



THE FORENSIC ENGINEERING REPORT

I-ENG-A® [IN-JUH]

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VENTILATION: SIMPLE CONCEPT BUT OFTEN FORGOTTEN

Moisture related problems such as mold growth and wood rot are common in many areas of the US both with and without humidity. To contrast, I recently returned from a business trip to the Middle East. I didn't see any moisture-related problems with wood decay or mold in buildings in that part of the world for two reasons. First, buildings are not constructed of wood. Douglas fir doesn't grow well in the desert so brick and stone are the construction materials most available. Secondly, it was 108 deg. F. and 10% humidity. Mold, like Douglas fir, doesn't grow well in the desert either. Here, in the Pacific NW, we have plenty of water due to our climate as well moisture released by our human activities inside our tightly closed houses.

Looking back through our job log I noticed that we have a high percentage of our cause and origin investigation assignments related to wood rot and mold growth. In review of these assignments we sub-categorized them into moisture sources of water leaks, errant moisture discharges into closed areas, and inadequate ventilation.

In this newsletter we will focus on the subject of inadequate ventilation.

The Pacific Northwest, and other areas of the country where high humidity is prevalent, has experienced numerous discoveries of wood rot and mold growth in large condominiums, apartment buildings and single occupancy residences. Blame for these problems has landed on virtually everyone including painters, siding installers, window manufactures, framers and even landscapers who were involved in the building construction process. We are even blaming our building energy codes for requiring such tight building structures.

In one of our recent assignments we were asked to determine the cause and origin of moisture and mold accumulation under the vinyl siding that was installed on the building exterior. There was much legal debate as to the primary source of moisture and how the moisture decided its "happy place" to be under the siding and condensed onto the building paper. At the end of the day however, a major culprit is inadequate ventilation between the siding and the underlying wall. Also, moisture laden exterior air can be drawn into a structure when negative pressure exists on the interior. This problem of moisture accumulation under siding is well known and understood. We know of some city codes that now require a minimum air space between the siding and the underlying wall of at least 3/4-inch. This practice promotes adequate ventilation to help keep the interstitial space dry. This is a simple solution that works well.

Another common finding during our investigations of ventilation problems is in homes with cathedral ceilings. We like cathedral ceilings for the reason of making our homes feel larger and more open. What we have discovered however, is that since there is no attic space in a cathedral ceiling design it often occurs that the space between the roof sheathing on the exterior and the wallboard on the interior is stuffed with insulation. The insulation effectively blocks passage of air from the soffit openings to the ridge vents therefore moisture cannot evacuate this space. The moisture then fosters the mold growth and eventually the wood structure begins to decay.

We have highlighted cathedral ceilings in this example but inadequate ventilation can result



VENTILATION: SIMPLE CONCEPT BUT OFTEN FORGOTTEN (CONTINUED)

in moisture induced mold problems in conventional attic spaces as well. The principle in both cathedral and conventional attics is for rising heated air to draw dryer cooler air through the lower soffit vents and exhaust the warmer moisture laden air out the ridge vents. In both instances examples of cathedral or conventional attics, free flow of ambient air is essential.

The simple solution during construction is to leave enough air space above the insulation so air can freely pass and with it carry away the damage causing moisture. The contractor must also take care to avoid blocking the soffit openings under the eave of the roof.

We should add also that attic ventilation is required by the International Building Code which gives a formula for determining minimum openings.

Yet another set of moisture problems that may be largely eliminated by improvements in ventilation techniques are box structures such as parapet walls, exterior support col-

umns, separation walls and building facades. These types of structures are often susceptible to leaks due to failed or omitted flashing. We find that the design is fundamentally not suited for the intended purpose. The case that comes to mind here is of a box construction wall between a swimming pool area and an exercise space inside the building. Prevention of the massive wood rot we found in this wall would have been the application of an impermeable seal on the swimming pool side and much larger ventilation openings top and bottom on the side of the wall opposite the swimming pool. The concept of well designed ventilation is still quite simple but again missed the mark in this example.

At the end of the day we vote for the free flow of air as the best and easiest way to prevent a whole host of moisture related problems that can occur almost anywhere in a building structure, be it crawl space, walls or attics.



Example of collapsing roof sheathing due to moisture induced wood rot above a cathedral style ceiling.

Article by:

TRNKA Engineers (I-ENG-A Seattle)
Zdenek "Denny" Trnka, PE

For assistance with similar issues, visit www.ienga.net for member firm locations throughout the country.

COMEDY RELIEF CORNER:

SECTION 15010 - PIPING SPECIFICATIONS

1. All pipe shall consist of a long hole surrounded by metal, glass, plastic or other specified material centered around the hole.
 2. All pipe shall be hollow throughout its entire length
 3. All pipe shall be of the very best quality and shall be perfectly tubular or pipular.
 4. All acid-proof pipe shall be made of acid-proof material.
 5. The OD of all pipe shall exceed the ID. Otherwise, the hole will be on the outside.
 6. All pipe shall be delivered to the jobsite with nothing in the hole, so that water, steam or other stuff can be out inside at a later date.
 7. All pipe shall be delivered without rust, since this can be more readily applied at the jobsite.
 8. All pipe shall be cleaned free of any covering such as mud, tar, barnacles, or any form of manure before installation. Otherwise it will make lumps under the paint.
 9. All pipe over 500 fee long shall have the words LONG PIPE clearly painted on each end, so that the fitter will know that it is long pipe.
 10. Pipe over two miles long shall also have these words painted in the middle, so that the fitter will not have to walk the full length of the pipe to determine if it is long pipe or not.
 11. All pipe over six inches in diameter shall have the words LARGE PIPE painted on it so that the fitter will not use it for small pipe.
 12. All pipe closers shall be open on one end.
 13. All pipe fittings shall be made of the same material as the pipe.
 14. No fittings shall be put on the pipe unless specified. If you do, straight pipe becomes crooked pipe.
 15. Fittings come in all sorts of sizes and shapes. Be sure to specify the direction you are going when ordering.
- (Author Unknown)



A WORD ABOUT WORDINESS

How many words in?

Pythagorean theorem 24

The Lord's Prayer 66

Archimedes' Principle 67

The 10 Commandments 179

The Gettysburg Address 286

The Declaration of Independence 1,300

U.S. Government regulations on the sale of cabbage 26,911

From PM Engineer April, 2003



THE NHTSA DEFECT INVESTIGATION REPORT

The investigations below are having a second and final phase of a NHTSA investigation. The Professional Engineers performing the Engineering Analysis determine whether a safety recall should be initiated or if the investigation should be closed. Most engineering analysis are resolved within one year.

For more information, visit www.nhtsa.gov.

2004-2005 Toyota Sienna With Power Rear Door	Unexpected Closing Of Power Liftgate	01-Dec-2006
2005-2007 Nissan 350z	Wheel Failure	03-Apr-2007
2006-2007 Jeep Commander	Engine Stall	27-Apr-2007
1999-2002 Buick, Oldsmobile, And Pontiac W/ Supercharged V6	Engine Compartment Fire	12-Jun-2007
2002-2003 Trailblazer, Ext, Gmc Envoy, Xl, Xuv Fuel	Pump Module Leaks Gasoline	10-Jul-2007
2002 - 2003 - Mini Cooper	Engine Compartment Fire	14-Aug-2007
2003- 2005 Land Rover, Range Rover Front	Differential/Driveshaft Failure	14-Aug-2007
My 2002 C/K 2500 Suburban/Yukon/Silverado/Sierra/ Avalanche	Trailer Hitch Receiver Failure	14-Sep-2007
2000-2003 Volkswagen Passat Passenger	Engine Compartment Fires	28-Sep-2007
2003 Chevrolet Cavalier Engine Stalling	Fuel Pump Failure	01-Nov-2007
2000-2005 Workhorse Chassis Built With Bosh Brake Calipers	Overheated Brake Calipers	16-Nov-2007
2004-2006 Cadillac Cts-V	Rear Drivetrain Component Failure	07-Dec-2007
2003 Land Rover Freelander	Fuel Pump Failure - Stall	07-Dec-2007
2005-2007 General Motors	Minivans Power Sliding Door Opening	11-Dec-2007
2004 - 2006 Bmw 5, 7, X3 & Z4 And 2006 3, 6 & X5 Vehicles	Bmw Airbag Light Illumination	04-Jan-2008
Sevas S-10 Aftermarket Wheels	Sevas S-10 Aftermarket Wheels	23-Jan-2008
2003-2004 Pontiac Vibe, Toyota Corolla And Toyota Matrix	Side Front Power Window Shatters	05-Feb-2008
2004-2005 Chevrolet Aveo	Stuck Throttle Valve	14-Feb-2008
2007 Chrysler Pacifica With 4.0l Engine	Engine Compartment Fire	21-Feb-2008
2005-2007 F-250 & F-350 Super Duty 4x4 Vehicles	Violent Front End Oscillation	14-Mar-2008

Defect or Recall Petitions (DP or RP): NHTSA may be petitioned to investigate an alleged safety defect or whether a manufacturer has successfully carried out the requirements of a recall. If the petition is granted, NHTSA opens an appropriate investigation. If the petition is denied, the reasons for denial are published in the Federal Register.

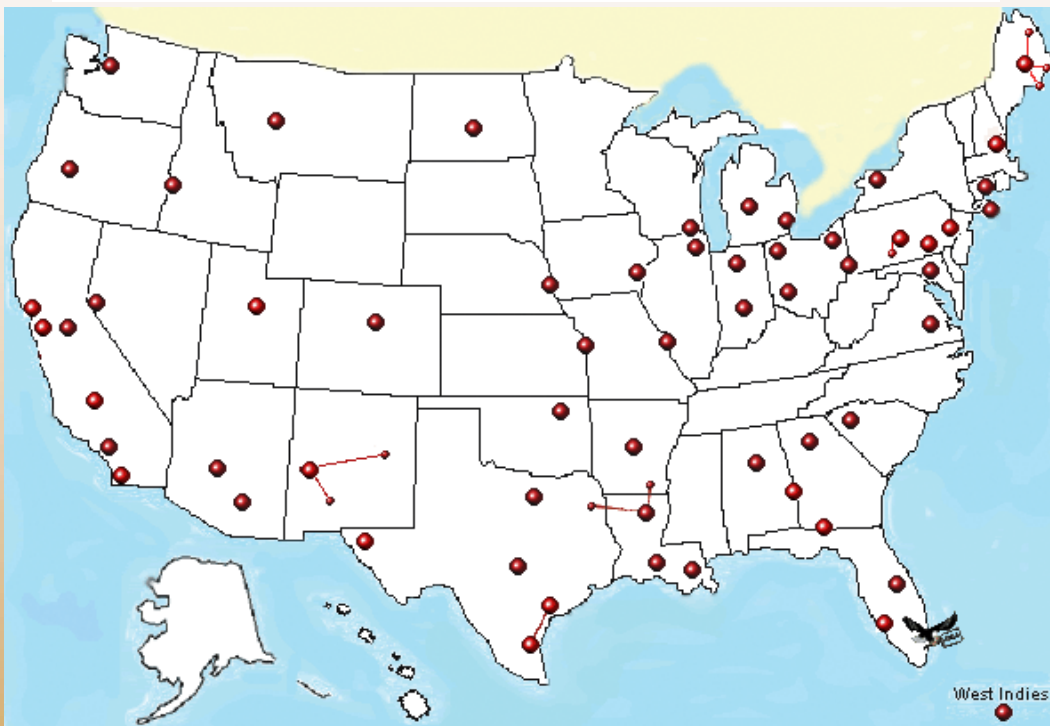
If you have a safety concern or want to learn more... VISIT: <http://www.safercar.gov> or CALL: 1-888-327-4236



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E-mail: info@ienga.net

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