

the
roofing spec

NOVEMBER/DECEMBER, 1981

National Roofing Contractors Association

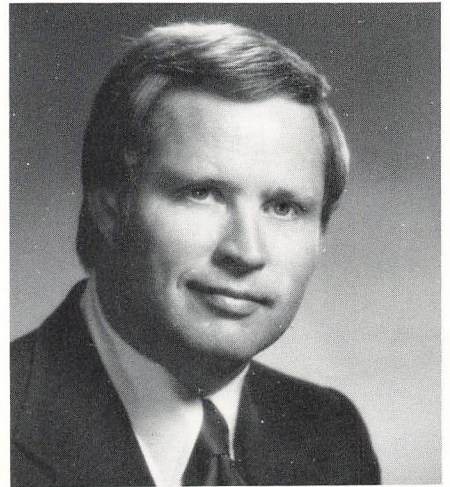
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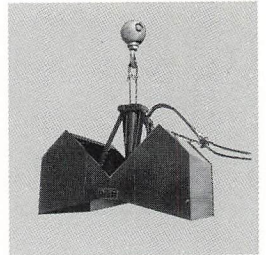
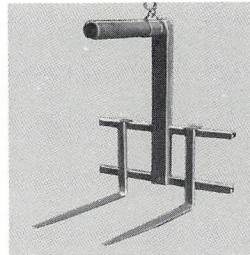
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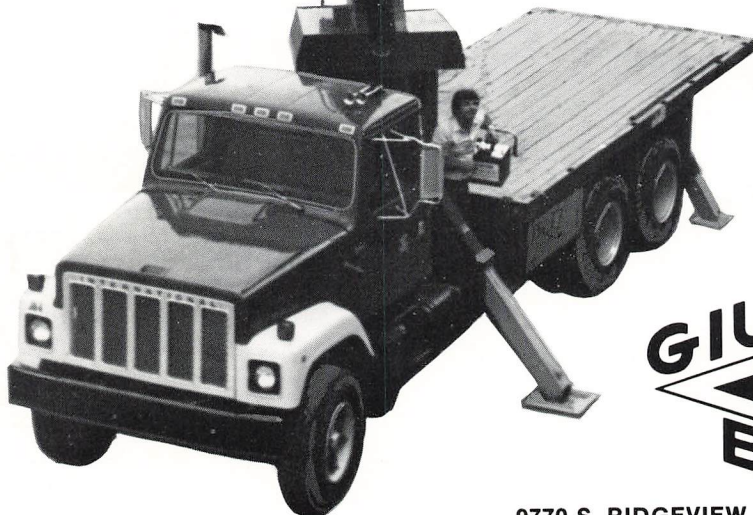
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The Growing Need for Technology

We should have known better.

Earlier this year, we embarked on a (then) limited-scale project of assimilating a "library" of published articles pertaining to roofing technology. Such a library, we reasoned, ought to reside in the NRCA office, and besides, a few of our members would probably like to have copies for themselves.

Well, so far a few hundred of our members have decided they'd like to have copies of this 60-article collection, as have a few hundred other interested parties.

The obvious message here is that there is a continuing and growing demand for roofing technology, and it's a message we must all take to heart.


Research work in our industry takes several forms. Some, like Dwight Musgrave (with an article in this month's **Roofing Spec**), originate their work in the laboratories of material manufacturers. Other work, like that reported here by Bob LaCosse, stems from long-term programs developed by NRCA and other similar groups. Still other research is developed by the National Bureau of Standards, manufacturers jointly, and occasionally by someone in the industry looking for an answer.

Incidentally, in this issue we have the benefit of Roger Bonafont's fine analysis, which helps to add a perspective to the whole business of making a science out of a trade with a tradition of being an art.

As in all important endeavors, communications becomes paramount. NRCA's studies on asphalt, for example, are meaningless unless we understand how asphalt interacts with felts, and so on and so on.

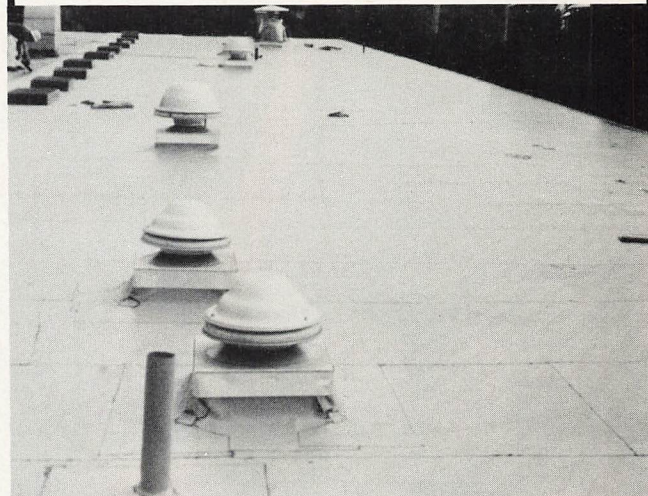
This, of course, has always been the case, but now the need is heightened because of the complexities of the marketplace. We must, as an industry, develop an understanding of our products, and we must agree on an approach to developing that understanding.

The progress we've made is remarkable, but it has only made apparent how much further we have to go.



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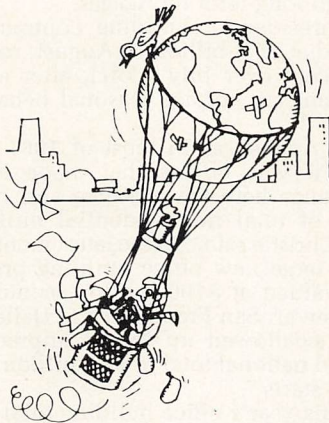
Ideas, notes and random thoughts

The U.S. Department of Labor's Occupational Safety and Health Administration has lifted the partial stay on its record access rule to allow construction workers to inspect their toxic exposure records as well as their medical records. The Advisory Committee on Construction Safety and Health (CAC) had reviewed the issue of records access and recommended that the stay be lifted while an overall review of the standard is being conducted. In announcing withdrawal of the partial stay in the *Federal Register*, September 15, 1981, OSHA noted that:

"This decision to lift the stay does not mean that OSHA has resolved the basic issue of whether the standard should be modified in general or for the construction industry in particular. On the contrary, this question will continue to be the subject for reviewing during the next six months, and the comments in this record will continue to form the major basis for the review process. Rather than consider the construction issue independently from the general consideration of the standard, OSHA has determined that it is more rational to examine all aspects of the standard and its impact or suitability for different industries in a single review process. Any modification affecting the construction industry, however, will be submitted to the CAC for their consideration and recommendations prior to proposal. In the meantime, in the absence of compelling justification, the standard is equally in effect for all industries."

For additional information contact James F. Foster, Occupational Safety and Health Administration, Office of Public Affairs, Room N3641, 200 Constitution Ave., N.W., Washington D.C. 20210. Phone (202) 523-8148.

While small-businessmen continue to suffer from record high interest rates, officials with the Reagan administration are still maintaining the relief is right around the corner.



At a recent hearing conducted by the Senate Small Business and the Joint Economic Committee, representatives from small business urged the administration to do away with

tight money controls.

"We desperately need short-term relief," said George Lyles, from the National Automobile Dealers Association.

Government officials commented that relief would be obvious as soon as President Reagan's economic programs begin to take effect.

Check those mailboxes for information on the upcoming Roofing Systems Conferences, to be held in Seattle and Phoenix in early December.

The purpose of the daylong seminar is to improve communications between all involved with roofing. Each conference features experts discussing all phases of roofing—from the roof deck to roof insulation to the membrane itself.

The Seattle conference, co-sponsored by the Roofing Contractors Association of Washington, will be held December 2 at the Westin Hotel. The Phoenix Conference, co-sponsored by the Greater Arizona Roofing Contractors Association, will be held Dec. 10 at the Phoenix Hilton.

For more information, contact NRCA at 312/693-0700.

Want to know how to save an estimated 100,000 barrels of oil a day? Simple. Just begin the period of daylight savings time about 50 days early!

The House Energy and Commerce Committee has already approved a bill to begin daylight savings time on the first Sunday in March, rather than the last Sunday in April. It would still end on the last Sunday in October.

Supporters of the legislation have said that in addition to the oil savings, the earlier daylight savings would also result in improved traffic safety and reduce crime due to more sunlight later in the day.

Farmers have opposed past attempts at lengthening the daylight-savings period because such a change would mean more hours of darkness in the morning.

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You can become a Friend by donating \$50 annually to the Foundation. Your tax-deductible contribution will help provide scholarships and develop educational programs to improve the roofing industry. For information, contact NRCA, 8600 Bryn Mawr Avenue, Chicago, Ill. 60631.

NATIONAL NEWS

No Improvement in August Construction

August contracts for new construction brought no significant improvement over July's bleak conditions in the nation's depressed building markets, as reported by the F.W. Dodge Division of McGraw-Hill Information Systems Company.

The seasonally adjusted Dodge Index of total construction contract value (1972=100) steadied at 156 in August, after sinking to 153 in July.

"The best that can be said about August 156 Dodge Index is that it indicates a period of stability after a nine-month decline from November's 205 level," said George A. Christie, vice president and chief economist for F.W. Dodge. "However, the conditions responsible for that decline, high interest rates and budget restraint on public works programs, remain as oppressive as before."

The actual value of newly started construction projects in August totaled \$12.3 billion, according to Dodge. This represented a seasonally adjusted annual rate of contracting of \$142 billion.

The value of August housing starts sagged another 6 percent in seasonally adjusted terms as mortgage rates rose above 17 percent.

"Few transactions were taking place in residential markets—either newly built housing or resales—without the use of 'innovative financing' such as second mortgages, wraparounds, or

buy-down mortgages," Christie said. "Early hopes are fading that homebuilding will be given a lift later this year by funds made available at below-market rates through tax-free All Savers Certificates.

"Any net inflow to the hard-pressed thrift institutions is more likely to be placed in eligible liquid securities than in long-term mortgages."

Nonresidential building contracts, valued at \$5.3 billion in August, rose 9 percent over July's total, after adjustment for normal seasonal behavior.

"In August, as in most of 1981 to date, it was offices that made the difference between advance and decline of total nonresidential building," Christie said. "In the latest month, three large new office building projects valued at \$100 million or more (in Denver, San Francisco and Dallas) were swallowed up in the unprecedented national total of \$2.1 billion of office starts."

"This year's office building total to date, at \$13.1 billion, is so far ahead of the same period of 1980 that it is already close to last year's record twelve-month total of \$13.5 billion," Christie said. "The likelihood of a soft landing from the 1980/81 office building boom grows less with each new month's peak in contracting."

At the end of eight months, the cumulative value of all construction started in 1981 totaled \$102.7 billion, "still ahead of last year's total by a shrinking margin of 6 percent."

Christie noted that "adjustment for inflation puts 1981's contracting below the 1980 amount when measured in dollars of comparable value."

Following is a summary of the latest month's Dodge construction statistics.

OSHA Will Launch New Safety Inspection Targeting Plan in High-Hazard Industries

Beginning Oct. 1, the Occupational Safety and Health Administration said it will employ lost workday injury rates to determine which firms in high-hazard industries warrant comprehensive programmed safety inspections, according to the **Bureau of National Affairs**.

"OSHA has 1,200 inspectors to cover approximately 70 million employees at five million workplaces," Assistant Secretary of Labor Thorne G. Aughter said. "Part of our strategy for improving OSHA must be to ensure the optimum use of our limited inspection resources to provide the greatest protection for workers most likely to be injured on the job."

The new targeting policy includes changes to the procedures of scheduling firms for programmed safety and health inspections in general industry. Firms in the construction and maritime industries will be scheduled for programmed inspections as before. Also, as in the past, OSHA said it will respond to employee safety and health complaints concerning any firm in any industry.

OSHA area offices will select individual firms for programmed safety inspections in general industry from a high-hazard list supplied by the national office, with industries ranked according to their lost workday injury rates. Firms with 10 or fewer employees are not required to maintain injury and illness data used in the targeting system; therefore, they will not be included in the list.

No inspections will be planned for firms where a substantially complete inspection conducted during the previous fiscal year turned up no serious violations, OSHA said. Firms will be selected for programmed health inspections in general industry in the same manner, except that the industry lists will be ranked according to each industry's health hazard index, rather than lost workday injury rate.

At the opening conference of the inspection, OSHA will explain to the employee representatives the new targeting system and ask to see copies of injury and illness data. (This procedure applies only to programmed safety inspections in general industry.) Using this information, along with employment figures and/or employee hours worked for the previous three years (two years for firms with more than 20 employees), the inspector will calculate the firm's lost workday injury rate (the number of lost work-

MONTHLY SUMMARY OF CONSTRUCTION CONTRACT VALUE

Prepared by F. W. Dodge Division
McGraw-Hill Information Systems Company

	August, 1981 Construction Contract Value (000,000)	Seasonally Adjusted Percent Change From Previous Month
Nonresidential Building	\$ 5,269.5	+9
Residential Building	4,893.6	-6
Non Building Construction	2,126.1	+9
Total Construction	\$12,289.2	+1

	8 Mos., 1981 (000,000)	8 Mos., 1980 (000,000)	Cumulative Percent Change
Nonresidential Building	\$ 39,271.4	\$34,008.5	+15
Residential Building	43,449.0	39,189.6	+11
Nonbuilding Construction	19,987.1	23,278.9	-14
Total Construction	\$102,707.5	\$96,477.0	+6

DODGE INDEX

(1972 = 100, SEASONALLY ADJUSTED)

June, 1981	170
July, 1981	153
August, 1981	156

day injuries per 100 workers). If the rate is below the most recently published Bureau of Labor Statistics national lost workday rate for manufacturing (5.7 lost workday injuries per 100 workers in 1979), the OSHA inspector would not conduct a full-scale safety inspection.

The inspector may conduct a limited inspection if the injury data indicates problems with specific processes or areas of a plant, if the inspector observes a serious hazard or imminent danger while at the plant, or if a formal employee safety complaint is filed at the opening conference.

Inspectors will conduct comprehensive safety inspections in firms with lost workday injury rates at or above the national lost workday rate for manufacturing and in companies which have failed to maintain the required injury and illness records or whose records cannot be verified as accurate.

Falsification of required OSHA records can result in a fine of up to \$10,000 and/or up to six months in prison, the agency warned.

If a firm's lost workday injury rate is low enough to exclude it from inspection, this will be explained to the employer and employee representatives present at the opening conference. If there is no employee representative present, the OSHA inspector will leave a letter to the employees explaining the exclusion and request the employer to post it.

The new policy is spelled out in OSHA Program Directive CPL 2,25B, dated Oct. 1, 1981; single copies may be obtained from the OSHA Office of Information and Consumer Affairs, Room N3637, U.S. Department of Labor, Washington, D.C. 20210 by sending a self-addressed mailing label.

Labor Dept. Issues Proposed Rules

Secretary of Labor Raymond J. Donovan said recently the Labor Department's Office of Federal Contract Compliance Programs (OFCCP) published its proposed affirmative action rules in the August 25 issue of the *Federal Register*.

"This regulatory package keeps the necessary safeguards for protected groups while cutting down the paperwork burden for employers," Donovan said.

Major provisions in the proposal included:

- Requiring written affirmative action programs only of contractors having 250 or more employees and a contract worth \$1 million.
- Eliminating various paperwork and reporting requirements, such as a Carter Administration proposal to require employers to prepare a written summary of

their affirmative action programs.

- Maintaining the current definition of underutilization as having fewer women or minorities in a particular job group than would reasonably be expected by their availability, but noting that employers will not be required to declare underutilization or set goals and timetables for job groups in which the employment of the two groups is at least 80 per cent of their availability.
- Permitting contractors having from 250 to 499 employees to prepare an abbreviated affirmative action program and contractors with several establishments in the "chain of command" to prepare an affirmative action program for all the establishments.
- Eliminating pre-award reviews.
- Allowing an extension in the duration of an affirmative program for up to five years if a contractor has signed an agreement to offer job opportunities to members of protected groups who are participating in training programs, or has an internal training program which provides reasonable opportunities for protected groups.
- Reducing from 16 to 9 the number of affirmative action steps required of construction contrac-

tors, and applying the steps and goals and timetables only to large construction contractors.

Donovan said that raising the thresholds for the written affirmative action program will free almost 75 per cent of employers from this requirement while retaining its protection for nearly 77 per cent of the workers presently affected.

He also stated that employers having contracts worth \$10,000 still are subject to Executive Order 11246, regardless of whether they have to prepare a written affirmative action program.

'82 Foam Meetings

The Urethane Foam Contractors Association will sponsor two regional seminars in April, 1982.

The seminars will feature technical industry information, up-to-date application techniques and general business information. Exhibitors will also be on hand to display industry-related products.

All contractors and other industry professionals are invited to attend both programs.

For information concerning exhibit space or registration, contact Jane Treiber at 1406 Third National Building, Dayton, Ohio, 45402.

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1982 Construction Gains To Be Tied To Increase Within The Housing Market Segment

Predicting that construction contracts in 1982 will total \$169.4 billion, 15 percent more than this year's anticipated level of \$147.8 billion, a leading industry economist cautioned that housing would play a pivotal role in this "improvement" as gains in private nonresidential building and declines in publicly financed construction cancel each other out.

The 1982 construction market forecast was delivered by George A. Christie, vice president and chief economist for McGraw-Hill Information Systems Co. Christie's remarks were made at the annual Building Products Executives Conference in Washington, D.C.

Christie said the revival of residential building will dominate the construction sector through much of 1982.

Christie believes that the excessively high interest rates that have been so damaging to the housing market in 1981 will not prevail much longer.

"The combination of a sluggish economy through mid-1982 that will limit credit demands, and a partial accommodation of monetary policy to the Administration's budgetary squeeze, will allow a recovery of housing as interest rates recede," he said. "Of course, the strength of housing's response to an expected decline in interest rates from their lofty peaks is something of a guessing game, but even a modest decline of mortgage rates should bring next year's housing starts within the range of 1.4 million to 1.5 million dwelling units."

The economist expects residential construction will come to \$82.8

billion, a 33 percent increase over this year's \$62.1 billion; nonresidential building contracts will reach \$57.1 billion next year, a one percent gain over this year's estimated \$56.3 billion; and nonbuilding construction, expected to total \$29.4 billion this year, will increase only one percent to \$29.5 billion.

The annual forecast presented by Christie, titled the 1982 *Dodge/Sweet's Construction Outlook*, is based on information provided by the two key divisions of McGraw-Hill Information Systems Company. Delivered annually at the Building Products Executives Conference, it is the highlight of

Housing up . . .
commercial down.

this national meeting for executives and officials of building materials manufacturing firms, industry associations and government agencies.

Christie set a low limit for the potential expansion of the entire nonresidential building category, due to the probability that the office building boom had reached its peak in 1981.

"The gap left by offices next year will be filled by the recovery of retail building and industrial construction," he said. "Since contracting for stores and warehouses mirrors the ups and downs of the housing market, the recovery of homebuilding in 1982 will be the catalyst for an upturn in

store and warehouse contracting."

To Christie, industrial building provides the construction industry with the best opportunity for expansion, "if not in 1982, then starting in 1982 and developing more fully in 1983." Christie pointed to the Reagan Administration's attempts to create a favorable environment for business capital spending.

"The building of manufacturing facilities could have the same impact on the construction industry as the office building boom did for the past two years," he said. "But there are several near-term obstacles to be overcome. With manufacturers currently operating at less than 80 percent of capacity, and giving greater emphasis to improving productivity and reducing unit costs, capital spending in 1982 is bound to be weighted heavily in favor of machinery and equipment rather than buildings."

"However, late in 1982, as the present slack in the manufacturing is taken up by rising economic activity, the investment mix will begin to shift to a higher proportion of buildings in order to provide the means for further expansion," Christie said.

Examining the nonbuilding construction sector, where Federal public-works programs play a major part, Christie said that the key words in the Reagan economic program are "stretchout" and "re-target." Christie said this translates into a 5-year cutback in already-existing Federal public-works programs, a reduction of \$20-25 billion in amounts already authorized by Congress.

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In the 16 years it's been on American roofs, Owens-Corning's Perma Ply-RTM roofing felt has failed on the following occasions:

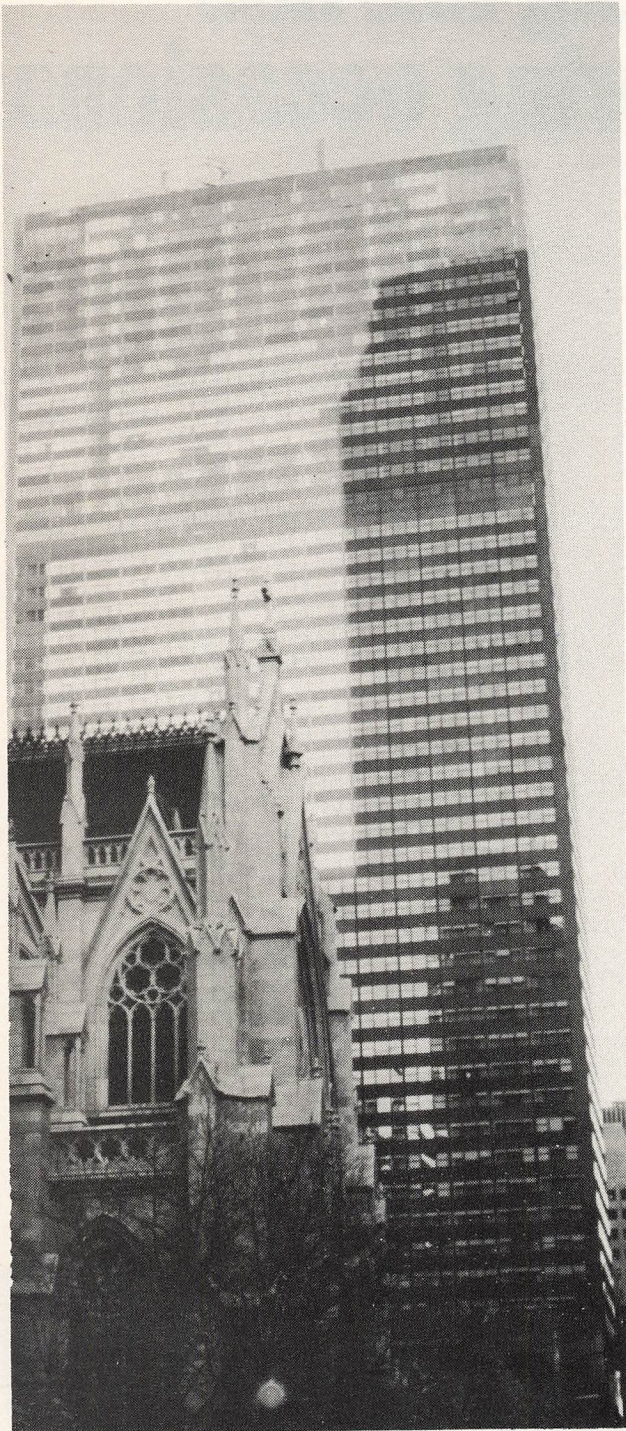
Not once.

Sixteen years—over three and a half billion square feet—and no known product failures. A record no one else can match. A free booklet, "The Case for Perma Ply-R Roofing Felts," has the facts. Write A.Q.P. Meeks, Owens-Corning Fiberglas Corporation, Fiberglas Tower, Toledo, Ohio 43659.



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Situated in the heart of Manhattan across the street from St. Patrick's Cathedral (foreground), The Helmsley Palace is a 51-story bronzed glass luxury hotel, one of four new elegant hotels in New York City protected by Dow's IRMA (Insulated Roof Membrane Assembly) system.

Tourist's Comfort A Key To New York's Renaissance

New York City, the flagship of American cities and port of call for more than half the foreign visitors to the United States, is undergoing a remarkable face lift just six years after near bankruptcy and utter collapse.

The recent appearance in Manhattan of six ultra-modern, ultra-comfortable and energy-efficient world class hotels evidences New York's dramatic comeback and is a catalyst for the city's continuing renaissance. "Continuing" is the key word because New York's business and civic leaders do not want their city to lose its forward momentum.

Thus the city's new hotels and buildings are being constructed to operate cost effectively far into the future. Employing the latest energy saving features, designers are seeking to keep operating and fuel costs low in order that New York's new buildings might serve as a long-term base for the city's financial recovery.

This is especially true of the new hotels which must not only offer their guests fine food and spectacular views, but warmth in New York's severe winters and cool comfort in its hot, muggy summers. With 55 percent of all foreign travelers to the United States visiting New York City, tourism is a vital part of New York's revitalization. No one, especially the hotel operators themselves, want to see empty hotel rooms—when the memories of the city's financial difficulties are still fresh.

"Between 1950 and 1975, New York City lost one of every three construction jobs," says Richard Kahan, president and chief executive officer of New York State Urban Development Corporation. "New York lost one of five transportation and utility jobs, and one of six manufacturing jobs."

City leaders were forced to seek federal aid to

Ongoing construction of three high-rise buildings as part of Battery Park City lends some hint for the success of Dow's IRMA system all across Manhattan. Because it is placed underneath Styrofoam* RM brand insulation, the roof membrane is protected from damage created by workmen's foot traffic and heavy equipment that would almost certainly destroy a conventional roof.



keep the city running, and Senator William Proxmire (D-Wis.) publically lectured them on the merits of fiscal responsibility. The New York bail-out became a national issue in the late 1970s.

"But we are no longer accepting this hemorrhage of jobs and industry," Kahan declares. The city's current construction boom is evidence of this attitude.

Harvey Grotsky, editor of **Hotel & Resort Industry** magazine, attributes the city's revitalization to several key elements.

"It begins with the simple fact that New York City was decayed . . . and began a rejuvenation effort about 1971," Grotsky said. "The current city administration began to straighten out its fiscal problems, then launched the remarkably successful 'I Love New York' public relations campaign about five years ago.

"But the whole key to the business boom is that there is a lost of money coming in from tourists and investors from abroad. The foreign dollar buys much more here than at home."

Of course, New York's tourist attractions, and the heavy influx of foreign travelers, account for much of the construction growth.

While six world class hotels have pierced the New York City skyline since the turn of this decade, five of them in midtown Manhattan, more diversified construction is underway along the banks of the Hudson River and in lower Manhattan, near the World Trade Center. Phase one of Battery Park City's housing, Gateway Plaza, is comprised of three high-rise apartment buildings with occupancy scheduled for spring of 1982; it has been financed at a cost of \$102 million.

In addition, six developers have been conditionally selected to construct phase two of the Battery

Park development, involving the construction of 2,100 additional housing units.

At Rector Place, Olympia & York Properties, Ltd., in agreement with the Battery Park City Authority, will develop the nine million square foot commercial center at an estimated cost of \$1 billion. Designed by world renowned architect Cesar Pelli, the design has been hailed as a new Rockefeller Center.

In addition, a huge Exposition Center extending from 34th to 39th streets along the Hudson River began in April 1980. It will require 4,300 construction jobs and will create 16,000 jobs for New Yorkers when it is completed in 1984, according to the New York State Urban Development Corporation. Tax revenue to be generated by the convention center is expected to be \$82 million annually for city and state, and \$832 million of economic activity for the state of New York.

But the most conspicuous indicators of the tourism renaissance are in the construction of six elegant hotels since 1979. Not since 1963 has there been a significant increase in hotel rooms available in New York City. Now reflecting the most ambitious expansion in hotel business in any American city since World War II are The Hotel Parker-Meridien, The Helmsley Palace, Vista International, The Harley of New York, Milford Plaza and Grand Hyatt New York.

The Hotel Parker-Meridien, unique in the United States for its French character, is an example of the uncompromising elegance now available. Jack Parker, a prominent Eastern realtor, paid \$75 million for the structure that opened March 20, 1981. Parker asked Meridien Hotels, Inc., a wholly owned subsidiary of Air France, to operate the 600-room, 41-story building located near Carnegie Hall.

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With rates ranging for \$95 to \$180 nightly, guests enter a lobby 70 feet high with marble arches and a ceiling fresco. The rooms are attractive, and the baths exceptional, done entirely in marble, including the fixtures.

Bernard Awenenti, general manager of the Parker-Meridien, explains that his goals are "to stress the enjoyment of life to our guests with the best possible accommodations, the finest French cuisine and in the richest French tradition."

Awenenti added that "Jack Parker made a commitment from the conception of this hotel to build the best possible structure, with the best and most dependable materials from foundation to rooftop."

Unlike most hotels in New York City, Parker insisted that a garage be built for guests and, rather than construct 25 additional rooms on the top floor, a rooftop swimming pool and jogging track were designed for added amenities.

Construction project director Howard Phillips, from the Jack Parker Construction Corporation in New York, was given a free hand to construct "the finest hotel in New York," with the best available resources. He described it as an architect's "dream and delight."

Marble was used extensively in the floor and walls of the lobby with arches, columns and areas of open space to create an expensive, eye-pleasing effect.

Among Phillips' strictest requirements in building materials was an easily applied wall and roof insulation that could meet the pace of fast-track con-

struction; one that had a proven past and would retain its thermal efficiency. The solution was provided by Ray Max, architectural specialist for The Dow Chemical Company.

According to Max, Styrofoam[™] brand insulation for walls and roofs is the most relied upon building protection system in Manhattan.

"Dow's IRMA (Insulated Roof Membrane Assembly) system has been used on about 300 schools in New York City over the past eight years," Max said. "Almost every new commercial building in Manhattan is using Styrofoam brand insulation."

Phillips, who has been specifying insulation of Styrofoam for six years, chose it to insulate the walls and roof for the Hotel Parker-Meridien.

"We're making an outstanding impact on New York City," Max said. "In addition to The Hotel Parker-Meridien, other hotels to use the IRMA system include the Vista, The Helmsley Palace and The Harley. The new Exposition Center will use more than a half-million square feet of Styrofoam brand insulation. And the subcontractors who are building Battery Park City have also specified Styrofoam brand insulation for the roofs. I know the tradesmen who are rebuilding this town and they know that we'll stand behind our product."

New York City is being looked upon as the beaming light of hope by other northern industrial cities suffering the pains of age. New York City becomes the first huge urban center to reverse a downward trend. It has recaptured its majesty, from its time-tested foundation to its glimmering new skyline.



Nieman Power Roof Remover...*

*Patent No. 3,779,605



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work of 6-8 men**

- A labor-saver — reduces costs over hand labor 50% or more.
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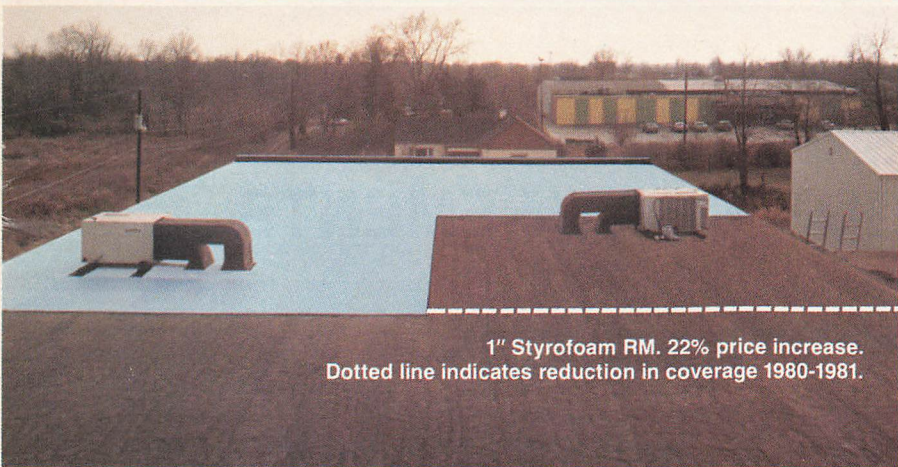
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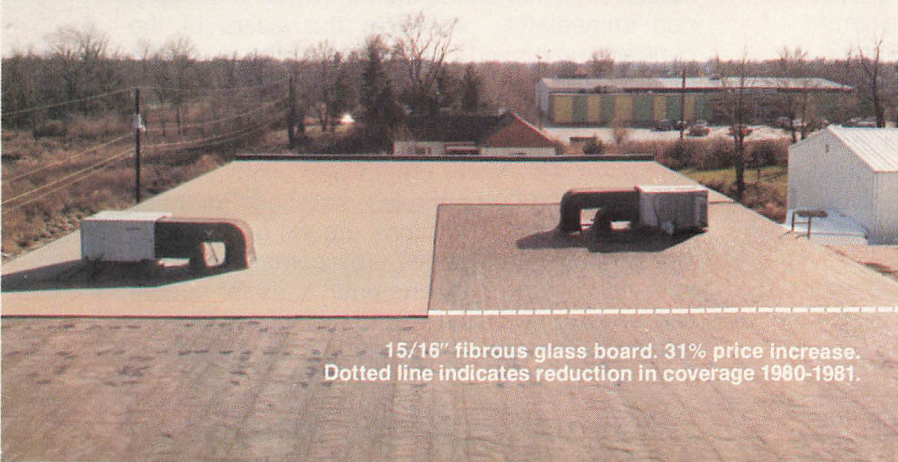
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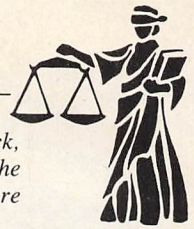
1" Styrofoam RM. 22% price increase.
Dotted line indicates reduction in coverage 1980-1981.



15/16" fibrous glass board. 31% price increase.
Dotted line indicates reduction in coverage 1980-1981.



1" urethane foam. 13% price increase.
Dotted line indicates reduction in coverage 1980-1981.



This monthly legal column is prepared for The Roofing Spec by the law firm of Summers, Hendrick, Spanos, Phillips & Grant. The column presents information on legal matters of general interest. The text is necessarily generalized, and you are advised to consult with a professional legal advisor before taking any action.

OFCCP PROPOSES EASING AFFIRMATIVE ACTION REQUIREMENTS FOR CONSTRUCTION CONTRACTORS

New affirmative action requirements proposed by the Office of Federal Contract Compliance Programs ("OFCCP") would reduce or eliminate many of the compliance burdens on smaller construction contractors. The proposed regulations are intended to respond to criticism of the OFCCP requirements which are so burdensome to smaller contractors. However, the proposed regulations do not eliminate affirmative action rules entirely, and many federal contractors will still be required to satisfy certain legal requirements.

Equal Opportunity Clause

Under current regulations, all contractors or subcontractors with federal or federally assisted construction contracts in excess of \$10,000 in specified areas must meet established goals and timetables for affirmative action. Contractors meeting the \$10,000 threshold also must take sixteen specific affirmative steps to comply with equal opportunity requirements.

The regulations now proposed by the OFCCP would establish a higher threshold for the applicability of hiring goals and other specific affirmative steps to construction contractors:

- *Category I*—Contractors who hold "small" federal or federally assisted contracts [totalling in excess of \$10,000 but less than \$50,000 will simply be required to include a brief equal employment opportunity clause in their contracts. This clause will not require specific goals or timetables for minority and female employment.
- *Category II*—The second category established in the regulations would apply to construction contractors with federal or federally assisted con-

tracts of \$50,000 or more who, during any consecutive six months during the twelve-month period immediately preceding the award of the contract, employed craft workers who worked a total of 20,000 or more hours. Through this rule, the regulations will cover most contractors having approximately twenty employees, although a contractor with fewer employees might be covered if the 20,000-hour rule is satisfied. For these contractors, the regulations require (a) the EEO clause described above, (b) compliance with specified hiring goals and timetables for minorities and women, and (c) compliance with nine additional specifications which will be set forth in the contract.

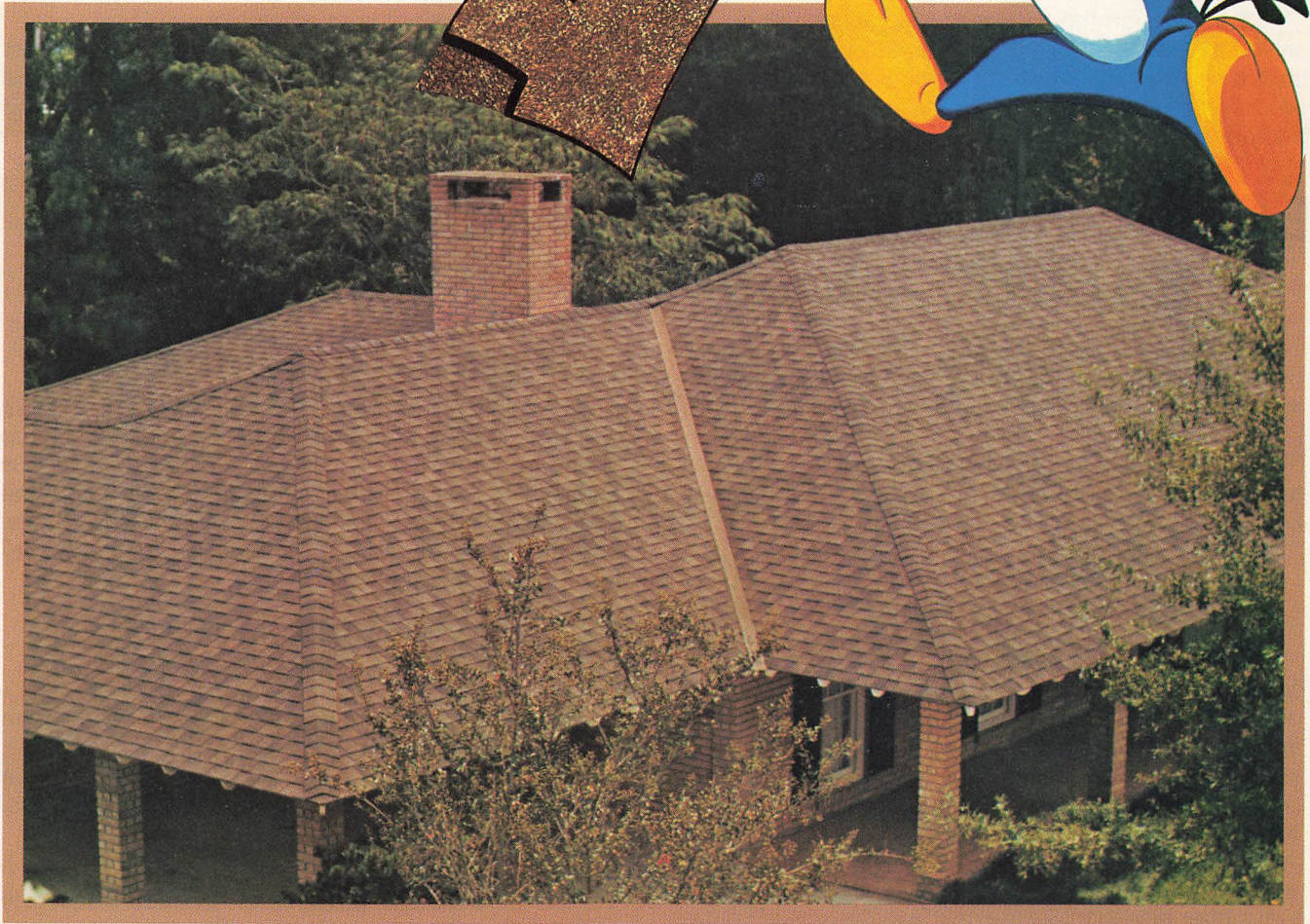
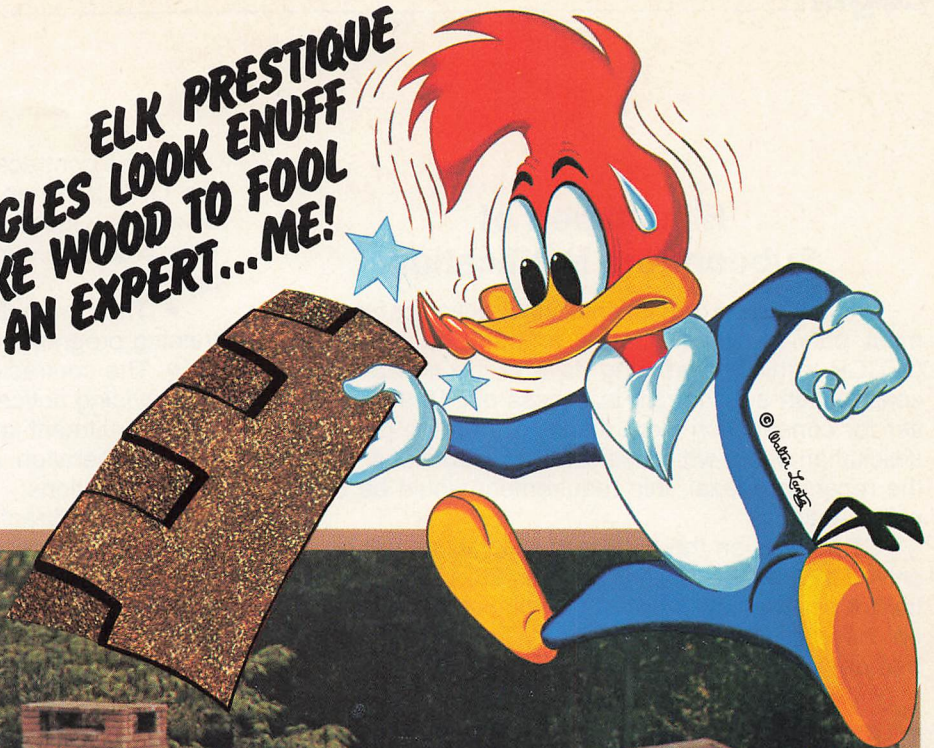
Affirmative Action Plans

Although the proposed regulations do not require construction contractors to prepare written affirmative action plans, each contractor in Category II must be able to "demonstrate fully its efforts" to satisfy the nine affirmative action requirements set forth in the contract specifications. Several of these efforts must be documented in order to comply with the law:

- Contractors are required to maintain a current file of names, addresses and telephone numbers of minority and female applicants referred from unions, recruitment or community organizations and the specific action taken with respect to each individual. The employer's decision to hire or reject such an applicant must also be documented in the file;

continued, page 18

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Elimination of Subcontract Notification

Under existing regulations, construction contractors must provide written notice to the Director of the OFCCP within ten working days of the award of any construction subcontract in excess of \$10,000 at any tier for construction work resulting from the particular solicitation under which his contract is obtained. Under the recent proposal, this requirement would be eliminated entirely.

Comments on the proposed regulations will be received by the OFCCP until October 26, 1981. Any contractor or association desiring to object to or comment on these proposals should notify the OFCCP before that date.

- The contractor must provide immediate notice to the OFCCP when a union fails to refer minorities or when the contractor has information that the union referral process has impeded his efforts towards affirmative action;

- The contractor must provide notice of on-the-job training programs for minorities and women;

- The contractor must disseminate his EEO policy by providing notice of the policy to unions and to training, recruitment and "outreach" programs to insure their cooperation in assisting the contractor with his EEO obligations;

- The contractor must post his EEO policy on bulletin boards accessible to all employees; and

- The contractor must send written notice of his recruitment efforts to schools with minority and female students and to minority and female recruitment and training organizations.

ECONOMIC RECOVERY TAX ACT OF 1981: ESTATE AND GIFT TAX REVISIONS

The recently enacted Economic Recovery Tax Act of 1981 makes a number of changes that will no doubt require many individuals to change their estate planning strategies.

The following discussion highlights the major changes to the Federal Estate and Gift Tax Law brought about by the new Act.

Estate and Gift Tax Exemption: Unified Credit.

The new Act increases over a six-year period the amount of lifetime gifts and estate transfers that can be made to children, grandchildren, and other heirs tax-free. Currently, this amount (not including gifts not taxed because of the annual Gift Tax exclusion) is pegged at \$175,625. By 1987, it will have increased to \$600,000. The new law does this by increasing the "unified credit"; that is, the credit each individual is allowed against taxable lifetime gifts and estate transfers. Other provisions of the new law, discussed below, make significant changes in the rules regarding transfers between spouses.

Under the new Act, the unified credit and amounts exempt from tax are increased as follows:

Year of Death or Gift	Amount of Estate and Gift Tax Credit	Estate Transfers or Gift Amount Exempted from Tax
1982	\$62,800	\$225,000
1983	\$79,300	\$275,000
1984	\$96,300	\$325,000
1985	\$121,800	\$400,000
1986	\$155,800	\$500,000
1987 and after	\$600,000	
	\$192,800	

Unlimited Marital Deduction.

Generally under present law, one-half of a gift from one spouse to another, or that portion of the estate (up to one-half) that a person bequeaths to his spouse, is deductible. The other half is subject to tax (before the application of the unified credit). Under the new law, effective January 1, 1982, all gifts and bequests between a husband and wife, can be made tax-free.

Increase in Annual Gift Tax Exclusion

The annual gift exclusion has been raised from \$3,000 to \$10,000 per recipient, effective in 1982. Thus, a husband and wife may give \$20,000 a year tax-free to any individual if they agree to split their gifts.

Decrease in Maximum Tax Rates

The present law provides a graduated tax rate schedule for cumulative lifetime gifts and estate transfers with a maximum tax rate of 70 percent of cumulative transfers in excess of \$5,000,000. This highest Estate and Gift Tax rate will be reduced to 50 percent over a four-year period starting in 1982.

Given the significant changes to the Federal Estate and Gift Tax law brought about by the Economic Recovery Tax Act of 1981, it will be necessary to review most wills to take into account these changes in the tax law. However, these changes will enable many taxpayers to eliminate all federal estate and gift taxation by planning their estates so that each spouse fully utilizes his or her unified credit amount, and takes advantage of the modifications to the marital deduction and annual gift tax exclusion.



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Study Reveals Asphalt Felt Saturation Insufficient

by Robert A. LaCosse, CAE
Director, NRCA Technical Services

Introduction

Most commercial buildings in the United States are protected by a built-up roof system. It is estimated that over three billion square feet of built-up roofing are constructed each year in the United States. A large majority of this three billion square feet consists of roof systems containing two to four plies of asphalt saturated roofing felt.

The quality of these asphalt saturated felts has a significant effect upon the performance of the built-up roof membranes in which they are used. The fundamental properties of asphalt saturated roofing felts are **total weight, quantity of asphalt saturant and tensile strength.**

For over fifty years the standard specification for saturated roofing felts has required 140 percent asphalt saturation based on the weight of the dry or unsaturated fiber mat.

When saturated roofing felts were first introduced, the 140 percent saturation level was easily obtained as the fiber contained a high quantity of rag furnish (raw material) and production speeds were nominal. When the rag furnish for producing roofing felts was changed to wood fiber and production speeds increased, problems arose. The nature of the fiber used in the felt and production speeds greatly affected the manufacturer's ability to consistently produce felts containing 140 percent saturation.

Nevertheless, specifications for roofing felts continued to require a 140 percent saturation level. The American Society for Testing and Materials' (ASTM) D08 Committee involved with these specifications has been studying a revision for several years, but to date the committee has been unable to find a mutually acceptable minimum limit for saturant content.

The National Roofing Contractors Association (NRCA) has been concerned about the quality of the felts being furnished to its members. In 1976, NRCA conducted a survey in which selected members from across the United States ordered felts to comply with ASTM specifications. These felts were tested for specification compliance and the results indicated that the majority of the felts being manufactured contained significantly less than 140 percent saturation. The range of felt saturation was between 80 and 130 percent with an average saturation level of 115 percent.

The primary reason for incorporating asphalt saturation in a roofing felt is to improve the water resistance. In order to learn more about the relationship between asphalt saturant and water resistance in roofing felts, NRCA, in conjunction with the Chicago Roofing Contractors Association (CRCA), initiated a joint laboratory study.

The laboratory work was performed by the Chicago Testing Laboratory, Inc. The work was directed by Dr. Edwin C. Mertz, former NRCA technical services manager, and Mr. Ted Grochowski, chairman of the CRCA Technical and Research Committee.

LABORATORY TESTS

The American Society for Testing and Materials (ASTM) has published specification D-266 which covers asphalt saturated organic fiber roofing felts. This specification outlines various tests which are primarily concerned with the weights of the components of the felts and some physical requirements specifically measure the effect of water on the felts; however, they do offer some characterization of the properties of the felts that were used in this study.

In addition to the tests required by ASTM Specification D-266, the following tests were used in the NRCA/CRCA study:

- **Kerosene Value** was determined by ASTM D-727 Procedure. Kerosene Value is a measure of a raw or desaturated felt's ability to absorb kerosene under a vacuum test method. The saturating capacity of the felt is based on the Kerosene Value and specific gravity of the bituminous saturant. The Saturation Efficiency is the percent of the saturant in the felt compared to the Saturation Capacity and is used in the industry as a criteria for manufactured felts.
Proposals have been made to establish a minimum specification requirement for a Saturation Efficiency of 70 percent.
- **Recovery of Saturant** was determined by extracting and recovering the saturant by the Absorption Procedure of ASTM Standard D-1856. The recovered saturant was tested by standard ASTM methods for softening point, penetration, specific gravity and viscosity.
- **Fiber Analysis** of the desaturated mats was determined by a standard fiber microscopy procedures.
- **Water Absorption** capacity was determined after varying periods of immersion in water at 23°C. After immersion, the surface water of the specimens was blotted off, and the amount of water absorbed was determined by weighing.
- **Wet Tensile Strength** was determined on felt specimens after 24 hours of water immersion. The results were compared to the tensile strength of dry specimens (conditioned to 50 percent relative humidity at 23°C).
- **Water Vapor Transmission Rate** was determined on specimens of felt in accordance with the procedures of ASTM D-96, Method B, at
continued, page 23

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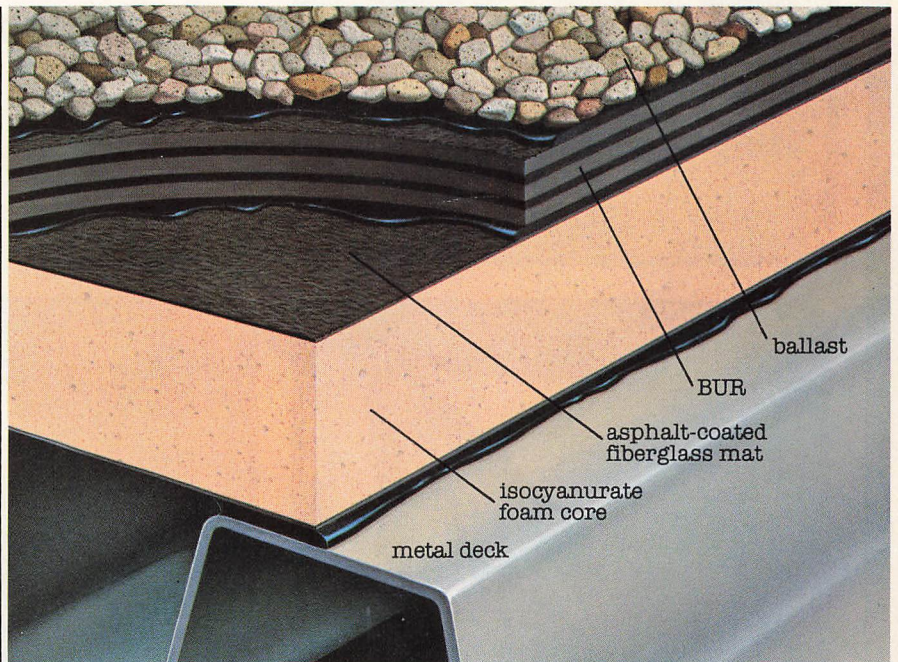
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Discharge height40'
Belt speed400 fpm
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Overall length63 ft., 6 in.
Hydraulic oilAutomatic transmission fluid
Wt.6,000 pounds
Engine25 H.P. Onan



Handles rolls or insulation to high discharge height.

ALSO INCLUDED

- Battery (standard car battery)
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23°C in which one side of the specimen is maintained at 50% R.H. and the other at 100% R.H.

- **Methylene Blue Dye Test**, developed by the Shell Oil Co., used to determine saturation efficiency. This test involves immersing specimens of saturated felt in a 1% water concentration of methylene blue dye under vacuum for 5 minutes. The vacuum is released, specimens removed, washed, and dried at 105°C. The asphalt is extracted with trichloroethylene in a Soxhlet extractor. The specimens are then dried and split within the web of the felt to reveal the interior staining of the fibers. Methylene blue is insoluble in trichloroethylene and thus the fibers that are not protected by the asphalt saturant are revealed by the stain. The amount of unstained fiber is generally an indication of the effectiveness of the saturant in protecting the fibers from water.
- **Equilibrium Moisture Content and Dimensional Stability** at exposures to 11, 50 and 84 percent relative humidity were determined in a Neenah Expansimeter in accordance with the Technical Association for the Pulp and Paper Industry (TAPPI). The Expansimeter contains a circulating air chamber with controlled humidity.

LABORATORY STUDY—PHASE I

The first phase of the study involved testing eight different rolls of commercially produced No. 15 (mass of 15 pounds per 100 sq. feet of felt) Asphalt Saturated Organic Fiber roofing felts representing seven different roofing material manufacturers. It was considered by those directing the study that these eight rolls were quite representative of the products currently in use throughout the United States.

Each roll of felt was subjected to the normal ASTM D-226 specification tests and all of the tests previously outlined.

The results of this study revealed a saturation level in the felts from 106 to 132 percent confirming earlier findings of the difficulty in achieving the 140 percent saturation level. No correlation was found between the amount of saturant in the felt rolls and their saturating capacity as determined by the Kerosene Value of the desaturated felt. The saturation efficiency varied from approximately 55 to 75 percent. This indicates that the problem of attaining 140 percent saturation in these eight samples of felt was probably not entirely due to the characteristics of the raw felt.

None of the tests for measuring water resistance showed any correlation to the amount of saturant in the felt. The wet tensile strengths to the amount of saturant for the eight rolls of felt varied from 48 to 64 percent of the dry tensile strength.

The results of the water absorption tests were similar for all of the felts with the exception of one roll. This one roll absorbed substantially more than the others, averaging about 38 percent absorption by weight after 24 hours of immersion compared to an average of about 25 percent absorption for the other seven rolls. The asphalt saturant recovered from this roll was also considerably softer than that recovered

from the other seven rolls, having a softening point of about 46°C compared to an average of about 60°C for the other seven rolls. The results of the water absorption tests on this one roll would tend to indicate that perhaps the softer saturant produces a finished felt having poorer resistance to water absorption.

The results of the Methylene Blue Dye Tests did not correlate with the saturant content of the felts even though there was a wide range of unstained fibers found amounting to 20 to 75 percent. Neither was any correlation found between the type of fiber in the furnish and the Methylene Blue Dye Test or the amount of the saturant.

The dimensional change of the felts immersed in water as well as those subjected to varying humidities in the Neenah Expansimeter did not show any correlation with saturant content. Also, there was no relation established between water vapor transmission rate and saturant content.

the majority of felts being manufactured contain significantly less than 140% saturation.

The results of the first phase of the study were somewhat disappointing in that the failure to establish a relationship between the saturant content of the felts and results of tests that might measure a felt's resistance to water. The poor correlation was attributed to the many variables in the eight different commercially produced felts such as fiber composition, properties of the saturants and variations in manufacturing processes.

LABORATORY STUDY—PHASE II

Since little correlation between saturant content and the resistance of the felts to water was found in the first phase of the study, it was decided that the number of variables in the specimens to be tested should be reduced by saturating raw felts in the laboratory to various levels using the same asphalt saturant and raw unsaturated felt. Five unsaturated felts and two saturants were obtained for use in the study.

Most of the work involved the use of only two of the raw felts, one composed of all wood fiber and one containing approximately 15 percent rag fiber and one asphalt saturant.

A simple laboratory saturator was assembled, consisting of a temperature controlled saturant bath and adjustable knip blades to remove excess asphalt from the felt as it was pulled from the bath. This simple apparatus produced saturated felts similar to those produced commercially. Varying levels of saturation were obtained by controlling the immersion time of the raw felt in the asphalt bath. Saturation levels were confirmed by weighing the finished felts for comparison with weights of the unsaturated felt.

Laboratory specimens of saturated felts were prepared in four series, with each series of felts con-

continued, page 24

taining the same raw or unsaturated felt and asphalt saturant at varying levels of saturation. Some problems were encountered in attempting to obtain laboratory prepared specimens containing 140 percent saturation. This difficulty in achieving high levels of saturation confirmed the industry problems of attaining a 140 percent saturation level in the felts.

Before discussing the results of the test performed on the four series of laboratory prepared specimens, a brief description of each series is in order.

Series 1 was composed of raw felt containing 15 percent rag, 50 percent groundwood and 35 percent chemically refined wood fiber with an asphalt saturant having a 54°C softening point. The saturating temperature was controlled at 175°C. Saturation levels obtained ranged from 47 to 127 percent.

Series 2 was identical to Series 1 except that the raw felt was an all wood fiber containing about 50 percent each of groundwood and chemically refined wood fiber. Saturation levels obtained ranged from 71 to 146 percent.

Series 3 was the same as Series 1 and 2 except that the raw felt contained about 4 percent rag fiber, 33 percent groundwood and the remainder chemically refined wood fiber. Saturation levels of 42 to 134 percent were obtained.

Series 4 was composed of the same raw felt used in Series 2, with a saturant having a higher softening point of 64°C and the saturating bath was maintained at a higher temperature of 205°C. Saturation levels of 50 to 140 percent were obtained.

The laboratory saturated specimens were subjected to various tests, particularly those tests which were considered to measure a felt's resistance to water.

This second phase of the study did produce some correlation between saturant content and the resistance of the felts to water.

strength as the saturation level increased, but the actual wet tensile strength was significantly higher at each saturation level.

The specimens from all four series were subjected to the Methylene Blue Dye Test and, in general, a good correlation was found in that the quantity of unstained fibers increased as the saturant level increased. At the lower levels of saturation, only 10 to 20 percent of unstained fibers were found, whereas, at the higher saturant levels, the results show 60 to 90 percent of unstained fibers.

CONCLUSIONS

The results of this rather limited study of Phase II, in which the saturant content for each series of laboratory saturated specimens was the only variable, indicated a correlation between the saturant content and the resistance of the roofing felts to water appears to exist. Although the resistance of the felts to water improved as the saturant content increased, the amount of improvement appeared to level out, showing only slight increments of improvement as the saturation approached the 140 percent level.

The Methylene Blue Dye Test appears to have some merit in visually depicting the efficiency of the saturant to protect the fibers from moisture; however, considerably more study of this method is needed to determine its reaction to various fibers and perhaps to quantify it in some manner.

The laboratory saturation process did confirm the industry problem in consistently producing felts having a 140 percent saturation level and indicates that some revision in ASTM D226, "Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing" covering these saturated felts is in order.

Therefore, with the difficulty to obtain 140 percent saturation in the felts, it is proposed, and agreed upon by NRCA, that the minimum saturation limit could be lowered to 120 percent which is believed to be satisfactory provided the felts meet the 70 percent minimum saturation efficiency requirement.

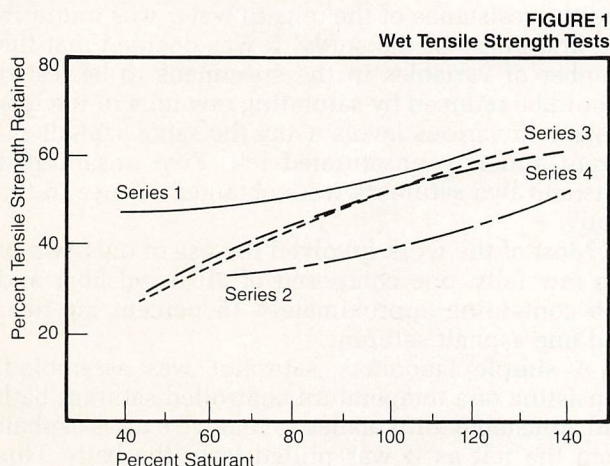
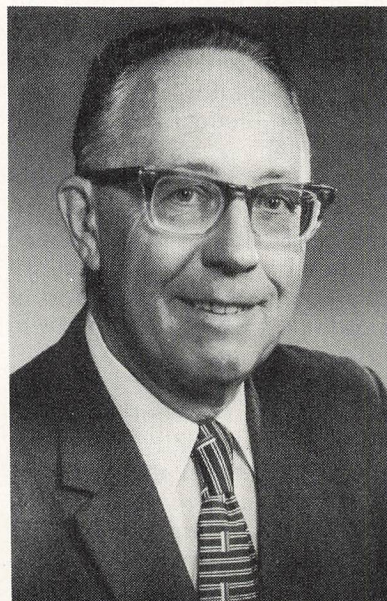


Figure 1 shows the data obtained on the four series of saturated felts when wet tensile strength test results (expressed as a percent of tensile strength of dry specimens) are plotted against the saturant content of the felts. Tests on all four series indicate some increase in tensile strength after 24 hours of immersion in water as the saturant content of the felt increased. Series 1 (raw felt with 15 percent rag fiber) showed the least improvement in retention of tensile



Robert A. La-Cosse, CAE, NRCA Director of Technical Services, presented an expanded version of this article at the recent International Symposium on Roofing, Brighton, England.

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Allegheny General Hospital, Pittsburgh, Pennsylvania

"...we know the owner has one of the best roofing systems he can buy."

Mr. George Mackey, Project Supervisor, MILLER, THOMAS, GYEKIS, Roofing Contractors says, "We've installed FOAMGLAS Insulation on lots of roofs over the years. We've found it to be a dependable, easily applied roofing insulation.

"But the main reason we like FOAMGLAS Insulation is its dimensional stability. We know that FOAMGLAS Insulation will not swell or shrink after it is installed. That's important for two reasons. One, this eliminates worry about splits or cracks caused by insulation movement. And two, we know the owner has one of the best roofing systems he can buy.

"On this roof, we installed a Tapered FOAMGLAS Roof Insulation System which consists of FOAMGLAS-BOARD and Tapered FOAMGLAS

Insulation. This system is extremely easy to install. Tapered FOAMGLAS Roof Insulation is identified by section and direction of slope... there's no guessing."

Today, Pittsburgh Corning has Tapered FOAMGLAS Roof Insulation Systems to fit any deck. They are all made with FOAMGLAS cellular glass insulation... the only totally waterproof, noncombustible, dimensionally stable insulation available.

Improving Products and Systems

Since the introduction of FOAMGLAS Insulation in the early forties, the Innovative Insulation People of Pittsburgh Corning have improved and continually adapted it to meet a broad range of building insulation needs.

The latest improvement has resulted in an R factor of 2.85... an 8% increase in thermal efficiency. That's a major improvement to an insulation that's already got a lot going for it... and for you.

It means less FOAMGLAS Insulation for some applications or increased thermal efficiency with no additional material for others.

For more information, write Pittsburgh Corning Corporation, Marketing Department RF1181, Presque Isle Drive, Pittsburgh, Pennsylvania 15239, (412) 327-6100.



**THE
INNOVATIVE
INSULATION
PEOPLE**

Associate Member News

GAF Sells Flooring Business to Swedish Company

GAF Corporation recently sold its worldwide flooring business to Tarkett AB, part of the Swedish Match Group, for \$56.6 million.

The sale, finalized Sept. 29, included GAF's vinyl flooring, floor tile and flooring felt operations in Long Beach, Calif., Vails Gate, N.Y., Whitehall, Pa. and Mullingar, Ireland.

Celotex Promotes Pair

The Roofing Products Division of The Celotex Corporation announced recently the promotion of two of its sales representatives.

A. T. "Andy" Cyganiewicz has been named field sales manager for the Atlanta Region, supervising sales and distribution in Florida, Alabama, Mississippi, Tennessee and Georgia.

Also, Michael C. Boyd was appointed field sales manager for Celotex roofing products in Texas, New Mexico, Louisiana, Oklahoma and Arkansas.

GAF Names Two Regional Manufacturing Managers

Dr. Donald LaPalme, vice president for manufacturing at GAF Corporation, has named two regional manufacturing managers to oversee production at several of GAF's building materials operations.

They are: Walter F. Becker, former head of the company's asphalt roofing plant at Joliet, Ill., and Murray S. Sherman, former manager at GAF's roofing insulation plant at St. Louis.

Becker will oversee roofing production at Mt. Vernon, Ind., Minneapolis and Joliet. Sherman will be responsible for production at Fontana, Calif., St. Louis and Dallas, and for the shut down plants in Denver and Kansas City.

Jerry Lebo, assistant plant manager at St. Louis, was named to replace Mr. Sherman as plant manager.

The nation's largest asphalt roofing maker, GAF maintains 21 plants around the country dedicated to asphalt roofing and roofing products.

Firestone Ups Manufacturing

The Firestone Industrial Products Company, is increasing its production capacity and capability of RubberGard, a single-ply rubber roofing material.

Panel sizes up to 40 feet wide and 200 feet long are being produced, said Sunil Kumar, manager of Firestone's RubberGard program.

"We have increased our production capacity and the size availabilities of our panels to meet the demand for RubberGard which is occurring in the new construction of commercial buildings as well as remedial roofing applications," Kumar said.

Firestone's EPDM roofing is available in two systems. In one, the RubberGard membrane is bonded directly to the insulation board or the roof deck. The second method is a loose-laid system in which the edges are fastened down and the remainder of the free-floating membrane is held down by ballast.

Accessories, which are provided, include neoprene flashing, adhesives, four types of sealants and Hypalon paints.

"RubberGard is installed by licensed contractors who have been field-trained by Firestone technicians," Kumar said. "Upon final inspection by Firestone technicians, each job meeting company installation requirements becomes eligible for a 10-year warranty issued to the building owner by Firestone."

Du Pont Booklet Explores Synthetic Rubber Roofs

The functionality, weatherability, and installation benefits of single-ply synthetic rubber roofing systems are explained in a booklet available from the Elastomers Division of the Du Pont Company.

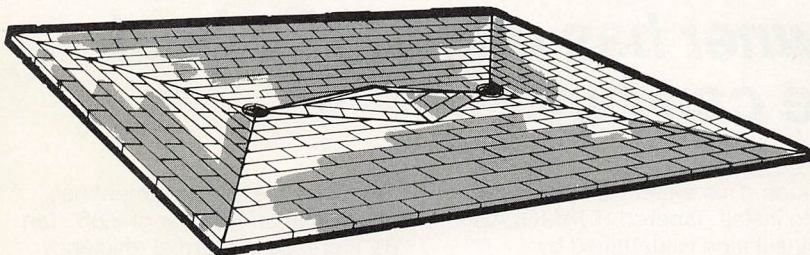
"A Good Roof Is One You Can Forget," a 16-page illustrated booklet, explores single-ply synthetic rubber roofing systems compared with traditional systems.

The booklet also describes the three installation methods: loose-laid, partly adhered, and fully adhered.

The loose-laid system, the booklet explains, often can be applied over existing roofs. The partly adhered system relies on mechanical fasteners to anchor the rubber, and the fully adhered system is the ideal choice for unusually shaped or steeply sloped roofs.

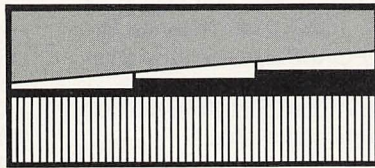
For a copy of the brochure, write to the Du Pont Company, Room X38737, Wilmington, Del., 19898.

The Most Effective, Fire Resistant, Energy Efficient Way of Sloping Any Roof is Also the Simplest



That's Why We Call It a System

The Lucas Tapered System is the ideal material for obtaining proper slope on any built-up roof. And, because this system of four factory tapered panels is incombustible, it's perfect for hot or cold applied roofs.



Lucas Sales Co. Inc.

10623 Baur Boulevard
St. Louis, Missouri 63132
(314) 993-9610

New Johns-Manville Contractor Program Announced

The new Johns-Manville "Approved Fiber Glass Insulation Contractor" program has begun with a series of management seminars at J-M world headquarters in Denver, Colo-

- Insulation throughout the country.
- Establish a high level of technical and professional competence.
- Identify insulation contractors who are trained to perform quality fiber glass insulation services to builders, consumers, utility companies and governmental regulatory agencies.

Each J-M management seminar is limited to 20 contracting firm owners or chief operating officers, to insure active participation and close attention to their needs. A minimum of one year in the contracting business and demonstrated financial stability are requirements to qualify as Approved Contractors. Installer training ses-

riety of selling aids; and a complete program of distinctive truck and uniform signage, featuring a dynamic star-stripe logo graphic design.

Celotex Opens Roofing Production/Stocking Facility In Fremont

Celotex Roofing Products Division recently opened a new production and stocking facility in California.

Its new Fremont, Calif. facility manufactures Celotex' Celo-Glass IV Fiber Glass Ply Sheet and Fiber Glass Cap Sheet products to "better meet the growing west coast demand for fiber glass roofing systems," according to Peter G. Nazaretian, product manager, built-up roofing (BUR) for Celotex.

Nazaretian stated that the Fremont plant has sufficient Celo-Glass IV production capacity to accommodate the growing needs of the west coast market. The facility houses its own credit and sales departments to expedite service to distributors and roofing contractors. Fremont will ship roofing products to 11 states west of the Rocky Mountains including Alaska and Hawaii.



rado. The program also includes applicator training nationwide, as well as a complete package of advertising and promotion aids.

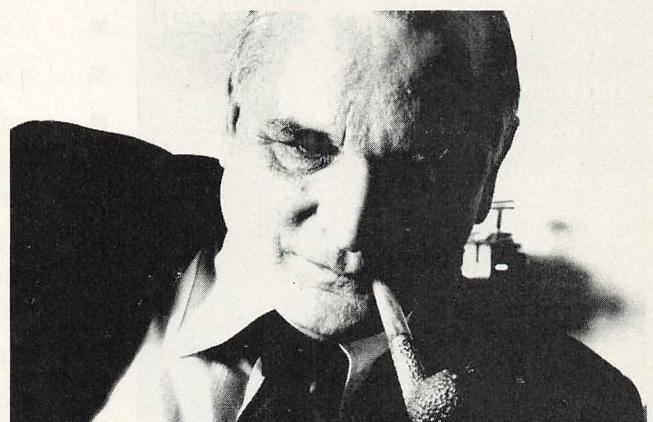
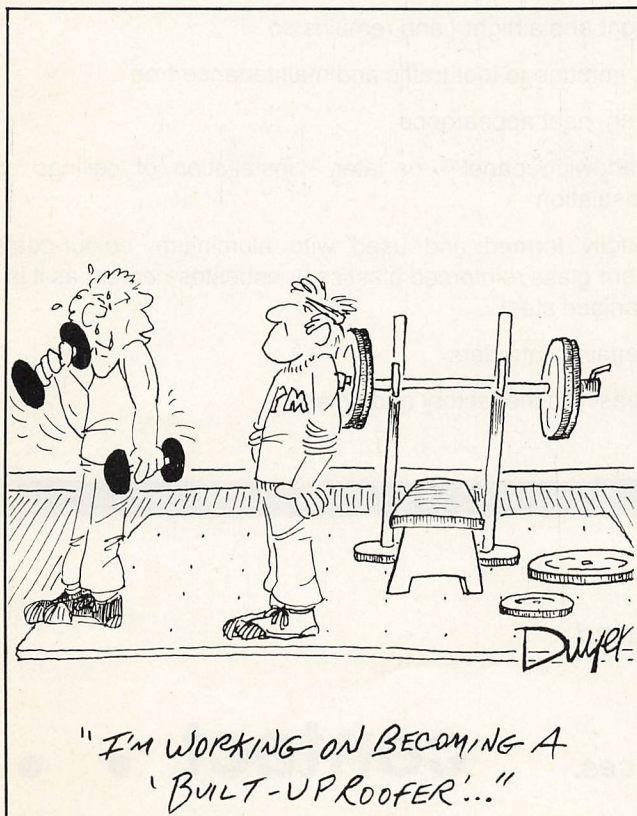
J-M's continuing support of insulation contractors during the 1980's is demonstrated by the new program, which has three major goals:

- Continue to promote quality application and installation of fiber glass home and commercial in-

sions are conducted by experienced J-M sales representatives at the participating contractor's place of business.

Two seminars were held in May and two in June. Additional seminars are scheduled for the rest of 1981. The 1982 schedule will be announced later.

J-M Approved Contractors will also benefit from national and local advertising targeted to their customers, including TV commercials; a wide va-



Dr. Robert Smithdas is blind, nonhearing, and nonverbal. He is a published poet.

President's Committee on Employment of the Handicapped
Washington, D.C. 20210

Produced by The School of Visual Arts Public Advertising System

INVITATION TO MANUFACTURERS

Secure a watertight future for yourself and your customers by accepting this offer of a licence on

THE UNIQUE DEKEX ROOFING, CLADDING AND DECKING SYSTEM

- Allows the construction of the equivalent of one strong, large panel on the supporting structure
- Permits the MANUFACTURER to maximise the strength to weight ratio of his product
- Offers MANUFACTURING, ERECTION and OPERATING cost advantages

PROBLEMS WITH ROOFS

Leaks

Wasted insulation because of leaking air and water

Corrosion

Havoc wreaked by temperature changes

Poor coverage factors

High installation cost

Difficult handling

Destroyed and damaged goods

Stock losses

RESULTS

Increased costs

Staff and customer dissatisfaction and frustration

THE ANSWER — DEKEX

The strong DEKEX profile, combined with the unique fastening system -

- maximises strength:weight ratios and saves sub-structure
- reduces working capital
- is simple and can be speedily installed
- is watertight and airtight - and remains so
- is robust, immune to foot traffic and maintenance-free
- has a clean, neat appearance
- allows sandwich panel - or later - installation of ceilings and thermal insulation
- is as readily formed and used with aluminium, colour-coated metals, fibre glass reinforced plastics or asbestos-cement as it is with galvanised steel
- protects against intruders
- handles easily in the factory and on site

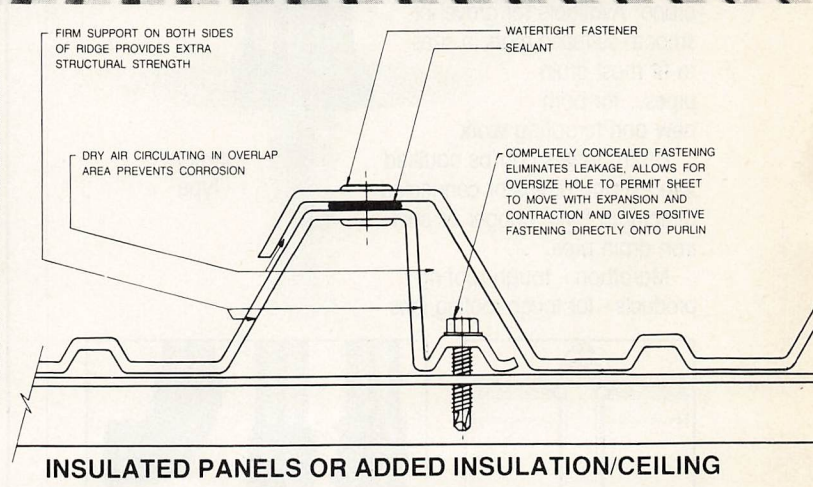
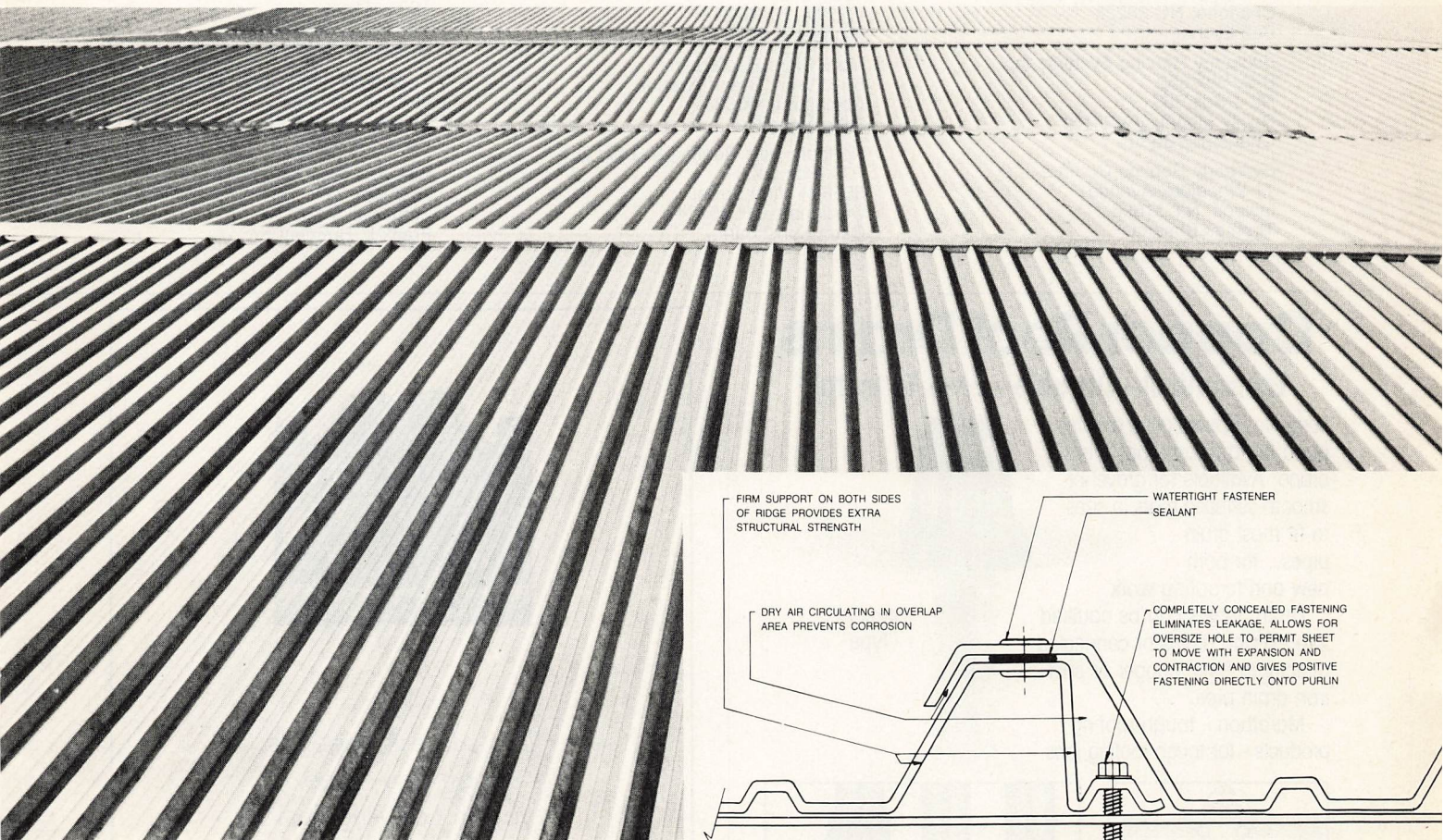
The DEKEX SYSTEM has been widely patented and commercially proved.

The owners of the technological rights are offering manufacturing and selling licences.

contact . . .

• • the **DEKEX** system

the steel single ply roof



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TELEX: 3-630 SA
TELEPHONE INTERNATIONAL: +27 12 86-9211

New Members

The following have been approved for NRCA membership between August 29 and October 9, 1981

CONTRACTORS

A & J Roofing Co. Inc.
P.O. Box 547
1280 Hillside Blvd.
Colma, 94014
Larry Tyler

Mike Barrow Rfg. Co. Inc.
1122 N. Pine
P.O. Box 9199
North Little Rock, AR 72119
Mike Barrow

Bates Roofing & Waterproofing
4270 Vinson Avenue
Macon, GA 31206
Tommy Bates Jr.

Caesar's Roofing Inc.
31 New Salem St.
Wakefield, MA 01880
Caesar J. Balzotti

Corporate Roof Services Inc.
P.O. Box 221334
4401 Colwick Road/Suite 600
Charlotte, NC 28222
Bob Lyons

Economy Roofing Systems Inc.
P.O. Box 552
Rt. 1 Box 565
Rocky Mount, VA 24151
Charles E. Barta

Eveready Roofing Co. Inc.
11 Wheelock Avenue
Inwood, NY 11696
Thomas Busaua

Galewood Tuckpointing & Roofing
Co. Inc.
3855 West Division
Chicago, IL 60651
Joseph J. Laurie

N. B. Handy Company
P.O. Box 11258
3105 Odd Fellows Road
Lynchburg, VA 24506
J.D. Christian III

William F. Hoffmann Inc.
15 Elm Avenue
Mount Vernon, NY 10550
Glenn M. Crooker

Isaacson Roofing Contractors Inc.
P.O. Box 2292
4211 Lower Beaver Road
Des Moines, IA 50310
Craig S. Isaacson

The Charles E. Mahaney Roofing
Co.
1953 Ohio
Wichita, KS 67214
Michael J. Boyd

Mont Clare Roofers Inc.
6910 West Grand Avenue
Chicago, IL 60635
John Megall Jr.

Northern Hills Roofing & S/M Co.
P.O. Box 24281
5556-1/2 Vine Street
Cincinnati, OH 45224
Carol Kunstman

Port Enterprises Inc.
P.O. Box 447
Warehouse Street
Port Lavaca, TX 77979
Ronny E. Barnett

Raico Industries Inc.
801 East Bay Avenue
Manahawkin, NJ 08050
Pete Kitson

Redd Roofing Company Inc.
P.O. Box 1304
4580 Madison Ave.
Ogden, UT 84403
K. Frank Redd

Roanoke Roofing & S/M Co. Inc.
P.O. Box 12607
2102 Lukens St. Northwest
Roanoke, VA 24027
Edward T. Bowles

Schultheis Bros. Co
1001 Millers Lane
Pittsburgh, PA 15239
Michael P. Durkan

Seabloom Roofing & S/M Inc.
2851 South Avenue
Toledo, OH 43609
Ray D. Micham

Seal-Tite Roofing Inc. & S/M
Rt 3 Box 23
Troutville, VA 24174
Frank L. Bramlett Sr.

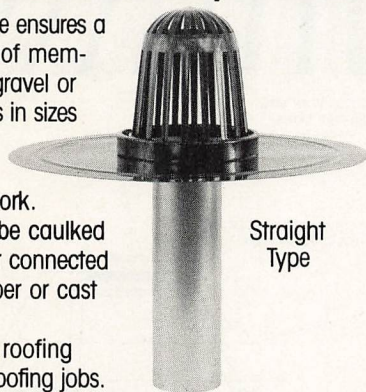
Copper Roof Drains

Economical - Durable - Easy To Install

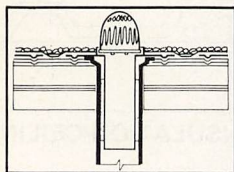
Long-life copper flange ensures a good bond to any roof membrane. Available for gravel or smooth-surfaced roofs in sizes to fit most drain pipes...for both new and reroofing work.

Drain outlets can be caulked into existing drains or connected directly to PVC, copper or cast iron drain pipe.

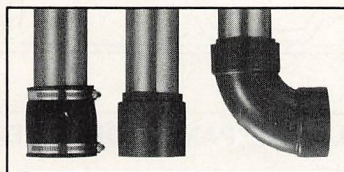
Marathon - tough roofing products - for tough roofing jobs.



Straight Type



75 Series - Fits inside existing drain.



100 Series - Optional connections for copper, plastic or cast iron pipe.

Marathon
Roofing Products Inc

367 Nagel Drive, Buffalo, NY 14225 (716) 685-3340 • Telex: 64-6214

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88 Signet Drive • Weston (Toronto), Ontario M9L-1T3
(416) 745-4111 • Telex: 065-27328



Our success depends upon you—see you in Los Angeles!

 NATIONAL ROOFING CONTRACTORS ASSOCIATION

Star Roofing Inc.
16 Luddington Avenue
Clifton, NJ 07011
Al Hess

United Roofing & S/M. Co. Inc.
P.O. Box 612
349 Broadway
Asheville, NC 28802
Harold Ogle

Wallace Roofing Company Inc.
554 South Craft Highway
Mobile, AL 33617
Ronald P. Wallace

Witch City Ventures Inc.
P.O. Box 607
7 Putnam St.
Salem, MA 01970
Paul Ouellette

Woodall Roofing Inc.
3026 Jett Dr.
Doraville, GA 30340
David Woodall

ASSOCIATES

A.L.L. Roofing & Building
Materials Co.
1212 West 58 Street
Los Angeles, CA 90037
Jerry Lessel

Badger Corrugating Co.
P.O. Box 1837
1801 West Ave. South
La Crosse, WI 54601
Michael J. Sexauer

Bowe Co. Inc.
24 Market Street
Saddle Brook, NJ 07662
W. Wilson

C.B.G. Associates Inc.
100 East Glenside Avenue
Glenside, PA 19038
Alan Gross

Pennsylvania Supply &
Manufacturing Co.
827 North 12th Street
Allentown, PA 18102
Peter D. Kuhns

INDUSTRIAL/INSTITUTIONAL

Johnstown Properties
Real Estate Invest. Dev. & Mgmt.
5775-A Peachtree Dunwoody Rd.
Suite 300
Atlanta, GA 30342
William H. Sharp

INTERNATIONAL

Avenue Road Roofing
58 Wade Avenue
Toronto Ontario
Canada M6H 1P6
David A. Stokes

Derbit Belgium S.A.

Parc Industriel 5920 Perwez
Brussels
Belgium
Jean Marie D'Hondt

South Africa Inventions Dev.
Corp.
P.O. Box 395
Pretoria Republic
of South Africa 0001
F. J. J. Van Vuren

Contest To Run Through December

What is the most unusual job in which you have been involved?

Whether you're a designer or contractor, send **The Roofing Spec** a brief summary of that job, highlighting the uniqueness of it. Be sure to include costs.

The "uniqueness" may be due to the cost, size working conditions, materials used, time it took, personnel involved, location or whatever else. Consider any job you've told others about with pride or maybe with embarrassment. Take the time now to jot down the basic information and send it to **The Roofing Spec**, National Roofing Contractors Association, 8600 Bryn Mawr, Chicago, Ill. 60631.

MINIMIZE ASPHALT HANDLING COST

**With a Taurus Mobile Storage
Tank eliminate several steps
in the handling of asphalt,
to increase production, to
maximize your job profits.**



37 ton/10,000 gallon capacity

Economy of operation:

- *Designed to be placed on the job and pump directly to the roof. Have the refinery deliver to your job site.*
- *Or, in between those big jobs, use as a storage tank in your yard to fill job tanks.*
- *No waiting for tank to warm up, a large volume of "Hot" kept at a consistent working temperature.*
- *No one on the ground maintaining tank or kettle. Tank will cycle automatically to maintain proper temperature.*
- *Substantial fuel savings over conventional job tanks and kettles.*

Safe, efficient and durable:

- *Controlled heating surface, eliminating hot spots which produce super-heated vapors that could cause a fire or explosion.*
- *A controlled heating surface resulting in prolonged flue life. No hot spots or coking. Longer intervals between cleaning of tank.*

Taurus also builds many other models to fill the individual needs of each contractor. Please call or write:

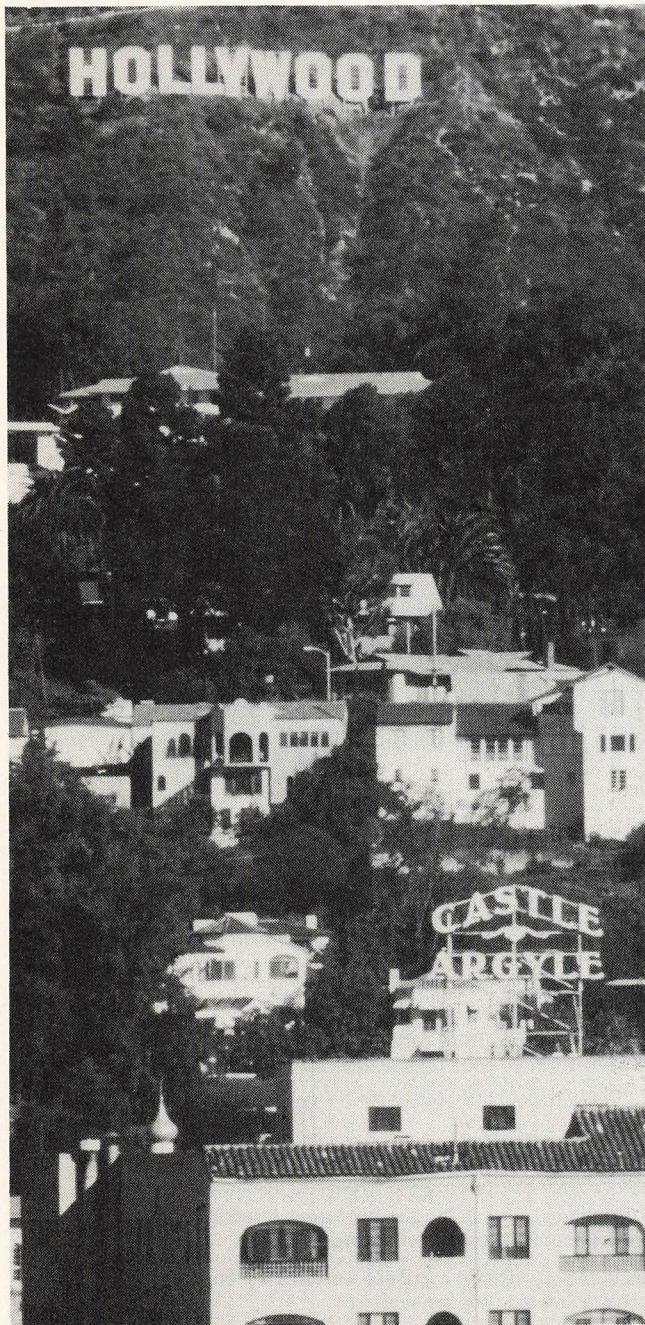


Liquid Asphalt Systems, Inc.

2425 Jefferson, Kansas City, Mo. 64108

Telephone (816) 474-0448

NRCA's 95th Annual Convention and Exhibit



In 1887, just over 100 roofers met for the first NRCA Annual Convention. In its 95 year life, the NRCA annual get-together has grown to be the largest and best attended convention in the roofing industry.

The 95th Annual Convention and Exhibit will be in Los Angeles, March 2-5, 1982. Six thousand industry representatives are expected to walk through the Los Angeles Convention Center where over 400 booths will display the latest roofing materials, equipment and services. Manufacturers of solar equipment will also be on hand.

In addition, many business sessions, workshops and social functions will be held in the Convention Center and in the beautiful Biltmore Hotel. The Los Angeles Biltmore is the headquarters hotel with the Westin Bonaventure, Convention Center-Holiday Inn and Hyatt hotels also reserved for convention housing.

Business Sessions

More on Elasto/Plastics

Up-to-date reports on the newest materials in the roofing industry, including an examination of standards work done in Canada and a report on the NRCA certification program.

Making Sense Out of the New Tax Law

It's a whole new ballgame for estate planning, pension plans and IRA's, and a tax expert will explain what it all means to a roofing contractor.

The Demographics of the Roofing Industry

Noted population expert Peter Francese will prepare a comprehensive survey and long-term outlook especially for the roofing industry, based on his considerable experience in the study of demographics.

Alcoholism and Drug Abuse

Do you have field problems you're not even aware of? As NRCA prepares to launch a model program, this session will brief you on the nature of the problem and what employers can and can't do about it.

Is Built-Up Roofing Dead?

Lest we forget, most roofs are still built-up, and we'll assemble a panel of expert roofing contractors to review the status of this vital part of the trade.

NRCA Testing Programs in Review

A report on some of the more significant recent NRCA technical and research projects, including work on gravel adherence, wind uplift, and glass fiber felts.

Will Reaganomics Work?

Economist Dr. Barry Asmus will provide a primer course on supply-side economics and offer his analysis on the outlook for the construction industry.

Executive Health and Weight

Buster Crabbe is alive and well, and will offer some basic steps on staying healthy.

Solar Energy Program

Two early-bird sessions to be held Tuesday, March 2 for those interested in learning about solar energy and its application in the roofing industry. The program will be divided into two sessions: the first will cover the basic principles of solar energy; the second program will deal with practical application methods from the roofing contractor's point of view.

A special Foreman and Superintendents Program

A full day specifically for roofing foremen and superintendents to be held on Friday,

March 5. In the morning, participants will visit the trade show followed by a luncheon with a motivational speaker. Educational programs are scheduled for the afternoon consisting of sessions on roofing equipment maintenance, blueprint reading and pre-job planning.

PRELIMINARY CONVENTION PROGRAM

Tuesday, March 2, 1982

9 am-9 pm

Hospitality Center Open. Twice during the first day of the convention a 45-minute "Welcome to L.A." program will be held for all wanting to know more about the city. From then on, this will be a Hospitality Center for women only!

1-5 pm

Solar Energy Program. A workshop covering the basics of solar energy and installation procedures.

5:30-6:30 pm

Champagne Party for new NRCA members and first-time convention attendees. Welcome Party—Official Opening of the Exhibit Hall. Come taste the wines and cheeses California is so famous for while viewing the exhibits for the first time.

6:30-8 pm

8:15-9:45 pm

NRCA Political Action Committee Mexican Fiesta—An opportunity to join a few stars in a fiesta-style buffet accompanied by "south of the border" music. Have a margarita from our fountains and enjoy the evening.

Convention '82

Wednesday, March 3, 1982

- 7:30-9 am Past President's Breakfast.
- Past Presidents and Officers only.
- 8-9 am New Member Breakfast.
- New Members Only.
- 9-12 noon Trade Show Open.
- 12 noon-2:15 pm Opening Luncheon.
- Keynote address by one of America's most prominent speakers will kick off the convention program.
- 2:30-4 pm Exhibitor Meeting.
- This will be for exhibitors only and is the first chance to select booth space for the 1983 NRCA Convention in San Antonio.
- 2:30-5:15 pm Concurrent Business Sessions.

EVENING OPEN

Thursday, March 4, 1982

- 7:30-9:15 am Member Breakfast.
- One of America's best-known personalities Art Linkletter, presents "Yes, You Can", with an emphasis on positive mental attitude.
- 9:30-12:15 pm Concurrent Business Sessions.
- 12:30-5 pm Trade Show Open.
- 8:15-11:45 pm Hurray for Hollywood!
- Dessert party with a Hollywood flair. An exciting evening filled with desserts and entertainment.

Friday, March 5, 1982

- 8-9 am National Roofing Legal Resource Center Breakfast and Annual Meeting.
- 9 am-5 pm Foremen and Superintendents Program.
- A special one-day program specifically for the foremen and superintendents of your company.
- 9-11:45 am Trade Show Open.

12:15-2:15 pm Awards Luncheon.

Noted Washington, D.C. columnist, Jack Anderson, will present "Washington Merry-Go-Round" in this informative and current look at Washington, D.C.

2:15-2:45 pm Member Meeting and Elections.

2:45-5 pm Concurrent Business Sessions.

7:30 pm-12:30 am Annual Banquet.

Dance to the music of Les Brown and his Band of Renown and join us in the presentation of the industry's most prestigious recognition, the J.A. Piper Award.



SPOUSE PROGRAM

This year's Spouse Program will be a delightful blend of history, culture and the excitement of Hollywood and Beverly Hills.

Wednesday, March 3, Marshall Stoltz, curator of the Norman Rockwell Museum in Philadelphia, and a former personal friend of this celebrated artist, will present a very intimate look at the life and paintings of Norman Rockwell.

A glamorous day awaits you Friday, March 5 as you look at some of Hollywood's most famous landmarks and the beautiful mansions of many movie and TV stars in Beverly Hills. There will be a luncheon hosted by a famous Hollywood star at the elegant Beverly Wilshire Hotel, and shopping on chic Rodeo Drive, which is often compared to the renowned Paris and Rome shopping streets. Browse through famed stores such as: Giorgio's, Gucci, Van Cleef, Arpel's and Tiffany's.

Other programs and further details coming.

continued, page 41

9.3 MILLION SQ. FT. "PROVEN IN USE!"

Conglas now has 9.3 million square feet of Conbase W-1 (Perforated) in place without a known urethane-caused blister.



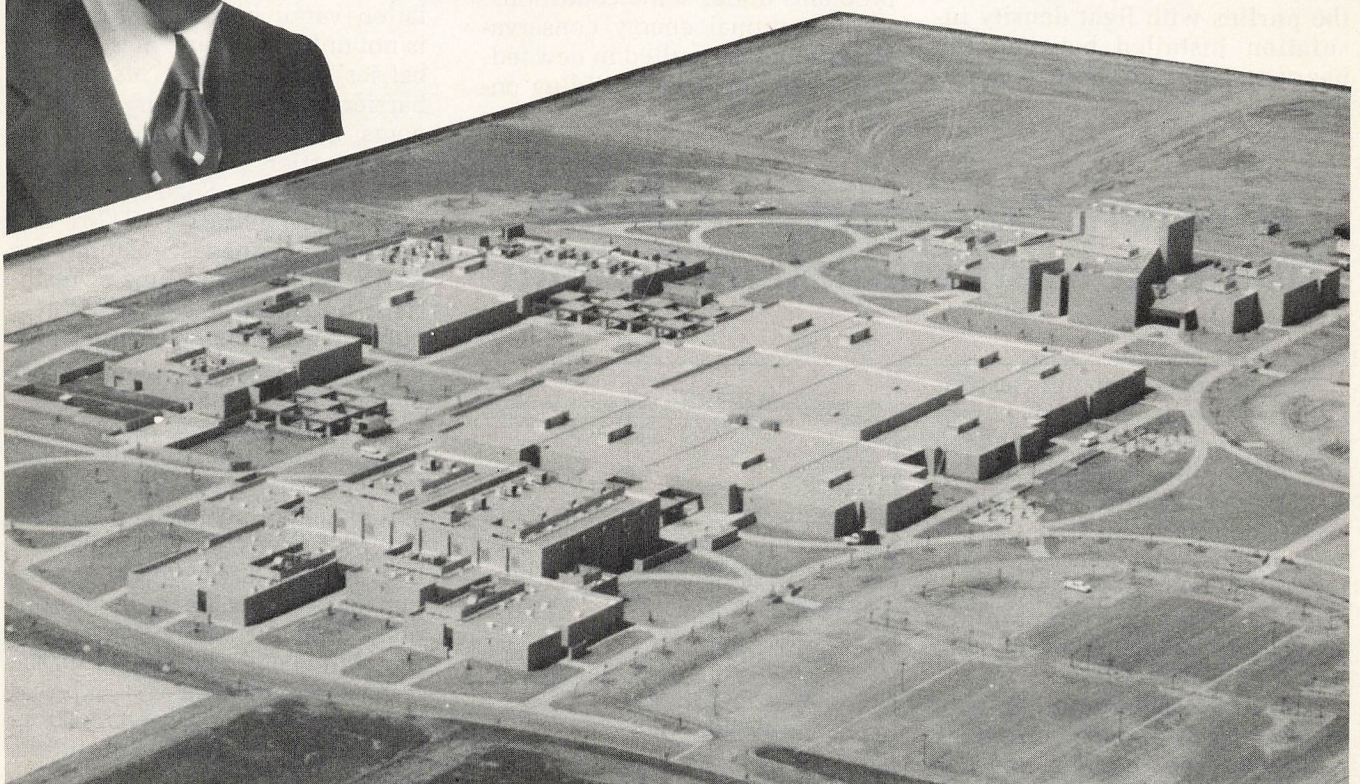
Dobson High School in Mesa, Arizona, was recently completed by Universal Roofers and Builders Incorporated of Phoenix, Arizona. The roof has approximately 260,000 square feet of roof area.

Consolidated Fiber Glass' Conbase W-1 (Perforated) meets the criteria set forth by the National Roofing Contractor's Association for roofing over polyurethane insulations. Bulletin No. 7 calls for either a second layer of roof insulation or a venting-type base sheet when roofing over thermally efficient urethane.

Make your next roofing project Conglas . . . the systems people with proven-in-use performance.

Wayne I. Mullis

PRESIDENT/UNIVERSAL ROOFERS AND BUILDERS, INC.



260,000 square foot Dobson High School located in Mesa, Arizona.
Architect: Still, Judd, Richards & Johnson, Mesa, Arizona.
General Contractor: Mardian Construction, Phoenix, Arizona.



CONSOLIDATED FIBER GLASS PRODUCTS CO., INC.

P. O. Box 5248 Bakersfield, California 93388 Ph. 805-323-6026

By D.S. Musgrave
Owens-Corning Fiberglas
Granville, OH

Metal buildings are generally constructed with no ventilation between the metal roof sheet and the roof insulation. This situation may result in moisture accumulation in the insulation, if the insulation does not have a satisfactory vapor barrier.

The insulation vapor barrier performance is not only a function of the vapor barrier material, but also vapor barrier seams and any components which must penetrate the vapor barrier.

An experimental investigation of a metal building roof insulation system, consisting of faced insulation boards suspended below the purlins with light density insulation installed between the board and the roof sheet, was conducted.

Metal buildings account for approximately 40 percent of the total low-rise, non-residential construction market. The traditional method of insulating a metal building is to install light density fibrous glass insulation, which has been faced with a vapor barrier material, between the purlins and roof sheet as shown in Fig. 1.

The insulation is compressed where the roof sheet is screwed to the purlins causing a substantial heat loss. The insulation compression also causes the purlins and fasteners to be cold enough to result in potential condensation problems under some conditions.

The national energy conservation effort has resulted in new federal, state and local building en-

To meet these new requirements a new insulation system was designed for metal building roofs. A major concern during the design of the insulation system was prevention of condensation in the roof cavity. Metal buildings are generally constructed with no ventilation between the metal roof sheet and the roof insulation.

Increased insulation levels cause lower roof cavity temperatures for potentially longer periods of time at or below the dew point. This situation can result in moisture accumulation in the insulation, if the insulation does not have a satisfactory vapor barrier. The insulation vapor barrier performance is not only a function of the vapor barrier material, but also vapor barrier seams and any components which must penetrate the vapor barrier.

The American Society For Testing and Materials (ASTM) has several standard test methods for testing vapor permeance of materials, but there is no ASTM test method for moisture testing of a composite structure. Such a test method was designed.

The moisture test chamber was designed to accommodate a roof test specimen constructed using actual metal building construction procedures and materials. The test area was large enough that vapor barrier seams and components puncturing the vapor barrier could be incorporated into the test specimen. The test exposed the specimen to severe building interior and exterior conditions for three weeks.

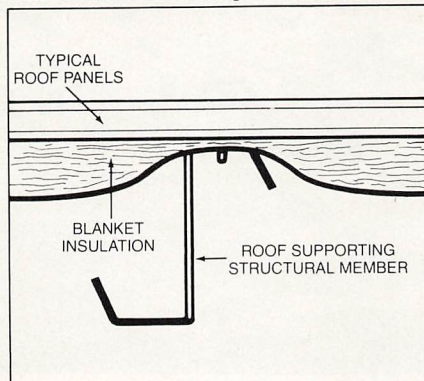
Moisture Transport In A Metal Building Roof Insulation System

A large scale moisture test facility was used, and 12' x 8' roof test specimen was constructed using actual metal building construction procedures and materials. The interior side of the test specimen was maintained at 21.1°C (70° F) and 50 percent relative humidity, while the temperature above the roof sheet was held below -23.3° C (-10° F).

In order to determine the temperature and humidity conditions within the roof plenum, the test specimen was instrumented with thermocouples and humidity gauges.

The test duration was 3 weeks, after which, the test specimen was disassembled for visual observations of the interior portion of the roof section and to obtain sample weights of the insulation. No significant moisture accumulated in the insulation or the roof cavity.

FIGURE 1
The Traditional Metal Building Roof Installation Method



ergy performance codes. The insulation method described above cannot meet the new codes in many areas of the country. Also to conserve energy, buildings are being constructed much tighter causing the interior relative humidity to increase which increases any condensation problems.

TEST CONDITIONS

The test conditions were selected to simulate severe winter conditions. This allowed potential problems to be identified in a relatively short test time. The interior side of the roof test specimen was held at approximately a constant 21.1° C (70° F), and 50

Test reveals correct method for insulating metal-building roofs

percent relative humidity. The exterior side of the roof test specimen was held at approximately -23.3°C (-10°F) except during defrosting of the air handling equipment.

The air handler was not completely sealed from the laboratory environment. This resulted in accumulation of moisture in the air handler which did not pass through the roof specimen. When the air handler could no longer maintain a temperature below -20.6°C (-5°F), it was necessary to defrost. The defrosting was accomplished by turning on the infrared lamp heaters directly above the test specimen, see Fig. 2. The infrared lamp heaters were not used during the test, ex-

DESCRIPTION OF TEST APPARATUS

The moisture test facility was originally constructed to investigate moisture transport in mobile roof cavities. Fig. 2 shows the general construction of the test chamber. The upper section separates from the lower section so that a test specimen can be installed.

Both the upper and lower section of the test chamber were well insulated. A vapor barrier was placed on the interior side of the lower section and the exterior side of the upper section. As mentioned earlier, some moisture could enter the upper section and the air handler without passing through the test specimen. This made it necessary to periodically defrost

test specimen was weighed before and after the test using a load cell with digital readout.

TEST PROCEDURE

At the beginning of the test, the dry and completely assembled test specimen was weighed using a load cell. The specimen was then installed in the test chamber. Throughout the test, temperature and humidity data were recorded every hour. Also, twice each week the test chamber was entered and the average humidity level was measured using a sling psychrometer.

When the air handler could no longer maintain the cooled side temperature below -20.6°C (-5°F) a two hour defrost cycle was initiated. During this cycle the interior side of the test specimen was inspected for any signs of moisture accumulation in the roof test specimen.

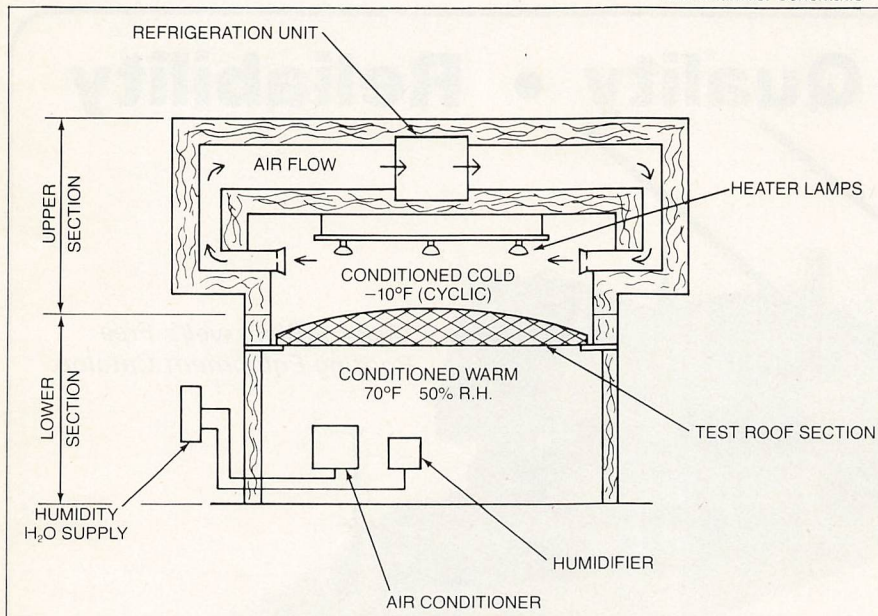
At the end of the test, while the specimen was still cold, it was removed from the test chamber and weighed. Then the insulation was removed and a visual inspection was made for any signs of moisture.

TEST SPECIMEN

The roof test specimen was constructed of standard metal building materials. The framework was three 0.20m (8 in) Z purlins and an eave strut supported on two I-beams. A roof sheet was fastened to the purlins using standard self-tapping screws with sealing gaskets. All roof sheet seams were caulked following the standard metal building industry practice. The sides of the specimen were sealed from the roof sheet to the structural steel by two layers of 0.15m (6 mil) thick polyethylene.

The insulation system consisted of a 3.81cm (1-1/2) thick, semi-rigid insulation board suspended below the purlin by a sup-

FIGURE 2
Test Chamber Schematic



cept as mentioned previously, because no daily solar freeze thaw cycle was desired. The test was run without the solar cycle that the largest accumulation of moisture would occur during the three week test.

These test conditions produced a vapor pressure differential across the roof test specimen of 1,379 N/m² (0.2 psi).

the air handler.

Six 350-watt lamps were in the lower section controlled by a variac to produce a constant heat source. Also in this section were a humidifier and water-cooled air conditioner by a humidistat and thermostat.

An automatic data acquisition system recorded the thermocouple and humidity gauge data. The

continued, page 38

port structure. The board was faced with a 1.15 NG/PA.S.M.² (0.02 perm) facing. The edges of the boards, which run perpendicular to the purlins, are moisture vapor sealed by wrapping the facing around the edge of the board and a few centimeters onto the back surface. The faced edge of the boards were forced tightly together during installation. This provided a water vapor seal which is 3.81cm (1-1/2 in) thick.

The board support structure consists of two spring steel purlin clips that are attached to a seal plate and guide legs. The seal plate is a 28 gauge sheet metal strip approximately three inches wide which supports the insulation board and provides a water vapor seal for the junction of the boards which runs parallel to the purlins. Six inches of light density fibrous glass backfill insulation was placed above the board and between the purlins. A 5.08cm (2 in x 2 in) angle was fastened

to one purlin and passed through an insulation board. The angle was installed to simulate the common knee bracing in metal buildings.

The test specimen was instrumented with thermocouple and humidity gauges. The instrumentation was installed on the insulation board interior surface, back surface of the insulation board and on the cold surface of the backfill insulation.

THE TEST RESULTS

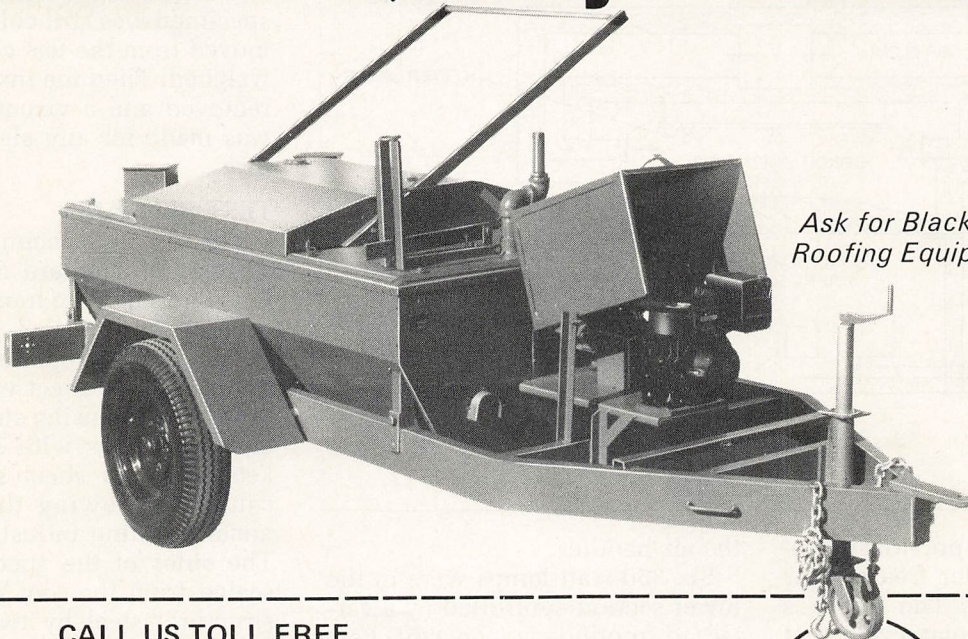
The temperature data indicates there was no degradation of the thermal performance caused by moisture accumulation during the three week test. If sufficient water vapor were transported and retained in the roof insulation, condensation and freezing could occur. Under these circumstances, the temperature profile across the roof section would change due to local variations in the insulation's thermal conductivity. As was expected, the temperatures mea-

sured on the back surface of the insulation board was much colder than locations away from the structural steel. The temperature profile, as mentioned above, showed no thermal performance change.

The temperature drop across the seams indicated that no significant amount of natural convection or moisture transport occurred at these locations. The humidity gauge on the insulation board interior surface indicated an average relative humidity of 55 percent. This agrees well with the approximately 50 percent relative humidity determined by the sling psychrometer readings made twice each week. The humidity gauge on the backfill insulation cold surface indicated that there was no moisture accumulation in the middle section of the specimen.

The test specimen's initial weight (completely dry) was 259 kg (570 lbs). The load cell used to determine the specimen weight

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has an accuracy of about ± 0.5 kg (± 1 lb). Thus, the specimen did not accumulate a substantial amount of water.

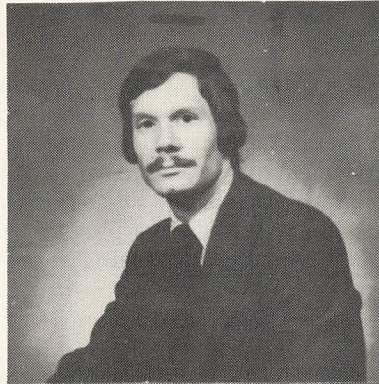
A visual inspection was made immediately after the test specimen came out of the test chamber. The insulation boards and light density fibrous glass backfill insulation were removed and found to be dry to the touch.

The only moisture noticed during the inspection was a slight sweating of the interior side of the roof sheet near the eave strut. It was estimated that the total moisture accumulation in this area was 0.12 litre (4 oz) of water.

CONCLUSION

The results of this test indicate that this method of insulating metal building roofs will not lead to significant moisture accumulation in the roof cavity and the resultant thermal performance decrease. More detailed conclusions are:

- A good vapor seal was provided at the insulation board seams which ran perpendicular to the purlins. This seal was produced by wrapping the vapor barrier facing around the edge of the insulation board and then forcing tightly together the board edges during installation.
- The insulation board support seal plate structure provided a good moisture vapor seal of the board seams which ran parallel to the purlins.
- The minor puncture of a vapor barrier faced insulation board by a knee angle brace did not result in a moisture vapor problem.
- The approximate 5 cm (2 in) air gap between the backfill insulation and the roof sheet did not result in a moisture vapor problem. Although care was taken so that no natural convection paths existed between the lower test chamber and the air gap between the backfill insulation and roof sheet.
- The type of testing described in this paper can reduce the moisture performance uncertainties of new insulation methods.



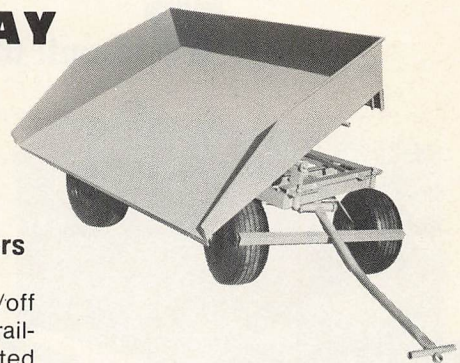
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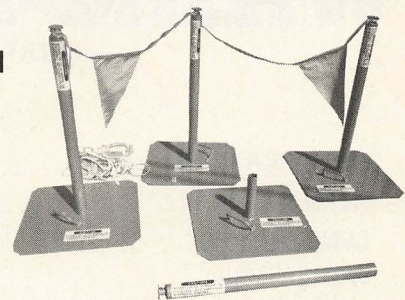


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Conferences Designed To Better Roofing

Two NRCA-sponsored conferences, designed to better the working knowledge of roofing professionals, are rapidly approaching.

The conferences, the 24th Annual Foreman and Superintendents Conference and the Roofing Systems Conference, will be conducted in several cities across the United States.

The Roofing Systems Conference will present concise information dealing with the basics of roof design, including the new single-ply systems. Each one-day session will feature a panel of expert speakers addressing the entire roof system—from the roof deck to roof insulation to the membrane itself.

Practical tips will be offered as

part of the Roofing Systems Conference. In addition, each conference attendee will receive a copy of *The NRCA Roofing and Waterproofing Manual*, a complete series of 21 **Roofing Spec** articles detailing roofing components and materials, *The NRCA Energy Manual*, and current copies of NRCA Technical Bulletins and important technical papers.

Scheduled Roofing Systems Conference speakers are: Charles Bechtel, Dayton, Ohio; Robert First, Sarasota, Fla.; Ray Johnson, Tulsa, Okla.; Wayne Mullis, Phoenix, Ariz.; and Monte Upshaw, Oakland Calif.

The Roofing Systems Conferences will be held in Seattle on December 2, Phoenix on Dec. 10, Chicago on April 1, Cincinnati on April 8, and Boston on April 15.

In an effort to advance the educational and professional knowledge of everyone involved with roofing, NRCA is also sponsoring the 24th Annual Foreman & Superintendents Conferences.

Each session tutors a roofing contractor's key personnel in all of the latest technical developments in the industry.

Among the many topics covered in each session will be an in-depth examination of single-ply systems, complete with a "hands-on" demonstration of single-ply applications. Representatives from Trocal, Cooley Roofing Systems Inc., Koppers Company Inc. and Carlisle Tire and Rubber Co. will show the foremen and superintendents the proper application of each respective product.

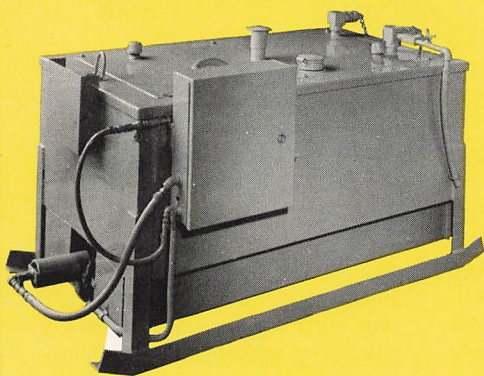
The conferences will be held in Denver, Jan. 6-8, Orlando, Jan. 13-15, and New Orleans, Jan. 27-29.

For more information on either the Roofing Systems Conference or the Foremen and Superintendents Conference, contact NRCA at 8600 W. Bryn Mawr Ave., Chicago, Ill. 60631.

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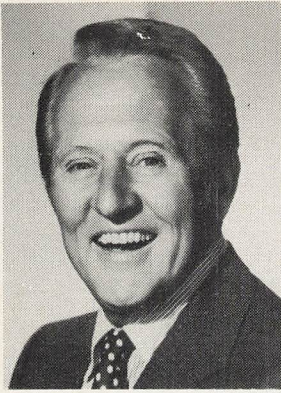
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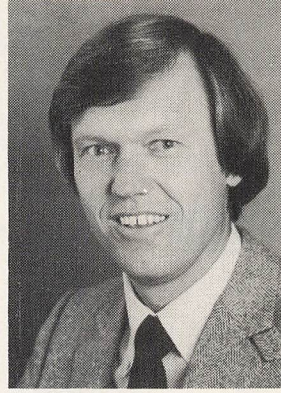
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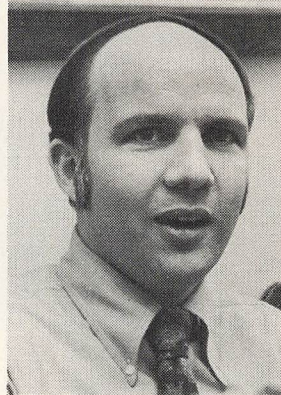
Art Linkletter, one of America's best known personalities will address NRCA members at the **Member Breakfast, Thursday, March 4**. He will present a highly inspirational program titled "Yes, You Can."



Barry Asmus, PhD., is a noted economist and on **Thursday, March 4** he'll present a seminar on supply-side economics and an outlook on the construction industry.



Jack Anderson, whose relentless digging has made him one of America's top investigative reporters, will discuss his observations on our country in a commentary called, "Washington Merry-Go-Round" at the **Awards Luncheon, Friday, March 5**.



Peter Francese, author of "The Peter Principle," is an expert on demographics, and on **Thursday, March 4** he'll discuss his comprehensive survey of the construction business.

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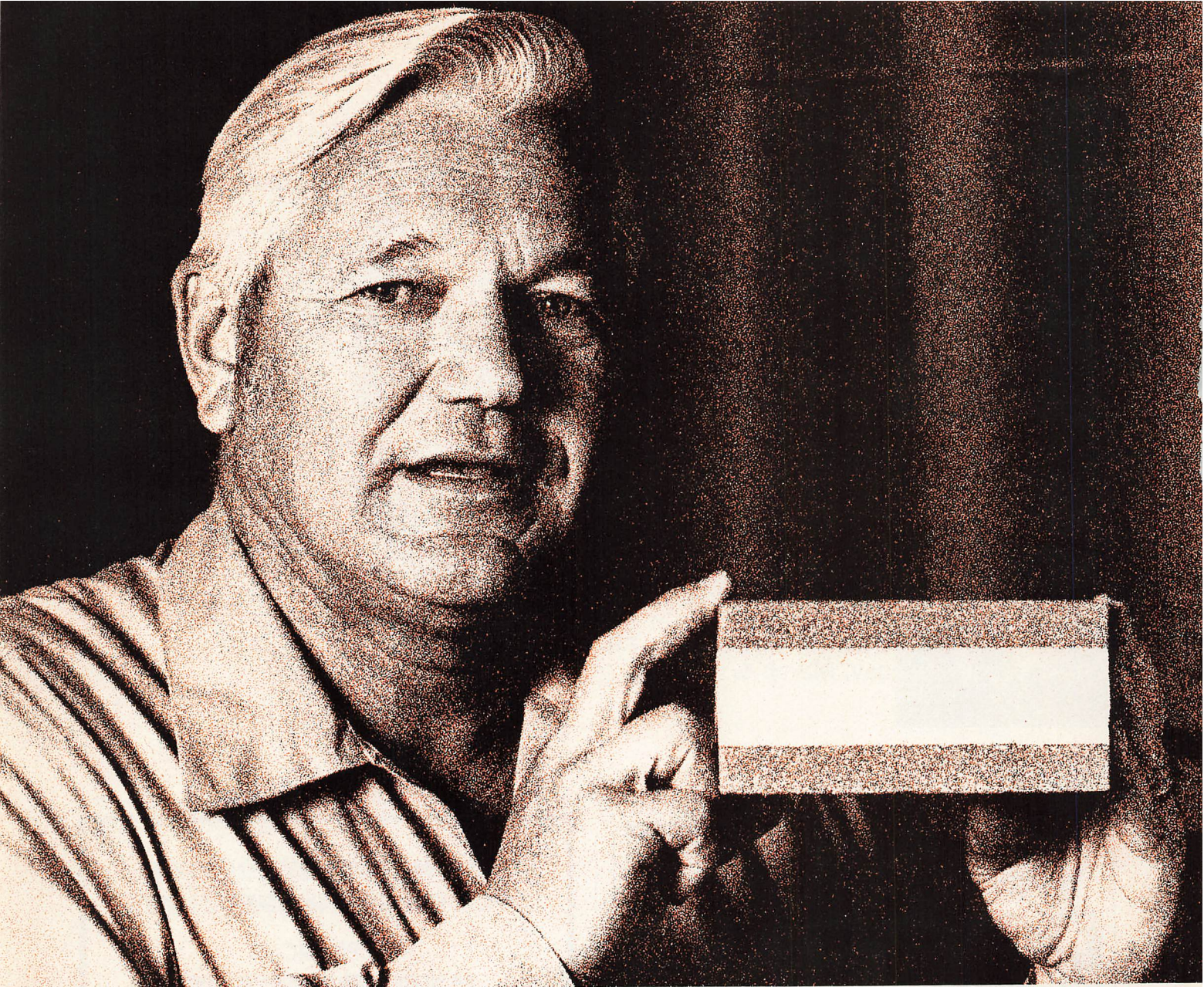
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1982 Construction Forecast —continued

"For 1982 this means holding expenditures for public-works construction to between 85 and 90 percent of the total authorized by existing legislation, or about 5 percent less than the actual amount spent in 1981. It could easily run higher, if the budget deficit leads to greater pruning," he said.

In addition, Christie sees little reason to expect any more than nominal improvement in construction contracting for generating facilities in 1982.

"The electrical-power industry is currently coping with excess capacity, lowered expectations of future energy requirements, and disenchantment with nuclear alternatives," he said.

"But things are quite different in the natural gas industry, due to the Alcan gas pipeline that has the strong backing of the Reagan Administration," Christie said. "A

new segment of the Alcan pipeline boosted utility construction

Local units of government must take up the slack in the cutbacks of federal building projects. . . .

George Christie

by \$1.5 billion this year. Another construction pipeline project, val-

ued at \$3 billion, is scheduled for 1982."

"On balance," concluded Christie, "the priorities of Reaganomics are more suppressive than supportive of construction. Militarization and industrialization simply do not involve much in the way of construction." Much of the deferred construction potential of the early 1980's can eventually be realized, Christie said.

"But it will only happen if local governments assume responsibility for the programs that the Federal government is abandoning, and inflation subsides enough to permit interest rates to return to a workable level. These changes, unlike tax and budget cuts, cannot be legislated. Only when this happens can the construction and building materials industries again approach full-scale operation," Christie said.



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Built-Up Roofing A Performance Concept

by R. L. Bonafont
Ruberoid Building Products Ltd.
London

There are two numbers associated with any built-up roofing system. The first is its installed cost and the second relates to its latent performance. The useful measure of cost effectiveness is simply the latter divided by the former. However, unless performance can itself be quantified, albeit approximately, the notion of cost effectiveness remains sterile and of no practical use.

The first step is to scrutinize the very concept of performance in relation to built-up roofing in order to provide a sound and rational basis for design, materials selection and specification.

The building owner is primarily concerned with the **performance** of the membrane **system** as a whole. It follows that materials, products and system components cannot necessarily be judged in isolation, but need to be assessed in combination with the other elements of the roof systems of which these particular components form part.

It is a function of design to so select and combine materials as to achieve optimum joint action and to engineer out as far as possible incipient component limitations.

The key words are:

- the **System**, and
- the **performance** achievable with that system

THE SYSTEM

The system is the totality or set of interacting system elements as supplied and fixed for use under service conditions. The criterion which determines membership of an element to a system is the degree to which behavior of that element influences the performance of the system to which it is presumed to belong.

Thus, a roofing system will generally include the following elements;

- Load bearing substructure.
- Vapor barrier, if any.
- Thermal insulation, if any.
- Membrane systems, which may be composed of one or more preformed sheeting bonded together or otherwise sealed to form a single composite waterproof membrane, or may be composed entirely of liquid applied material with or without reinforcement.
- Membrane protection or surfacing treatment, if any.

While the elements of the systems as described above relate to function, the design or system variables of interest are those related to:

- The physical dimensions of elements and sub-elements.
- The properties of materials in each element at any given time.
- The combination and relative position of elements within the system; because combination will itself influence performance (eg. warm roof, cold roof and inverted roof assembly).
- Workmanship.

GENERAL DEFINITION OF SYSTEM PERFORMANCE

The function of performance is to ensure the fitness for a specified purpose when the system is properly installed, and the ability to continue to perform as required for an acceptable or specified period of time.

System design and related materials selection have to study two distinct sets of requirements.

First, there are the **long term** requirements which ensure that the system is initially fit and then remains so for the intended life of the system.

Second, there are the **short term** requirements to ensure that the system components and assembly operations are reasonably tolerant to site and weather conditions such that proper installation is

highly probable in the first instance.

The specifier is mainly concerned with the long term requirements, it being reasonably assumed, although not always so, that the manufacturers have met the practical short term requirements of the contractor.

However, both sets of requirements are of equal importance. There is clearly no merit in having materials which are potentially advantageous in the long term if they are likely to be too sensitive to workmanship and weather under normal site conditions. Nor is there any merit in materials which are easy to assemble on site but unlikely to give satisfaction in the long term.

Any laboratory evaluation program of materials or systems must assess compliance with both long and short term requirements. Experience in England has tended to show that single layer performed sheeting systems and liquid applied membranes involve a greater risk of call-back and are not favored in some quarters for this reason. The greater risk is in a large measure due to the lesser tolerance of such systems to site and weather conditions in England.

AN APPROACH TO DESIGN METHODOLOGY

The general definition of systems performance given previously is useful as a succinct description of overall design objectives, but it is far too general to form a basis for a design methodology.

The key word to be associated with performance is **durability** in both its inherent and structural sense. It is the failure to achieve intended durability that creates the problem for building owners, designers and contractors alike. Therefore, the 'pathology' of roofing is the natural and logical starting point for a design and specification methodology.

The ultimate purpose of materials selection and system design must be to minimize the risk of premature malfunction or failure to meet intended requirements. For present purposes, a failure may be regarded as any manifestation which, if it occurred, would result in a justifiable complaint on the part of the building owner.

The design and specification procedure must of course deal with matters other than incipient failure. A system is required to comply with building regulations, and may have to meet specific requirements in respect of fire or safety. These aspects are not the subject of this article, but must not be overlooked in the overall design process.

All cases of roofing failure (other than those caused by natural cataclysms) can be traced to human error of one kind or another. It is therefore instructive and possibly salutary to classify such errors into basic categories as follows:

- **Foreseeable design errors;** usually related to inappropriate or impractical details. These arise from a designer's or specifier's avoidable lack of familiarity with the subject or a failure to consult authoritative and experienced sources of information.
- **Workmanship defects,** or misuse or abuse of materials on site.
- **Misjudgments** concerning the level of performance required in a particular case.

A system must desirably offer more than is strictly required of it in order to give a high probability of meeting the performance requirements under service conditions, having regarded to design imponderables, materials tolerances and workmanship variability. The role of the performance concept in this connection is to reduce risk by application of rational design principles.

The probable consequence of a

misjudgement is a roofing failure. A useful starting point for a design methodology is to identify and list failures according to the type of visible consequential damage to the roofing system, if only to ensure that attention is directed to the types of malfunction that are known or likely to occur in practice.

The following brief comments do not purport to deal with the relevant design aspects, but hopefully serve to set a scene.

Wind Damage

Wind damage mainly affects self-finished membranes or those under light-weight surface treatments.

Wind action may give rise to cumulative and often unseen weakening of the roof system over a period of time such that actual damage appears to occur during a relatively light storm. The correlation between intensity of storm and related damage is therefore frequently confusing.

Slippage of Membranes (on slopes or at upstands).

Slippage is prevented by choosing adhesives with resistance to creep at the highest service temperature likely to be encountered on the roof. The incidence of slippage has increased in recent years because of the high standards of thermal insulation in roof construction.

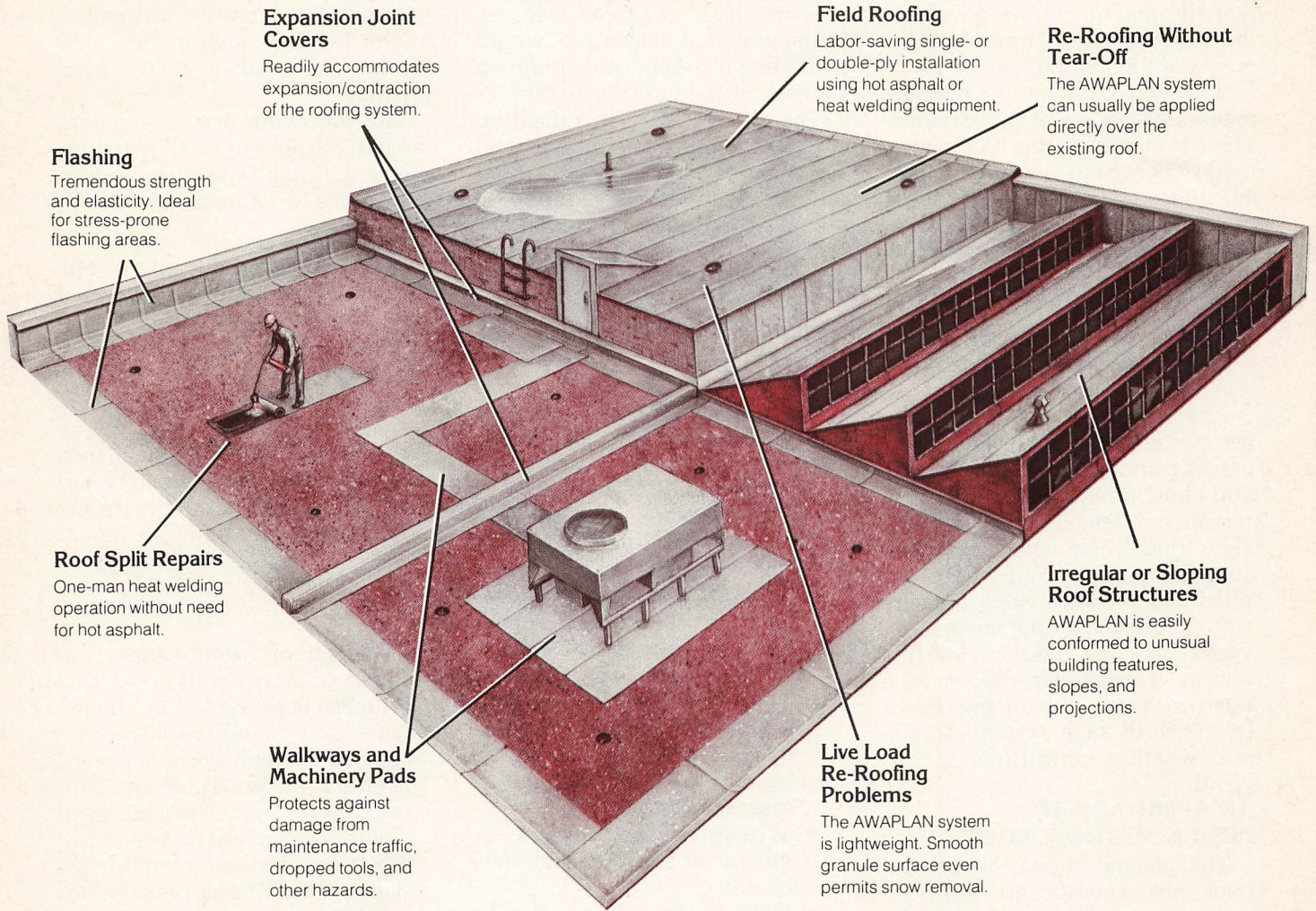
In Britain and on roofs with a pitch in excess of 25°, it is usual to use 115/15 bitumen to bond built-up membranes. When selecting or specifying hot melt adhesive, it is important to ensure by screening tests that their rheological properties are not degraded by normal heating in kettles on site.

continued, page 47

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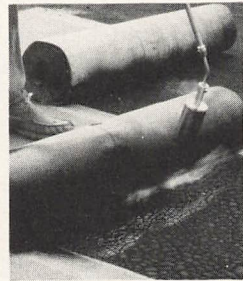
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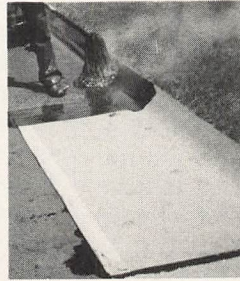
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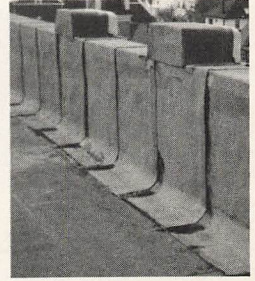
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Roof Edging



Wall Flashing

Alternatively, membranes must be mechanically anchored to resist movement down the slope. The roofings so anchored must be capable of developing sufficient resistance at anchorages to avoid tearing or deforming excessively, and the anchors must themselves be able to carry the loads imposed upon them.

Cosmetic Deficiencies

This embraces a number of different visual defects which may appear on the exposed face of a membrane. Cosmetic deficiencies may remain as aesthetic blemishes of little major consequence, or they may be the precursors of more serious effects likely to result in membrane degradation and ultimately water penetration. The more common visual defects are:

- Lack of color fastness.
- Self-generated staining.
- Corrosion or pollution effects.
- Loss of surfacing granules.
- Flaking or stripping of bituminous coatings
- Membrane blisters.
- Wrinkling.
- Alligatoring.
- Generalized surface disintegration.

Water Penetration: presumed through the roof covering in the absence of obvious defects from wind damage, membrane slippage and cosmetic deficiencies. Cases of suspected water penetration fall into two categories; **Apparent Penetration** and **Actual Penetration**. It is important to appreciate that the appearance of water on the underside of a roof construction does not necessarily imply a leak through the roof covering.

Apparent Penetration

The more common causes are condensation and water entrapped within the roof system during construction.

The subject of condensation

within roofs has received a great deal of attention in the last twenty years. There is ample documentation on the subject in most countries and little excuse today for failure to deal with potential problems at the design stage.

Actual Penetration

The penetration of rainwater through a roof covering arises because of an unintended and generally localized discontinuity in the membrane.

Structural discontinuities are themselves conveniently classified into three categories:

- **Self-Induced Delamination:** a separation or disjoining of previously bonded preformed elements of the covering.
- **Puncturing** of the covering by; human action, animal action and weather action. The puncture resistance of a given membrane system is a property which is difficult to quantify in an unequivocal manner. Membrane systems can be generally ranked in order of resistance to penetration, but the problem of deciding how much resistance is required in any particular case is difficult to resolve objectively and remains largely a matter of judgment.

- **Structural Rupture**

The rupture of the membrane by in-plane forces is caused by the local over-stressing of the membrane with or without prior fatigue weakening. Membrane stresses are generated primarily by movements in the elements of the construction or other materials which are in intimate contact with the membrane and which are therefore able to deform it.

Ice on flat or ponded roofs

should be viewed as a substrate capable of generating stresses in the membrane so covered. Caked mud deposits on a membrane may also generate stresses capable of causing rupture.

In exceptional cases, pronounced shrinkage or thermal stresses in a restrained membrane may contribute towards its rupture.

Selection of Roofing Materials

A built-up roofing membrane consists of two or more superimposed layers of preformed sheeting in combination with a suitable adhesive to support the sheetings, bond them together and to seal the laps to form a single impermeable membrane.

The installed membrane may advantageously be viewed as a single layer material reinforced at various depths by the base fabrics provided in the sheetings.

In a bituminous built-up system, the bitumen provides the waterproofing and the base fabrics act as reinforcement to arrest fissures and to confer added features, such as puncture resistance and nail holding properties.

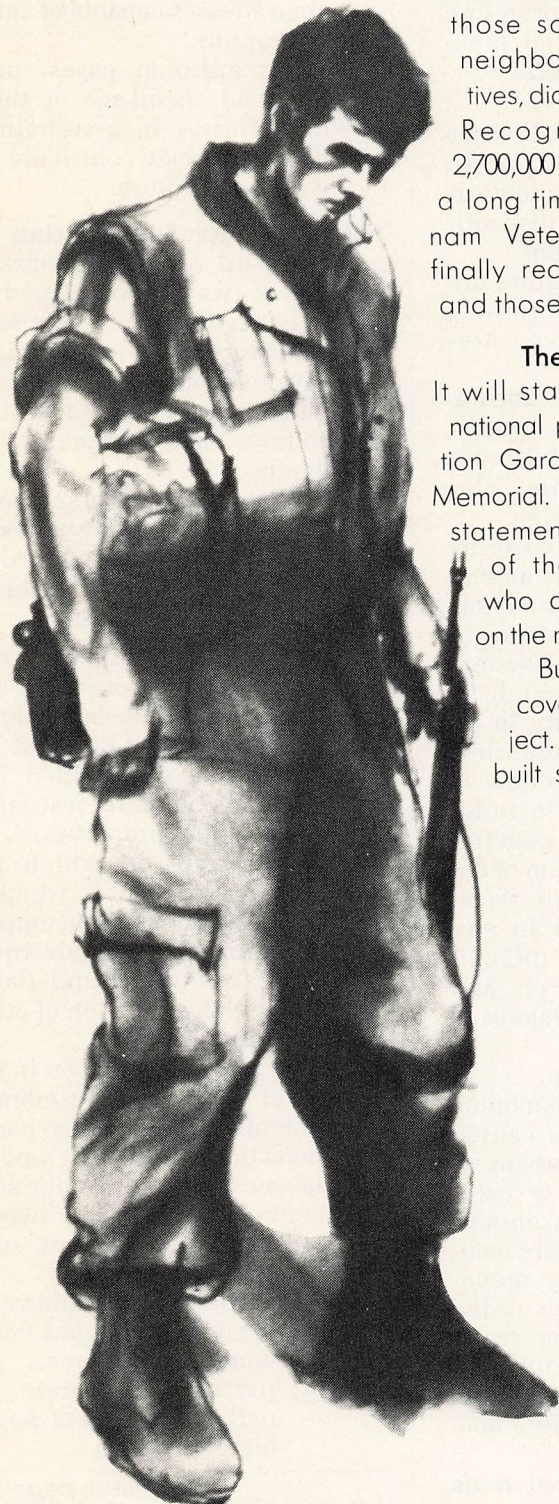
The substrate on which the membrane is laid and to which it is usually attached is an important building element governing the choice of the first underlayer and possibly the selection of other superimposed layers.

The decisions to be taken in the design of a built-up membrane conveniently fall into three parts:

- Selection of the first underlayer as a function of the substrate. The choice is between:
 - (a) fully bonding to substrate,
 - (b) partial bonding and venting or by means of a frame bonding technique,
 - (c) partial attachment by nailing through a suitable underlayer,

continued, page 54

THEY DESERVE TO BE REMEMBERED



Those who served.

They came from high schools and colleges, big cities and little towns.

Some of them were drafted and others volunteered. The war they

fought was controversial at best, greatly despised at worst. But those who fought, those sons and daughters, neighbors, friends and relatives, didn't judge, they served.

Recognition of the over 2,700,000 who served has been a long time coming. The Vietnam Veterans Memorial will finally recognize their service and those who died.

Their Memorial

It will stand on two acres of national park land in Constitution Gardens near the Lincoln Memorial. It will make no political statement. The names of each of the 57,692 Americans who died will be inscribed on the memorial.

But we need money to cover the costs of the project. The Memorial will be built solely with funds from

your tax-deductible contributions. Twenty dollars will inscribe the name of one Vietnam Veteran who died in the war. All donations will help make the Memorial a reality. Remember those who fought and served our country...

Give to the Vietnam Veterans Memorial Fund.

Vietnam Veterans Memorial Fund
P.O. Box 37240
Washington, D.C. 20013

Enclosed is \$100 ___ \$50 ___ \$20 ___ Other ___
for the Vietnam Veterans Memorial.

Name _____

Address _____

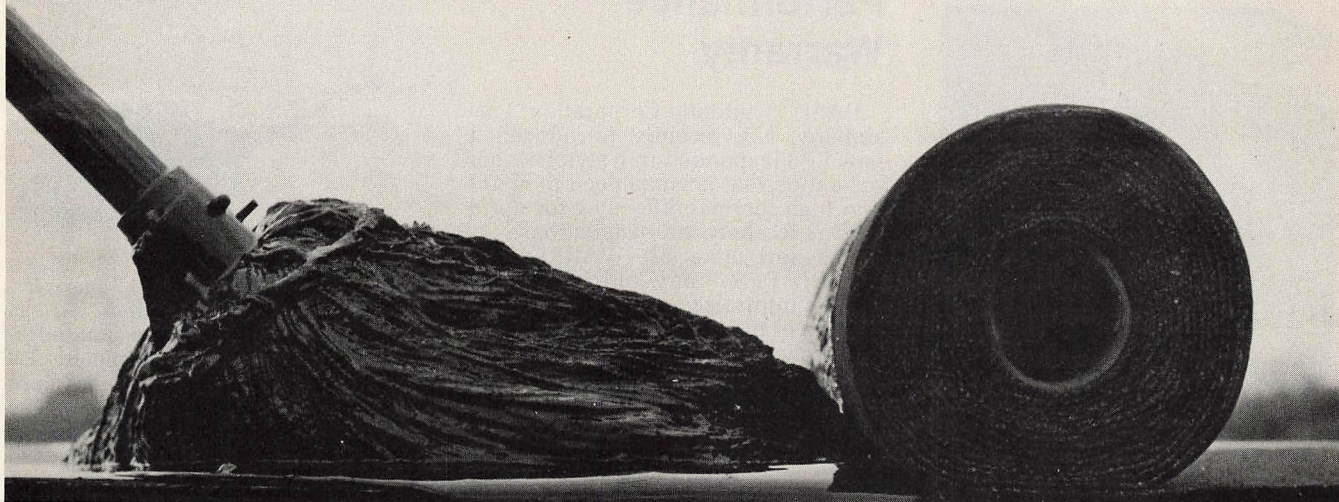
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VIETNAM VETERANS MEMORIAL FUND

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Siplast thinks so.

Everyone realizes the benefits of an elastomeric roof. But what about the time and money you've invested in hot asphalt?

Paradiene gives you the best of both worlds.

Paradiene can be applied conventionally, only by Siplast approved contractors, using hot asphalt as the adhesive.

Most important, however, is the glass-reinforced elastomeric asphalt base found in Paradiene's top and base ply. It allows 100% elongation with full recovery. So when your building expands, Paradiene also stretches. And when your building contracts, Paradiene contracts right back with it.

And this elasticity lasts.

With 14 years of experience and millions

of squares presently in place, Paradiene continues to retain its elasticity through the sun's severe ultraviolet rays, thermal shocks, random ponding water and extreme low temperature.

Because of its granular surfaced top ply, Paradiene doesn't require gravel, making it a relatively lightweight system at a maximum of 180 pounds per square. This makes it ideal for new and re-roofing applications.

Available in seven colors, the Paradiene system has a time-proven performance record, guaranteed against leaks for 10 full years.

So when you invest in your next roofing system, why forfeit anything?

Paradiene. Because quality with profit is the name of the game.



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In Arkansas, Call Collect 501/246-8094

New products, ideas, publications

New LP Torch From Goss, Inc.

Goss, Inc., a manufacturer of flame tool equipment, has introduced a new Ready-Flame Torch that uses vapor LP gas and is designed specifically for bonding new self-adhered membrane roofing materials.



The Ready-Flame Torch is equipped with a lever that, when squeezed, causes the torch to emit a full brush flame. When the lever is released the flame automatically returns to a previously adjusted level. This feature increases job efficiency and decreases fuel consumption.

Benoit Offers a 12-page Booklet Outlining Three New EPDM Systems

A 12 page color brochure is now available from Benoit Inc. illustrating its three EPDM roof membrane systems, Balleded, Fully Adhered and Batten Fast. The publication describes the advantages of using these systems for new and reroofing.

The EPDM membrane has been used throughout the world since 1963 with over 2 million squares installed on all types of structures. The membrane is manufactured without using talc and the manufacturer claims the Benoit field seams develop over six times the strength of a conventional adhered seam. Vulcanization requires the equivalent of 24 hours at 160 degrees F.

The Benoit Balleded system is U.L. approved for class A construction and the fully adhered and Batten Fast systems are F-M approved for Class I construction.

Complete data, samples and color brochures are available upon request. Call or write Benoit Inc., 635 North Prior Ave., St. Paul, Minn., 55104; (612) 646-1387 or 1-800-328-1436.

BASF Presents a Five-year Thermal Performance Warranty

BASF Wyandotte Corporation, Parsippany, N.J. recently introduced a new EPS (expanded polystyrene) roof insulation that is guaranteed to maintain high thermal efficiency for up to 5-years in approved installations.

The new material—WARRANTY-GRADE EPS—may help building owners minimize heating and cooling costs over many years of service. The comprehensive thermal performance warranty is made possible because of the product's high resistance to moisture and aging, the manufacturer claimed.

The new insulation might also provide improved cost-efficiency compared to other materials. According to BASF research, WARRANTY-GRADE EPS has twice the R-Value per dollar of glass fiber, fiberboard and perlite roof insulation—and about one third more R-Value per dollar than either urethane or extruded polystyrene foam insulation.

WARRANTY-GRADE EPS is manufactured by a number of independent companies throughout the U.S. from BASF Styropor® expanded polystyrene. It is available in almost any thickness, as flat or tapered roof insulation, and as factory laminated composite roof insulation.

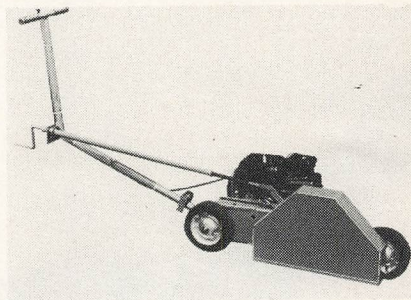
For more information on the product, where to buy it and BASF's warranty plan—write: BASF Wyandotte Corporation, Styropor Division, 100 Cherry Hill Road, Parsippany, N.J. 07054.

Cartoon Hero Promotes New Roofing Shingle

Woody Woodpecker, that devilish bird that has entertained generations of Americans, is now helping Elk Corporation of Dallas, promote Prestique laminated fiberglass roofing shingles to dealers and applicators.

Aeroil Cutter Works Under Roof Equipment

The Aeroil Products Company has introduced a powered roof cutter for cutting under roof mounted equipment such as air condensers and cooling towers.



This unit, the "LO-PRO," has a low profile cutting head which will accommodate either a two-or-four edged cutting blade of 12" diameter. The power head is positioned so that closer cuts can be made to parapets, skylights and other roof projections reducing the need for hand labor.

The "LO-PRO" weighs only 97 lbs and the double jointed handle can be folded, reducing overall size and permitting it to be carried in a small truck or station wagon.

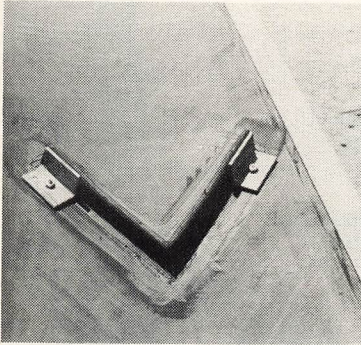
New PAC-CLAD in Five Colors

After five years of tests, Petersen Aluminum Corporation has introduced PAC-CLAD 70% Kynar 500® fluoropolymer finishes for heavy galvanized steel. PAC-CLAD can be used for mansards, flashing, coping, gravel stops, and general sheet metal use. PAC-CLAD is available in five standard colors from Petersen Aluminum's Chicago and Dallas warehouses in 48" widths. Special sizes and colors can be supplied in minimum quantities from 20,000 to 40,000 pounds.

The manufacturer conducted all-weather tests in southern Florida before bringing this product to market and the results of those tests are available by writing: Petersen Aluminum Corporation, 3825 North Willow Street, Schiller Park, Ill., 60176 or call (312) 671-2510 or 800-323-1960 outside Illinois.

Morgan Offers New Cleat Stiffener

Cleat stiffeners are now bolted behind the V-cleats on the Morgen Roofers Conveyor belt. With the cleat stiffeners attached, the Roofers Conveyor can handle packaged material that is wider than the belt at the maximum angle of elevation.



The cleat stiffeners are available for installation on previously purchased conveyors.

For more information, contact Morgen Manufacturing Co., P.O. Box 160, Yankton, S.D., 57078.

Cedar Shingles Meet National and Local Codes

Eastern white cedar shingles are available now with fire-retardant treatment to expand use in residential and commercial building construction.

The shingles are being pressure treated with a proprietary fire-retardant solution by Koppers Company Inc. Pittsburgh, Pa., to meet national and local building codes.

In tests conducted by Underwriters' Laboratories, the Koppers fire-retardant treated white cedar shingles obtained a classification as Class C prepared roof covering materials.

Details on the Koppers white cedar shingles may be obtained by writing to Koppers Company Inc., Architectural Building Products Division, 1900 Koppers Building, Pittsburgh, Pa. 15219.

J.P. Stevens Introduces Hi-TUFF System

J.P. Stevens Elastomeric Products Department has introduced Hi-TUFF, a new flexible membrane system, now

being marketed in the Northeast U.S. for commercial and industrial roof applications.

Stevens Hi-TUFF is a high-strength, flexible membrane with a web of polyester scrim sandwiched between two unbalanced thicknesses of a compound based on Hypalon, a synthetic rubber. It is easy-to-handle, easy-to-install and offers a high degree of dimensional stability, tear-resistance, abrasion-resistance and weatherability, the manufacturer claims.

Eventually, Stevens plans to market Hi-TUFF nationally. Additional information can be obtained by contacting the J. P. Stevens Elastomeric Products Department, Easthampton, Mass., 01027.

Rufon Fabrics Sold By Phillips Fibers Corporation

Phillips Fibers Corporation has developed and is marketing a line of nonwoven fabrics with properties specifically engineered to meet the requirements of the industrial roofing industry.

Trademarked Rufon, the new fabrics are manufactured from 100 percent man-made fibers. They are currently available in weights ranging from 2-6 oz./sq. yd. and up to 15 feet in width, are lightweight, flexible and resistant to rot and mildew.

Rufon is used in single-ply roofing systems as a slipsheet between decking and the PVC waterproof membrane, as a separator sheet of stone mat between ballast and insulation in inverted roofs, and as a reinforcement membrane between bitumen layers in felt roofing structures.

Marathon Introduces New Roof Insulation Venting System

Marathon Roofing Products Inc. has announced a new insulation vent—the Ex-Flow Insulation Vent. Marathon Ex-Flow Insulation Vent is made of tough, lightweight, high density polyethylene.

The deck flange is 10½" in diameter, the body has a vent area of 5¼" in diameter and is 8" high. It features a vandal-proof cap and special silicone rubber valve.

The valve operates in a wide range of temperature extremes to release trapped air, gas and water vapor from within flat roof insulation and prevents their return.

The Marathon Ex-Flow Insulation Vent operates on a single principle—the heat of the sun will raise roof temperatures to 150°–170°F or more. As the roof temperature increases so will the insulation layer, causing any moisture present to be converted to water vapor. Water will expand 1,500 times its initial volume when vaporized.

The internal pressure created by water vapor forces the valve of the Marathon Ex-Flow Insulation Vent open, allowing the release of moisture and pressure. When the internal and external pressures are equalized, the valve closes, thereby preventing air re-entry. The protective cap bars snow and wind-blown rain.

Roof venting with Marathon's Ex-Flow Insulation vents is recognized as good insurance against blisters, cracking and alligating.

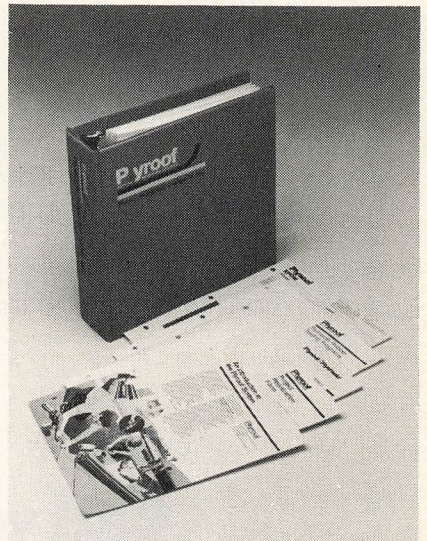
The Ex-Flow Insulation Vent is now available from Marathon distributors throughout the United States.

Single-Ply Specs

A new 72-page Specifications Guide on all Plymouth Plyroof Single-Ply Membrane Roofing Systems now is available from the Plyroof Division of Plymouth Rubber Company.

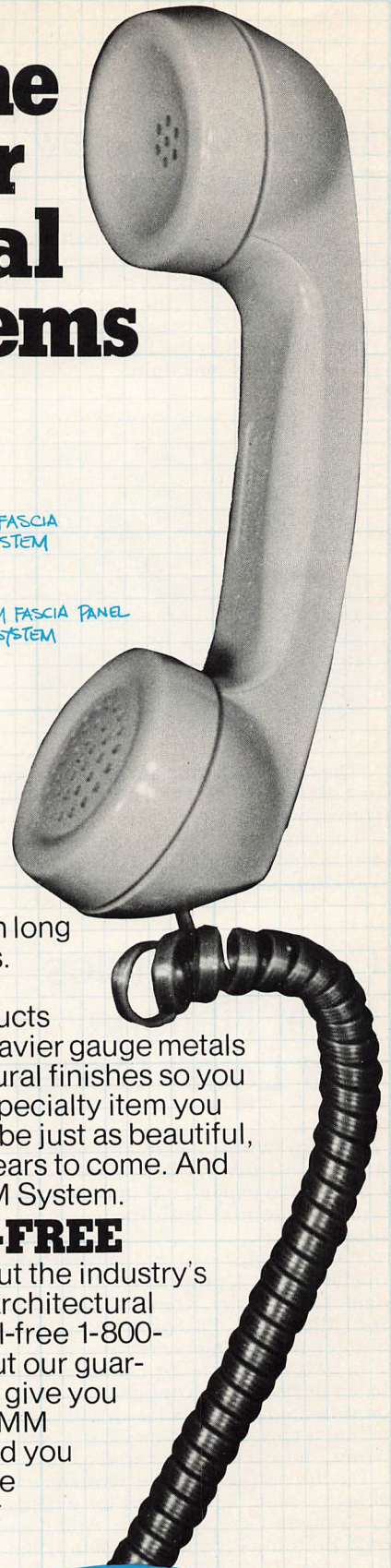
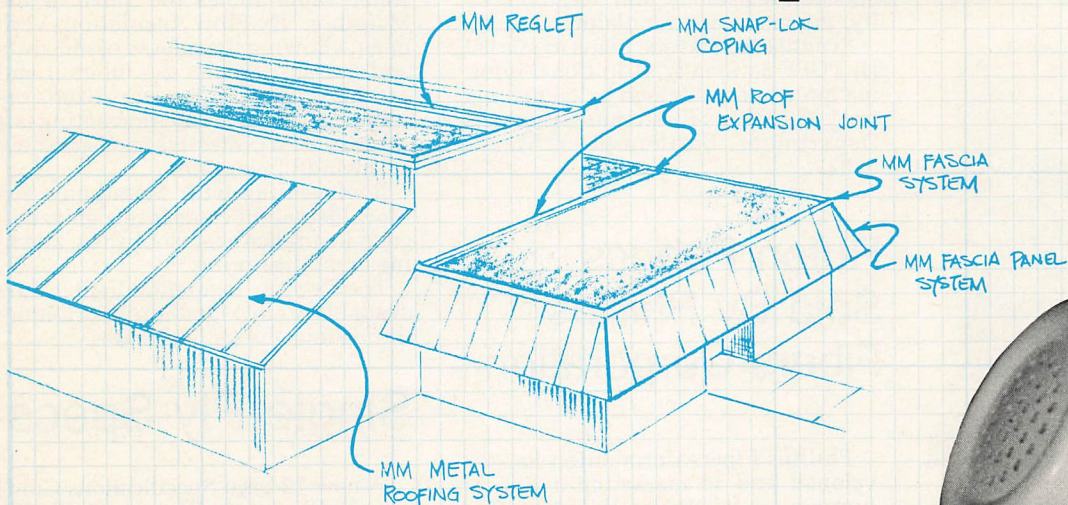
The new binder details a history of installations, and the company's warranty programs, as well as detail drawings, specifications and installation guides for Plyroof PVC, SRC, Plyseal EPDM and Plyshield Neoprene roofing systems.

In addition, the binder has Estimating Guides, Accessory Materials, Testing Program Information and Product Samples.



The new binder is available to architects, engineers and installing contractors; inquiries should be sent to Plyroof Division, Plymouth Rubber Company, 104 Revere Street, Canton, Mass., 02021.

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SERI Publishes Third Edition of Solar Education Directory

The Third Edition of the *National Solar Energy Education Directory* has been published by the Department of Energy's (DOE) Solar Energy Research Institute (SERI).

The 280-page *Directory* is a comprehensive, up-to-date listing of 2,308 solar-related courses and 367 programs and curricula offered at over 892 post-secondary educational institutions nationwide. SERI specialists anticipate that the publication will be of particular value to science teachers and guidance counselors in assisting students selecting higher education as preparation for solar-related careers.

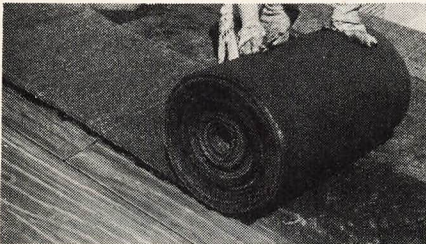
Kevin O'Connor, of SERI's Academic and University Programs Branch, said the *Directory* is the result of a survey conducted with the cooperation of SERI, the Department of Energy, the Office of U.S. Congressman George E. Brown, Jr., (D-Calif.) and the Congressional Solar Coalition. Over 9,000 surveys went to approximately 4,400 U.S. post-secondary institutions.

"The *Directory* is available through the U.S. Government Printing Office and consists of detailed information on all programs, courses, and curricula offered by the responding institutions and other sources of information," O'Connor said.

For a copy of this *Directory*, write: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402; Stock #: 061-000-00534-7; Price: \$7.00. Make check or money order payable to Superintendent of Documents.

Clarmac RM-a New Roofing Membrane

Clark-Cutler-McDermott, a leading manufacturer of adjustable machine mounts, vibration pads and engineering fabrics, is introducing CLARMAC RM, a new flexible asphalt-impregnated polyester fabric roof membrane.



The manufacturer claims this new single-ply membrane reduces installation time and material costs, re-

sponsible for the expense of "built-up" roofing construction.

CLARMAC RM is applied directly over a tack coat of emulsion or hot-mopped roofing adhesive and is covered with a finish coat of emulsion or hot-mopped asphalt. Aggregated topping is optional.

CLARMAC RM is packaged in rolls 36" x 150' or 72" x 75'. Weight is 22 oz/sq. ft. or 14 lbs. per square.

For more information write: Clark-Cutler-McDermott Co., P.O. Box 269, Franklin, Mass. 02038.

"Air Force I"

"AIR FORCE I" is an air-powered mastic/resaturant sprayer for cold roof coatings, interplys, and waterproofing which has been introduced by Aeroil Products Company.

"AIR FORCE I" consists of air operated pump, air operated hoist, air operated hose reel with 200 feet of hose and a spray wand with "reverse-a-kleen" tungsten carbide spray nozzle, all connected to a master control panel.

"AIR FORCE I" is available with a mastic/resaturant preheater, air compressor and a granular hopper.

This unit integrates all equipment into a single organized operating system and is mounted on a heavy duty trailer towable at highway speeds.

Book Helps Architects Weigh Construction Systems Costs

A new edition of a book designed to aid architects in projecting current building costs has been published by McGraw-Hill Cost Information Systems Division.

Titled "1982 Dodge Construction Systems Costs," the book assists architects, contractors and building owners. It offers detailed price information on superstructure, foundations, partitions and other major construction data for over 44 building types. This information enables architects to make easy cost comparisons for each part of a building.

"With little calculation, an architect or contractor can make a cost comparison—such as looking up prices of various exterior walls, or examine trade-offs between design and cost of different building parts," says chief editor Percival E. Pereira. "Basically, the book enables readers to quickly evaluate costs of specific design decisions."

The 1982 edition of "Dodge Construction Systems Costs" sells for \$46.65 and is available by writing to McGraw-Hill Cost Information Systems, 1221 Avenue of the Americas, Suite 1757, New York, NY 10020.

Systems IV

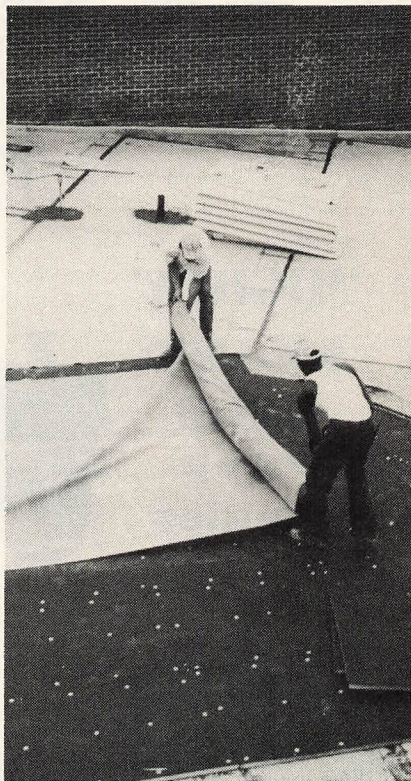
Consolidated Fiber Glass (CONGLAS) of Bakersfield, Calif., recently introduced Systems IV, a new series of Built-Up Roofing Specifications. The specifications incorporate the use of heavily reinforced fiber glass base and ply sheets that exceed the minimum tensile strength requirements set forth in ASTM D-2178 for Type IV ply sheets.

Conbase W-1 IV is a heavy fiber glass base sheet and the successor to Conbase W-1, the first all-fiber glass base sheet introduced to the industry in 1974. The product weighs 25 lbs. per square and is shipped in 3 square rolls.

Conply A/IV is a porous, hi-tensile strength ply sheet complying with the standards set forth in ASTM D-2178, Type IV. The product weighs 11 lbs. per square and is shipped in 5 square rolls.

Firestone RubberGard

Workers atop a school building near Knoxville, Tenn., roll out RubberGard roofing material prior to bonding it to already installed insulation material.



Firestone's RubberGard distributor in Knoxville is rushing to complete many RubberGard installations before the World's Fair is held in the city in 1982.

(d) loose laying.

- Selection of the membrane finish to suit the functional requirements in respect of fire codes, aesthetic considerations, roof traffic, and chemical resistance or other special technical needs.
- Selection of materials for the core of the membrane.

The point to note is simply that different levels of performance may be achieved by the selection and combination of appropriate materials to suit particular requirements. The aim of informed design must be to select a particular level of performance at the least installed cost, unless money is no object.

CONCLUSIONS

Roofing materials cannot be properly evaluated in isolation.

The customer buys the latent performance of a system and a system is essential for sound design.


The substrate to which the built-up membrane is applied will usually have an important bearing on the composition of the superimposed membrane.

The purpose of the many so called high performance roofings is to provide an opportunity to increase safety factors in respect of one or more design factors or then to provide specific system features, like puncture resistance, chemical resistance, etc.

The selection of reasonable safety factors for a particular case must largely remain a matter of judgement over which opinions may differ. Many problems with flat roofs stem from the provision of inadequate safety factors.

Relatively high safety factors should be considered in cases which:

- The consequential cost of a roofing membrane failure is high,
- The membrane in the finished construction is hidden from view and largely inaccessible for timely maintenance and repair.
- There is going to be heavy-foot traffic on the roof, and
- Where the roof is subject to ponding and therefore liable to the mechanical effects of ice.

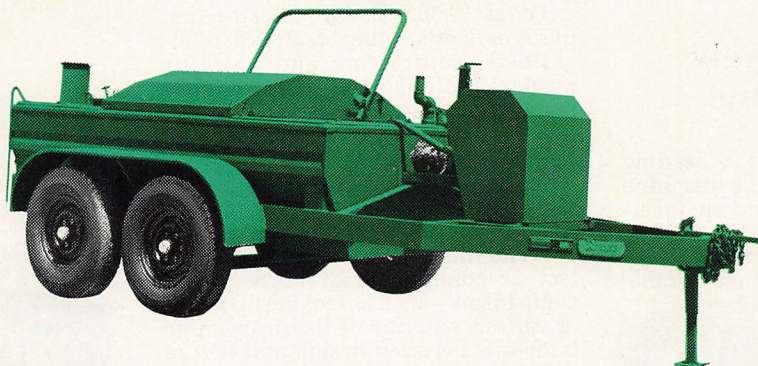
Finally, consistently satisfactory control of moisture in buildings will greatly depend upon the application of an engineering design approach in order to balance cost and risks with due regard to the laws of physics. 



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IT'S THE LAW! Warning Lines on roof jobs...

(See Federal Register dated November 14, 1980.)

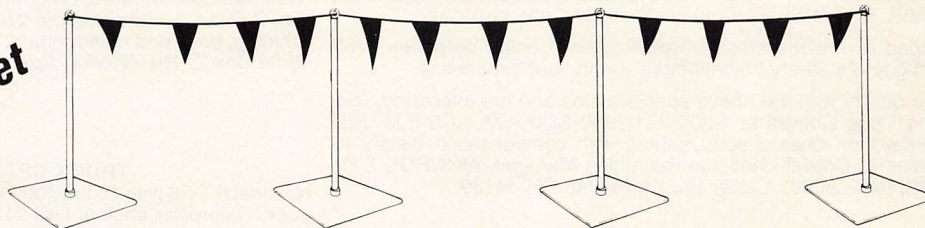
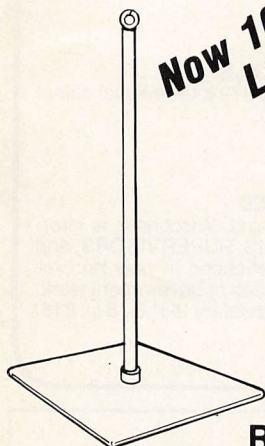
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IMPROVED! Now a longer system and
At a lower price per foot!

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Conforms to New OSHA Regulations

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**HILCO Perimeter Warning
Line System Consists Of:**

4 Base Sections with Stanchions

**100 foot Warning Line with
Bright Red Plastic Pennants**

**ONLY
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PER SYSTEM**

**Shipping Weight
Approx. 210 lbs.**

RULES FOR OSHA STANDARD ON ROOF WARNING LINES

Taken from: Federal Register Vol. 45, No. 222, Dated Nov. 14, 1980, Page 75618.

"The system is not intended to serve as a positive restraint, but only as a warning system."

Warning lines may be used only on low pitched roofs with a height of greater than 16 feet. Warning lines shall be erected and maintained as provided in this standard.

Warning lines shall be erected around all sides of the work area and at access paths to work and materials storage areas. Warning lines are NOT to be used at roof edge materials handling areas.

When mechanical equipment is not being used, the warning line shall be erected not less than six feet from the roof edge.

When mechanical equipment is being used, the warning line shall be erected not less than ten feet from the roof edge perpendicular to the direction of equipment operation and six feet from the roof edge which is parallel to the direction of equipment operation.

OSHA REQUIREMENT

- 16 lb. test at 30" on stanchion before tipping over.
- Flags or pennants to be 34"-39" from roof surface.
- Flag or pennant line shall have a tensile strength of 500 lbs.
- Warning line shall be flagged at not more than 6 foot intervals.

HILTS TESTED

- 19-20 lbs. before tipping over.
- 37"-39" from roof surface on stanchion (do not allow pennant to sag below 34")
- Pennant line test 550 lbs.
- Pennants every 13 inches.

The above is only a very brief outline of the published law and should not be the sole criteria for using or not using a warning line system.

It is suggested that you obtain a copy of the Federal Register mentioned above so that you can get the FULL scope of what is required by OSHA.

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CLASSIFIED

Place a classified ad in *Roofing Spec* for 25 cents per word. There is a minimum charge of \$10.00. Boxed or display advertisements are available in the classified section for \$20.00 per inch (one inch minimum). Ads using blind boxes available at no additional charge to NRCA members; non-members add \$5.00 to total order. Send ad copy and payment to: Advertising Manager, *Roofing Spec*, 8600 Bryn Mawr Ave., Chicago, Ill., 60631

ROOFING TECHNICAL SERVICE REP

We're a subsidiary of MONROE INCORPORATED, an international manufacturer of cold process roofing systems and we're in search of a TECHNICAL ROOFING TROUBLE-SHOOTER WHO MUST BE EXPERIENCED in APPLICATION and DESIGN OF HOT, COLD & SINGLE PLY SYSTEMS. You MUST ALSO BE EXPERIENCED in dealing with customers and contractors and in the IDENTIFICATION and SOLUTION OF ROOFING PROBLEMS. You will be required to TRAVEL EXTENSIVELY, domestically and internationally.

Included is major-medical-hospitalization, dental, corporate profit sharing and a salary commensurate with your experience.

If you qualify with the above specifications and are interested, telephone Doug Colwell at 1-800-321-7990 8:30 A.M. to 5 P.M. EST weekdays or forward your resume with compensation history to: Douglas A. Colwell, National Recruiting Manager, MONROE SYSTEMS, INC., 30801 Carter St., Cleveland, OH 44139

Roofing Supt.
Top Salary

Looking for individual who has minimum of 10 years experience in B.U.R. Must be able to sell & supervise. Excellent starting salary & benefits for full time position. If you are a selfstarter & looking for the best opportunity of your life, this will be the job for you. Must have excellent references. Apply Box "QA," NRCA, 8600 W. Bryn Mawr Ave., Chicago, Ill., 60631.

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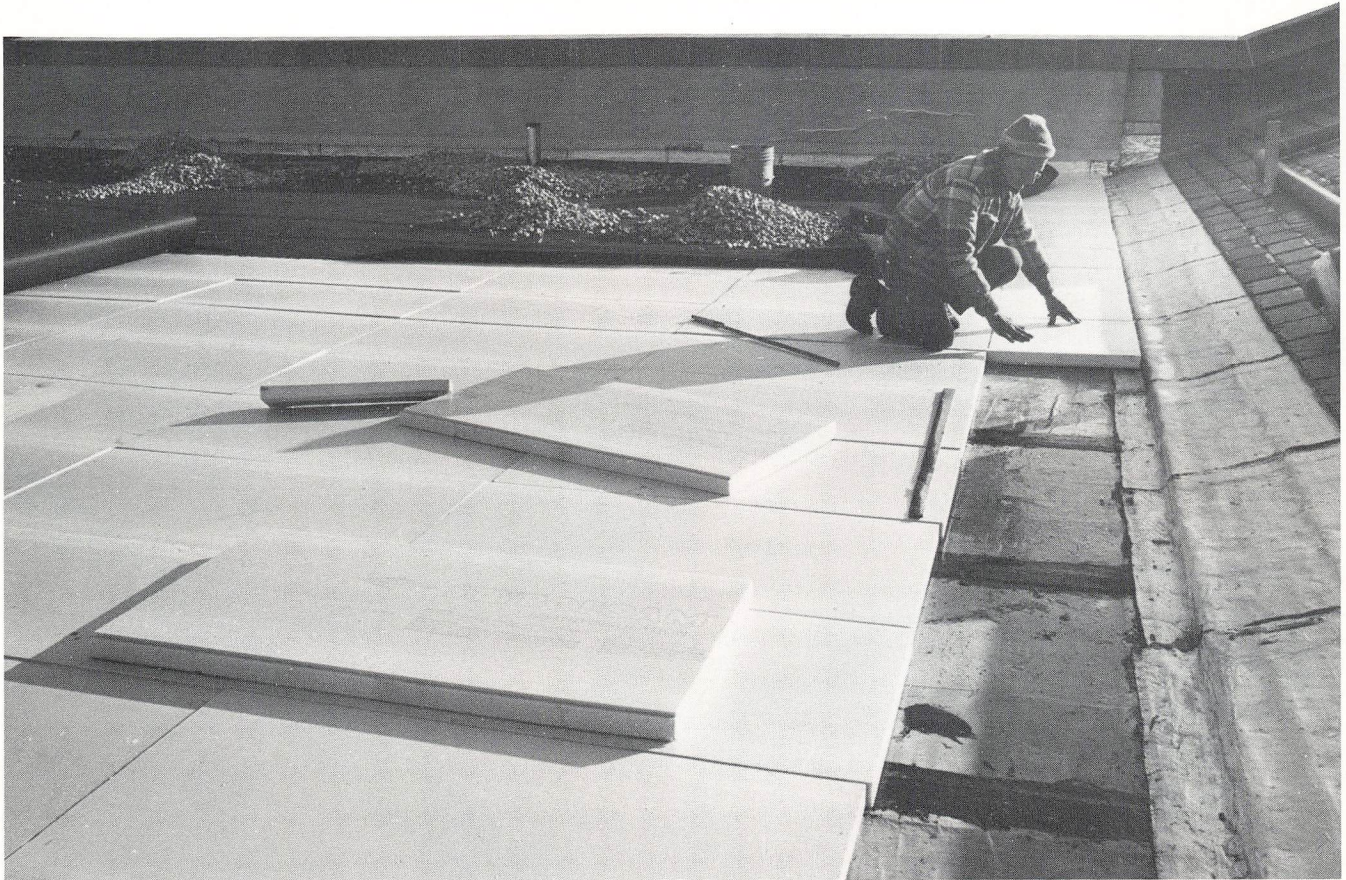
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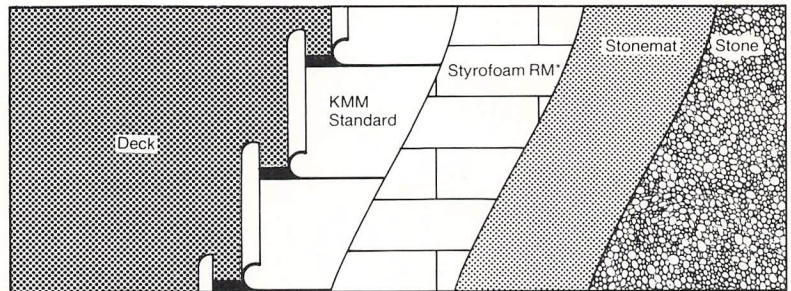
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