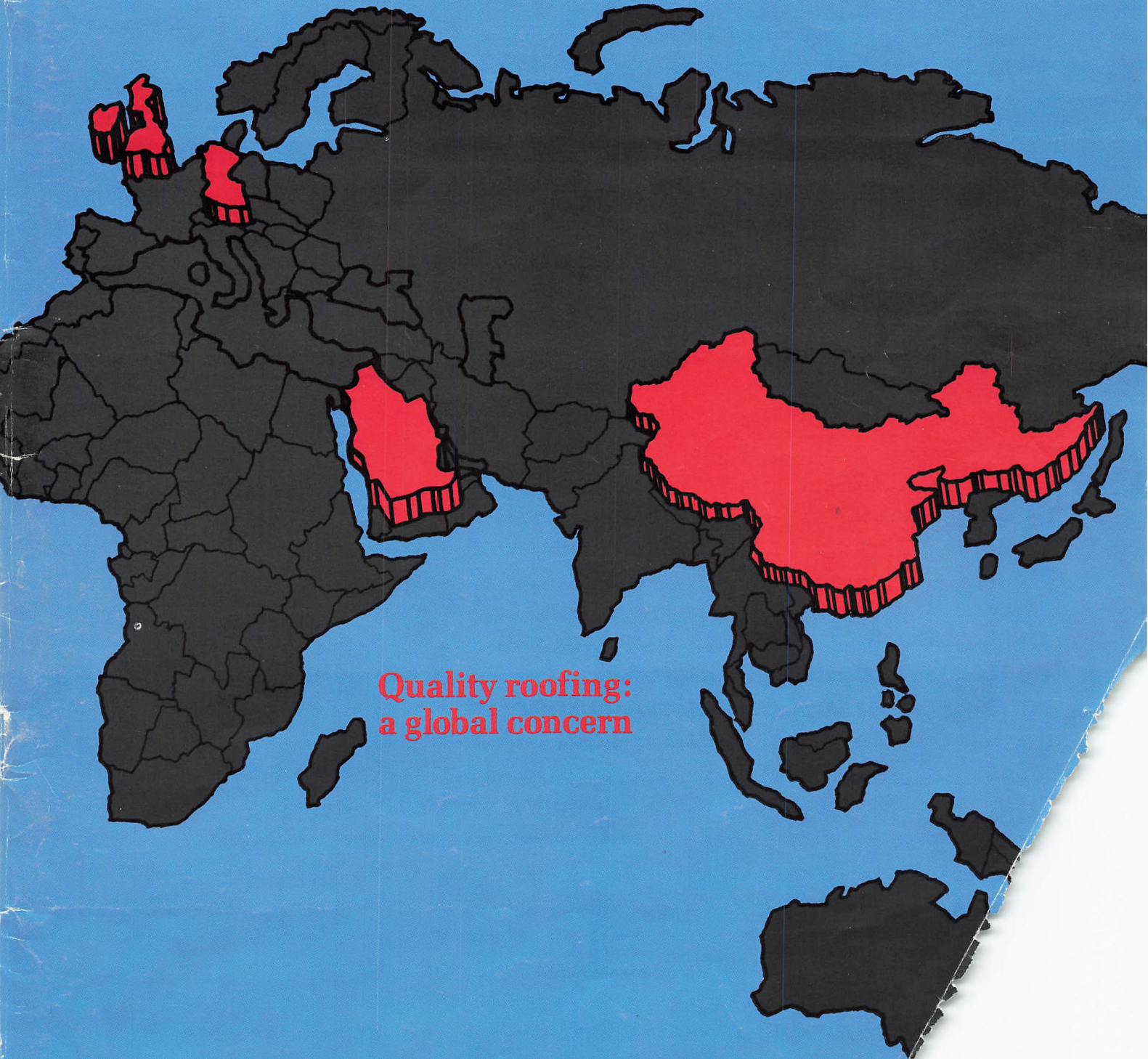


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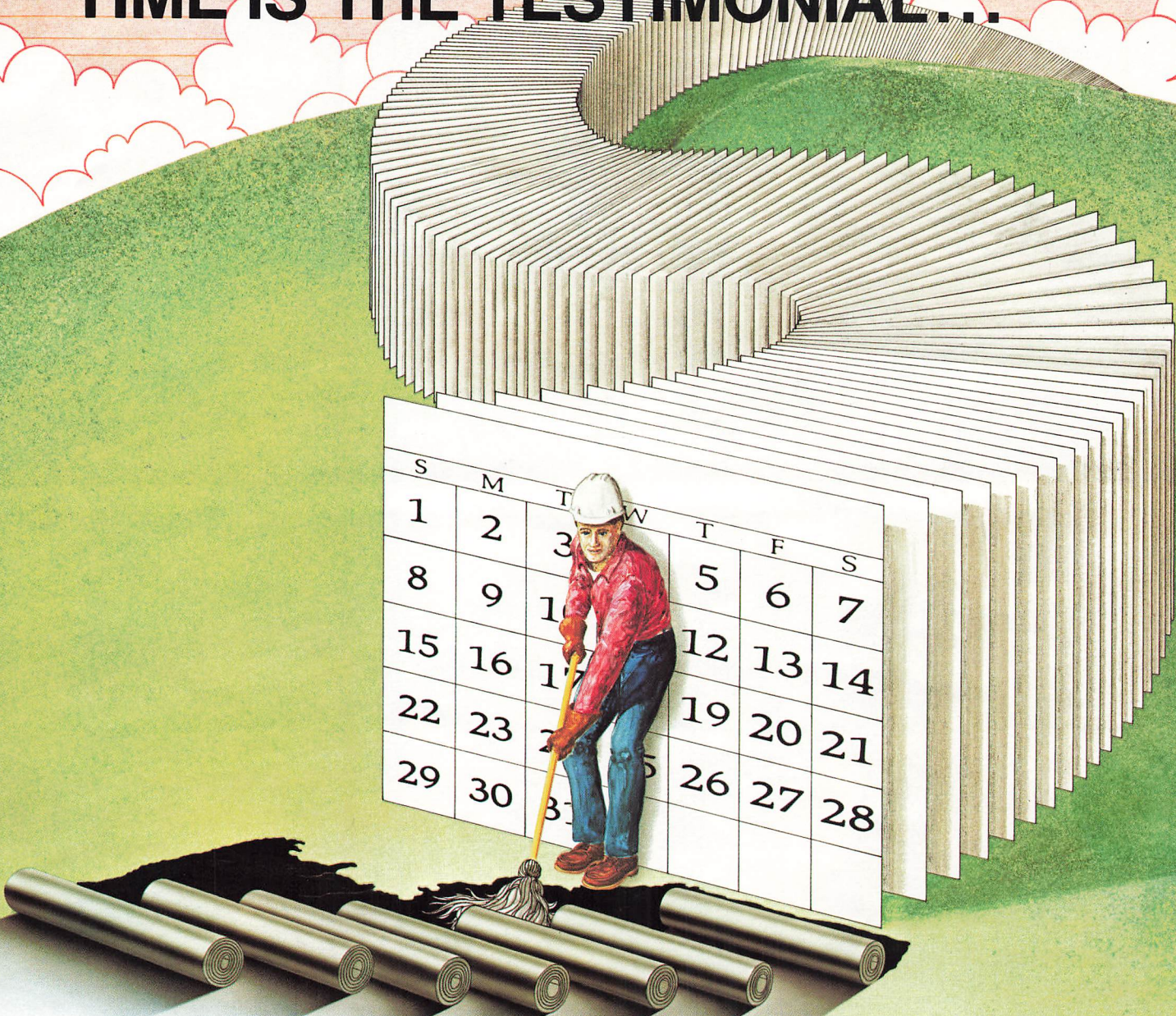
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September 1984



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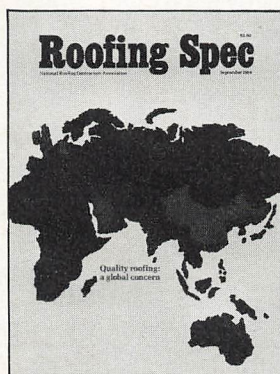
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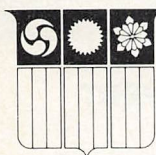
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The roofing techniques developed in other countries can have great impact on the industry all over the world.



NATIONAL ROOFING CONTRACTORS ASSOCIATION

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Second-class postage paid at Chicago, Ill., with additional entry filed in New Richmond, Wis.

Annual subscription rate for NRCA members is \$15, included in **Annual Membership Dues**. Additional Subscriptions for member firms are \$10 annually. Non-member subscriptions are \$15 per year.

POSTMASTER: Send address changes to **ROOFING SPEC**, 8600 Bryn Mawr Ave., Chicago, Ill. 60631.

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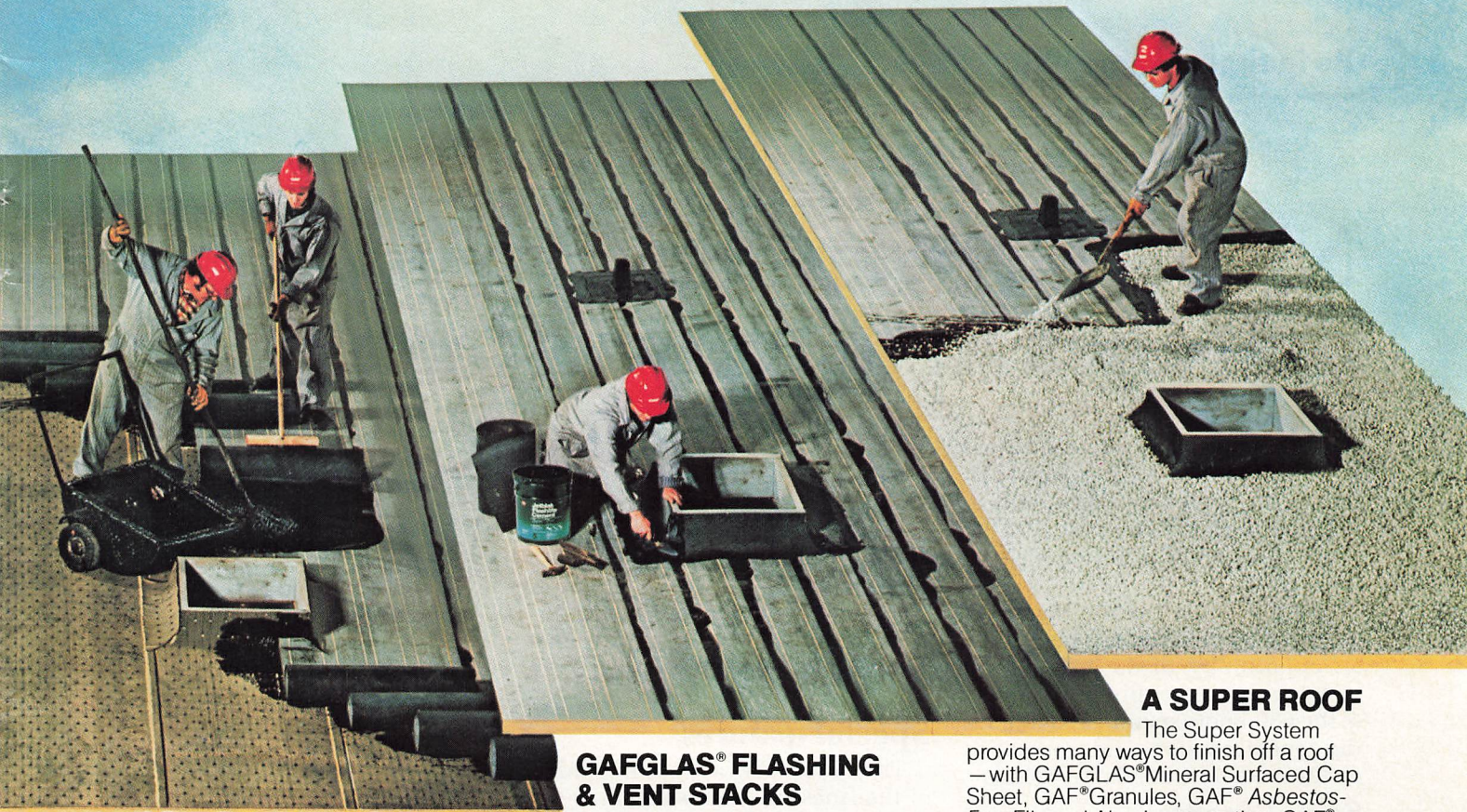
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Be in that number

NRCA Convention marches in to New Orleans

New Orleans, a city renowned for its music, food, eclectic culture and perpetual party atmosphere, is the host of the NRCA's 1985 Convention and Exhibition, Feb. 10 through 13.

"Stay in Tune" is the meeting's theme. Participants will be offered an opportunity to do just that by viewing up-to-the-minute products at the 680-booth exhibit and attending general sessions and workshops on the most recent industry trends.

Social events

The Convention will begin with the welcome reception, Sunday, Feb. 10 at The Rivergate convention center. NRCA President Wayne Mullis will cut the ribbon and the Olympia Brass Band, a New Orleans musical tradition, will lead people into the hall. The Political Action Committee party will follow at the Holiday Inn Crown Plaza.

The Convention will immediately precede the Mardi Gras festival in New Orleans. On Tuesday evening, Feb. 12, the Association has planned its very own Mardi Gras parade with marching bands, dancing majorettes and authentic Krewees in their colorful, lavishly designed costumes. The parade will lead revelers to the *S. S. President*, a magnificent southern showboat. Every deck will feature a different New Orleans brand of entertainment.

On Wednesday night the annual dinner dance will be held at the Hilton Hotel.

Spouse activities

A very special spouse program

will offer a lesson in Creole cooking and a tour of the design studios where the elaborate Mardi Gras floats are being prepared. Spouses will also experience the full flavor of the city when they join the tour to such one-of-a-kind areas as the Garden District, the exclusive Lakefront, the Creole Esplanade and the French Quarter.

Special features

The "Crescent City" boasts some of the finest dining establishments in the world, and what they give daily aerobic fitness classes must take away. The classes are scheduled during the meeting so attendees can work off the pralines and cream.

Convention participants can stay in tune with the meeting's events by watching NRCA TV Today, the Association's daily cable television show, and by reading *Convention Spec*, the daily newspaper delivered to hotel room doors.

Let's get serious

New Orleans has much more going for it than its festive ambience. The city is the largest port in the country and the nerve center of Louisiana's tourist business. It is the state's banking and judicial center, an important petroleum town and home to a thriving aerospace industry. More than 1,200,000 live in New Orleans, which covers 363.5 square miles.

The city has its own symphony, ballet and opera companies. The Museum of Art has an impressive collection of its own and hosts many



well-known traveling exhibits. New Orleans supports several theatres, and is a stopover for major Broadway touring companies. The Audubon Zoo houses a huge menagerie in beautiful surroundings.

Of course, the New Orleans Saints and the USFL Breakers claim their share of attention, too.

Convention-goers will definitely not lack for things to do.

Come on down

The NRCA member registration price is \$315 before Nov. 29, and \$335 after that. Non-member fees are \$355 before Nov. 29, and then \$375. Spouse registration costs \$300 before Nov. 29, and \$320 after that. The registration price entitles you to a badge and entry to the exhibit hall, welcome party, educational workshops, general sessions and all ticketed meal and social functions. The spouse registration includes these items, plus a spouse program ticket.

Contact the Meetings and Conventions Department for more information. Don't miss this trip to one of the most enjoyable, hospitable cities in the world.



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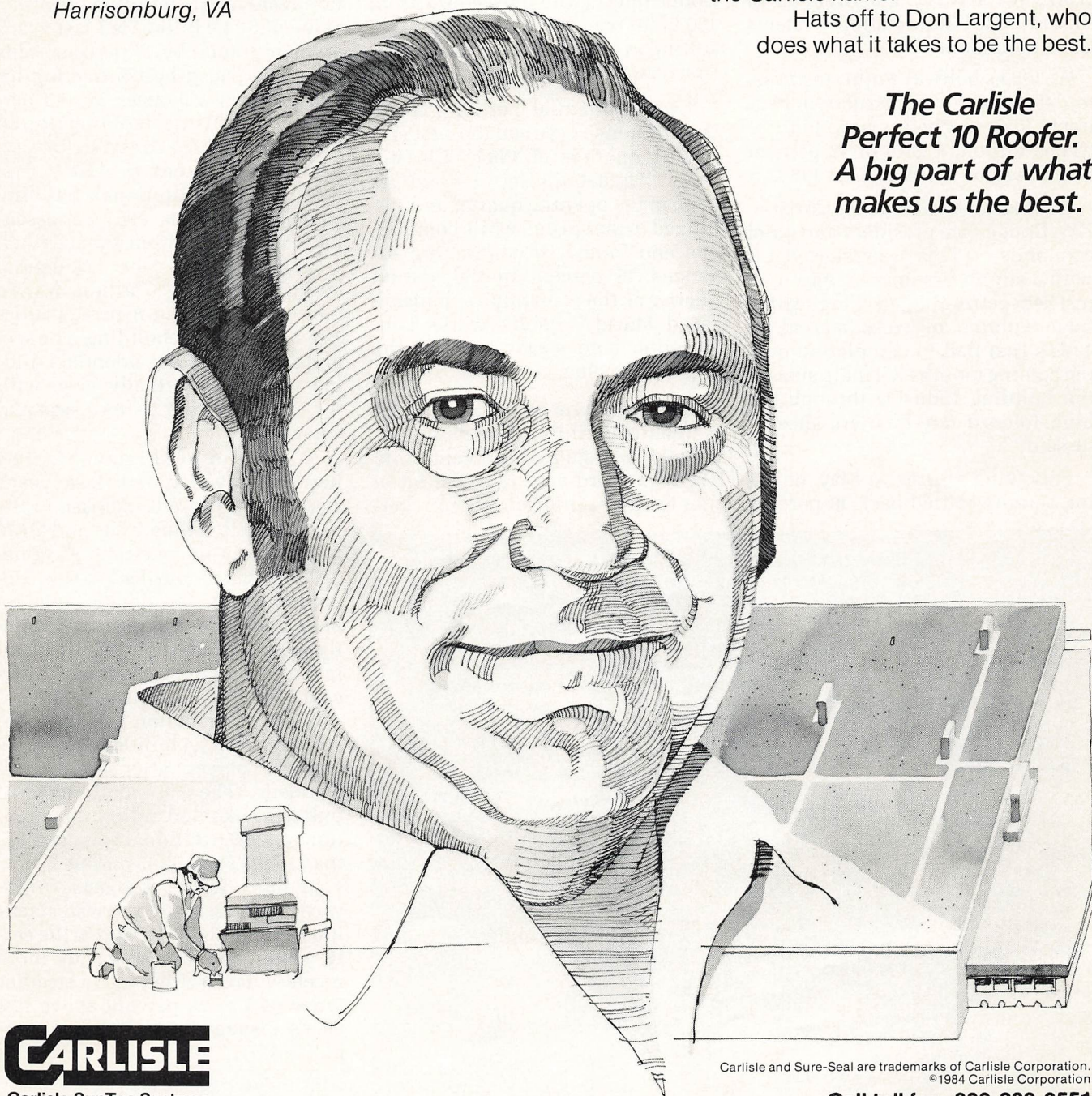
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NATIONAL NEWS

Contracting reaches new high

June construction contracting totaled \$20.0 billion and carried 1984's second quarter to a record \$60.1 billion of newly started construction work, the F.W. Dodge Division of McGraw Hill Information Systems Co. announced.

At 1984's halfway point, the year-to-date total of construction contracts also reached a new high of \$105.5 billion, a gain of 12 percent over the same six months of 1983.

According to George A. Christie, F.W. Dodge vice president and chief economist, "This year started off with a strong first quarter and then just kept getting better. Bringing this huge volume of work started in 1984's first half to completion over the coming months will help sustain the building industry through the high interest rate quarters ahead," he said.

Following a surge in May, building activity settled back 10 percent

in June without losing its earlier momentum, Christie pointed out. Through the three months of the second quarter, the seasonally adjusted Dodge Index (which uses 1977 as its 100 base) read 145, 165, and 148, resulting in a record 153 average. The first quarter averaged 148.

"Non-residential building made the difference between the first and second quarters of 1984," Christie said. "Homebuilding reached its peak in the opening quarter and stabilized in the spring, while commercial and industrial contracting advanced 15 percent in the second quarter as the economy's expansion raced ahead." Public works construction held steady through the first half of 1984.

Although June contracts for non-residential building retreated a seasonally adjusted 14 percent from May's extraordinary rate, the latest month's \$6.7 billion of new commer-

cial, industrial and institutional building projects remained at a near-record level, according to Christie.

Through June, 1984's cumulative non-residential building contract value of \$34.9 billion led last year's six-month total by 17 percent. This gain was paced by contracting for stores and warehouses (up 43 percent) and industrial buildings (up 34 percent). Office construction advanced 17 percent in 1984's first half, while institutional building (schools, hospitals, etc.) was essentially unchanged from a year earlier.

June contracts for residential building totaled \$9.9 billion, down a seasonally adjusted 8 percent from May's rate of homebuilding. The second quarter's total residential building value was virtually even with the first quarter after seasonal adjustment.

At the end of six months, 1984 housing activity led last year's starts—a 13 percent increase in the number of dwelling units and an 18 percent gain in construction value. "Nearly three-fourths of this improvement in the housing market has been concentrated in multi-family units, which in 1984's first half made up a surprisingly high 42 percent of the total," Christie said.

Contracting for non-building construction, at \$3.4 billion in June, declined 11 percent after seasonal adjustment. The six-month total of public works and utility construction was \$17.9 billion, 12 percent less than in the same 1983 period.

"Public works projects—highways, bridges, sewer and water facilities—were highly erratic in the early months of the year but more recently have settled into a steadier range of 5 to 10 percent above last year's average level," Christie explained.

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MONTHLY SUMMARY OF CONSTRUCTION CONTRACT VALUE
Prepared by F. W. Dodge Division
McGraw-Hill Information Systems Company

	June, 1984 Construction Contract Value (000,000)	Seasonally Adjusted Percent Change From Previous Month	
Non-residential Building	\$ 6,745.5	-14	
Residential Building	9,859.3	- 8	
Non-building Construction	3,400.0	-11	
Total Construction	\$20,004.8	-10	
	6 Mos. 1984 (000,000)	6 Mos. 1983 (000,000)	Cumulative Percent Change
Non-residential Building	\$ 34,855.3	\$29,695.6	+17
Residential Building	52,817.6	44,662.6	+18
Non-building Construction	17,867.5	20,248.1	-12
Total Construction	\$105,540.4	\$94,606.3	+12

DODGE INDEX

(1977 = 100, SEASONALLY ADJUSTED)

April 1984	145
May 1984	165
June 1984	148

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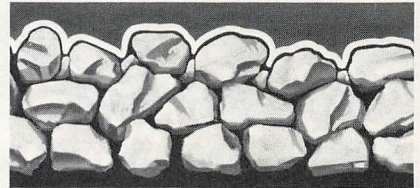
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NATIONAL NEWS

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Louisiana prompts payments

A Louisiana law requiring prompt pay to subcontractors on private sector jobs was hailed by Eugene Grieve, president of the American Subcontractors Association (ASA).

Grieve praised the measure for tackling the problem of unjustified payment delays on privately funded projects. The prompt pay legislation requires prime contractors to pay subcontractors within 15 days after the prime receives payment. A prime who fails to make this payment will be required to add on a .5 percent penalty for each day the payment is late. The maximum penalty can be as high as 15 percent of the total amount the sub is owed.

Several states have approved or

are working on prompt pay measures for contracts with the state governments. Prompt pay requirements have also applied to federal projects for years. But, the Louisiana law is the first to set standards for timely payment in privately owned and financed construction projects.

A Louisiana house version of the prompt pay bill narrowly won in the state's senate and then gained the house's concurrence. "Passage of this bill sets a sensible standard for other states," Grieve said, "Although we must seek prompt pay by the public sector in some areas, ultimately our goal must be fairness in the private sector as well."

Group protects homeowners

A new organization has been formed to protect the homeowner's interests. The American Homeowners Foundation is a national group based in Washington, D.C. Its members are homeowners, home buyers, home sellers and home investors. Foundation programs are designed to educate both its members and the federal government about the impact of government actions on mort-

gage interest rates and homeowners' tax deductions.

Foundation publications guide members through either buying, owning, selling or investing in a home. The Foundation also publishes the newsletter "Homebase" to keep its members informed.

For more information contact the Foundation at P.O. Box 4709, Arlington, Va. 22204.

Survey finds wages still frozen

Frozen wages continue to dominate wage and fringe benefits negotiations in the construction industry, according to a Construction Labor Research Council (CLRC) report.

In more than half the negotiated wage settlements the CLRC studied, wages remained the same or were reduced. Across the nation CLRC found the average negotiated wage had dropped 17 cents. In the rare instance where an increase was negotiated, the money went to benefit funds, not wages.

Some areas did show wage increases, however, with the largest in-

creases recorded in the middle Atlantic states. The largest pay decrease was in the south central states.

For the country as a whole, wages have remained steady or dropped for the past two years, according to CLRC, in sharp contrast to previous years. In 1982, for instance, the average wage change was an increase of \$1.23 per hour.

CLRC surveyed 342 agreements, covering more than 232,000 building tradespeople, to compile its report.

continued, page 13



The Manville Fesco® Board in use would blanket most of Manhattan Island.

Since we began making Fesco Board in 1959, more than six billion square feet have been used on the roofs of America. Enough to cover all of Manhattan Island, except for Central Park. And we wouldn't want to cover that.

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NATIONAL NEWS

continued from page 11

MCAA wants set-asides to end

The Mechanical Contractors Association of America, Inc. (MCAA) would like to see the minority set-asides called for in the Minority and Women Business Enterprises laws phased out. In their place the Association recommends intensive training programs to help minorities and women compete for jobs on an equal basis with established companies.

MCAA suggests that the present set-aside regulations be continued for another three years, but at the end

of this time all bids should be determined by the competitive bidding system. During the three-year period set-asides are used, the Association would like criteria established to ensure that firms in the program are in fact minority or women's enterprises.

MCAA's position was developed by the Association's Equal Employment Opportunity Committee and confirmed by the Board of Directors at the MCAA's mid-year meeting.

Study notes recession survivors

If you're a roofing contractor your competition may actually have increased during the recent recession, according to a study by Cahners Publishing Co.

Using Department of Commerce, Bureau of the Census figures, Cahners determined that the number of construction companies, subsidiaries and local offices fell by 7 percent from 1977 to 1982. The number of special trade contractors increased by 2.3 percent, however.

Contractors building office buildings, single-family homes, industrial buildings and other structures were hardest hit during the recession,

with 22.3 percent of them closing up shop.

Companies that survived the shake-out saw their business increase dramatically by 1982, according to the survey. The dollar volume of receipts for all construction companies and their divisions and offices rose 45.6 percent during the five-year period studied.

A complete report will be available free from Cahners in late August. A copy may be obtained by writing Russell Pratt, manager of planning, Cahners Publishing Co., 221 Columbus Ave., Boston, Mass. 02116.

Contractors agree to publish manual on proper relationships

Subcontractors and general contractors found some things to agree on at the semi-annual liaison meeting held recently between the organizations representing them.

The three groups, the Associated General Contractors of America (AGC), the American Subcontractors Association (ASA) and the Associated Specialty Contractors (ASC), agreed to jointly produce a manual on conducting a successful pre-construction project meeting. The manual will outline the proper relationships between the general contractor and subcontractors.

The meeting also produced a joint

guideline for the assignment of subcontractors. The guideline lists procedures to be followed when an owner or architect assigns work to subcontractors. The guideline now goes to each group's board of directors for its approval.

The groups didn't agree on everything, however. One item of contention at the meeting was AGC's Form 600, a standard subcontract the ASA and ASC believe is unfair to the subcontractors. The form was released by AGC in July.

continued on following page

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Our built-up roofing system gives you base and finishing felts, insulations based on Fesco® Board and thermally efficient foams plus a complete line of cements and coatings.

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And these three systems work with our line of accessories—expansion joints, fascias, drains and solar-operated roof vents.

You can't miss with Manville systems. Because we cover everything.

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NATIONAL NEWS

continued

Falling vacancy rates may spur construction

We may be seeing a surge in new industrial building soon as the number of vacant factories available continues to decrease. That's the prediction of Coldwell Banker, a commercial real estate firm that periodically surveys the United States'

industrial and office vacancy rates.

According to the firm, industries are expanding and upgrading their facilities to take advantage of the economy's upswing. As part of this expansion companies are buying up and moving in to previously built fa-

cilities. Coldwell's industrial vacancy index for the country declined in June to 4.7 percent from 4.8 percent in May.

The office vacancy rates for downtown constructions continued to move upward, according to Coldwell. From March to June of 1984, the firm's office vacancy index rate rose .4 percentage points to 13.5 percent. The national office vacancy rate for suburban areas has been steadily declining, however, and at the end of June stood at 18.1 percent.

The rise in office vacancies is blamed on the pace of office building and rehabilitation. A surge in office construction at the beginning of the economic recovery has outpaced demand momentarily, according to Coldwell. The firm expects a turn in this trend by the end of the year.

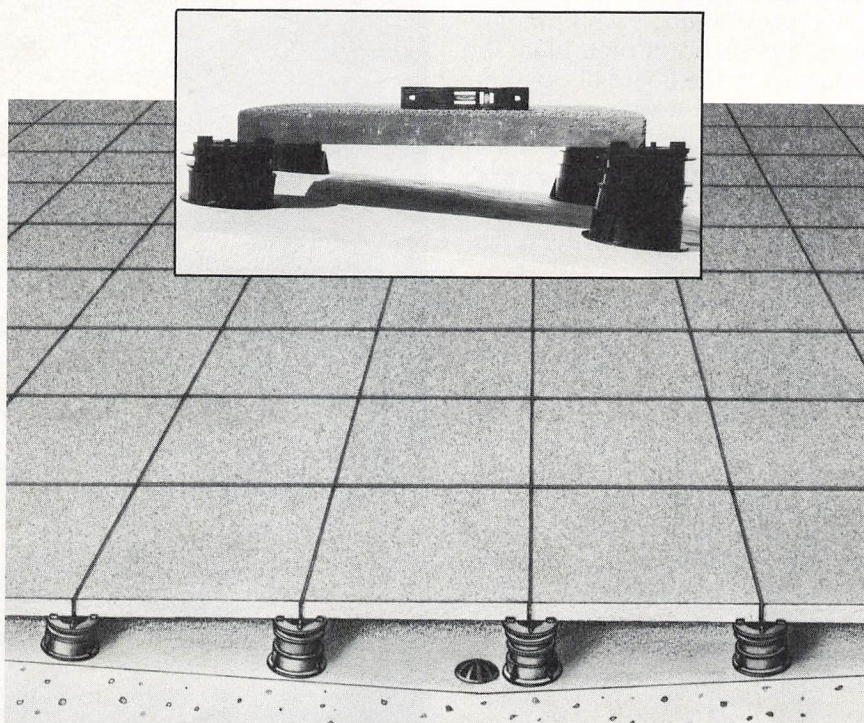
OSHA hears NCA testimony on asbestos

The National Constructors Association is urging separate asbestos handling standards for the construction industry. Fred Graham, chairman of NCA's Safety and Health Committee, suggested to the Occupational Safety and Health Administration (OSHA) that existing standards be modified to apply more directly to construction activities.

It is the Association's fear that if contractors must follow the same standards as manufacturers it will force inappropriate control measures on the construction industry.

Graham also said it was unnecessary for contractors and their employees to be certified in order to work with asbestos. An OSHA inspection could just as easily ensure an employer's compliance with handling requirements, he asserted.

Graham's remarks were made during the last week of OSHA hearings on asbestos handling.



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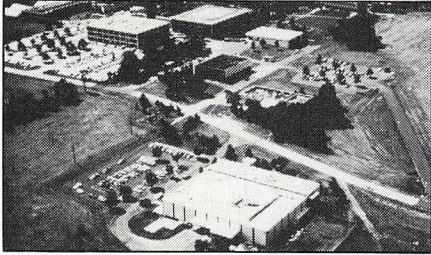


Associate News

W. P. Hickman acquires Ball Microzinc line

The W. P. Hickman Co. has announced the purchase of the Microzinc architectural, sheet metal and roofing product line of the Zinc Products Division of Ball Corp. Hickman will manufacture and market the line with exclusive rights to the trade name "Microzinc." Ball will supply zinc coil to Hickman.

Rohm & Haas announces new projects



Rohm and Haas research laboratory

Elastomeric roof mastics manufacturer Rohm & Haas has several new projects in the works, according to William Kirn, technical services manager, Roof Mastics, Caulk and Sealants.

Chemists are developing solvent-based roof mastics, which should solve the problem associated with repairing mastic roofs in cold weather.

Also, research is being conducted on asphalt modifiers with acrylic chemicals to improve mastics' low temperature performance, flexibility and durability.

In addition, Rohm & Haas is developing higher performance mastics "to make them even better than the current ones," Kirn said. The oldest Rohm & Haas mastic roof system has lasted eight years. However, exposure tests in Florida, Pennsylvania, France and Australia demonstrate mastic durability over a 10- to 15-year span, according to the company.

Firestone renames roofing products division

Firestone's roofing products division has been reorganized and named the Firestone Building Products Co., reported Benjamin G. Ammons, corporate vice president of product services.

Ammons added that the newly named company is a division of The Firestone Tire & Rubber Co. and will be directed by Sunil Kumar, general manager.

The Building Products Division, with its headquarters in Indianapolis, Ind., has a new plant in Prescott, Ark. and will continue to obtain roofing materials from the Noblesville, Ind. plant of the Industrial Products Division.

"The responsibility of the company will be to manufacture and market roofing products and other related items," Kumar explained.

Owens-Corning Fiberglas to build in Arkansas

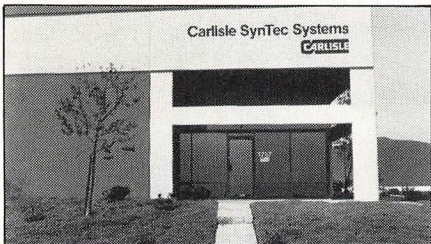
Owens-Corning Fiberglas Corp. has announced plans to build a multi-million-dollar production facility in Fort Smith, Ark.

Owens-Corning has purchased a 35-acre site on Planters Road in Industrial Park South. Construction began in June with start-up set for summer 1985. According to Bert E. Elliott, vice president of Owens-Corning's Roofing Products Operating Division, the 63,000-square-foot facility will produce Fiberglas mat for residential and commercial roofing products.

"Mat produced at Fort Smith will be used by the company's residential and commercial roofing plants to meet growing demand for Fiberglas roofing products," says Elliott.

The plant is expected to employ about 75 people and operate on a 24-hour, seven-day-a-week schedule.

Carlisle SynTec opens western distribution center



Carlisle SynTec western distribution center

Carlisle SynTec Systems recently announced the opening of a Western Distribution Center in San Francisco, Calif. to provide quicker, more efficient service to its representatives, distributors and applicators in the fast-growing western single-ply roofing, lining and waterproofing systems market.

The 15,000-square-foot center, designed to provide rapid turnaround to any location west of the Rocky Mountains, will stock a complete inventory of Carlisle products and handle all functions from order entry through delivery of materials.

Carlisle has named Ed Farina western regional manager to oversee western service operations.



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Temple-Eastex
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1893 Formation of the original company by T.L.L. Temple as a forest products supplier in East Texas.



1958 Expansion into the manufacturing of fiberboard products after 60 years of steady growth.

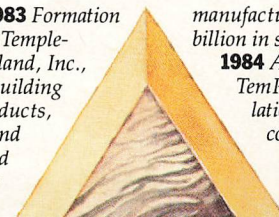
1980 Opening of Temple-Eastex rigid foam insulation plant in Diboll, Texas.



1983 Formation of Temple-Inland, Inc., a building products, pulp and paper, and container

manufacturer with \$1.2 billion in sales.

1984 Addition of TemPro roof insulation to the company's product line.



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Affiliate News

Tulsa hosts MRCA Convention

America's heartland is the scene of the 35th Midwest Roofing Contractors Association Convention Oct. 28 to 31. The annual meeting and trade show is expected to draw 2,500 people to Tulsa, Okla.

"Tulsa was chosen because of its central location. We have a lot of contractors in that area," Barbara Myers, MRCA administrative manager, says. "Also, we held our convention there in 1957 and it was very popular."

Exhibitors will fill almost 400 booth spaces in the Tulsa Convention Center. MRCA reports that this will be its largest trade show ever.

Business programs

MRCA, NRCA and The Society of the Plastics Industry (SPI) have just completed field and laboratory research on expanded polystyrene (EPS) insulation. The project was designed to develop data on the design, material and application criteria necessary for EPS insulation use in built-up and single-ply roofing systems. The research findings will be revealed in a business session at the convention.

During the 1981 convention in St. Louis, MRCA presented research data on Type IV glass felts, which were being marketed at that time. Today's Type IV glass felts are now being tested, and a comparison of the data will be explored during another session. "We intend to identify glass felts by product name in this year's program as we did in 1981," MRCA has announced.

Other topics on the convention agenda are: an update on Factory Mutual's loss prevention data sheet 1-28; practical information on single-ply safety and health; a nuts-and-bolts reroofing lecture; and a discussion of changes in marketing techniques and their legal ramifications.

Special features

Howard K. Smith, ABC news anchor man, will speak at the Monday, Oct. 29 welcoming luncheon. Author extraordinaire George Plimpton will address the group on Tuesday.

The MRCA's James Q. McCawley Award will be presented during the Tuesday evening banquet. Dancing to the Glenn Miller Orchestra will follow dinner.

The Tulsa Excelsior and Westin Williams Plaza hotels are being used for the meeting. Contact Barbara Myers at MRCA, 1000 Power and Light Building, Kansas City, Mo. 64105 for more information.



What makes the NRCA-sponsored Business Insurance Program a smart buy?

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Association finds its niche in global roofing community

By William Cullen, NRCA research associate

NRCA has become more and more involved in international roofing and waterproofing activities in the past several years. This involvement raises questions. Why does NRCA, a recognized leader of the U.S. roofing industry, wish to encourage member and staff participation in international activities, and how does this participation serve NRCA's membership?

Staying on top

Roofing materials and methods have changed more in the past 10 years than in the entire history of the U.S. roofing industry. These changes are occurring at such a rapid rate that it's a difficult and time-consuming task just to keep up to date. For example: for more than 100 years, bituminous roofing involved only two basic substances—bitumen and paper. It was a felt-making process. Now other technologies involving glass, elastomers, plastics and coatings play critical roles in the manufacture, application and performance of roofing systems.

European countries have taken the lead in applying these technologies to roofing. Many of the membrane products now used in the United States originated in Europe.

It is also true that roofing research in other countries far surpasses the limited activity in the United States, which is primarily concerned with product development. Foreign research is conducted by both government and private sector organizations. It is gratifying to see the scientific and technical papers on basic and applied roofing research produced by our foreign colleagues.

These countries are not content to simply produce technical data but are using the research to develop

Foreign affairs become a learning experience.

standards and guidelines for day-to-day roofing operations. It behooves us to keep abreast of these international technological developments, which seem to be taking place at a much greater rate than here in the United States. These developments have strong implications for technology standards development, international trade, our economy and our society.

Developing international contacts

NRCA's long-range plan recognizes the advantages to its members of strong international relations. NRCA is firmly committed to becoming more involved in international roofing activities.

The rationale behind this goal was to provide a single voice to represent the common interests of the entire roofing industry in international affairs. Although a number of individuals and companies have contacts abroad, there was no unified activity in this area.

A more selfish reason for international involvement was that it would provide a distinct advantage to NRCA members: they would receive an additional resource to keep them informed of changes occurring in roofing technology that may affect their businesses. The Association's gathering of information from international sources and translating it to effective roofing practices saves members

countless hours and allows them to pursue their professional interests more effectively.

On a U. S. industry-wide basis, international standards research is brought to the attention of standards generating committees and those performing research. This prevents unnecessary duplication of activities. In brief, the cost of such involvement in international activities is very low in relation to the benefits derived by NRCA members and the U. S. roofing industry.

Pinpointing single-ply performance

Elastomeric and polymeric roofing membrane materials have become a dominant factor in the U. S. NRCA 1983 Project Pinpoint results indicate that these membranes now comprise at least 30 percent of the domestic market, and this percentage is expected to grow.

Considering the growing importance of single-ply materials, it is unfortunate that the lack of standards and criteria as well as application and maintenance guidelines has resulted in serious and costly errors. These will continue to occur, to the great dissatisfaction of the manufacturer, specifier, contractor and owner.

Early in the new product revolution, NRCA recognized a need for data on the properties and performance of these membranes. The trade and research organizations in Europe were judged to be valuable sources for such data. They had more knowledge of and experience with several of these new membranes than their U.S. counterparts.

To tap this foreign resource, NRCA was instrumental in establishing an international technical committee on single-ply roofing, sponsored by two



of the world's foremost building research organizations. They are the International Union of Testing and Research Laboratories for Materials and Structures (RILEM) in France and the International Council for Building Research, Studies and Documentation (CIB) in Holland.

I chair this committee and Dr. Walter Rossiter of the National Bureau of Standards (NBS) in Gaithersburg, Md. is its secretary. The committee is composed of about 50 members from 20 nations, representing the broad spectrum of the international roofing industry: produc-

ences on roofing technology. This series was so successful that the 1977 meeting was opened to the international roofing community. A total of 32 papers was presented by world-renowned building technology experts. The audience numbered more than 800 attendees from 35 countries.

In September 1985, the Second International Symposium on Roofing Technology will be held at NBS in Gaithersburg. This event will surpass the 1977 session in attendance and the quality and number of papers. To add to the international flavor of this conference RILEM is joint-

■ to organize symposia and meetings of a specialized nature.

RILEM executes the majority of its work through technical committees such as 75-SLR On Single-Layer Roofing. Through NRCA's association with RILEM, and especially this technical committee, members of both organizations will benefit. This cooperation will also meet the greater need of helping the international roofing community deal with the technical challenges of today and the future.

A small world after all

NRCA's involvement in the international arena is further enhanced by its international membership, which currently numbers about 150 people representing 25 nations. Our international members help us establish lines of communication between various countries and NRCA members.

Also, NRCA members and staff participate in international conferences and symposia on roofing. Sponsoring organizations include the International Waterproofing Association, the European Union of Agreement and the Bituminous Roofing Council, among others.

We also maintain contact with some of the Asian countries. The People's Republic of China is represented in this issue of *Roofing Spec* with an article authored by my colleague and friend Professor Xu Zao-dong.

In reviewing the various activities of NRCA it becomes evident that the Association has grown to become a dominant force on the international scene. Our continued participation and further growth in this area will benefit our members and the international roofing community. ●●●

Roofing research in other countries far surpasses limited activity in the U.S.

ers, contractors, consumers and researchers.

The organizational meeting was held in Washington, D.C., April 1983. The second meeting was hosted by the Center for Science and Technology of Building in Paris, May 1984.

The committee (which has a projected life of only five years) has established two objectives: 1) to prepare a report on state-of-the-art materials, test methods, criteria and standards currently available throughout the world, and 2) to develop recommendations for criteria and test methods suitable for generating realistic single-ply roofing performance standards by recognized standard-making bodies, such as the ISO and ASTM.

Meeting of the minds

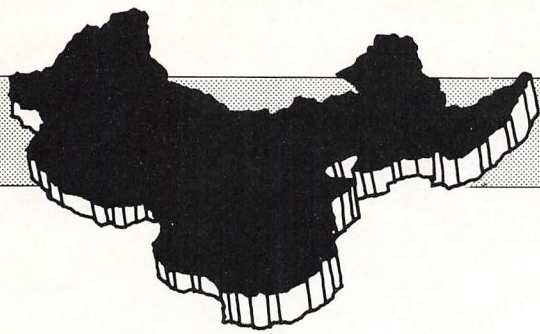
In 1969, NRCA joined NBS in sponsoring a biannual series of confer-

ly sponsoring this symposium with NBS and NRCA.

Working through RILEM

RILEM is truly an international association. Incorporated in Switzerland and headquartered in Paris, the organization has 800 individual and organization members from 76 countries. Associate membership in the organization was conferred on NRCA in 1982. RILEM's purposes are:

- to exchange information on building materials and structures and to cooperate in research and testing;
- to study test methods, emphasizing their improvement and consolidation;
- to collaborate with national and international associations;
- to facilitate the exchange of scientists and technicians and



Chinese roofing: no longer a puzzle

by Xu Zhao-dong

Over the years, through contacts with other roofing experts from many countries, I have come to realize that little is known about the waterproof roof in China. I hope that this brief outline of China's roofing practices, written at the request of NRCA Research Associate Bill Cullen, will help improve the international exchange of roof techniques and make these exchanges more convenient for those involved in research.

This article will focus on soft waterproofing techniques, used to a great extent in our urban areas. Tile material is used mainly in rural China. Soft waterproofing materials include felts, roof sealants and liquid coatings. These are made chiefly from asphalt or tar pitch.

BUR a Chinese tradition

The built-up asphalt membrane system with a protective coating is the traditional soft Chinese roof. In all of China's cities 70 percent of the structures have felt roofs. These are not the three- to five-ply systems common in other nations, however. The standard Chinese roof uses only two plies. In each layer felts are connected with a 15-centimeter (6 inch) overlap (see Figure 1). This kind of roof usually lasts more than 15 years if properly constructed.

When it seems likely that a roof will develop significant cracks, a perforated asphalt felt is used. Once the widest crack possible in a particular roof substrate is known, a computer can determine the perforated felt's correct aperture parameters—

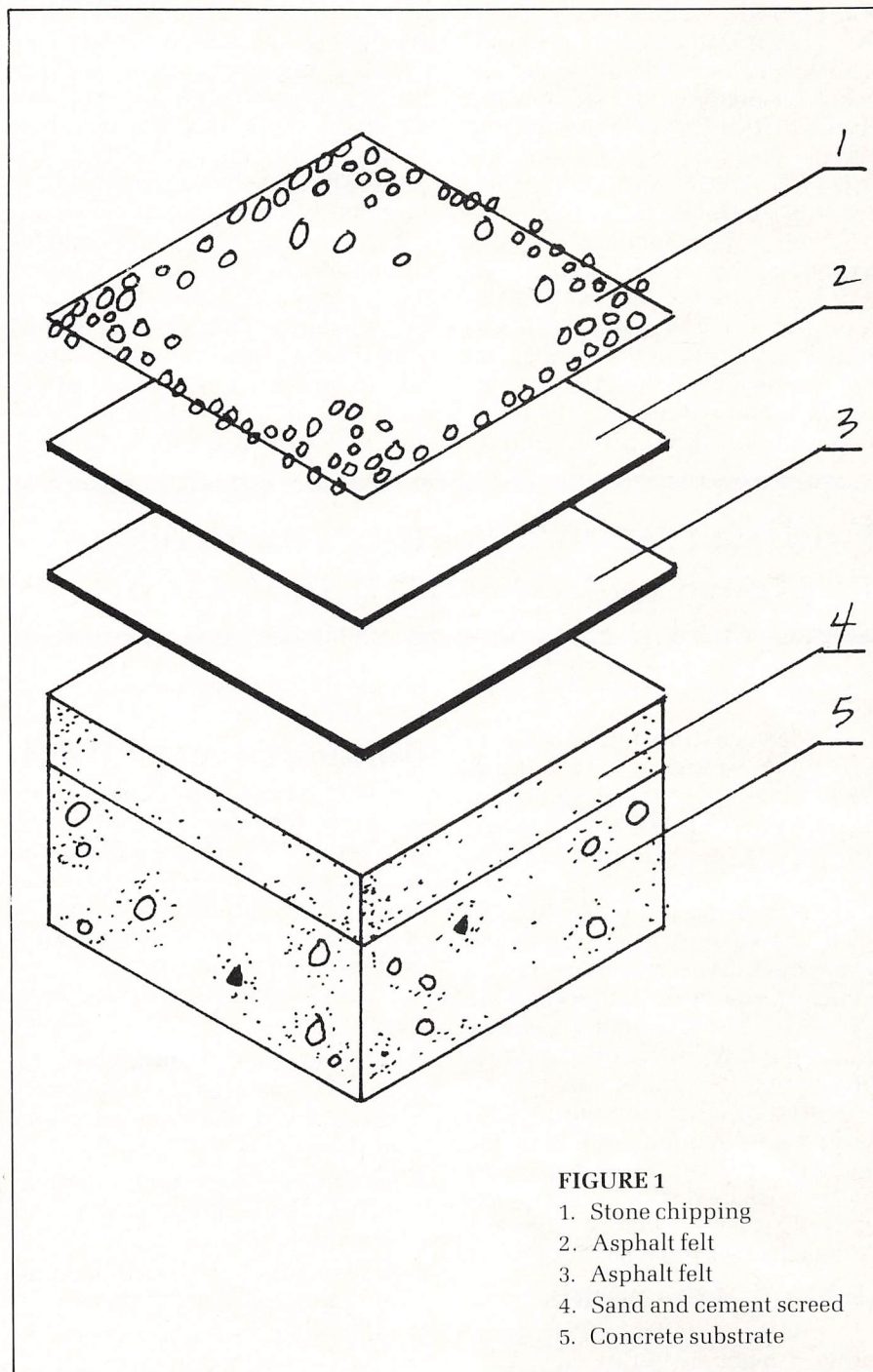


FIGURE 1

1. Stone chipping
2. Asphalt felt
3. Asphalt felt
4. Sand and cement screed
5. Concrete substrate

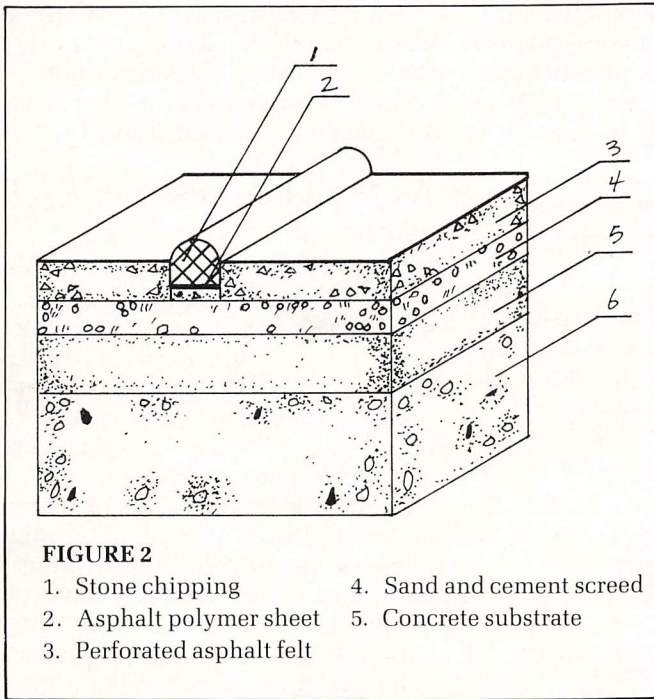
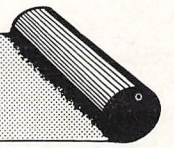


FIGURE 2

- | | |
|----------------------------|---------------------------|
| 1. Stone chipping | 4. Sand and cement screed |
| 2. Asphalt polymer sheet | 5. Concrete substrate |
| 3. Perforated asphalt felt | |

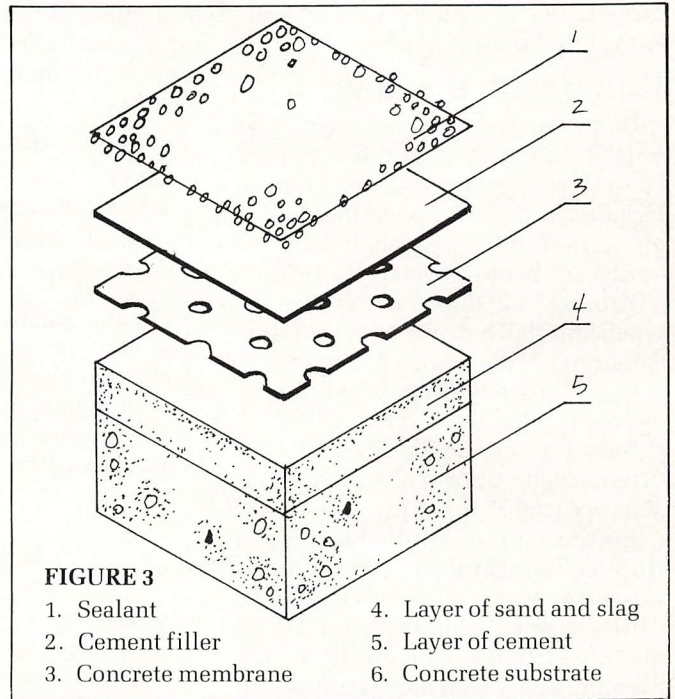


FIGURE 3

- | | |
|----------------------|---------------------------|
| 1. Sealant | 4. Layer of sand and slag |
| 2. Cement filler | 5. Layer of cement |
| 3. Concrete membrane | 6. Concrete substrate |

the number of holes, their spacing and diameter.

These parameters are calculated by the formula:

$$\sigma_x = \frac{\sigma_o}{3} + 2bn_1 + D_e^{-a_2} \frac{\Sigma - \Sigma_o}{b}$$

where:

σ_x = stress in water level direction

σ_o = stress when the substrate crack occurs

Σ_o = strain when the substrate crack occurs

Σ = strain when the felts slowly extend

$b; e; D; a$ = rheological constants

In a standard Chinese application, the perforated asphalt felt is used in a two-ply felt system (see Figure 2).

Cast in stone

Reliable waterproof concretes can be made by mixing the waterproofing into the concrete. Contraction

and swelling can cause cracks in a concrete membrane if it is too wide, however. To avoid this, concrete membranes in China are 3 to 4 centimeters thick and no more than 2 meters wide. Sealants are used to fill the cracks between the membranes. (see Figure 3).

The layer between the concrete membrane and the substrate is composed of loose sand and slag. This lets a concrete membrane contract or expand freely and avoid cracking as its temperature and moisture content change.

The sealant between the membranes requires a high elongation value, generally more than 300 percent. In order to let the sealant deform freely, an insulation layer is placed beneath the sealant, preventing it from sticking to the layer underneath (see Figures 4 and 5).

When a viscoelastoplastic sealant is used, its deformation rule fits Bingham's model:

$$S_a = \left[\frac{1000}{R_a \sqrt{\frac{P_a}{\pi}}} \right]^{-2} - 2R_a + 1$$

where:

S_a = hole spacing

R_a = hole radius

P_a = hole frequency

This formula is used to determine sealant deformation over time.

The sealants in China are made from elastic, plastic, elastoplastic and many other types of materials. Elastic sealants are generally hot-applied; plastic sealants do not require hot application. The service life of a

continued on following page



China

continued

properly applied, good quality sealant is more than 15 years.

Going with the flow

Liquid material poured or sprayed on the substrate is another typical Chinese roofing application. The material used in this procedure may be an asphalt-rubber, asphalt-asbestos or asphalt-bentonite combination.

Almost all these materials are water-emulsified and dry quickly. Generally, the poured membrane is applied in two coats while the sprayed membrane is applied in three. Perforated glass fiber felts are often used to improve stretching resistance (see Figure 6).

Because liquid-applied roofing is thinner than a built-up membrane, it possesses less stretch resistance. In China, special attention is paid to its crack resistance—the ability of the membrane to resist damage by a substrate crack.

The waterproof coating's crack resistance is determined by its elonga-

tion rate and the length of the stripping area. The relationship between these factors may be expressed by the formula:

$$\beta = l_0 \cdot \delta$$

where:

β = index of crack resistance property

l_0 = length of the stripping area

δ = elongation rate

The more a membrane's stripping area can be broadened as the substrate crack widens, the better the membrane's crack resistance.

In the following formula, the stripping area of coating L can be expressed as:

$$L = \frac{\sqrt{k \cdot h}}{\sqrt{\sigma_2}}$$

where:

k = plastic constant, determined by unidirectional extension

h = thickness of the coating

σ_2 = vertical stress on the coating in the crack area

The stretch-resistance, cohesive strength and elongation rate of the coating must be adjusted in order to obtain the necessary crack resistance when the coating is used.

Asphalt has venerable ancestry

China has a long history of bitumen use. The application of natural asphalt can be dated as far back as 3,000 years in the Zhou dynasty. But it wasn't until the 1930s that straight-run asphalt became a standard roofing product. In the 1950s, oxygenated asphalt became widely used.

Today, the popularity is growing for asphalt with a small amount of polymer added. The improved asphalt can be used in a wider range of temperatures, and waterproofing materials made with it also possess enhanced properties (see Table 1).

China is especially experienced in using tar pitch as a basic waterproofing material. Tar pitch can be used in

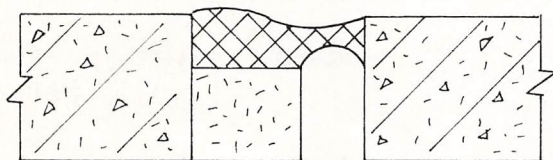


FIGURE 4

The sealing deformation is restricted

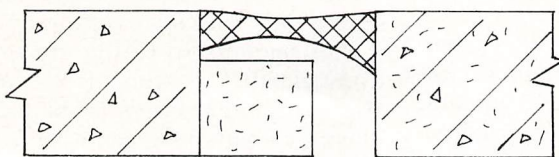


FIGURE 5

The sealing deformation is unrestricted

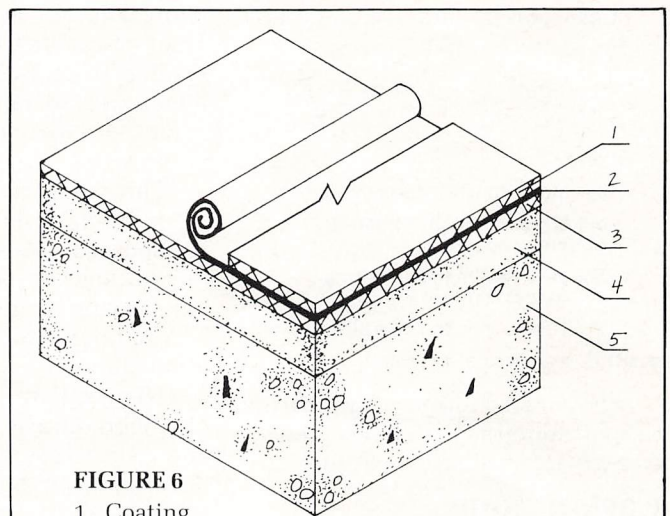


FIGURE 6

- | | |
|---------------------|---------------------------|
| 1. Coating | 4. Sand and cement screed |
| 2. Glass-fiber felt | 5. Concrete substrate |
| 3. Coating | |



almost all the roof waterproofing products such as felts, sealants and coatings.

In the 1960s, the quality of tar pitch products was usually poorer than asphalt products. Today, tar

pitch products improved by polymers are much better than asphalt products. Common tar pitch felts and improved tar pitch felts are compared in Table 2.

As Tables 1 and 2 show, polymers

have greatly improved the property indexes of both asphalt and tar pitch products. The felts sustain higher temperatures, resist lower temperatures and withstand greater strain than conventional felts.

Chinese fortune telling

China is a big country with 1 billion people. There is a great demand for building materials, especially since the country's development accelerated in the 1980s. The shortage of waterproof roof materials has become a prominent problem.

The built-up roof will play an important role in China for a long time to come. But changes and improvements are needed for Chinese roofing to keep pace. We must pay particular attention to developing:


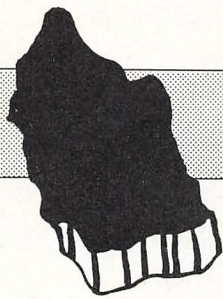
- glass fiber felts impregnated with asphalt;
- special felts, including hot-melt felts, self-adhesive felts and aluminum foil felts;
- roofing sheets, including chloroprene, polyisobutyl rubber, chlorosulphonated PE, polyvinyl chloride and other elastic materials;
- improved asphalt, including materials improved with rubbers and resins;
- all kinds of sealants, including roofing sealants and door, window and wall sealants; elastic sealants including one- or two-component liquid sealants are especially needed.
- different kinds of liquid waterproof roof coatings, especially water emulsified coatings, along with quick-drying and large-area spraying techniques and
- various effective roofing maintenance techniques and a highly effective roof rejuvenator. 

TABLE 1

Types	No. 500	
Indexes	Common Felt	Improved Felt
Total asphalt weight (measured in grams per meter)	not less than 1400 g/m	not less than 1400 g/m
Water impermeability (measured in kilograms per centimeter pressure after 30 minute's testing)	not less than 1.5 kg/cm	not less than 2.5 kg/cm
Water absorption	not less than 1 percent	not less than 1 percent
Heat resistance (measured in degrees centigrade without change after 5 hour's testing)	85°C	90°C
Pliability (measured in lowest degrees centigrade sample may be bent over 25mm mandrel without cracking)	18+2°C	-10+2°C

TABLE 2

Types	No. 350	
Indexes	Pitch Felt	Improved Pitch Felt
Total weight of pitch (measured in grams per meter)	not less than 800	not less than 1000
Water impermeability (measured in kilograms per centimeter pressure withstood)	not less than 1 kg/cm after 15 minute's testing	not less than 2.5 kg/cm after 30 minute's testing
Water absorption	not less than 3 percent	not less than 1 percent
Heat resistance (measured in degrees centigrade without change after 5 hours testing)	70°C	100°C
Pliability (measured in lowest degrees centigrade sample may be bent over 25mm diameter mandrel without cracking)	18+2°C	-20+2°C



Saudi tour covers Kingdom

If it weren't for the dinosaurs I would have never gotten to Saudi Arabia. Their residue funded the trip.

Ostensibly, it was Owens-Corning Fiberglas® and the Saudi government that paid my expenses, as well as the expenses of 27 other design, engineering and construction magazine editors. But it was oil, the gooey black fossil fuel the Saudis suck out of the desert, that made it all possible. It was oil that bought the 747 that flew me to Saudi Arabia and it was oil that financed my first-class airfare, hotel room and sumptuous meals. But most important, it was oil that paid for the finest architects, engineers and materials to build the three magnificent international airports I had come to the country to see.

Owens-Corning, a company that has collected its share of petrodollars supplying the materials for and erecting the two finished airports, planned the trip and extended the invitation. O-C's itinerary packed a week's worth of architectural sight-seeing into three busy days.

According to Owens-Corning's Fritz Lalendorf, O-C and its PR firm, Burson Marsteller, arranged the trip to keep O-C in the public's eye while company officials contemplated a replacement for their energy-saver awards program. The tour gave O-C a forum to announce to the world that it had become an international company capable of surmounting great environmental and aesthetic challenges.

The Saudis, who are usually cool to visitors (they don't even issue tourist visas), found the tour a perfect chance to parade their most as-



sessing the leadership qualities that could inspire men to follow him into battle. He could even make last-minute itinerary changes that would roust us out of bed at 5 a.m. without fomenting open rebellion.

But even though the General and his men were eager to please, their climate wasn't particularly accommodating. It presented the same challenges to us it presents to the country's architects and builders. The temperatures were typical for midsummer, reaching 120F during the day. The desert winds kept up a steady pace and the relentless sun baked the juice out of everything exposed. Rain wasn't in season while we were there so we didn't get a chance to see one of the torrential downpours that drops much of Arabia's 2 to 4 annual inches of rainfall in a single storm. Fortunately, with everything from buses to hotels heavily armed with air conditioning, we didn't need the stamina or durability of a construction worker or a Saudi roof to survive the environment.

One of the warmest Saudis we met on the tour was Major General Said

Our glimpse of KAIA's Haj Terminal was well worth the trip

Yousef Amin, Saudi Arabia's deputy president of civil aviation and director of the International Airports Projects. The General was a combination host, tour guide and tyrant, who with considerable charm and candor won over 30 hard-boiled, cynical American journalists. Though retired from the military, he still pos-

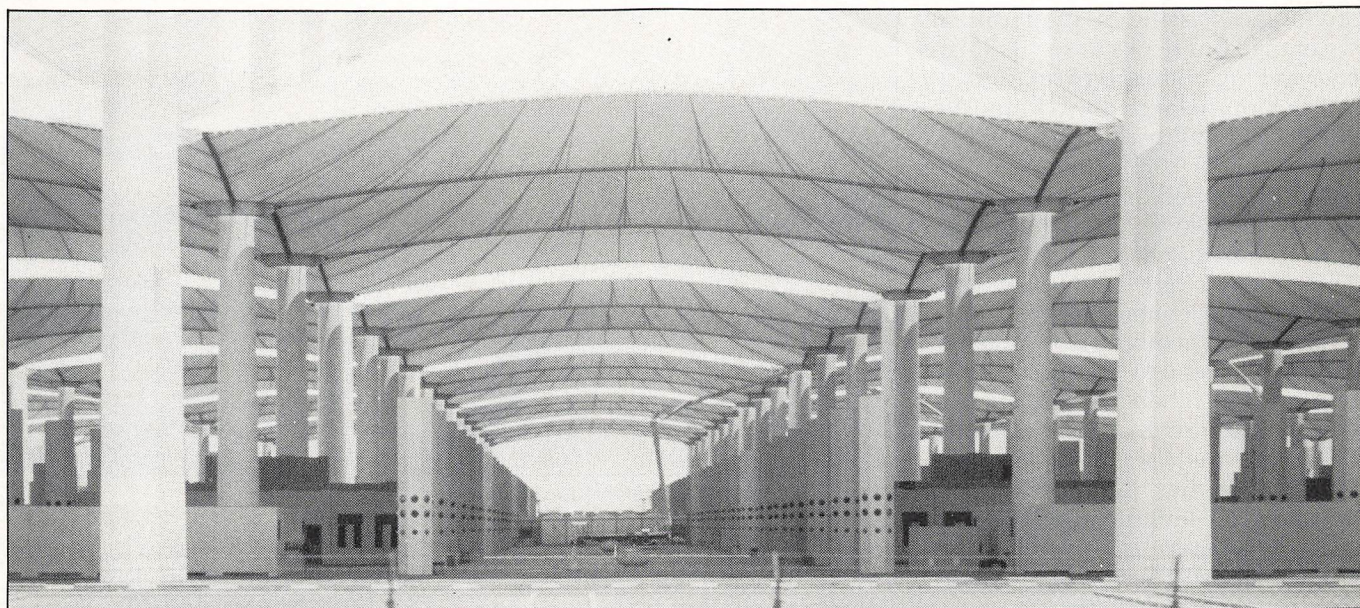
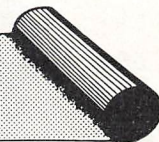
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A tent for ten thousand

Our journey began with an overnight flight from New York to Jeddah, a city of 700,000 on the Red Sea. We landed at the first airport on our itinerary, King Abdulaziz International Airport (KAIA). The airport's standard arrival and departure terminals were pleasant but certainly nothing to fly halfway around the world to see. Our glimpse of KAIA's recently built Haj Terminal, on the other hand, was well worth the trip.

The Haj is the pilgrimage to the

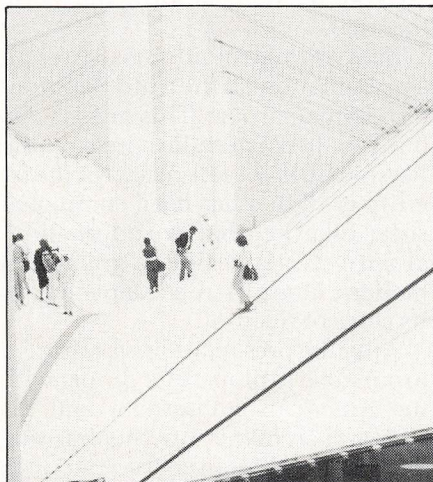


One corridor of the Haj Terminal, an airport facility designed to accommodate Moslem pilgrims.

holy city of Mecca each Moslem is encouraged to make at least once in his or her life. Jeddah, 45 miles away from Mecca, is the traditional port of entry for foreign pilgrims or Hajis. The Haj Terminal was built to handle the thousands of Hajis who pour into Jeddah during the Haj season, which lasts for 70 days each year. During this time more than a million pilgrims will pass through KAIA on their way to and from Mecca.

The changes air travel and jumbo jets have made to the Haj in recent years made the Haj terminal necessary. In the past, Hajis would trickle in over several months. Today 5,000 pilgrims arrive and depart by plane every hour during the peak of the Haj season. At times 80,000 to 100,000 Hajis may be waiting at the airport for ground transportation to Mecca or departing flights home.

To accommodate this annual throng, the terminal's architects/en-



The press tour examines the terminal roof.

gineers, Skidmore Owings & Merrill, decided not to construct a building. Instead, they chose to create a sheltered space that would protect the pilgrims from the desert heat, while providing a transition from traveller to Haji.

The design selected for this task borrows from the country's tent-dwelling heritage. It is a tent large enough to accommodate 10,000 people at one time. Its rows of white Fiberglas tent peaks, floating serenely above the desert floor, dominate the airport's skyline.

We didn't visit the terminal that first day; we only saw it from the windows of the mobile lounge that took us from our plane to North Terminal where non-Haj visitors are processed. The next morning, after we had slept off our jet lag, we were bused to the Haj Terminal from our hotel.

As we circled the terminal to reach the entrance the huge, empty structure majestically glided by our bus windows. With the Haj season still two weeks away, there was little activity there except for our arriving

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Saudi Arabia

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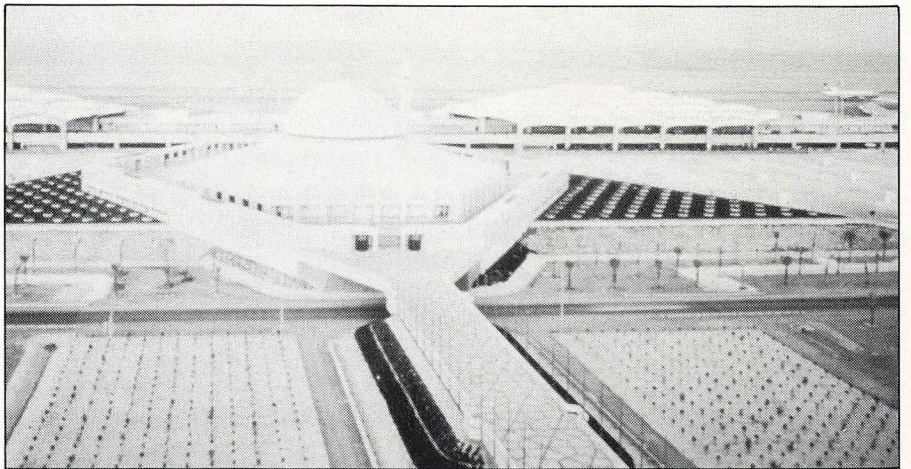
entourage. Passing by the terminal we craned our necks to see its intricate and ingenious construction.

The terminal is really a composite of 210 smaller Fiberglas fabric tents, each covering 9,000 square feet. The tents are shaped and supported by cables attached to 150-foot steel pylons. The tents' peaks reach 110 feet. Their lower edges are 66 feet from the terminal's concrete floor.

The tents' membranes were fabricated by O-C and the entire structure was erected by an O-C subsidiary, Owens-Corning Saudi. O-C Saudi raised the roof in 21-tent modules after connecting the panels on the ground. Each module was lifted into place by a centrally controlled mechanical hoist. The company claims the repetitive installation techniques it developed allowed the structure to be completed four months ahead of schedule.

Once we arrived at the Haj Terminal entrance we left our bus and walked through an orientation area where foreign Hajis are familiarized with customs and processing procedures. Then, like Hajis, we were led into the terminal. The floor space was open and comfortable. The translucent roof tamed the glaring desert sun, turning back 75 percent of its rays. The high roof and its upswept tent peaks allowed desert breezes to enter and refresh the shaded interior. Though the air temperature outside was quickly climbing to 100F, inside the terminal it remained in the 80s.

After a tour of the facilities we rode cherry picker hoists to the top of the structure, where we walked on top of the roof. The tent membranes were as taut and bouncy as trampolines yet strong enough to hold our weight. We could walk anywhere we



The mosque and two terminals of KIA in Riyadh.

wanted on the roof (although once you've seen one tent peak, you've seen them all), but we had to avoid stepping on the neoprene strips that covered the bolts holding the fabric together.

Back on the ground we sat through a presentation on the third Saudi international airport. This one is to be built in the Eastern Province on the Persian Gulf. A scale model of the facility is all that has been completed so far. Like the other two international airports, its design is grand and modern. One difference, however, is its acres of flat roof.

After the presentation we returned to our hotel to prepare for dinner with the American ambassador and his wife at their home. Another bus ride back to our hotel from the American compound brought our first full day in the Kingdom to a close.

An oasis for two million

Early the next morning, we flew to Riyadh, a metropolis of 1.7 million people in the middle of nowhere. The city lies deep in the heart of the

desert. Unlike Jeddah with its history of pilgrim traffic, Riyadh has had little contact with the outside world until the 20th century. We were warned repeatedly by people in Jeddah that Riyadh was a more conservative city and less tolerant of American ways.

The Saudi government, however, has been actively promoting Riyadh as the country's capitol and premier city. Consequently, government ministries, foreign consulates and private companies have been steadily relocating there, bringing new ideas to mix with the city's traditional and conservative bedouin values.

Riyadh's new King Khaled International Airport (KIA) is a symbol of the city's entry into the world arena. Its terminals welcome both foreign and domestic visitors with cool, luxuriant oases. Our tour of KIA began almost immediately as we disembarked from our plane and walked through one of the airport's four terminals.

The dominant feature of the building was the terraced roof. The spherically arched, triangular roof panels

Photo by Gregory Murphey

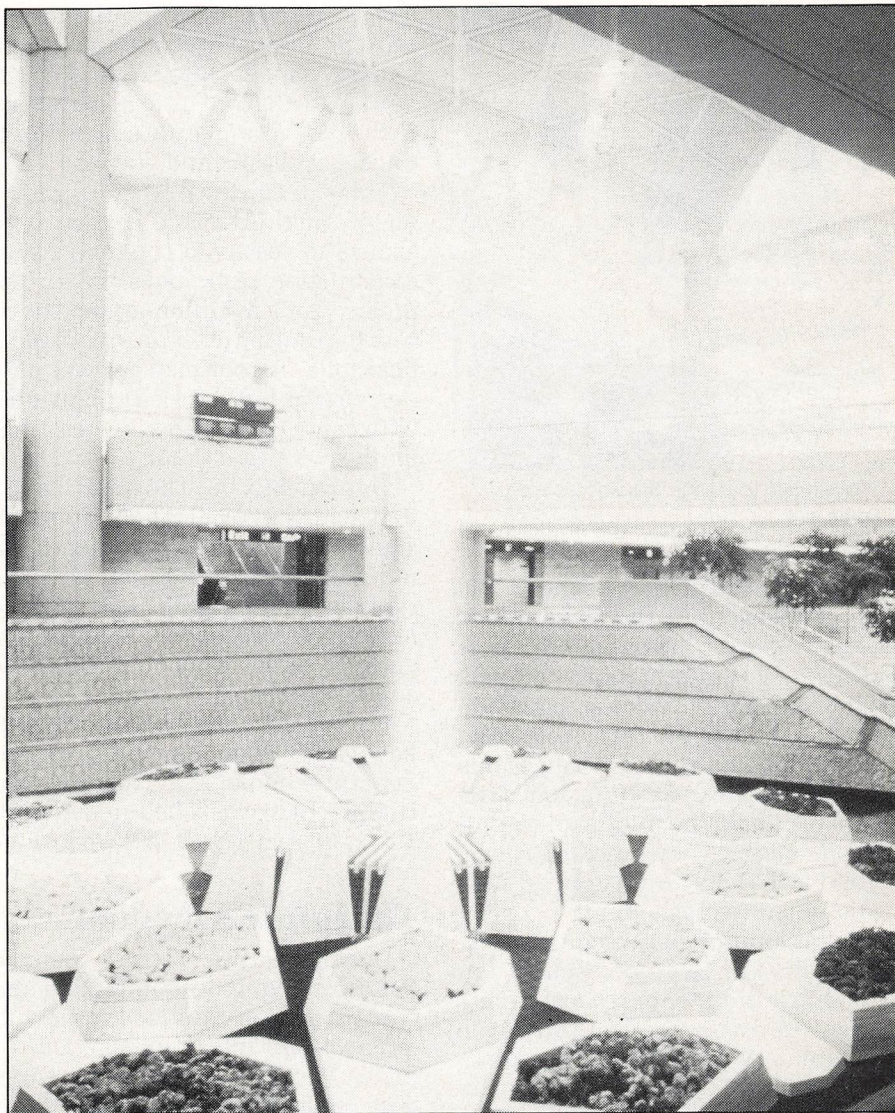
recalled the spreading palms of a desert oasis. Latticed clerestory windows and floor-to-ceiling glass exterior walls provided natural lighting. The sensation of a cool desert refuge was strengthened by the splashing fountain and lush foliage in the middle of the terminal.

In addition to the four terminals the airport complex included a mosque that could hold 5,000 worshippers. Beautiful works of Islamic art, commissioned by the General, lined the walls. A royal pavilion for the comings and goings of the royal family and visiting dignitaries faced the mosque and the four terminals.

The Saudis gave us a grand tour of the facilities, allowing us a comprehensive survey of its design. Each terminal is covered with 72 roof shells, rising to a height of 102 feet. The royal pavilion is roofed with 33 arched shells. Six panels in the middle of the pavilion form a free-standing dome, creating a high-ceilinged ceremonial hall inside. The roof and dome of the airport mosque, the dominant feature of the KKIA complex, are covered with ceramic tiles.

Although KKIA isn't just one large Owens-Corning product like the Haj terminal, O-C and O-C Saudi did play a major role in its construction. O-C provided Perma Ply-R built-up roofing and Fiberglas roof insulation for some of the support buildings as well as glass-fiber reinforced plastic, general service items and thermal/acoustical building insulation for the terminals. O-C Saudi located sources for and installed all of the fixtures and equipment in the terminals.

Carl de Moll, manager, sales and marketing for Owens-Corning's Arabian Fiberglass Insulation Co., said the Arabian heat and sun don't



A fountain in one of KKIA's four terminals shoots a spray of water toward an arched triangular roof panel.

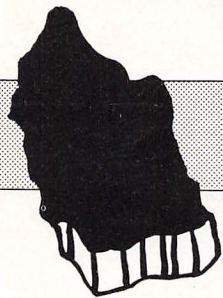
present a problem to the built-up roofs. However, one had to be careful not to put a roof on during the hottest weather. Sometimes it would be necessary to apply the roof during the cooler morning or evening hours, he said.

Our tour of KKIA included the

mosque, the royal pavilion and several support buildings. We were also taken through the fourth terminal where work is still in progress.

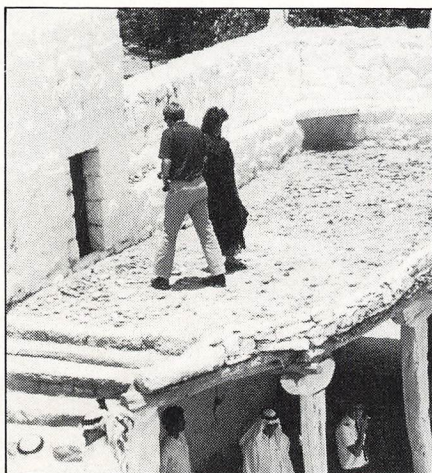
At the request of the General, we spent the night in Riyadh even

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Saudi Arabia

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Two hundred years ago, this was the typical Saudi roof.

though it wasn't part of the initial trip. That evening, the General took us on a tour of the Kingdom's new Ministry of Information complex where the Saudi national television studios are located. Like everything else we had seen it was an awesome structure with an exotic, science fiction design. In the middle of its polished marble courtyard/driveway stood a 100-foot tower topped by a glass-enclosed restaurant.

After a bit of shopping in downtown Riyadh, we got back to our hotel just in time for a short night's sleep. We awoke on the third day to an itinerary that bore little resemblance to O-C's original plans. Instead of returning to Jeddah for a city tour and plenty of afternoon free time, we found ourselves following the General through small hillside towns in the mountainous Saudi Southwest.

The common roof

Our tour did include some local architecture. One building we

swarmed over had been the town's most prominent home 200 years ago. Granite steps set into its stone courtyard wall allowed us to scramble up to the roof, a single-ply consisting of one layer of sand and gravel.

This side trip to a less sophisticated region of the Kingdom gave us a chance to see more common Saudi construction techniques. When the project isn't a billion-dollar showcase the roofing takes on a more practical tone. A roof may get wet only twice a year, but between rains it must withstand the ravages of heat, humidity, wind and sand.

One recently built hospital we visited had a typical Saudi roof designed to protect its own integrity as much as the hospital's interior. The roof featured felt plies laid under a heavy layer of gravel. Topping the entire system were poured-in-place concrete slabs.

Finally, at the end of the day's journey we flew back to Jeddah for our departure home. Unfortunately, our flight, which was scheduled to leave at 12:30 a.m., was delayed three hours.

The future Kingdom

During the three days I spent in Saudi Arabia, I saw contracting and construction techniques quite different from those in the United States. Most buildings in the Kingdom, such as the Haj Terminal, are built from the ground up by a single, usually foreign, contractor. Because the contractors come from all over the world, several different standards are used.

A recently passed Saudi law is changing this method of contracting, however. It requires that at least 30 percent of the construction be completed by Saudi subcontractors.

For their current roofing needs the Saudis seem to be buying off-the-shelf systems.

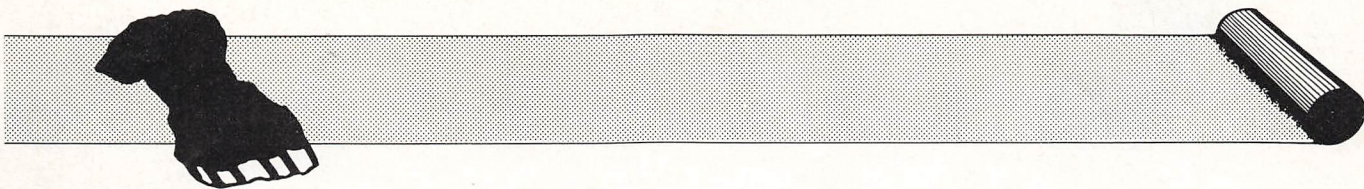
Saudiazation also dictates the use of Saudi-made materials whenever possible.

At present, much of the Kingdom's roofing is primitive or nonexistent. But as de Moll said, even if it rains only once, a roof must still be able to perform. As the Kingdom installs more and more modern conveniences, such as delicate communications and data processing equipment, the need for adequate roofing may increase. Also, air conditioning is becoming more of a necessity for the Saudi citizen, making proper insulation a top priority in new buildings.

For their current roofing needs, the Saudis seem to be buying off-the-shelf systems. U.S. contractors will find few innovations or trends in Saudi roofing practices. But manufacturers like Owens-Corning clearly believe that Saudi affluence makes the country a prime market. In the future we may see roofing designed specifically to meet Saudi requirements, such as materials capable of withstanding the climate's intense ultraviolet radiation.

The Saudis may just be catching up to us now, but at the pace they are going we may see innovations emerging from the country that will find their way into our own roofing market.





Dach + Wand '84

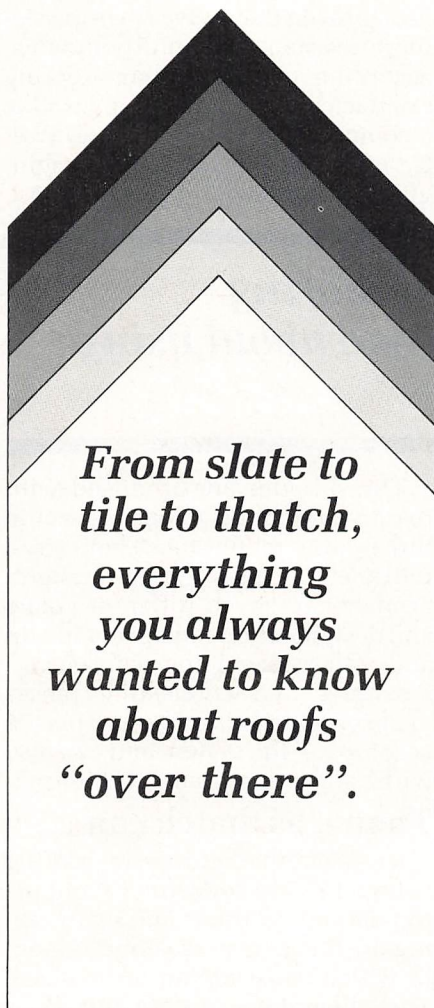
The European roofing market: on display at International Exhibition

A spokesperson for Dach and Wand calls it "the most important international exhibition for the roofing trade." The annual show is held in a different city in Germany every year and attracts 28,000 visitors from 25 countries. More than 350 exhibitors from 13 countries fill every available corner. Dach and Wand, referred to in our neck of the woods as the International Trade Exhibition for Roof, Wall (dach, wand) and Insulation Techniques, was in Hamburg May 31 to June 3 of this year. The people who attended and the products displayed provided a microcosmic view of the European roofing industry.

Optimistic voices

"Optimism abounds in West Germany's roofing trade," the meeting's spokesperson says. "With the construction industry moving out of the slump thanks to falling interest rates, the roofing trade as a supplying industry is in a mood of positive expectancy."

Figures published by the German Roofing Contractors Association in Cologne reveal a 6 percent increase in roofing on older buildings and a 45 percent increase in new construction. "In 1982, work on new build-



ings only made up 30 percent of the market," the Association says. "The clear shift evident in the 1983 figures is another indication of the upswing in construction activity."

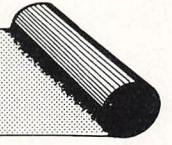
The new materials and machinery on view at Dach and Wand played a significant role in boosting investment confidence, the exhibitors report, although those displaying large-scale equipment still noted contractors' "marked degree of caution."

Insulation interest

Visitors were particularly interested in insulation materials. The West German hosts of the exhibition attribute this curiosity to recent revisions in insulation ordinances.

"The more stringent specifications for heat insulation have been sufficient to increase its use in the roofing trade," the German Roofing Contractors Association spokesperson comments. "The specifications require more material to be used than before. Another factor has been the cost-conscious attitude of a great many firms and property owners. With energy costs still high, they have opted for more insulation to save money."

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European market

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"Thermal insulation has become an issue of great relevance not only for flat-roofed buildings but also for those with sloping roofs," he adds.

For the most part, manufacturers have been able to replace harmful asbestos with modern plastics that satisfy the same specifications. Dach and Wand exhibits clearly reflected other changes and trends in the industry, also.

A matter of tile

There is now, for example, a substitute for slate tiles. It's cheaper than slate and easier to work with. "More and more elastomer webs are being used in roofing because of the advantages they offer over traditional felt or PVC materials," the Associa-

substances such as acid rain have hit the news relatively recently, European builders have been conscious of these problems for many years. The Federal German Building Ministry estimates the environmental damage to buildings at 4 million German marks per year (about \$11,680,000). One of the highlights of Dach and Wand was the display of the latest techniques and materials designed to reduce exterior building damage.

For decades, ceramic materials have proven themselves to be particularly resistant to harmful pollutants, according to the German Roofing Contractors Association. Annawerke, a company based in Rodental, West Germany, displayed ceramic shingles at the international exhibition.

evidence of this, as well as their fondness for thatched roofs.

"In the inclement climate of this part of the world, thatched roofs have stood the test of time," the Association spokesperson reports. "Not only do they keep out the rain, wind and snow, they are also an ideal means of heat insulation. The house is warm in winter and cool in summer."

So great is the market for this roof system that the German Roofing Contractors Association conducted a special conference during the international exhibition to address newly drafted specifications for thatched roofs. According to the Association, the aim of the revisions was to "adapt the regulations governing this traditional craft to take into account modern-day developments and requirements."

Although thatching has been popular in Europe since the Middle Ages, American roofing contractors have never taken the technique too seriously. There is a company in California that markets the system, however, and its general manager is convinced that architects will see the advantages in a roof that lends a European cottage-style ambience to American homes.

Looking ahead

In 1985, Dach and Wand will be held in Cologne, May 16 to 19. According to a survey conducted by the German association after this year's show, exhibitors and visitors thought the potential for learning and selling was "the most worthwhile it has ever been" and the majority plan to attend in 1985.

If the European roofing industry is changing as rapidly as it is in the United States, Dach and Wand is a command performance. ❁●●

It's clear that European roofing contractors are concerned about using natural products.

tion states. "Slate is holding its own, but the German slate mines face stiff competition from the Spanish. The slate there is significantly cheaper."

Clay tiles are making a comeback, and even glass tiles, which are considerably more expensive, are being used more than they were two or three years ago. "Concrete pan tiles are still used much more than any other kind," a Hamburg roofing contractor notes. Dach and Wand exhibitors indicate that the trend is toward more natural building materials, and builders are making decisions based on this.

Acid test

Although harmful environmental

The shingles are produced with two rows of holes to ensure secure three-point mounting. They are 8 millimeters thick, frost-resistant, available in seven different colors and designs and stand up to acid rain and other damaging substances. Flashings and connecting pieces made of coated aluminum or plastic accompany the system and can also withstand environmental battering.

Thatch as thatch can

It's clear that European roofing contractors are concerned about using natural products and maintaining the integrity of the environment in which construction takes place. Their liberal use of slate and tile is

Now available from NRCA is the worker training program *Application of the Built-up Roof: Felts and Surfacing*. The training package consists of a narrated audiovisual presentation and companion workbook specifically designed for training workers through in-house sessions in the contractor's shop. It is intended to introduce the roof mechanic to the basic components of the hot built-up roof, fundamental BUR membrane design and specifications, and critical application considerations and procedures.

The audiovisual program, available in either slide/cassette or videotape format, consists of 600 slides and 74-minute narration. It provides clear, step-by-step instruction in the application of bitumen, felts, and surfacing material, including job set-up, equipment-handling, and safety considerations.

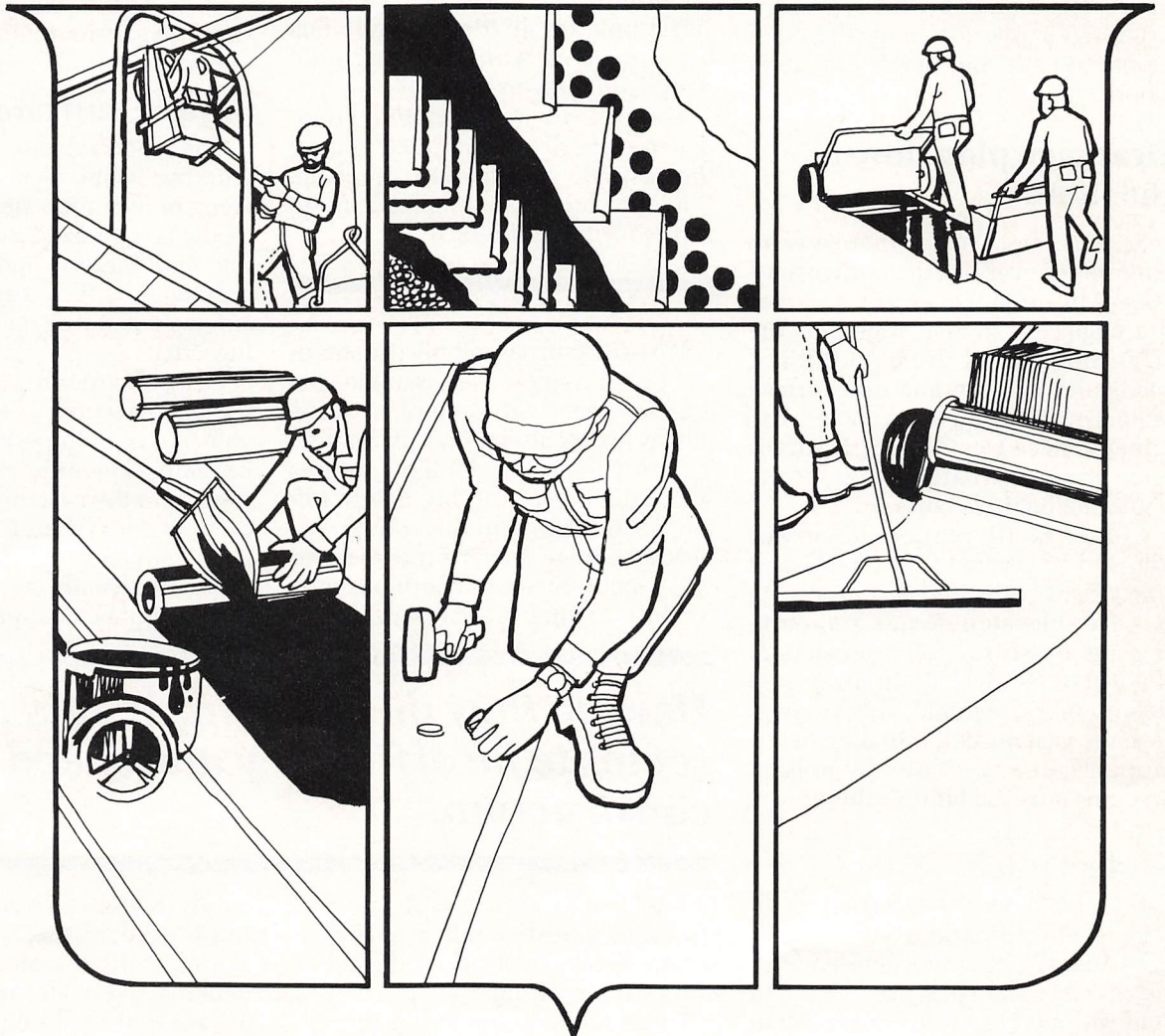
A comprehensive workbook contains a complete outline of the program plus quizzes, drills, and tests to gauge student progress and aid in instruction. A complete instruction guide is also available.

Up to nine hours of credit toward the requirements of the Academy of Roofing

Application of the Built-up Roof: Felts and Surfacings

Contractors program can be earned using this program.

For more information on the program, contact Alan Grayson, NRCA Director of Education, 8600 Bryn Mawr Ave., Chicago, Ill. 60631.





The British comment on U.S. roofing: efficient but old-fashioned

By Arthur Quarmby

I was out in the midwestern United States recently, flying back and forth over that vast flat checkerboard of farmland, which just goes on and on and on. In the vast catchment area of the upper Mississippi there are no hills at all; stand up and you are higher than the highest hill for hundreds of miles. The area's severe climate challenges builders with lots of everything: snow, sun, rain, the occasional tornado and the more regular flood.

Drainage plan down the tubes

Shortly after the war there was an attempt in several of the midwestern states to organize surface water drainage; to gather together the rainwater outfall from buildings, roads and parking lots into surface water sewers. This was a short-lived attempt because the storm surges were so severe that the new sewers could not begin to cope.

Consequently, the population was allowed to revert to its established practice of rainwater pipes spewing out over blacktop. Roads and parking lots overflow into ditches, and the ditches slowly drain away into deep creeks, which oh-so-slowly lead the vast rainfall into the Mississippi. There's no other way in such an enormous flat land, is there?

Perfect pitch

My work was concerned with wide-span industrial roofs. Here, I found a very common tendency to vary the steelwork in order to achieve one enormous doublespan roof with a very gentle two-way slope, giving slow, trouble-free roof drainage.

We've been examining roofing in other parts of the world from an American perspective in this issue so perhaps it's only fair to present the other side. Arthur Quarmby, Dipl. Arch., F.R.F.B.A. is a British architect with experience on both sides of the Atlantic. He operates a medium-sized practice in Britain that has been involved with projects in the American Midwest.

This article was originally published in the September 1983 issue of the British publication Roofing, Cladding and Insulation and is reprinted with permission.

We in Britain commonly use standard portal frames. We assemble several together with valleys between (always a potential source of trouble). The Americans use raking beams with columns of varying height (often including columns down beneath the ridge line) in order to avoid valleys and create one enormous roof.

The roof pitch is almost universal-

How do they do it? The only real clue seems to be efficiency and speed of construction.

ly 4 inches in 12 feet, with the roof structure being two felt layers on insulation slabs over profiled steel or aluminum decking.

These roofs do not suffer the unfavorable reputation affecting flat roofs in Britain. Industrial buildings are often less of a problem than other

types, admittedly, but one cannot help wondering whether the 4 inch in 12 feet pitch, sufficient to prevent ponding, does not perhaps contribute to the continuing good roof performance.

It certainly is all part of the slow-drainage-of-surface-water principle outlined earlier; the rainwater runs off but it runs off slowly, and the snow stays up there and steadily melts.

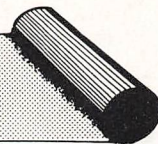
Simple and cheap

The proposed roofs on which I was working were very simple. They were of the type described, to be erected on an existing area of blacktop and largely open around the perimeter with a small amount of sidewall cladding on the snow drifting side.

Each was roughly 100,000 square feet in area (and how refreshing to be able to talk in Imperial terms again; like some splendid vision of the future), and the cost erected and complete was less than £2 (about \$2.75) per square foot.

Now that really is very cheap. It includes roof beams spanning 65 feet,

columns at 25 foot centers, a building 400 feet by 250 feet with the big sloping felted roof with insulated decking, rainwater goods and a bit of sidewall cladding. All this plus foundations and erection and repair of the blacktop for under £2 per square foot.



How do they do it? The only real clue seems to be efficiency and speed of construction. Also, competition is very active, a major factor since the materials themselves are similar in price.

Perhaps we in Britain could well

study the Americans' techniques in order to improve our own efficiency.

On the other hand, it is encouraging to find that the general standard of their planning and effective architectural design of industrial units is both ineffective and old-fashioned.

In the specialized area that concerned me, I found that someone had a bad idea on layout back in the 1940s, everybody copied him, and there has been no new or better idea since. There is definite scope for a British contribution here.

Contractors struggle to keep stiff upper lip despite sagging economy

It's difficult to decide what is more intriguing about the comparison of NRCA to its British equivalent, the National Federation of Roofing Contractors: the differences or the similarities.

"The Federation itself would appear to be similar to the NRCA," Michael J. Tremlett, the Federation's education and training officer, says. Tremlett paid a visit to the NRCA office in Chicago recently and offered his comments on the roofing industry in the United Kingdom.

"We have about 500 company members," Tremlett reports. The companies are represented by individuals, as they are in NRCA. Manufacturers can be members of the Federation, also, under the associate category.

The organization's London headquarters employs 15 people. Tremlett directs education activities out of Birmingham, England.

How's business?

"We've been going through a considerable recession," Tremlett says grimly. "The situation has been helped of late by the government's refurbishment program.

"The government pays up to 90 percent of the costs on these special

projects in the form of grants." It sounds like FDR's old Works Progress Administration program. "Yes," Tremlett agrees, "but unfortunately, these funds have been cut this year."

Interestingly enough, Tremlett says the majority of Federation members are slate and tile contractors. "The second largest group is composed of profile sheet metal contractors, or what we call sheeters and cladders," he adds. "Built-up felt roofing is third, and mastic asphalt is fourth." He does not even mention elasto/plastic.

"At the moment, it doesn't appear that there is a huge market for that kind of roofing in England," Tremlett comments. He attributes the obvious disparity between the single-ply market in the United States and his native land to a number of factors. "You have your big rubber manufacturers over here," he says tactfully. Because of the general malaise in the British building market, he adds, the shopping center types of projects for which single-ply systems are often used have not made it off the drawing boards.

Educating the mechanic

Tremlett sits on the committee of the City Guilds of London Institute

that develops questions for roofers' tests. The slaters, tilers and mastic people are examined by this agency. The committee also reviews testing materials and recommends changes or revisions.

"You can only take the test if you already have about 900 course hours in," Tremlett says. "The test is part theoretical and part practical."

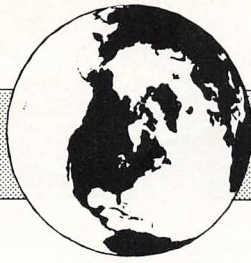
Training is conducted by the Construction Industry Training Board in the United Kingdom. When the training and examination procedures are concluded, the roofer is awarded a certificate to show to potential employers.

The big picture

Although the Federation addresses many issues, the overriding concern is still the sluggish economy in the United Kingdom. British roofing contractors have not been enjoying the recovery their American counterparts have.

"It varies from area to area," Tremlett says. "In southeast London, for instance, the situation is not as pronounced. But until there is an upturn in industry in general, the roofing picture will not improve."





1985 International Symposium

From planning to execution losing nothing in translation

How many conference attendees does it take to change a light bulb?

None. The meeting planner has spent the entire previous night checking lights, air conditioning systems and audiovisual equipment to see that nothing is going to burn out, break down or short-circuit.

Those few fortunate souls who have only attended meetings and have never been involved in planning or execution probably have little understanding of the preponderance of these kinds of details. Those who have been responsible for such functions often wonder why anyone would do this for a living.

With the International Symposium on Roofing Technology a year away, there's still plenty of time to check the lightbulbs. But other preparations for the meeting are well under way.

The Symposium is scheduled for Sept. 18-20, 1985 in Gaithersburg, Md. The last Symposium was in 1977 and attracted 800 people. Next year's meeting, which will once again be co-sponsored by the National Bureau of Standards (NBS), NRCA and the International Union of Testing and Research Laboratories for Materials and Structures (RILEM), is expected to draw more than 1,200. The size of the group and the international scope of the lectures present a situation to the meeting planners that is...well...shall we say, challenging.

Master plan

Planning and scheduling is critical. No amount of lead time is too great for such a function, says Gale Kiesel, NRCA's director of meetings and conventions.

"The Hilton and Highland hotels in Washington, D.C., which we'll be

using for the meeting, were booked long ago," she reports. "When you need 700 rooms, you have to get your bid in early."

Kiesel has scheduled her first mailing, which will include general information about the Symposium and registration materials, for this September. She has pencilled in two more mailings before the meeting; the third will include the final program. But there's a lot to be done before that can be pulled together.

"We negotiate with the hotels and airlines on rates, of course. We'll map out the complete schedule, with speakers, titles of papers, locations, times and so on. The speakers must submit their biographies for introductions and their audiovisual equipment needs so we can reserve those items."

Based on the registration fee that has been determined, the staff also orchestrates all meals and receptions, down to ordering flowers for the tables and designating reserved seating areas. Local transportation must be arranged; the photographer hired; a spouse program outlined; all support materials printed, packed and shipped, including badges, programs, and meal tickets.

So far, we're talking about the usual stuff. These arrangements must be made for many meetings. But there are some needs peculiar to a culturally complex conference. The international flavor may be exciting, but it means a wholly different set of worries.

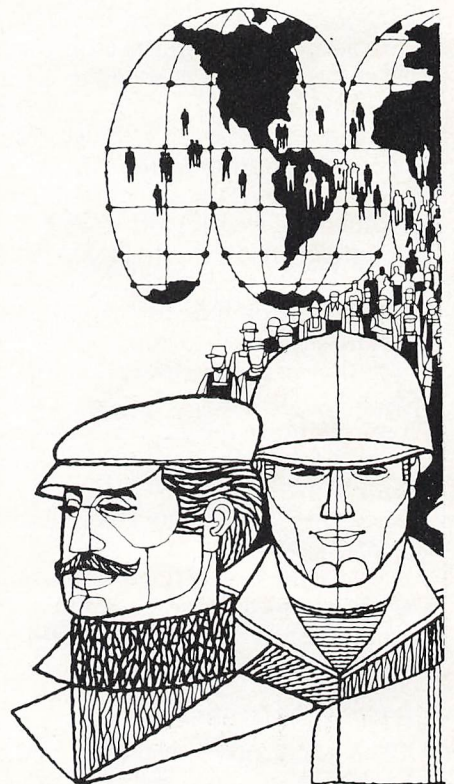
First of all, the Symposium is only held once every eight years, so the amount of information to be exchanged and the number of speakers are staggering. A total of 88 papers will be presented in concurrent sessions. Each presentation will last on-

ly about 20 minutes.

"We'll have to devise a system to signal the lecturers," Kiesel says. "We've got to stick to our schedule or we're dead."

"Simultaneous translation from French to English and English to French will be going on," Kiesel says. "We may be offering Japanese translation, also, depending on how many registrants we get."

"The size of the potential audience means that we have to use two auditoriums at NBS headquarters for general sessions. So any translation





apparatus or personnel will have to be doubled."

Interpreters will be standing by constantly during the Symposium to meet any special needs.

Sarah Torrance, meeting coordinator at NBS, offers another reminder: citizens of Eastern Bloc countries cannot carry their own currency into the United States; VIPs must be met at the airport and financial arrangements must be made to see them through their stay.

Even banquet decorations take on a new importance. Kiesel is hoping

to have a flag from each attendee's country at the main dinner held during that week.

Please proceed

Printed conference materials usually consist of programs, handouts from speakers and a list of attendees. To add to the value of the International Symposium, however, a textbook containing the submitted papers will be distributed to the participants at the meeting. NRCA's Technical Services Department is coordinating the editing; the Communications Department is overseeing the production of the book.

duction stages early next spring to meet the September deadline.

Going public

Publicity plans for a conference of this magnitude must be as carefully mapped out as other meeting planning tasks.

News releases have already been distributed to the building trade press here and abroad and a schedule of press contacts has been outlined. The publicity will include a combination of feature stories, brief news items and updates. NBS will draft some additional releases to send to those on its mailing list.



Interpreters will be standing by constantly to meet special needs.

The deadline for the papers is Oct. 1. (Author's abstracts had to be submitted by May 1 of this year.) The Technical Services Department will review each paper briefly; it will then be sent to one of a panel of manuscript reviewers. If all goes well and the reviewer has no questions or concerns, the paper will go to a technical editor hired especially for this project by NRCA.

The paper will come back to NRCA and be entered into the word processing system; if it has been submitted in French it must be sent to a translator. The staff will edit the paper for consistency of style at this point. The author sees the paper again for final approval.

The proceedings will actually take the form of two textbooks, each about 600 pages long including charts, graphs, formulas and photographs. The materials must enter final pro-

In August 1985, press kits will be ready to distribute to both the trade and public media. NRCA's public relations agency, the Public Relations Board, will help place the information and encourage its use. The upcoming Symposium will be highlighted in the Association's other public relations activities as well.

Smooth sailing

The ultimate measure of a meeting's success, of course, is in direct proportion to the participants' lack of knowledge about what goes on behind the scenes. The harder one works to prepare, the smoother the sessions run.

Now that you know what's involved, we'd like you to test our theory. For more information on attending the International Symposium, contact Gale Kiesel in the Meetings and Conventions Department.

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Letters

Concrete facts

I am writing in response to the offer made by Stephen Phillips on behalf of the NRCA in his letter of May 7, 1984 to use your organization as a forum to present information on the subject of BUR roofing performance over lightweight concrete decks.

As you know, the Construction Products Division of W. R. Grace & Co. is the leading manufacturer of lightweight concrete aggregate marketed under the Zonolite Roof Insulation name. In this role we feel compelled to comment on the technical bulletin recently issued by the Roofing Systems Technical Committee (RSTC) of the NRCA and the Asphalt Roofing Manufacturers Association (ARMA) (see *Roofing Spec*, February 1984, page 14).

Specifically, we fully endorse the recommendations in the bulletin and especially the recommendation to determine that the deck system has been specified in strict accordance with the deck manufacturer's recommendations. We also strongly recommend positive venting of lightweight concrete decks, ideally by using slotted metal steel decks and always with topside venting provided by the mechanical fastening of the roofing membrane and vented roof edges.

We disagree strongly, however, with the basic premise of the bulletin, which states that roofing membrane systems installed over lightweight concrete decks have a greater potential for problems than systems installed over other substrates.

We were shocked to learn from Mr. Phillips' letter that the NRCA has no evidence and did no testing to substantiate the problems identified in the bulletin but relied on anecdotal statements, which are refuted by the statistics in the NRCA's own Project Pinpoint. We believe the bulletin

must be modified to eliminate the erroneous references to unsubstantiated problems.

W. R. Grace has the facts to refute each of the problems identified in the bulletin. Let's look at them one by one.

Weakening of the membrane/ reduced membrane service life

Lightweight concrete roof decks have been used in the construction industry for more than 40 years. These decks have been placed over many different types of substrates, including vented steel centering, structural concrete, formboard and in reroof situations. Traditionally, four-ply saturated organic felt BURs were commonly used over lightweight decks. When this type of membrane was used, a long service life resulted. The NRCA's own Project Pinpoint statistics do not reflect a higher incidence of problems over lightweight concrete.

Grace's own statistics show a less than 1 percent failure rate for BURs over Zonolite decks. However, more than 90 percent of all failures of BURs over Zonolite have been systems using either asbestos or coated felts. The high incidence of failure of asbestos and coated felts is well documented by Project Pinpoint. These membrane systems are no longer marketed.

It is the position of W. R. Grace that properly applied four-ply saturated organic and fiber glass BURs perform extremely well over lightweight concrete decks. Marginal membranes do not perform adequately over any substrate.

Membrane splits due to freezing.

W. R. Grace has scientific evidence that lightweight concrete decks do not freeze and expand in cold climates and cause membrane

splits. By far the great majority of BURs that have split over Zonolite decks have been asbestos felts, which the NRCA's Project Pinpoint has shown split over all substrates and are no longer available to the industry.

Membrane blistering

With the development of the Zonolite Base Ply Fastener in 1972, blistering between the lightweight concrete deck and the roofing membrane was eliminated. Roofing membranes properly attached with base ply fasteners and vented at roof edges do not develop blisters.

Reduced fastener holding power

Fastener holding power increases with age. This occurs because of the chemical bond formed between the galvanized coating and the cement matrix. The record of excellent wind uplift performance of lightweight concrete decks is one of the best in the industry. This is well documented by the most vigorous approvals given lightweight concrete roof systems by Underwriters Laboratories (UL), Factory Mutual (FM) and code approval agencies.

Rusting fasteners, metal forms and other metal accessories

W. R. Grace is not aware of the type of problem cited except where non-galvanized fasteners and metal accessories were used or where continual water leakage occurred as a result of flashing failures or improper flashing application.

Reduced insulation values

All insulations pick up moisture in actual use. Most lightweight insulating concrete systems currently being installed contain some amount of polystyrene insulation, which offers high R-value at low cost.

continued on following page

Letters

continued

Polystyrene is relatively unaffected by moisture compared to other rigid insulations.

The performance comparison of insulation materials using steady-state ASTM procedures is misleading relative to actual in-place performance. The real world does not create steady-state temperature or moisture conditions.

W. R. Grace is at the forefront of developing in-place thermal measurement techniques. Data to date show that thermal performance of lightweight insulating concrete systems is less affected by moisture, air-infiltration, board joints, insulation fasteners and thermal short-circuits than dry-board insulation systems.

W. R. Grace would like to extend an invitation to NRCA Executive Di-

rector Bill Good, NRCA Technical Services Director Bob LaCosse and NRCA Research Associate Bill Cullen to visit our office in Cambridge for an in-depth discussion of the above issues. Thereafter, we would hope to present this information to the roofing industry through the NRCA's offices.

I would be interested in your reader response.

John A. Danneker
Vice President and General Manager
Construction Products Division
W.R. Grace & Co.

NRCA replies:

W.R. Grace & Co. asked NRCA for copies of all data in support of the statements made in the RSTC Bulletin in question. NRCA did not say there was no evidence to support the Bulletin, but responded in part as follows:

"NRCA sincerely believes that there is a general industry consensus that residual moisture in lightweight insulating concrete decks poses a potential threat to obtaining

satisfactory long-term roofing performance... This is certainly the view of the Technical Operations Committee of NRCA and is also expressed in roofing literature, including roofing materials manufacturers' publications....

"NRCA holds the specific information that it receives from its members in confidence, and this is a condition upon which many members share information with NRCA. Without violating that confidence, I can only report to you that members of NRCA in various sections of the country have experienced roofing problems when built-up roofing has been installed over lightweight insulating decks, particularly those decks that retain high degrees of residual moisture."

A simple solution

I read with interest Mr. Richard Baxter's article concerning moisture accumulation in single-ply assemblies in your June 1984 issue. I feel it's time the NRCA addressed this very serious problem as single-

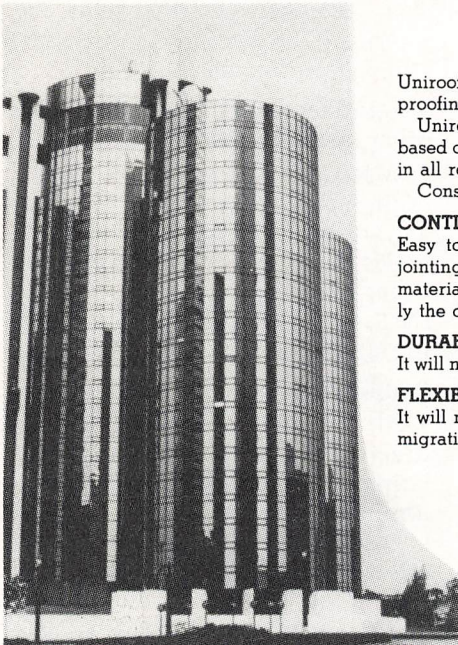


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ply membranes become more and more acceptable in the marketplace. The accumulation of moisture on the underneath side of the membrane is very critical, not only to membrane performance but also insulation performance.

Mr. Baxter does an excellent job of bringing the problem to light. However, he does not offer the most simple solution: to use an extruded polystyrene as the under-membrane insulation. We have been doing this in our geographical area now for more than four years with excellent results.

We would be most happy to share our experiences with Mr. Baxter or your advisory staff if additional information concerning extruded polystyrenes under single-ply membranes is warranted.

Thank you very much for this excellent article. We look forward to future articles concerning long-term performance of rigid insulations and compatibility with single-ply membranes.

Kenneth E Schmidt
Seward Sales Corp.

A burning issue

The article by Stanley Warshaw, "The Effects of Wind Uplift on Single-Ply," in the June issue was one of the finest presentations I have read. One hopes that the industry listens to Mr. Warshaw's wise counsel and develops more answers to the numerous questions he raises.

I was one of many who raised sim-

news" concerned the interaction of the corporate components we dealt with. The marketing people did not want to hear anything negative about their products. Meanwhile, Rome was burning. The legal departments knew that it was burning but they thought they could get the fire out without calling the fire department and blaming somebody else. Management, who manned the fire

A new fire is smouldering right now. Have we learned anything?

ilar questions to the built-up roofing manufacturers some 15 years ago. Our questions were ignored for some five years until the disastrous failures of the 1970s spurred the growth of the single-ply industry. It was only then that we started to receive answers to our questions, most of which have been answered at this time.

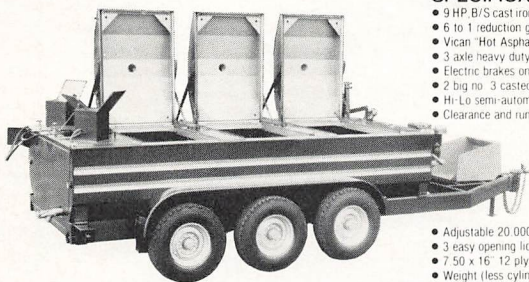
One of the most interesting parts of my experience as a "bearer of bad

brigade, was on vacation and didn't know the fire had started. The technical people who knew the fire had started (indeed, some of them were arsonists) couldn't contact management, weren't listened to by marketing and were ignored by legal. Rome burned.

A new fire is smouldering right now. Have we learned anything?

Jack Williams, president
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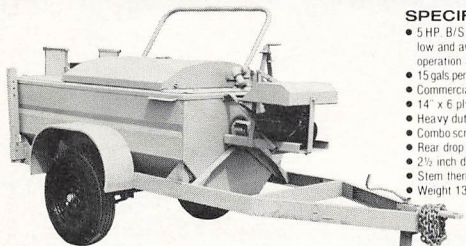


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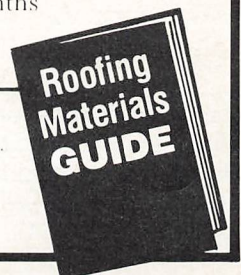
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Sept. 30–Oct. 3

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Conference & Seminars
American Institute of Plant
Engineers (AIPE)
Chicago, Ill.

Oct. 9–11

Mid-Atlantic Conference & Seminars
American Institute of Plant
Engineers (AIPE)
Philadelphia, Pa.

Oct. 9–10

Roof Inspection, Diagnosis & Repair
Seminar
Roofing Industry Educational
Institute
St. Louis, Mo.

Oct. 11–12

Single-Ply (elasto/plastic) Roofing
Systems Seminar
Roofing Industry Educational
Institute
St. Louis, Mo.

Oct. 12

Double-Breasted Construction
Operations Seminar
Advance Conference Concepts
Cleveland, Ohio

Oct. 12–13

Mini Convention
Arizona Roofing Contractors
Association
Wickenburg, Ariz.

Oct. 16–17

Roofing Inspection, Diagnosis &
Repair Seminar
Roofing Industry Educational
Institute
Richmond, Va.

Oct. 18

Design & Specifications of Roofing
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Member Supplement

Study group reconvenes in Italy, Greece for international view of industry

Sixty-eight U.S. roofing contractors and their spouses and guests got a first-hand look at the Italian and Greek roofing industries in February when a study group reconvened there following the NRCA Annual Convention and Exhibit in Atlanta. The study group hoped to gain insights to the roofing industries in these countries, especially to gather information about the production of modified bituminous membranes. This roofing system has gained a larger share of the U.S. market in recent years.

A closer look at the manufacturing of these products was believed to be potentially valuable—particularly in Italy, which was basically the first modified bituminous membrane marketplace.

Lectures, meetings, plant and job-site inspections were all part of the information-gathering process.

When in Rome

The group arrived in Rome, on Sunday, Feb. 19. No meetings or job visits were scheduled for that day. On Monday morning the participants toured the city, noting construction in progress and the types of roofing systems being applied.

The Italians have more than a decade of experience to help them make the best use of the new modified bitumen products.

Perhaps in some countries these changes are still considered revolutionary, however, the systems have been used for many years in Europe. However, new developments do not appear to be coming from old, established companies. Young companies have taken the technology a number of significant steps forward. Bitogum Corp. of Rome is one of these.

Felice Fortuna, export director of Bitogum, met with the group on Tuesday afternoon. The Bitogum export manager and a former professor of chemistry who heads the technology department were also present. They summarized the roofing industry in Italy as it relates to the development of modified bitumen membranes.

A general discussion of roofing as a business in Italy revealed that modified bitumen manufacturers tend to have smaller companies averaging about 20 to 40 employees. The manufacturers sell through their representatives directly to the roofing contractors. These representatives call on architects and specifiers to promote their products, the Bitogum staff reported. They also said it is a law in Italy that the roof guarantee must cover a period of two years, although Bitogum supplies a 10-year guarantee on some products. The roofing contractor in Italy must be licensed and must have at least two years' experience to obtain the license.

The group met again on Thursday to tour Bitogum's plant. The tour included an examination of the production process for modified bitumen membranes. Bitogum personnel demonstrated the torch application. A slide presentation and lecture featured a discussion of the membrane's reinforcements, quality control and a comparison of this product with synthetic membranes. (Technical data gathered is on file at NRCA.)

It's Greek to them

The group traveled to Athens, Greece on Friday. The weekend was spent touring the city. A trip to the plant of ESHA Corp., a firm producing asphalt and chemical products,

was planned for Monday. The chairman and managing director of the plant, Apostolos N. Kallios, greeted the study group.

Kallios led a tour of the plant and explained the history of the company. The group was particularly impressed with the manufacturing equipment, which allows for the production of various types of roofing membranes on the same machine.

The group also had an opportunity to visit the sports palace in Athens, currently under construction. This provided an outstanding hands-on job-site inspection. The sports palace is rather unusual: the roof deck is stainless steel cable with about 4 centimeters of insulation. The roofing membrane is a reinforced elastomeric membrane being used in two-ply construction.

The Roman Pantheon was another stop on the tour of Athens. The building was first constructed in 27 B.C. The Pantheon is a circular chamber 144 feet in diameter. The dome is supported by eight large arches. Through careful maintenance the original dome endured centuries of weathering. In 1500 new lead plates were installed. The plates served their purpose well; not until the late 1960s did the Pantheon suffer serious problems. Corrosion had led to severe leakage. In 1972 the Pantheon was reroofed with Derbigum. The roofing has been in place since then and has performed well.

Future sites

Before the study group returned home, the participants discussed future sites for reconvene sessions. Strong interest was expressed in the development of ongoing study trips on roofing technology.



Contractor computer use: NRCA's got the data

NRCA has made a computer clearinghouse available to its contractor members. This service will benefit contractors presently using computers in their business or planning to install a system in the future.

The computer clearinghouse service allows any NRCA member to obtain information on computer systems installed by other contractors. This information can include data on hardware, software and types of functions being performed.

The Association recently surveyed both the computer users and non-users among its membership, collecting 755 responses. This survey

established data on 268 computer installations. Most of the respondents indicated that they will share their knowledge with other NRCA members.

The following tables highlight some of the survey's findings. Table 1 shows how quickly and significantly computer use has grown in the last couple of years. Most of the current users have installed their systems less than two years ago.

According to the survey results reported in Table 2, computer use will continue to grow in the near future; 57 percent of all survey respondents not presently using a computer are planning to install a system in the next two years.

About one third of the computer systems in place were purchased and installed with the help of outside consultants, according to the survey. Table 3 indicates that 31 percent of the contractors buying hardware and 36 percent of the contractors buying software engaged outside consultants for the purchase.

Many off-the-shelf computer pro-

grams have been developed that meet the contractors' needs. The data in Table 4 reflects this trend. Of the computer-using survey respondents, 43 percent purchased packaged software instead of developing custom software in-house.

Table 5 illustrates the respondents' hardware preferences. IBM dominates this field with a 23 percent market share, almost twice as large as its closest competitor. When contractors were asked what computer model they used, the IBM PC was mentioned most frequently.

While the large micro-computer companies dominate the contractor market, the proliferation of smaller computer companies has made its mark on the industry. As Table 5 indicates, 55 smaller manufacturers have equipment installed in 35 percent of the respondents' companies.

Those PCs are used most often for payroll and general accounting calculations, according to Table 6. Surprisingly, only 7 percent of the computer users are preparing estimates on them. This seems to contradict

Table 1: Age of computer installations

Total respondents	286	(100%)
0-1.5 years	131	(46%)
1.5-3 years	52	(18%)
3 years-4 years	34	(12%)
4 years-5 years	28	(10%)
6-14 years	41	(14%)

Table 2: Planning future computer systems

Total respondents	467	(100%)
Will install system:		
in next 6 mos.	55	(12%)
1 year	114	(24%)
2 year	86	(18%)
No plans at this time	265	(57%)
	202	(43%)

Table 3: Use of consultants in procuring software and hardware

	Software	Hardware
Total respondents	276	(100%)
Used consultants	99	(36%)
Did not use consultants	177	(64%)
	178	69%

Table 4: Use of customized/packaged software

Total application software responses	1682	(100%)
Customized software	971	(57%)
Packaged software	711	(43%)

Table 5: Computer hardware by manufacturer name

Total computers reported	374	(100%)
IBM	84	(23%)
Tandy Radio Shack	46	(12%)
Apple	42	(11%)
Digital Equipment	23	(6%)
Burroughs	18	(5%)
Texas Instrument	15	(4%)
Basic 4	14	(4%)
55 additional manufacturers	132	(35%)

Table 6: Functions (applications) being performed and software source

Function (Application)	Total reporting	SOURCE				
		Not defined	Packaged	Customized package	Custom	
All Functions	1724 (100%)	63 (4%)	690 (40%)	240 (14%)	731 (42%)	
Payroll	222 (100%)	11 (5%)	78 (35%)	32 (14%)	101 (46%)	
Accounts payable	217 (100%)	7 (3%)	85 (39%)	26 (12%)	99 (46%)	
General ledger	210 (100%)	6 (3%)	91 (43%)	26 (12%)	87 (41%)	
Accounts receivable	197 (100%)	5 (3%)	76 (39%)	24 (12%)	92 (47%)	
Job costing	181 (100%)	10 (6%)	64 (35%)	19 (11%)	88 (49%)	
Spread sheet	139 (100%)	4 (3%)	81 (58%)	18 (13%)	36 (26%)	
Inventory	136 (100%)	5 (4%)	48 (35%)	19 (14%)	64 (47%)	
Word processing	119 (100%)	5 (4%)	58 (49%)	26 (22%)	30 (25%)	
Estimating	114 (100%)	6 (5%)	37 (33%)	17 (15%)	54 (47%)	
Budgets	103 (100%)	3 (3%)	46 (45%)	17 (17%)	37 (36%)	
Equipment control	46 (100%)	— —	15 (33%)	5 (11%)	26 (57%)	
Roof design	12 (100%)	1 (8%)	2 (17%)	5 (42%)	4 (33%)	
Energy analysis	11 (100%)	— —	2 (18%)	3 (27%)	6 (55%)	
12 additional functions	17 (100%)	— —	7 (41%)	3 (17%)	7 (41%)	

the often-heard sentiment that contractors need to automate estimate preparation.

The PCs are performing these tasks with a variety of software, both ready-made and custom-designed. Some tasks appear to be general enough to be handled by off-the-shelf software. However, custom-designed software was used more often for most applications. The information in Table 6 may be useful to first-time computer users trying to decide if off-the-shelf software would meet their needs. The chart lists the software packages contractors have found most useful for specific tasks.

For contractors looking for the most suitable computer system, Table 7 may be useful. It reports the hardware/software combinations some computer users found helpful for their specific tasks.

The survey's results have been organized into a computer data base for easy reference. If this information can be of value to your company, call or write to NRCA. A list of contractors using specific hardware or software can also be provided upon request.



Table 7: Most common hardware/software combination for specific functions

Function (Application)	Hardware/software system	Number of users
Payroll	IBM/PC-BPI	4
	TRS 80/16-Radio Shack	4
	TI/990-Concord Mgt.-Systems	4
Accounts payable	IBM/PC-BPI	4
	TI/990-Concord Mgt.-Systems	4
General ledger	IBM/PC-BPI	5
Accounts receivable	TI/990-BPI	4
Job costing	TI/990-Concord Mgt.-Systems	4
Spread sheet	IBM/PC-Lotus 1-2-3	5
	IBM/PC-Lotus 1-2-3	5
	IBM/PCXT-Lotus 1-2-3	5
Inventory	TI/990-BPI	3
Word processing	IBM/PC-Word Star	4
Estimating	IBM/PCXT-Lotus 1-2-3	2
Budgets	IBM/PC-Lotus 1-2-3	3
Equipment control	IBM/34-Concord Mgt.-Systems	2
Roof design	TRS/80-Science Ed. Bus. Systems	1
	Eagle/3-Science Ed. Bus. Systems	1
	Apple/IIe-Hi-Res. Arch. Design	1
	Apple/MAC-Mac Point	1
Energy Analysis	Xerox/820-Super Calc	1
	TRS80/3-Radio Shack	1
	Apple/IIe-Visi Calc	1
	Digital Eq./PDP4-Lotus 1-2-3	1
	IBM/PC-Lotus 1-2-3	1

New Members

The following have been approved for NRCA membership for June and July.

CONTRACTORS

- Able Sheet Metal & Roofing
3412 Pinemont
Houston, Texas 77018
Stephen W. Connolly
- All Phase Roofing, Inc.
8200 E. Place Suite 301
Denver, Colo. 80231
Barton L. Primm
- Armstrong Roof Systems
P.O. Box 15219
Santa Fe, N.M. 87502
Richard Armstrong
- Central Roofing
Route. 1, Box 261 E.
Monroe, La. 71202
H.L. McLaughlin
- Fields & Sons Roofing
830 Santiago Road
Costa Mesa, Calif. 92626
Brenda Fields
- Hollis Roofing, Inc.
P.O. Box 2229
213 Conway Drive
Columbus, Miss. 39704
Karen Hollis
- Independent Roofing & Siding Co.
700 Stephenson Ave.
Escanaba, Mich. 49829
Paul E. Neumeier
- Inman Services
415 E. Votaw St.
Portland, Ind. 47371
Lee G. Inman
- R. Kaller & Sons
134 Sibley Ave.
Ardmore, Pa. 19003
Richard R. Kaller
- Lawson Roofing, Inc.
700 Gwenn
Springdale, Ark. 72764-2906
Glen Lawson
- Mueller-Haines Roofing, Inc.
6170 E. 49th Ave.
Commerce City, Colo. 80022
Fred L. Haines
- R.S.I. Industries, Inc.
652 Del Prado Blvd. N.
Cape Coral, Fla. 33909
Ken Daugherty
- Southern Colorado Roofing Co.
307 S. Mechanic St.
Pueblo, Colo. 81002
Glen Samson

- West Bend Roofing, Inc.
P.O. Box 63
West Bend, Wis. 53095-0063
Edward J. Frac

ASSOCIATES

- Aplex Plastics, Inc.
3793 N. Peachtree Road
Chamblee, Ga. 30341
Bob Findley
- Behstev Corp.
4201 W. Shaw
Suite 103
Fresno, Calif. 93711-6202
Curtis Hart
- Roofers Mart of America, Inc.
111 W. Port Plaza Suite 523
St. Louis, Mo. 63146
Gregory Faherty
- U-Flow, Inc.
Ellicott Station
P.O. Box 19
Buffalo, N.Y. 14205
Philip Uglow

CONSULTANTS

- Louisiana Roofing
Consultants, Inc.
609 E. Main
Winnfield, La. 71483
S. T. Williford

INDUSTRIAL/INSTITUTIONAL

- Lincoln Property Co.
101 Lincoln Center Drive
Foster City, Calif. 94404-1130
Wayne Biancalana

INTERNATIONAL

- Fester De Mexico S. A.
Ejercito Nacional 579, 6o
Piso, Col Granada
11520 Mexico D. F.
Eduardo Zepeda G. P.
- M J Roofing & Supply, Ltd.
1065 Selkirk Ave.
Winnipeg MB. Canada R2X 0C2
Mike Prokopich

Sorry, wrong number

NRCA members are advised to make a correction in their 1984-85 membership directory, according to Carl Good, manager of NRCA's Member Services Department. On page 16 of the directory the phone number of IVS, Inc. in Englewood, Colo. was listed incorrectly. The correct number is 303/922-8355.

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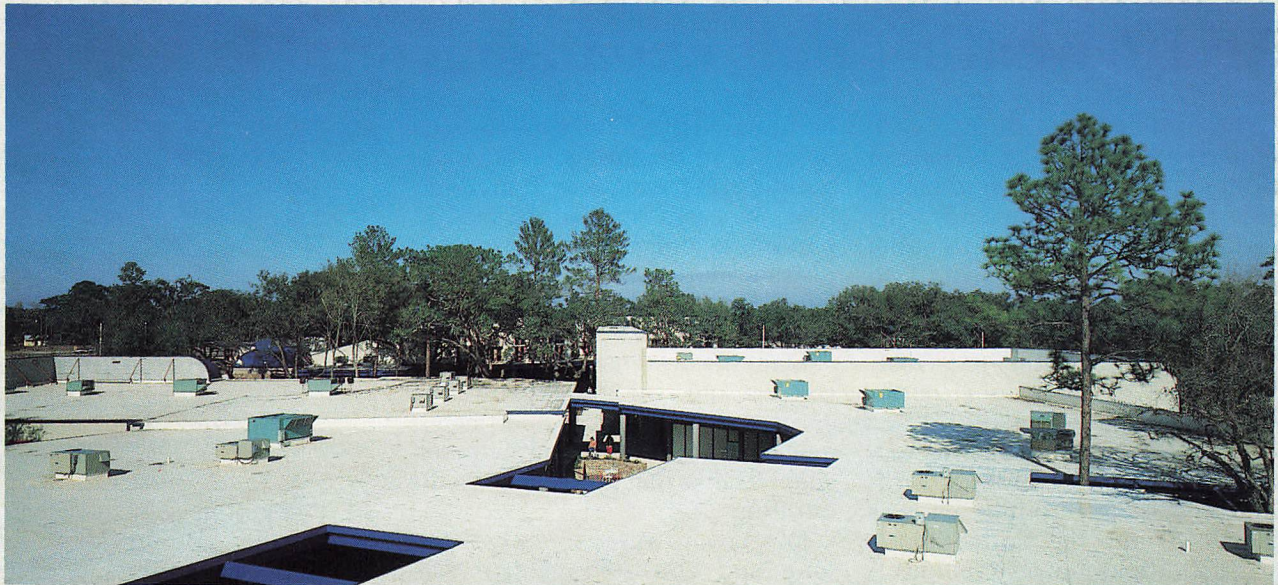
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Here on the roof of the new Loehmann's Plaza, Altamonte Springs, Florida, a watertight Hi-Tuff single-ply roofing system is in service.

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On roofs everywhere, elastomeric single-ply roofing is replacing less durable materials. And among single-ply systems, nothing tops a Hi-Tuff roof. Scrim-reinforced Hi-Tuff is mechanically attached, eliminating ballast. It's white for energy savings, FM I-90 for wind resistance, UL Class A for fire resistance, and backed in writing directly to the owner by Stevens, one of America's largest corporations.

For information and a seamed sample, write to J.P. Stevens & Co., Inc., Roofing Systems, Easthampton, MA 01027. (413) 527-0700.

"Hypalon" is a Du Pont registered trademark.

STEVENS
Roofing Systems

J. P. Stevens & Co., Inc.
Elastomeric Products Department

Check #837 on Reader Service Card

On the Roof

Arctic weather puts expansion joint to test

While foreign roofing may face unique challenges, you don't have to go out of the country to find trying climates. The North Slope oil fields in Alaska lie 350 miles north of the Arctic Circle. Buildings built to service the fields face temperatures as low as -60F and winds that can drive the chill factor to -120F. There's also the occasional earthquake to keep things interesting.

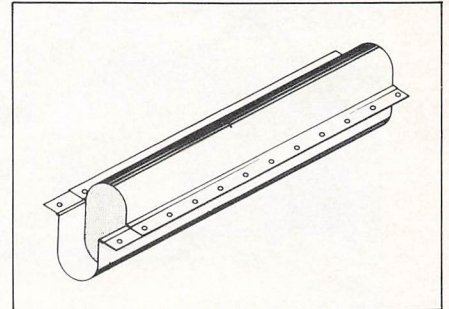
When the oil fields needed a processing plant, a complex of standardized prefabricated buildings was planned. Under the North Slope's harsh conditions, however, connecting and sealing these units presented a problem.

The specifications called for an expansion joint cover that could span and seal the 9-inch gap between

buildings, withstand extreme temperature differentials, allow for building movement in four directions, be easily applied, be maintenance free after installation, be fire resistant and be insulated. Manville's custom-designed expansion joint covers fit the bill.

Manville designed these covers to connect and seal straight runs and corners around building perimeters and for locations around cylinder-shaped tanks that protrude from the buildings.

Joint covers were generally 10 feet long and consisted of two flat-formed, 4-inch metal flanges. The flanges were adhesively and mechanically bonded to both sides of an insulated expansion joint cover. The exterior skin of the cover was made



Isometric view of expansion joint

of silicone-impregnated fiber glass, while the interior skin was of aluminized fiber glass.

Nearly 30,000 linear feet of various widths of covers were installed to seal the gaps on all perimeters of the modules, including walls, roofs and floors.



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New LITE-TOP is a single-ply Hypalon®* sheet roof membrane that gives you the best of both worlds... the best of both plastic *and* rubber.

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Plus it presents an attractive, energy-saving white surface to the sun. Other colors are also available.

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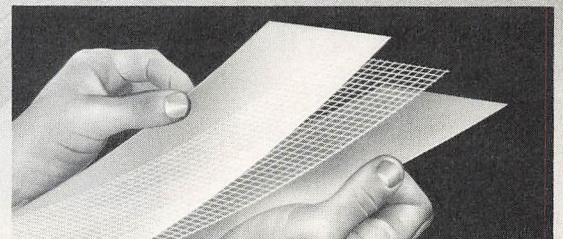
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"Keeping Water in Its Place"

Check #817 on Reader Service Card

Du Pont introduces the strongest reinforcement ever for BUR: new Reemay[®] Hot

New fabric combines the stability of fiberglass with the flex of polyester to help you win more bids



REEMAY Hot combines the stability of fiberglass (middle ply) with the stretch and flex of polyester.

Du Pont's new REEMAY Hot roofing fabric is the strongest reinforcement you can buy for hot 3-ply roofs. A single ply supports the weight of two men.

REEMAY Hot is really a tough, light sandwich of fiberglass between two layers of REEMAY spunbonded polyester. Break strength is 50% over the 200-pounds-per-inch NBS recommendation for 20-year roofs, and over 50% higher than Type IV

fiberglass. And stretch and flex-life are 1,000 times higher, to resist splitting and cracking.

REEMAY Hot—made only by Du Pont—is highly conformable. It absorbs asphalt thoroughly over a broad temperature range. And it weighs a lot less for easier handling and reduced freight costs.

You'll offer higher quality and win more bids with Du Pont's new, super-strong reinforcement fabric. For more

information and the distributor nearest you, call (302) 999-5077, or write: Du Pont Company, Room G40088, Wilmington, DE 19898.



New Products, Ideas, & Publications

CMI offers aluminum in V-beam sheets

Aluminum V-beam sheets are now available for commercial and industrial roofing and siding from Corrugated Metals, Inc.

The sheets offer 39-inch coverage and come in stock lengths of 8, 10, 12, 24 and 30 feet and standard thicknesses of .032, .040 and .050 inch. The sheets are available in either Stucco Embossed Mayan Bronze or Dover White finish.

CMI also offers corrugated roofing, siding and specialty products in finish widths from 26 to 51 inches. Available gauges range from .010 to .080 inch, with shipping lengths of up to 57 feet. CMI also manufactures many profiles in 48-inch widths.

Additional product information may be obtained from Corrugated Metals, Inc.

Check #214 on Reader Service Card

Heat gun has mica element for durability

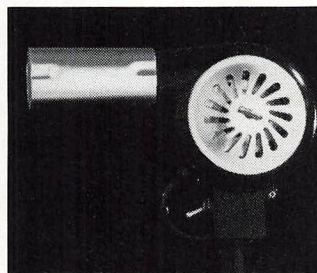
A lightweight, flameless heat gun, which provides up to 750F of concentrated heat, has been introduced by Milwaukee Heat Gun Tools, Inc.

The model 750-X gun features a mica electric heating element core, which resists the cracking that can occur in ceramic cores if the gun is dropped or jolted. The housing is manufactured of lightweight die-cast magnesium.

The flameless heat gun can be used to soften shingles before cutting and to dry damp surfaces.

Information on other applications and details of the gun are available from Milwaukee Heat Gun Tools, Inc.

Check #215 on Reader Service Card



Howmet/Alumax systems feature snap-on seams

Sup-R-Seam and Sup-R-Batten are the snap-on standing seam and batten seam systems that have recently been introduced by Howmet/Alumax. In the systems the panels are rolled with a 1 7/16-inch-high leg on either side. This raised leg serves as a water diverter and provides an anchor for clips fastened 24-inch on center. The standing seam or batten is then snapped onto the clips, concealing clips and fasteners.

The systems require no special tools or mechanical seaming machines and serve as a floating roof, which provides freedom of movement with thermal expansion and contraction.

Further information and specifications on these new products may be obtained from Howmet/Alumax.

Check #216 on Reader Service Card

Compressor line includes new two-stage units

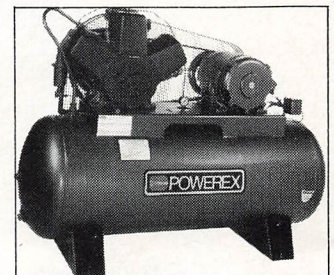
The Powerex line of industrial air compressors has been broadened by the recent addition of a new series of two-stage reciprocating compressors. The series covers the three- to 15-horsepower range with five new models.

The Powerex two-stage uses a two- and three-cylinder air-cooled pump, cast iron, diamond-bored cylinders and one-piece connecting rods. The compressor also has stainless steel valve restrictors and anti-corrosive treated plates designed to increase valve life.

In addition, the Powerex two-stage utilizes an out-balance system to reduce oil consumption and vibration, a dual element filtering system to cut noise levels and a spring cushion unloader system designed to improve volumetric efficiency and valve plate life. Other features include pressure switch unloading for loader starts, an oil sight gauge and front and rear ball bearings for crankshaft alignment.

More details on Powerex compressors is available from the manufacturer, Campbell Hausfeld.

Check #217 on Reader Service Card



MBMA offers publications on metal buildings

The Metal Building Manufacturers Association has made available a number of publications on metal building systems.

Among the literature available is the *Metal Building Systems Manual*. The 120-page illustrated manual contains data on wind load criteria for low-rise construction based on four years of research at the University of Western Ontario. It also includes recommended design practices, the code of standard practices, guide specifications and metal building systems nomenclature. The research for the manual was sponsored by MBMA in conjunction with allied construction organizations.

Also available is the *MBMA Fact Book*. This eight-page, four-color publication spotlights gains in sales, steel tonnage use and low-rise market share in non-residential construction by the 30 member companies of the MBMA over the last year. The booklet also contains 40 photographs illustrating a variety of architectural appearances that are possible by combining metal building systems with metal-clad fascia or glass, brick, stone, wood or concrete sidewalls.

More information on metal building systems literature can be obtained from MBMA.

Check #218 on Reader Service Card

Elco fasteners hold roofs firmly without leaks

A new fastener sealing system has been introduced by Elco. The Flo-Seal™ system consists of a special configuration that is designed into the fastener head and a UV-resistant sealing washer.

When driven, the system provides a custom seal through the controlled flow of the washer. The system compensates for different installation techniques and can be overdriven, underdriven or angle-driven. Flo-Seal is also available with Stalgard coating, which provides corrosion resistance and eases installation.

Another addition to the Elco line is a new fastening system for single-ply roofs. Tapdek-SP™ uses a fastener with a locking collar and a stress disc with locking tabs. When the fastener is driven through the disc, the collar and tabs permanently hold the disc under the head of the fastener. The fastener is organic-coated for corrosion resistance and is available in eight lengths. The stress disc is made of a thermo-plastic material with a ribbed design for extra strength.

Additional information on both products is available from Elco.

Check #219 on Reader Service Card

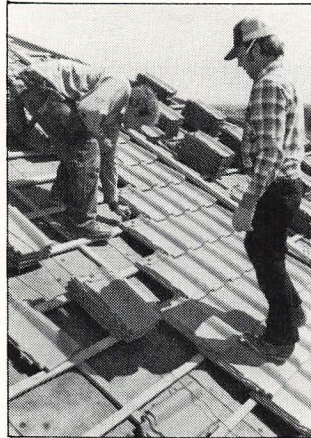
German tile now distributed by Midland Co.

A special roofing tile manufactured by a West German firm is now being imported and distributed by Midland Engineering Co.

The Heisterholz Corp. has designed its tile with an interlocking system that uses a specially designed storm clip. This design makes direct nailing of the tile through the waterproof underlayer into the roof deck unnecessary and eliminates up to 280 nail holes per square according to Midland. The tile is available in a range of colors in either French or Spanish styles.

Complete details on Heisterholz tile is available from Midland.

Check #220 on Reader Service Card



PVC membrane gets good marks from UL and FM

Following extensive testing at Underwriters Laboratories (UL), unballasted Interroof Systems are now listed UL Class A. The Interroof membrane does not require any special coatings or surface treatments to meet Class A or Class B requirements.

The non-ballasted Interroof System is also Factory Mutual (FM) I-90 approved when installed with all attachments on the underside of the roofing membrane.

Interroof is a PVC membrane system available from IPW Interplastic.

Information on the system is available from the manufacturer.

Check #221 on Reader Service Card

UL gives FireGard EPDM Class A rating

Weathergard Roofing Systems, Inc. has announced that its FireGard rubber membrane formulation has passed testing to qualify for Underwriters Laboratories' Class A resistance listing. The FireGard membrane is available in both white and black EPDM and may be used in fully-adhered or mechanically-fastened designs.

Roofing systems utilizing this membrane require no further coating to maintain fire resistance. White EPDM systems will also maintain their light color.

More information on FireGard may be obtained from Weathergard.

Check #222 on Reader Service Card

BUR moisture found without puncturing roof

Tramex Electronics has developed a new electronic instrument that detects moisture in built-up roofs.

The Leak Seeker allows the operator to trace a leak to its source without puncturing the waterproof layer of the roof. The unit works by transmitting electronic signals through the roof surface.

The unit is fitted with two operating ranges so that moisture can be detected through both smooth-surfaced and gravelled roofs.

This system of moisture detection requires no special installation or regular servicing.

Information on the product is available from Tramex Electronics, Inc. or from the Irish Export Board.

Check #223 on Reader Service Card



Coating resists ponded water and UV rays

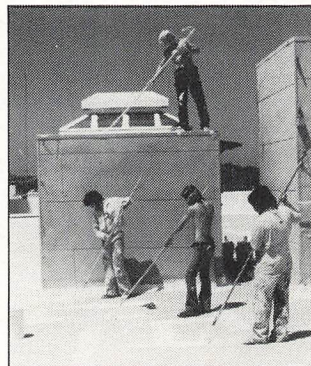
Elasta-Roof Cote, a high solids elastomeric terpolymer latex acrylic coating, has been introduced by Textured Coatings of America, Inc. The coating is formulated to resist ponded water damage.

Elasta-Roof Cote can be applied over freshly painted urethane foam, conventional bituminous built-up roofs (flat or pitched), asphalt roof shingles, galvanized metal roofs (flat or pitched) and concrete and clay tile. The coating is also recommended for use on mobile home roofs.

Titanium dioxide and zinc oxide have been compounded into the fillers to provide protection from UV and infrared rays. A non-mercurial system is included for mildew protection.

Additional information on Elasta-Roof Cote is available from Textured Coatings of America, Inc.

Check #224 on Reader Service Card



Alkor CPE available in wider sheets

Chlorinated polyethylene (CPE) single-ply roofing membrane has been made available by Alkor in new 80-inch-wide sheets.

Use of the new wider sheets can reduce seam welding costs up to 35 percent, according to the manufacturer. This can lower in-place cost by reducing material handling and allowing faster coverage of the roof surface.

The 80-inch-wide CPE membrane is designed to provide resistance to weathering, fire, chemicals, fats, oils, fuels and other deteriorating substances.

It is available in three types from Alkor: type 35093, used for maximum extensibility under ballasted or inverted roof membrane assemblies; type 35094, which has a polyester fleece backing for adhering to asphalt; and type 35096, which has a heat-sealed polyester scrim reinforcement for maximum strength on mechanically fastened roofs.

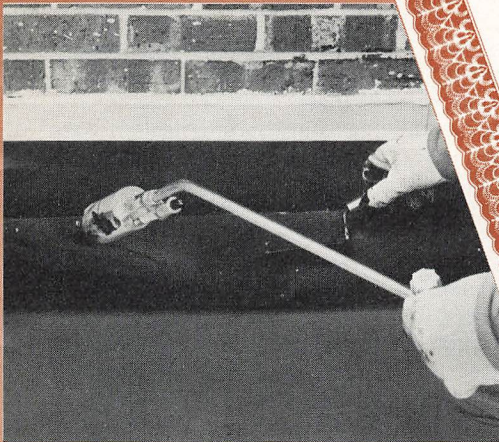
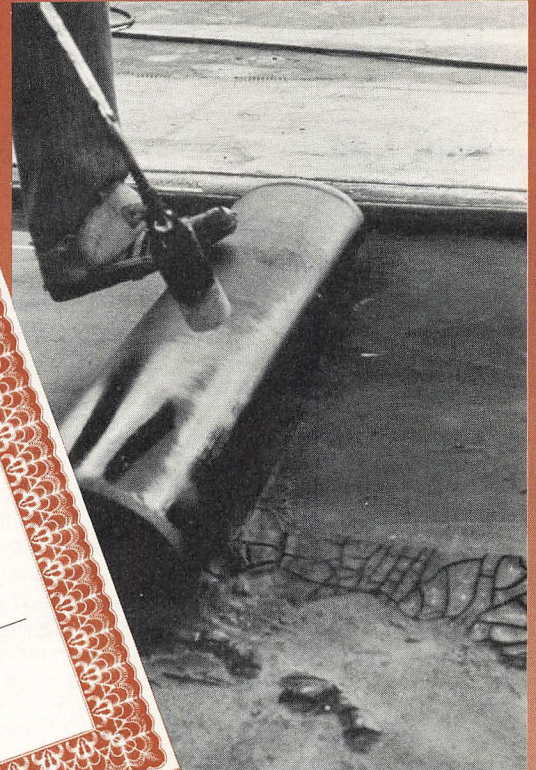
Alkor CPE roofing systems meet the requirements of Underwriters Laboratories (UL), Factory Mutual (FM) and other government and regulatory agencies.

More details on the product are available from the manufacturer.

Check #225 on Reader Service Card

continued, page 52

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This certificate is awarded only to experienced, carefully selected roofers who have been trained in the application of BRAI modified asphalt membrane.

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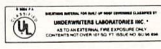
brai[®] is the leading modified asphalt roofing preferred by professional roofers.

Only those roofers who have proved their reliability are eligible for U. S. Intec training and approval. By selecting one of these professionals, you assure yourself of the finest roof modern science and engineering can supply.

Get a BRAI roof — with up to 15 years' leakproof warranty. It's heat-welded to assure weathertight bonding on all surfaces — penetrations, flashings, and slopes up to and including vertical. And it's guaranteed not to separate or "alligator."

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 North Branch, NJ 08876 • (201) 725-8317



Subject to the conditions of approval as shown on FM Label 71 (444) AIA

See ICBO Report No. 390 and National Research Board Report No. 292 for details on conditions of approval. They are subject to re-examination, re-approval, and possible cancellations.

Slide rule calculates roof deflection

A slide rule deflection calculator is available from Keystone Steel & Wire Co. The calculator is designed to aid in the selection of truss tee subpurlins and gives complete specifications for roofing systems that incorporate truss tee subpurlins with gypsum, lightweight concrete or structural wood fiber roof tiles.

The calculator is 8 inches by 11 inches and is printed on heavy stock. The use of two-color printing on both sides makes the table and chart easy to read.

The calculator may be ordered from Keystone Steel & Wire Co.

Check #226 on Reader Service Card

Hilts adds new products to equipment line

Three new products have been added to the line of equipment carried by E. L. Hilts & Co.

The Delmhorst moisture meter can be used by professional roofing contractors, roof inspectors and maintenance crews to measure moisture levels in roofs. It is a compact, portable unit that comes with a leather carrying case.

Hilts has also introduced the Hilco hand spudder. This portable gravel scratcher weighs 3 1/2 pounds, and comes with a 1 1/2-inch and a 2 1/2-inch blade.

Another new Hilts product is the FLD 750 roof dryer. This dryer utilizes forced hot air to dry roof membranes and decks.

Further details on all of these products are available from Hilts.

Check #227 on Reader Service Card

Modified bitumen from Genstar applies easily

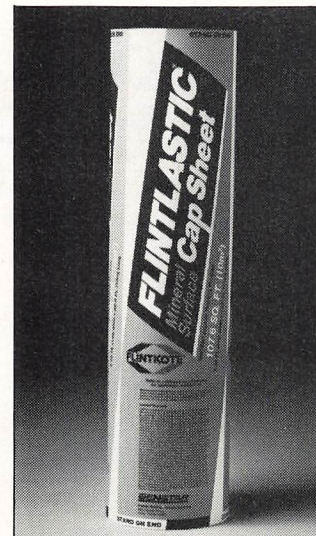
Genstar Roofing Products Co. has announced a new modified asphalt commercial roofing system for use in new roof and reroofing applications.

Flintlastic® is a two-ply system that utilizes a styrene/butadiene/styrene modified asphalt formula with a reinforcing structure. It can be applied using standard roofing tools; crews working with the system need no special training.

Flintlastic is designed to maintain its workability in a wide range of temperature conditions, according to the manufacturer. It can be applied even in sub-freezing temperatures, allowing for an extended work season. The system conforms to uneven surfaces and can be used on structural concrete, insulated steel and plywood decks and most existing commercial built-up systems.

Other details on the product are available from Genstar.

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Celotex Corp. offers brochure on Anchor bond

The Roofing Product Division of the Celotex Corp. has published literature on two of its new products, Anchor Bond roof insulation fasteners and Bright'n White roof coating.

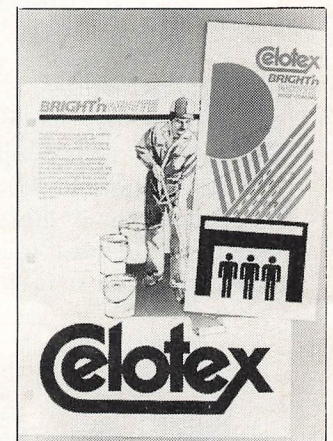
The Anchor Bond fasteners are designed for attaching Celotex insulation boards to steel, wood and structural concrete roof decks. The fasteners are available in two sizes: standard for steel decks only, and heavy-duty, which is suitable for use on all types of roofs.

All of the steel fasteners are Endurion-coated and feature extra-long piercing points and cutting edges designed to reduce driving time and prevent fastener snapping or bending.

Bright'n White roof coating is a water-based acrylic, elastomeric roof coating that dries to form an elastic protective coating for built-up roofs. Bright'n White provides 85 percent light reflectance. It is non-flammable and may be recoated without removing previous applications.

New product literature may be obtained from Celotex.

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ENGINEER

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CertainTeed Corporation, a leading manufacturer of building materials, has an opening at its Technical Center in Blue Bell (suburban Philadelphia) for a Product Development Engineer with experience in commercial roofing systems and materials.

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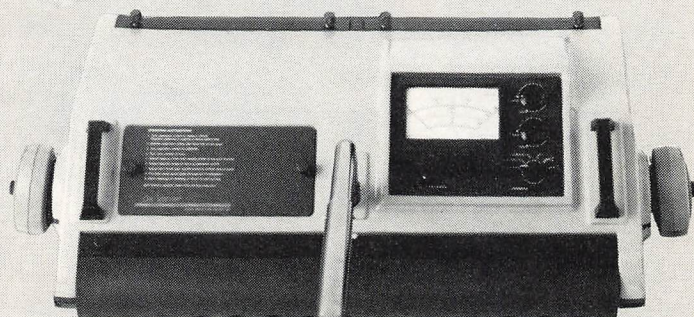
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continued on following page

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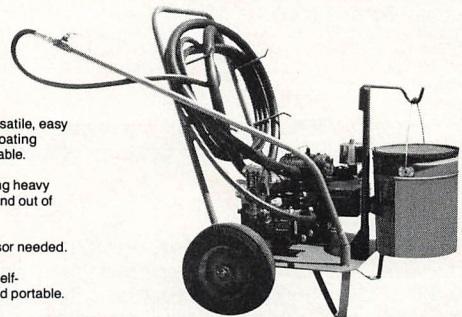
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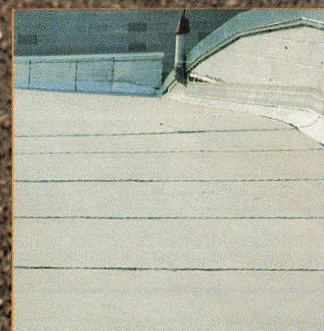
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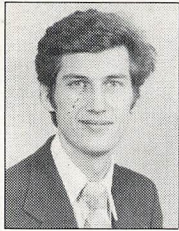
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TECH TALK

by Bob LaCrosse, CAE, director of Technical Services
and Jeff Lowinski, manager of Technical Services

FM responds to data sheet criticism

Roofing contractors have been waiting for the release of the revised Factory Mutual (FM) Data Sheet 1-29 on Single-Ply Membrane Roof Systems, first published in August 1979. Contractors and building owners are concerned about the wind uplift resistance of loose-laid and mechanically fastened systems. Problems associated with the increased ballast weight have caused some to shy away from these single-ply systems.

FM data sheets have a great impact on the roofing industry.

In response to this concern, and because of several recent insurance losses involving single-ply roofing systems, FM stepped up its efforts to update Data Sheet 1-29. NRCA received a working draft of 1-29 and circulated it to a committee composed of representatives from NRCA, FM, the Midwest Roofing Contractors Association, Underwriters Laboratories and Kemper. The committee reviewed the draft and suggested a joint meeting with key FM people.

Committee members had serious concerns about certain items in the draft, including criteria on wind uplift and fire resistance. This was beyond FM's traditional scope of responsibility. Also, sections in the draft could be interpreted as mandates or requirements for proper installation. Some of the installations covered in the draft have yet to be proven over time; others are applicable only to specific generic or proprietary roof systems.

Techniques were described that may be suitable for one set of circumstances, but totally inappropriate for others. The FM draft did little to specify when these techniques may or may not be applicable.

FM data sheets have a great impact on the roofing industry. Architects and building designers regard them as authoritative sources for design information. Thus, the committee thought that only statements relating to FM concerns should be included in the document. The revision to 1-29 was much too broad and attempted to

cover areas beyond the realm of FM's expertise.

The joint meeting took place at Factory Mutual's research facilities in Norwood, Mass. on July 25, 1984. The major discussion topics were the proposed data sheet's broad scope and the lack of specific criteria. Also, some areas of Data Sheet 1-29 were difficult to interpret, especially what was needed to demonstrate compliance. The committee explained to the FM representatives that very often the data sheets were used as specification requirements. The current draft 1-29 could be so broadly interpreted that there could be serious confusion about whether a roof system did or did not meet its requirements.

Factory Mutual responded that the majority of its data sheets are guidelines, and Data Sheet 1-29 dealt with relatively new technology. There were, however, several fundamental specification requirements that could have been clarified.

- At present, Factory Mutual does not list loose-laid, ballasted single-ply roof systems in their *FM Approval Guide*. This is principally due to the lack of accepted wind uplift testing methods. Thus, Factory Mutual thinks it is obligated to provide engineering design criteria in Data Sheet 1-29 for loose-laid systems, and especially for ballast weight.
- Only those fully adhered or partially adhered single-ply roof membrane systems listed in the *FM Approval Guide* are acceptable by FM under Data Sheet 1-29.

The committee recommended that something be done to clarify these two points. Factory Mutual agreed that dividing the current draft into two separate documents would be the best solution.

The title and scope of the first half of the current draft were changed to address only adhered and mechanically attached single-ply roof membrane systems. Emphasis was also placed on the fact that only those adhered or mechanically attached single-ply systems listed in the *FM Approval Guide* would be considered for construction. The second half of the current draft became a distinct document dealing only with loose-laid and ballasted single-ply roof systems. This document will rely on design engineering and analysis for the acceptance of loose-laid systems rather than on tested performance.

Factory Mutual accepted the Committee's suggested revisions to the draft Data Sheet 1-29, and agreed to incorporate them into the final publication. However, FM's timetable does not permit another review before publication. The new revised edition should be available from FM in the next two months.



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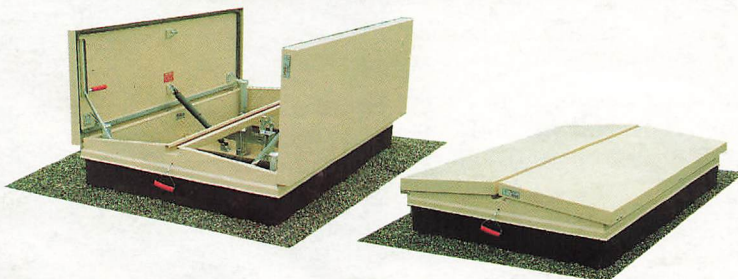
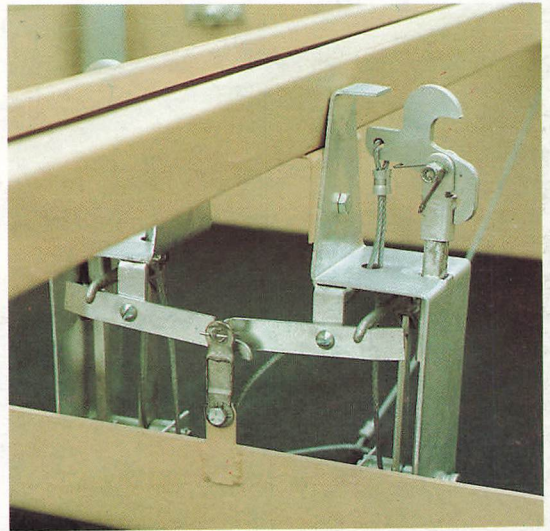
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