Oak Park, IL 60302		
MANAGING EDITOR (Name and Address): Jack Vaughan, RRCA, 1515 W. Harlem, Oak Park, IL 60302		
6. OWNER (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication is published by a nonprofit organization, its name and address must be stated.)		
NAME: National Roofing Contractors Assn.	ADDRESS: 1515 W. Harlem, Oak Park, IL 60302	
7. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS OWNING OR HOLDING 1 PERCENT OR MORE OF TOTAL AMOUNT OF BONDS, MORTGAGES OR OTHER SECURITIES (If there are none, so state)		
NAME: NONE	ADDRESS	
8. FOR COMPLETION BY NONPROFIT ORGANIZATIONS AUTHORIZED TO MAIL AT SPECIAL RATES (Section 132.122, PSM)		

	AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS	ACTUAL NO. COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE
A. TOTAL NO. COPIES PRINTED (Net Press Run)	5164	8000
B. PAID CIRCULATION: 1. SALES THROUGH DEALERS AND CARRIERS, STREET VENDORS AND COUNTER SALES	-	-
2. MAIL SUBSCRIPTIONS	2962	2792
C. TOTAL PAID CIRCULATION (Sum of 10B1 and 10B2)	2962	2792
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS SAMPLES, COMPLIMENTARY, AND OTHER FREE COPIES	1776	4630
E. TOTAL DISTRIBUTION (Sum of C and D)	4770	7422
F. COPIES NOT DISTRIBUTED: 1. OFFICE USE, LEFT OVER, UNACCOUNTED, SPOILED AFTER PRINTING	424	578
2. RETURNS FROM NEWS AGENTS	-	-
G. TOTAL (Sum of E, F1 and 2 - should equal net press run shown in A)	5164	8000

11. I certify that the statements made by me above are correct and complete. SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER, OR OWNER: William A. Good, Editor

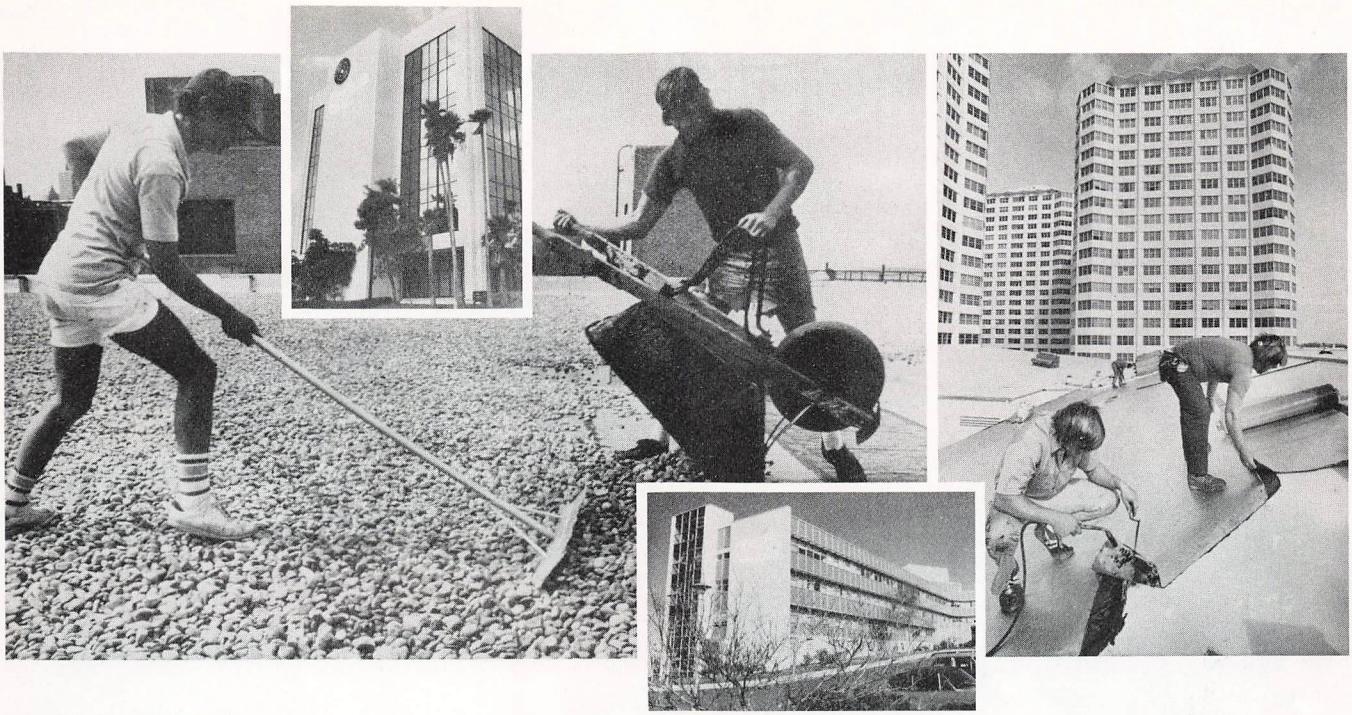
12. FOR COMPLETION BY PUBLISHERS MAILING AT THE REGULAR RATES (Section 132.121, Postal Service Manual)

39 U.S.C. 3626 provides in pertinent part: "No person who would have been entitled to mail matter under former section 4359 of this title shall hereafter be authorized to mail matter at such rates unless he files annually with the Postal Service a written request for permission to mail matter at such rates."

In accordance with the provisions of this statute, I hereby request permission to mail the publication named in Item 1 at the phased postage rates presently authorized by 39 U.S.C. 3626.

SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER, OR OWNER: William A. Good, Editor

PS Form 3526, July 1979 (Page 1) (See instructions on reverse)



"After four years of using KMM single-ply roofing, we have over five million square feet installed, and zero problems."

Richard F. Milanese,
President, Triple M Roofing Corporation

That's the beauty of it. KMM® Membrane Systems are problem-solvers. Specifiers and building owners will discover, as Mr. Milanese has, that KMM is a fast, easily applied, watertight roofing system. Only components that will not readily absorb moisture are used in its manufacture. KMM Standard is loosely laid, attached only at the roof perimeter and not to the roof deck or insulation. Hence, normal building expansion and contraction can occur without significant stresses being transmitted to the roofing membrane . . . a major contribution to the reduction of splitting roofs.

"From an applicator's viewpoint, it's the simplicity of KMM that's important . . . the ease in which it goes down, and the fact that there's less downtime than with conventional systems."

KMM Membrane systems solve roofing applicator problems, too. Mr. Milanese who heads one of the largest commercial roofing firms on the East Coast, speaks from experience when he states . . . "The simplicity of KMM is beautiful. Unlike built-up roofing that takes years to learn, KMM techniques can be mastered rapidly. Once our initial crew is built up we can train new men to operate at full capacity, almost immediately."

The KMM System lends itself to easy application. Because it's a cold applied system, the handling, mopping and critical temperature processes of conventional systems are eliminated. Also with either KMM Standard or KMM Aluminum membranes the roof is made watertight simply by fusing the laps with a torch.

". . . no trucks, no kettles, no equipment, no ripping bars."

For roofing applicators who work in different localities, there's another big advantage in using KMM. Mr. Milanese, whose Triple M firm works on jobs all over the Eastern Seaboard, says it's no longer the hassle it used to be . . . "All we do is send one of our trained crews out of town with a minimum of hand tools . . . no trucks, no kettles, no equipment, no ripping bars." What was once a major logistical problem, no longer is.

Whether you're a building owner, specifier, or roofing applicator, it pays to know more about KMM Membrane Systems. Just write to:

Koppers Company, Inc.
Building Materials Division
Dept. 3D
1901 Koppers Building
Pittsburgh, PA 15219

Koppers, the roofing people manufacturers of coal tar built-up roofing and waterproofing systems, KMM® Membrane, Exeltherm® roof isulations, reinforcement fabrics and roof maintenance products.

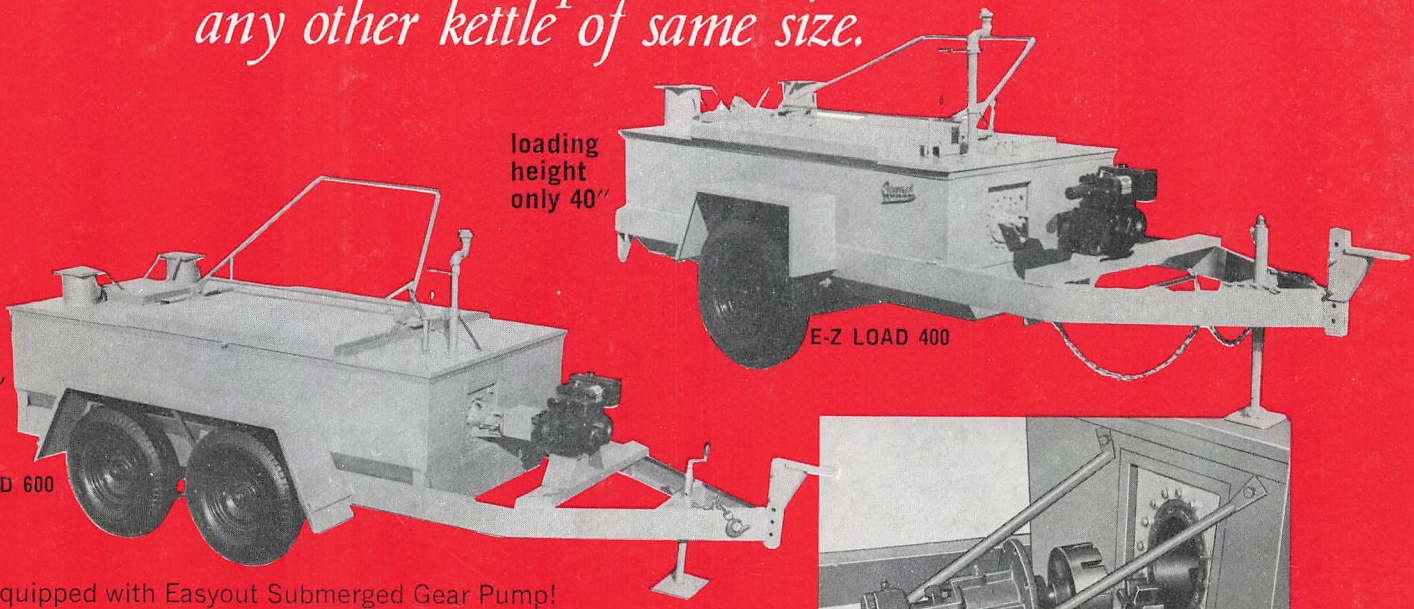
KOPPERS
Architectural and Construction Materials

T29-8045

Aeroil

e-z load kettles

melts more hot per hour than any other kettle of same size.



- Equipped with Easyout Submerged Gear Pump!
- Patented Heat-Riser cuts morning heat up time in half.
- Cover with break-away-lever-action makes opening a cinch!
- Heavily insulated!
- Equipped with adjustable tow hitch and double safety tow chains.
- Adjustable screw jack—the easiest way to keep kettle level.
- Heavy channel frame goes full length of kettle!

Easyout Submerged Gear Pump is easily serviced from outside the kettle. Pump never needs pre-heating because it's submerged in the hot. Pumps to 150 ft. plus at 35 GPM.

There are more Aeroil Kettles in service than any other make.

Aeroil's reputation for making roofers kettles that out produce and out live all others is legendary, now the E-Z LOAD Kettles are our newest legend. There's no question that these kettles can economically and efficiently supply a big crew on a big job . . .

but did you know

that on small jobs the E-Z LOAD Kettles offer you a number of benefits too! . . . such as, kettleman will have more time to do other jobs, torches can be turned down saving fuel, reducing coking and emissions, and increasing kettle-tube life.

(Kerosene or LP-Gas)

Model Number	Capacity	Length Overall	Width Overall	Tire Size	Loading Height	Kerosene Tank Capacity	Shipping Weight Approx.
E-Z LOAD 600	600 gal.	196″	85″	(4) 7.00x15 8 ply	42″	40 gal.	3800 lbs.
E-Z LOAD 400	400 gal.	180″	76″	(2) 7.00x15 8 ply	40″	30 gal.	2300 lbs.

Aeroil Products Company, Inc.

69 Wesley St., South Hackensack, New Jersey 07606 • 201-343-5200

the roofing spec

Volume 8 Number 8 November 1980

(USPS 942-900)

Staff

William Good, CAE, *Editor-in-chief*
Peggy Pasquini, *Associate Editor & Advertising Manager*
David Honaker, *Associate Editor*
Diane Guenther, *Associate Editor*

OFFICES:
1515 N. Harlem Ave.
Oak Park, IL 60302
Telephone: 312/383-9513

Departments

Features

Advertisers

THE ROOFING SPEC is published monthly except for Feb., June, Aug., and Dec., by the **National Roofing Contractors Association**, 1515 North Harlem Avenue, Oak Park, Illinois 60302. **Annual Subscription Rate** for NRCA members is $6.00, which is included in Annual Membership Dues. Additional subscriptions for member firms are $6.00 annually. Non-member subscription s $12.00 per year. **Second Class Postage** paid at Oak Park, Illinois.

OFFICERS and DIRECTORS

NRCA OFFICERS

President
WILLIAM KUGLER
Denver, Colorado
Senior Vice President
JOHN ZAMRZLA
Lancaster, California
Vice Presidents—Two Years
CHARLES BECHTEL
Dayton, Ohio
ROBERT HARRISON
Greenville, South Carolina
MARLIN POTTEIGER
York, Pennsylvania
Vice Presidents—One Year
ROBERT L. BUBENZER
Indianapolis, Indiana
ARNIE SCHMAUTZ
Portland, Oregon
JOE RUTKOSKI
Tampa, Florida
Immediate Past President
THOMAS MANSON
Kansas City, Missouri

BOARD OF DIRECTORS

Three Year Term
W. PRENTISS BAKER, III
Raleigh, North Carolina
MICHAEL BELDON
San Antonio, Texas
JOHN BRADFORD
Billings, Montana
JOHN CARRUTH, JR.
Miami, Florida
CHARLES GRIFFITHS, JR.
Binghamton, New York
LEIGH HAIGHT
Seattle, Washington
STEPHEN KRUPNIK, JR.
Glen Burnie, Maryland
GLENN LANGER
Milwaukee, Wisconsin
WAYNE MULLIS
Phoenix, Arizona
EUGENE SCOTT
Chicago, Illinois
ROBERT SNEAD
Cleveland, Ohio
ROBERT THERRIEN
Keene, New Hampshire
CYRIL TILSEN
Madison, Wisconsin
MONTE UPSHAW
Oakland, California
JOHN VAN WAGONER
McLean, Virginia
JAMES WHEELER
Knoxville, Tennessee
Two Year Term
GAYLORD BLUE
Sunnyvale, California
TOM BROWN, JR.
Detroit, Michigan
LEONARD COHN
Albany, New york
CHRISTOPHER CRONIN
Harvey, Illinois
ROBERT FIRST
Lima, Ohio
HARLAN HANSON
Ames, Iowa
WILLIAM HENDRICKSEN
Wheeling, Illinois
RAY JOHNSON
Tulsa, Oklahoma
BURTON KARP
W. Hartford, Connecticut
C. A. LEASE
Stockton, California
JAMES A. McBRADY, JR.
South Portland, Maine
DONALD McNAMARA
Milwaukee, Wisconsin
SAM PIPER
Greenville, South Carolina
CHARLES W. RUFF
Baltimore, Maryland
MILTON E. THOMPSON, JR.
Hialeah, Florida
JACK WILLIAMS
Wahpeton, North Dakota
One Year Term
WILLIAM DAVIS
Sterling Heights, Michigan
ROBERT DOVE
Tallahassee, Florida
HARRY ESBENSHADE
Parkersburg, West Virginia
WILLIAM KULZER
Philadelphia, Pennsylvania
MILLARD LEMON
Richmond, Virginia
GEORGE S. MOELLER
Kansas City, Missouri
LAWRENCE T. MUSIL, JR.
Seattle, Washington
A. B. PADON, JR.
Omaha, Nebraska
HOLLIS PORCHER
Corpus Christi, Texas
MIKE PROMEN
Broadview, Illinois
JIM REUTER
St. Louis, Missouri
RICK ROSENOW
Chicago, Illinois
ROBERT SANDERS
Smyrna, Georgia
JIM THEILING
Cleveland, Ohio
MIKE WILKINSON
Charlotte, North Carolina
RICHARD WILLIS
Dayton, Ohio

STAFF

Executive Vice President
FRED GOOD, CAE
General Manager
WILLIAM GOOD, CAE
Technical Services Manager
ROBERT LaCOSSE, CAE
Technical Services Coordinator
JOHN MISH
Member Services Manager
ROBERT McADAM
Administrative Manager
PEGGY PASQUINI
Program Manager
DAVID HONAKER
Manager, Litigation Center
PATRICIA APPELHANS
Assistant Administrative Manager
DIANE GUENTHER
Communications Manager
JANE LEPESKA
Convention & Advertising Manager
PATRICIA GREIG
Administrative Assistant
SANDY HABERKOST
Secretaries
BENNETT BROWN
PATRICIA DWYER
REBECCA GARMON
LYNN KEEFE
MELODY LEJCAR
TAMMY RALLS