RCI Interface MAR 1992

The Foam Line

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North Carolina Foam Industries, Inc.

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POLYURETHANE FOAM CHEMISTRY

Spray-applied polyurethane foam is a unique roofing material. It is sprayed as a liquid directly onto the roofing substrate; within seconds, it foams, expanding 20 to 30 times its original volume. The foam forms a fully adhered, closed cell structure which resists water infiltration while providing insulation. Because of these properties, spray-applied polyurethane foam can:

IMPROVE DRAINAGE: Polyurethane foam can be applied in varying thicknesses to eliminate existing ponded areas and build taper into the roof surface.

INSULATE: The aged R value of polyurethane foam is about 6.3. Thickness may be built up to achieve a desired value.

WATERPROOF: Polyurethane foam's closed cell structure prevents liquid water penetration. Because foam is fully adhered to the substrate, there are no channels for water to flow even if the foam is punctured.

BREATHE: Water vapor diffuses through polyurethane foam. Unusual vapor drive problems can be solved by the appropriate use of polyurethane foam and vapor retarders.

SELF FLASH: Separate flashing and counter flashing materials are generally eliminated.

Like all roofing systems, spray-applied polyurethane foam roofs must be properly designed and installed; it's the purpose of this and subsequent articles to provide clarification and information to the professional roof consultant so that polyurethane foam roofs may be designed, maintained, and repaired intelligently. The remainder of this first article will discuss the basics of polyurethane foam chemistry.

FOAM CHEMISTRY

Polyurethane foam is the product of chemical reaction: the reaction occurs on the roof surface. Two components, the "resin" and the "iso" are mixed in the nozzle of a spray gun; the mix is spray-applied to the roof surface; the mix reacts, forming a rigid foam.

Basic Ingredients

All polyurethane foam system manufacturers package their foam chemicals in two container sets (drums, tote tanks, or pressurized tanks). With the exception of some pressurized tank systems, the containers are labeled with the contents and color coded. The containers may come letter coded as follows:

"A" Side	Iso (isocyanate) Component
"B" or "R" Side	Resin Component

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Don't ever mix the two components without the proper equipment. Equipment used for one component must never be used for the other. The iso and resin will immediately react when mixed; cross contamination will result in a real mess.

Foam chemical systems have shelf lives. The catalyst in the system can age and "die." Verify that the foam system being applied is within the manufacturer's stated expiration date.

Foam systems are formulated for use at specified air and surface temperatures. Fast, regular, and slow systems are available for varying seasonal conditions. Always use the manufacturer's recommended system speed for the specific ambient conditions.

Iso

Polymeric MDI (methylenediphenyl diisocyanate) is an isocyanate which reacts with a polyol resin to form polyurethane. Iso is also highly reactive with water, including ambient humidity.

Handling the iso requires more care than the resin. While in storage and use, iso must be kept clean, dry, and above freezing; otherwise solids (the polymerized product of the isocyanate-water reaction) may form causing later line blockages and poor quality foam.

Resin

"Resin" is actually a mixture of several components (some reactant, some not) including:

1. Polyol: The main reactant ingredient which forms the polyurethane backbone of the foam.
2. Blowing Agent: A gas generating ingredient (may be reactive) which forms and expands the foam cells as the main reaction proceeds. The amount of blowing agent in the formulation determines the foam density.
3. Catalyst: The ingredient which controls the reaction speed of the foam system. A catalyst slowly loses it activity with time; shelf life of foam systems are based on effective catalyst life.
4. Surfactant: Acts as a mixing aid for the components, helps control cell size.
5. Flame Retardant: Reduces the combustibility of polyurethane foam, enabling the foam to meet building code flammability requirements.

While not as sensitive to contamination as iso, the resin mix must also be kept clean and dry. Nonpressurized resin containers may be equipped with a vacuum relief bung. Storage temperatures for resin containers must be controlled (65°F to 85°F). If the resin becomes too hot, evaporation of blowing agent may cause blowing agent losses and/or over pressure of the container. If too cool, the increased resin viscosity will make pumping difficult.

The Foam Line

continued

General

Virtually all foam chemical systems are mixed in a 1:1 ratio. Should this ratio not be maintained, "off-ratio" foam is formed. Off-ratio foam (lacking iso or lacking resin) does not meet the physical property requirements of roofing foam; it will blister or leak water or will manifest itself in some other undesirable manner.

The iso-polyol reaction generates heat (exotherm). This heat of reaction raises the temperature of the foam ingredients, vaporizing the blowing agent and speeding the reaction. The timing of events during foam formation is critical; the foam chemical systems are precisely formulated to control this timing. Foam chemical systems should never be altered in the field.

Polyurethane foam is sprayed in passes or lifts to achieve the full specified thickness (usually one inch minimum for coated polyurethane foam systems and 1 1/2 inches minimum for aggregate covered systems).

Foam must be applied in pass thicknesses of at least 1/2 inch (cured foam). To apply less thickness risks insufficient mass of material to generate the heat and temperature needed to produce high quality roofing foam and reduce the likelihood of delamination.

Because a reacting foam mass generates heat and because foam is such effective insulation, a large mass of reacting foam can build up a lot of internal heat. Although the surface of the foam mass may only feel warm, the internal temperature can get hot enough to degrade the foam. Roofing foams should not be sprayed too thick at one pass (i.e., build up several passes of foam to the desired thickness). Test spraying (to check foam quality, spray pattern, etc.) should be on cardboard or scrap board. These foam accumulations should be minimized or broken up into smaller pieces a few minutes after spraying to avoid heat build up and potential spontaneous combustion.

Foam thickness per pass 0.5 inch MINIMUM
1.5 inches MAXIMUM

Cold substrates can act as heat sinks, absorbing heat from the reacting mass. This may result in a loss of foam yield. At worst, the blowing agent may revert to liquid, causing yield loss and substandard foam qualities.

Under typical conditions, foam yields should be 2 1/2 to 3 board feet per pound, depending on foam density (higher density yields less foam).

Reacting polyurethane foam sticks like glue. Atomized droplets from the spray gun may become airborne. The resulting overspray may stick to nearby clothing, eye glasses, walls, windows, and automobiles. Wear old clothes or disposable garments; do not wear plastic lens eye glasses; protect camera lenses. Unless previously arranged, the applicator is responsible for overspray damage to buildings and cars and should take precautions to avoid this exposure.

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Properties

Typical polyurethane foam properties are:

PROPERTIES	ASTM TEST	VALUE
Core Density	D-1622	2.5 - 3.0 lb/ft^3
In-place Density	D-1622	2.7 - 3.2 lb/ft^3
Compressive Strength	D-1621	35 lb/in^2 Minimum
Closed Cell Content	D-2856	90% Minimum
Thermal Conductivity	C-177 or C-518	0.16 - 0.18 BTU/ft^2-hr-^{o}F-in
Flammability*	E-84	<75

*This standard is used solely to measure and describe properties of products in response to heat and flame under controlled laboratory conditions. This numerical flame spread rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

A CALL FOR WORDS

***Richard M. Horowitz** AIA CRC*

It has been said* that Roof Consultants are Stupid.

(*mainly by Contractors)

It has been said* that Roof Consultants are Ugly, Mean, Cheap, Vicious, Foul-Mouthed, Illiterate, Crooked, Dirty, and Short-Sighted.

(*mainly by other Roof Consultants)

In order to convince an unbelieving world that Consultants can read, write, and cipher, we need examples of writing from our Membership (in English, if possible) to prove you can DO IT.

Such examples might be copies of love letters to someone else's wife, letters seeking to persuade the Utility Company to turn your power back on (Because you fully intended to pay your bill. Really!) or (O, hear the serpent begotten) articles on roofing.

This whole thing is a sneaky way of telling you that the soon-to-be expanded version of Interface, which will be published every other month commencing November 1992, needs lots of stuff to publish from all of you.

This means you! Yeah, you!

Afraid you don't know anything and you will be humiliated if you put your dumb ideas on paper? Don't worry, Dick Canon knows everything and he will fix it up so that it will look like you know what you are talking about.

Afraid you can't spell? Only four people in the whole Institute can and they won't identify themselves.

Afraid of getting sued? (You think you're that good or that important?) Don't worry; our cheap legal counsel (he is cheap because we don't pay him) will look over your writing and will cut out all the juicy parts.

Afraid that people will look you up in the Membership Directory, call you at home, and offer unsolicited advice as to where you should go? (This is called "Networking with your fellow consultants") Hell, you're not going to let little things like that get to you, are you?

A CALL FOR WORDS

continued

So, if you want to prove that you are a Real RCI Consultant and not a wimp, you will go immediately to your word processor, knock out a 2,500 word article showing all you know about roofing and send it to RCI (Attention: Handsome Lyle Hogan, the Author's Friend). Your wife will adore you, your children will look up to you with admiration, strange women will accost you on the street and request your autograph, and RCI might even knock $5 off your dues (we're all heart, but we're cheap, too).

In addition to those reasons (as if they were not enough), consider that being a Published Author will look real good on your resume. RCI is now studying how many RCICEU's (Continuing Education Credits) to award per article. Beside all that, you will be contributing to your Institute and to your Profession. And finally, you will give Lyle a good reason not to publish another article from me (I have submitted a thirty-eight page treatise entitled, "The Roof Consultant and the Meaning of Life," which he says he will inflict on you if you don't contribute!)

Submitted articles are sent to three or four members for review; grammatical, technical, literary. These critiques are sent by the Interface staff to the Author for his study and possible incorporation into his article. No one is sent naked before his peers; you have plenty of back-up and the process is painless, even enjoyable.

It's your Newsletter; it's your Institute. RCI is asking you for your support. RCI is you. Don't let yourselves down.

REGION ONE MEETING

Thomas White, CRC
Region I Director

On January 17, 1992 another successful Region One Meeting/Conference was held at the Factory Mutual Conference Center in Norwood, MA. Eighty attendees (50% members/50% non-members) were present. Consultants, architects, engineers, manufacturers, contractors, and governmental agencies were well represented. Ten manufacturers participated in the tabletop exhibit portion of the program.

The program began with a short business meeting. Members were reminded that a new Region Director would be elected at the National Convention in March.

Two technical programs on wind design topics were presented. Mr. Phil Smith of Factory Mutual compared ASCE 7-88 (formerly ANSI 58.1) Factory Mutual, Underwriters Laboratory, and Building Codes. Mr. Rick Cook with Austin/Dillon/Cook in Hanahan, SC offered his observations of roof damage in the Charleston, SC area as a result of Hurricane Hugo. After lunch, attendees made a tour of the Factory Mutual Test Facility. Attendees received .2 RCICEU's for the meeting.

Roof Pollution

Lyle D. Hogan PE CRC

POLLUTION FROM THE ROOF? A STORMWATER CONCERN

Rooftops may soon receive visits from unlikely guests. This is in the wake of new regulations (from EPA) regarding stormwater runoff in industrial settings. Thousands of plants and municipalities must secure National Pollutant Discharge Elimination Systems (NPDES) Permits for stormwater runoff which is ultimately received in waters of the United States. The rooftops will be examined for possible contributions to pollutant loading. Together with paved parking lots, roofs are "impermeable" zones as opposed to grassy areas and similar surfaces which permit infiltration. What will the technologists be looking for on roofs?

Plasticized PVC Sheet Membranes: Some products contain light molecular weight plasticizers such as Butyl Benzyl phthalates, di-N Butyl phthalates, and bis-2 ethylhexyl phthalates. Light molecular weight plasticizers in some sheet formulations have been known to migrate away from the PVC resin.

Copper: Used in architectural metal roofs and accessories in many other roof types, this metal is easily detected in the battery of tests performed on water samples. The highly sought after "patina" which copper develops is a natural weathering behavior, but in certain instances may influence water quality.

Polycyclic Aromatic Hydrocarbons (P.A.H.): Fresh bituminous repairs, particularly those consisting of coal tar pitch-based resaturants and mastics are the culprit here. This condition eventually moderates as the lighter end molecules evaporate; nonetheless, initial pollutant loading can be significant as evidenced by the sheen on water observed in gutters.

Zinc: Also among the list of metals investigated in water samples, zinc may be traced to poorly weathering standing seam roofs.(See Photo 1) Additionally, zinc (an activator in the manufacturing of EPDM rubber) may be liberated from certain EPDM roof membranes as carbon black weathers from the surface.

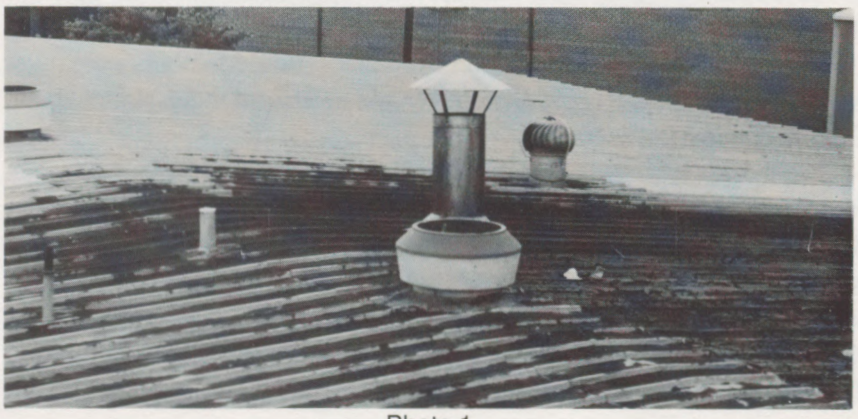

Photo 1

Roof Pollution

continued

White Metal Oxide Pigments: Solids such as titanium dioxide are readily liberated from the surface of certain white, polymeric roof membranes. This substance does not appear to constitute a significant health risk; however, when revealed in water test results, the roof may hold the explanation.

Rooftop Spills: While fugitive air emissions are not scrutinized in a stormwater study, chemical spills or discharges from rooftop equipment will influence water quality. Photos 2, 3, and 4 show examples of rooftop exudates which may be detected in spit of dilution during rainfall events.

A thorough study of a facility's stormwater regime will include the roof. It may be convenient at that time for the owner/occupant to conduct a maintenance inspection which the roofing industry so commonly complains he/she does too little of.

Photo 2

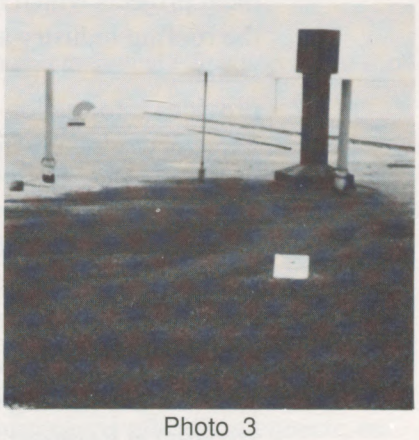

Photo 3

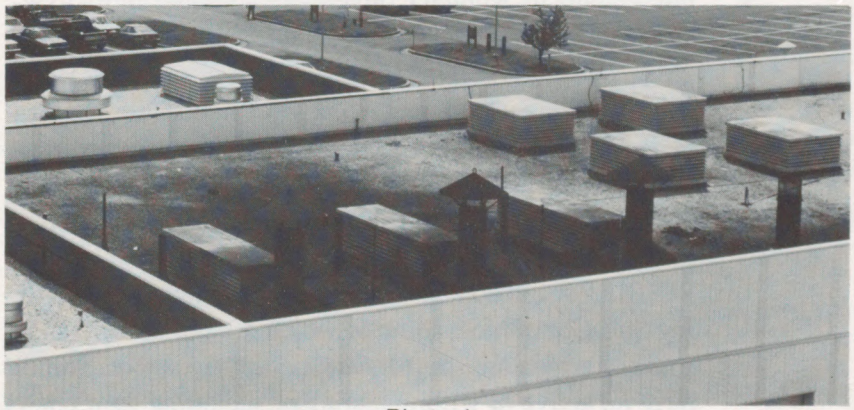

Photo 4

WHAT DOES RCI DO ANYWAY?

Richard Horowitz AIA CRC

A member of the Executive Committee who shall remain nameless (he is also Chairman of the Membership Committee) keeps asking loudly at each Committee meeting, "What does RCI do for its members anyway? What are they getting for their dues money?"

Until recently, our organization was becoming notorious for not getting the word out to its members. It's not that RCI wasn't doing anything, it's just that no one seemed to be able to spare the time to tell anyone about it. As the working cadre of officers, directors, and dedicated committee chairmen has expanded, this larger leadership group is better able to do more things; it has finally occurred to them that it is vitally important that the members and others are informed of RCI's activities, of its accomplishments, and of its yet-unexplored areas of endeavor.

So What Does RCI Do Anyway?

For Its Members, RCI:

1. provides a forum for all interested members of the Roofing Community to come together, exchange ideas, learn from each other, use its newly-found strength to implement projects which might benefit the many segments of the roofing industry and, most specifically, the Roof Consultant.
2. provides information networking (via the Membership Directory, annually updated and sent to each member) with other members. You have a question; call and ask.
3. publishes INTERFACE, our periodic newsletter which truly wishes to be the voice of the Roof Consultant; it seeks to provide new information of interest to Consultants and the industry. Articles and letters are solicited. Got a gripe? Send a nasty letter to the Editor.
4. provides networking (hob-nobbing with your fellow wizards) at Regional Meetings and now at Chapter Meetings such as in Florida (other Chapters are being proposed).
5. implements its Annual Convention; an opportunity to attend technical presentations and seminars, view the RCI Trade Show, participate in (and learn from) the Project Manual Competition, meet your peers, and (most important) participate in our annual meeting where every member can have his say. Amazingly, it always ends on time.
6. provides Committee Activities: There are 25 RCI committees (not including special subcommittees such as RCI/NRCA Liaison Committee or the National Advertising Sub-Committee, some of which are permanent, and some of which are short-lived); not all are active. Some have no active or willing members, including their chairs.

WHAT DOES RCI DO ANYWAY?

continued

Others have over 75 names on the roster (how to have a meeting?), some have no clear purpose; others cannot manage to generate activity because of the time claims of the Chairman's business; RCI is being slighted in some part by the success of its members.

7. struggles to formulate a meaningful Code of Ethical Standards that will not get us busted by the Feds.
8. has implemented a national public relations program to make RCI, its Certification Program, and its members better known to the non-roofing community.
9. attempts to recognize the outstanding Consultant by assessing his (or her) education, work experience, personal integrity, and knowledge of roofing through RCI's Certified Roof Consultant Program.
10. rotates its leadership positions. Nobody here is President for Life--Or wants to be. Come aboard and be welcome. There is much to do. We need your warm body and your ideas.

For the Roof Owner/User, RCI:

11. promotes professionalism and technical education in the roofing industry.
12. refers inquiries to members in the Owner's area.
13. has implemented a Quick Response Program which utilizes RCI members to survey existing buildings in areas subject to storm damage; such buildings would be revisited and inspected for damage after a major storm to provide real world information on the performance of installed roofing systems.

For the Roofing Industry, RCI:

14. offers a level playing field whereon manufacturers, distributors, contractors, governmental officials, architects, engineers, and consultants exchange views and information. We are a group that does not want to own anyone's soul. We have no "party line."
15. is a sponsor of RICOWI, an inter-roofing industry committee which is attempting to set standards in the area of wind uplift resistance.
16. confers with, cooperates with, and (in some cases) contributes funds to, various (non-profit) roofing organizations.
17. attempts to gather beneath its umbrella all consultants, aspiring consultants, and interested others so as to show, by precept and example, a better way to practice.

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WHAT DOES RCI DO ANYWAY?

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18. (perhaps, most importantly of all) has begun to formulate comprehensive programs for:
    a. an International Directory of Roof Consultants; since no one else registers Roof Consultants, RCI is going to do it.
    b. an Education Program designed to define and provide the knowledge which RCI deems a Registered Roof Consultant should possess; to provide to the industry a model and example of what a quality roof consultant should be.

These Programs, which aspire to set the standards by which Roof Consultants might ultimately be rated, licensed, and regulated by law, will be open to all.

What RCI Doesn't Do Yet (But Hopes To Someday):

- produce a comprehensive Manual of Professional Practice, including Standard RCI Documents.
- provide Standards for Roofing Specifications.
- provide comparisons of roofing systems and products in a format which might interface with NRCA's Project Pinpoint, for example.
- produce its own research programs designed to assess real-world performance of roofing systems and components.
- assemble and make available to its members a Data Base of Roofing Information.
- evolve suggested standards for roof details.
- provide feedback to manufacturers concerning product warranties, materials, application, and performance.
- influence the roofing industry commensurate with RCI's control over specifying billions of dollars worth of roofing and waterproofing materials.

ABOUT OUR MEMBERS

IN MEMORIAM

Douglas L. Senecal, Product Market Manager for Roofing, Dow Chemical U.S.A., Midland, Michigan, died January 17, 1992. Mr. Senecal was an RCI Charter Member and the first RCI Associate (Industry) Member.

NEW REGION II DIRECTOR

Calvin A. Roche
Advanced Design Roofing Systems
11625 Dunn Creek Rd.
Jacksonville, FL 32218
904-630-3525

Industry Updates

ASTM

NEW CHAIRMAN, VICE-CHAIRMAN, TREASURER, AND SIX DIRECTORS ELECTED TO ASTM BOARD OF DIRECTORS

Chairman
Emery Farkas
W.R. Grace
Cambridge MA

Vice Chairman
C. Ross Thomson
Ross Thomson & Associates
Ontario Canada

Treasurer
Arthur Cohen
Copper Development
Association
Greenwich CT

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Whittier CA

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Monitoring Systems Lab
Cincinnati OH

Director
Michael M. O'Mara
GE Corporate R & D Lab
Schenectady NY

Director
Garland W. Steele
Steel Engineering
Tornado WV

ASTM Committee E-06 on Performance of Building Construction, March 22-25, Adams Mark Hotel, St. Louis, MO, Contact: John Vowell 215-299-5496.

NATIONAL BUILDING SYMPOSIUMS INSTITUTE

April 13-16, 1992, Plano Convention Centre (metropolitan Dallas area) Plano, Texas; four day symposium with nationally known speakers and over thirty sessions on roofing, waterproofing and curtain walls; for more information contact the National Building Symposiums Institute, (713) 440-8284.

WESTERN STATES ROOFING CONTRACTORS ASSOCIATION (WSRCA)

WSRCA is holding its 18th Annual Convention and Trade Show at Bally's Hotel & Casino Resort in Reno, Nevada, June 1-3, 1992. For more information call 415-588-9722.

1992/1993 RCI Calendar Of Events

REGION I MEETING
March 16, 1992 at RCI Convention

REGION II/CAROLINAS CHAPTER ORGANIZATIONAL MEETING
March 16, 1992 at RCI Convention

REGION VI

A. Region VI Meeting/Roof Decks
June 1, 1992
Reno, NV
(precedes WSRCA convention)

B. Region VI Meeting/Metal Roofing
August 10, 1992
Oakland, CA

NATIONAL BUILDING ENVELOPE SYMPOSIUM
April 13-16, 1992
Plano Convention Centre, Plano Texas
Contact: Phylis French
NATIONAL BUILDING SYMPOSIUMS INSTITUTE
15531 Kuykendahl, Suite 275
Houston, TX 77090
713-440-8284

G.M. Kassem Roofing Systems Sponsors March Issue

*G.M. Kassem Roofing Systems is a 23 year old Pittsburgh based single-source E.P.D.M. roofing firm that manufactures, installs and guarantees its installations nationwide.

G.M. Kassem also is the exclusive provider of the ULTRA - N.P. mechanically attached system. The ULTRA - N.P. has the highest possible rating from Factory Mutual, Underwriters Laboratories and Metro Dade.

*Above text supplied by sponsor

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