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RESEARCH REPORT

INCOMPATIBLE BUILDING MATERIALS

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Incompatible Building Materials

A report documenting premature failure in residential construction resulting from material incompatibility

Canada Mortgage and Housing Corporation

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For:
**Policy and Research Division,
Canada Mortgage and Housing Corporation**

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Cette publication est aussi disponible en français sous le titre : *Matériaux de construction incompatibles*
Rapport sur la défaillance prématurée de bâtiments résidentiels découlant de l'incompatibilité de matériaux
de construction, 63264

Note to users

This report documents and shares information about building material incompatibilities.

It opens with a "Quick Reference Guide to Incompatibilities." The Quick Reference Guide is a fast and easy way to find out if a material is incompatible with other materials.

Appendix B, page 48, is the survey form that was CMHC used to solicit incompatibility reports for this document. We encourage you to share your experience with additional incompatible building materials by completing the survey and returning it to CMHC.

The text of this document is also available on-line, at the CMHC Web site, at www.cmhc.ca.

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Trend Analysis

The first effort at compiling examples of material incompatibility has generated 35 examples (in addition, there are many other examples that have not been included because they were seen to be inappropriate uses of materials or violation of well-known good practices). The analysis of the examples that were included in this report (and others that were not included) results in some general observations about particular areas of difficulty.

Education

Several examples were reported that involve dissimilar metals. While there will always be examples of incompatibility that cannot be avoided—even the manufacturer has not foreseen certain limitations—many incompatibilities are well documented but are either ignored or not recognized. Therefore, it is likely that recurring metal incompatibilities demonstrate a need for ongoing training or skills upgrading.

Sealants

Sealants are a group of materials with a fairly high number of reported incompatibilities. This is likely due to the wide range of formulations and applications for such products. Because they are often formulated for specific applications, problems or poor performance are bound to occur when a sealant is used for an application for which it was not designed. The General Information section for sealants will assist builder practitioners to make educated sealant selections. It would be helpful for all stakeholders if sealant tubes had a simple label used by all manufacturers that indicated product uses and limitations.

Builder awareness

Builder surveys provide insight into where the majority of building defects are occurring.

A 1992 survey made by the NAHB Research Centre determined that the most frequent reports of callbacks were attributable to:

- Paints/caulks/finishes
- Flooring
- Windows and skylights
- Doors
- Foundations and basements
- Siding and trim
- Structural sheathing
- Wallboard
- Foundation insulation and waterproofing
- Framing

to code requirements. For example, there are reports of both sheathing tape and duct tape being used to seal duct joints in forced-air heating systems without clear indication that the tapes meet the NBCC flame-spread requirements for such applications.

Although duct tape has many useful temporary uses on the job site, its effectiveness for permanent applications is doubtful, and it is reported to have a very short performance effectiveness in applications close to heat sources. It is essential to ensure that innovative uses of products do not violate building code requirements.

Instruction labels

From the cases uncovered during the research for this project, it is obvious that some problems encountered by builders result from a failure to read or respect product limitations noted on the product packaging. For example, the rush to apply paint in unheated conditions as fall temperatures decrease often ignores the temperature application ranges recommended on the product.

While exceeding the product limits may get the project completed in time, it also brings a fairly high likelihood of recalls later, often at higher cost than doing the work according to instructions in the first place.

Trend summary

Building is a complex process that requires knowledge of a wide array of products and principles. Education and continual skills upgrading is needed for building professionals to stay aware of the limitations of both old and new products. It appears that many incompatibilities could be avoided if:

1. Manufacturers could find a clearer, harmonized way to indicate product limitations on product packaging. Sealants, for example, have numerous formulations and there are many manufacturers. A standard label on each tube of sealant indicating best uses, appropriate and inappropriate uses would help simplify product selection.
2. Building professionals need to read and understand product uses and limitations and make product selections that will avoid incompatibility problems.

Appendix A: Research Sources

This list summarizes the groups, publications, associations, companies and organizations contacted by telephone, e-mail or Web site review during the research stage of gathering cases of building material incompatibilities.

Industry associations

Alberta Floor Covering Association

Alliance of Canadian Building Officials

Building Envelope Research Consortium

Building Owners and Managers Association

Canadian Association of Home and Property Inspectors

Canadian Home Builders' Association

Canada Mortgage and Housing Association

Canadian Roofing Contractors Association

Canadian Wood Council

Construction Specifications Institute

Energy & Environmental Building Association

Forintek Canada Corp.

Greater Vancouver Home Builders Association

Homeowner Protection Office of British Columbia

Manufactured Housing Institute

National Association of Home Builders

National Association of Home Builders Research, ToolBase Hotline

Partnership for Advancing Technology in Housing (PATH)

Starline Windows

Architectural associations

Alberta Association of Architects

Architects' Association of New Brunswick

Architectural Institute of British Columbia

Manitoba Association of Architects

Nova Scotia Association of Architects

Ontario Association of Architects

Ordre des architectes du Québec

Royal Architectural Institute of Canada

Saskatchewan Association of Architects

Periodicals

AIA Architecture

Architectural Digest

Architectural Record

Architectural Journal

Architectural Record

Builder Magazine (NAHB)

Builder Online

Canadian Building Digest

Canadian Home Builder Magazine

Canadian House and Cottages

Fine Homebuilding

Hanley-Wood Publications

Homes and Cottages

Journal of Light Construction

McGraw Hill Construction (ENR, Sweets, Arch Record, etc)

Progressive Architecture

Professional Builder Professional Remodeler NAHB

This Old House

ToolBase E news

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Advisory committee

Walter Burningham, W.E. Burningham & Associates
 Don Johnston, Canadian Home Builders Association
 Alphonse Caouette, Canadian Construction Materials Centre (CCMC):
 Paul Morris and Jennifer O'Conner, Forintek Canada Corp.
 Bob Switzer, Polygon Construction Management Ltd.
 Skip Lennox, Glidden ICI Paints
 John Straube, University of Waterloo
 Chad Foreshew, Ontario New Home Warranty
 Rick Bortolussi, City of Richmond/B.C. Building Officials Association:

Technical reviewers

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 Sivan Parameswaran, NRC (retired), "Division 5—Metals"
 Paul Morris, Forintek Canada Corp., "6.1.1"
 Bruno Di Lenardo, Canadian Construction Materials Centre, IRC, "7.1 Envelope"
 Joseph Borsellino, Patenaude JBK, "7.2 Roofing"
 Jerome Klosowski, sealants expert, "7.3 Sealants"
 Skip Lennox, Glidden ICI Paints, "9.1 Coatings"
 Jean Claude Carisse, National Floor Covering Association, "9.2 Flooring, Resilient"
 Alberta Floor Covering Association, "9.2 Flooring, Resilient"

Survey respondents

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Bart Blainey	Wayne Heath	Robert Mearns	Darrel Smith
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Tom Bowen	Karl Klatt	Hugh Miller	Tom Trestain
Eric Clough	Ian Knight	Jim Morrison	Bernardine Van der Meer
Gerry Coming	Walter Kuch	Greg Nelson	Victor Zukowski
Andy Cook	Ben Levinson	Myron Pasaluko	Marshall Zwicker
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