



Quality Assurance Program

For the Air Barrier Industry

Presented by Mr. Ryan Dalglish

Air Barrier Association of America

www.airbarrier.org

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- This presentation will not highlight focus or reference to a specific product of manufacturer

AIR BARRIERS

QUALITY ASSURANCE

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QUALITY ASSURANCE

FOR AIR BARRIERS

Learning Objectives

- Describe how quality management systems can be applied to the construction process and how quality assurance differentiates with quality control
- Assess potential impacts to cost, scheduling, building performance and durability by poor installation of air barriers through the use of case studies.

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Learning Objectives

- Describe language required in a specification that provides key criteria in regards to implementing an air barrier site quality assurance program to reduce liability and risk.
- Define key components of an air barrier site quality assurance program and assess the importance of each component and how they interrelate.

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Learning Objectives

- Through use of illustration and actual project site photo's, identify acceptable and unacceptable installation of a variety of air barrier materials to determine if the assembly would meet manufacturer's installation instructions and code requirements.

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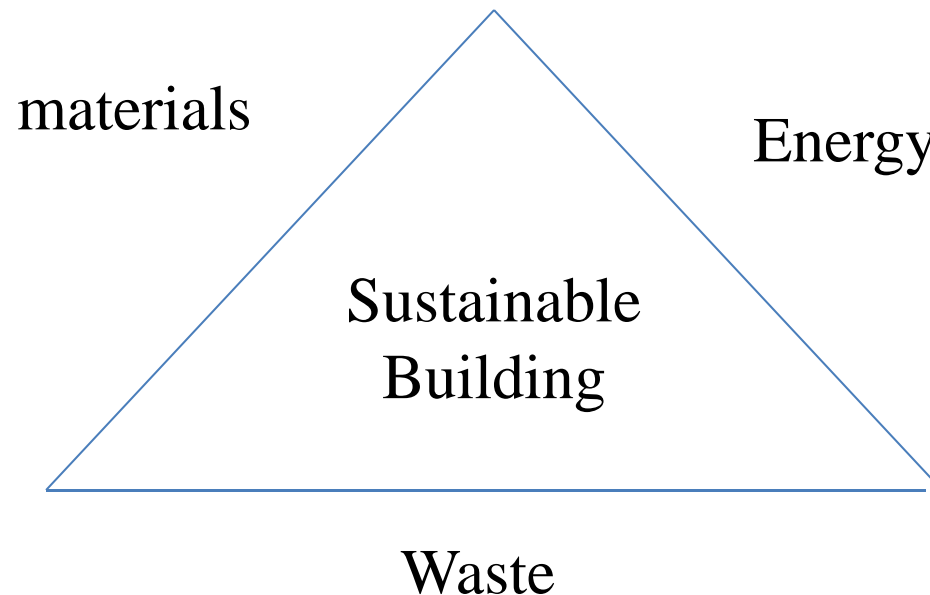
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Quality Required for Sustainability

*No matter where
you stand in regards
to what makes a
building sustainable,
everyone will agree
that it is a quality
built building*



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What is Quality ?

- It is a methodology of prevention rather than a cure for failures
- Is made up of typically 5 key ingredients

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What is Quality ?

- 5 key Ingredients:
 - Define Quality
 - Define standards and specifications
 - Establishment process for corrective action
 - Train for Competency
 - Commit to Continuous Improvement

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Quality is Not:

- Waiting until there is a defect



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Quality is Not:

- An add on item



"Now slap a little quality on,
and we'll ship this sucker out."

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Quality is Not:

- A last minute effort to save a program or project



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What is Quality Assurance?

Definition:

- The planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be full filled.

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Quality Assurance in Buildings

- Based on ISO 9001 Quality management systems – Requirements
 - Say what you are going to do
 - Do what you say
 - Prove it

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System Thinking

- Think of a cup of coffee at Starbuck



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Quality Assurance vs. Quality Control

“Inspection with the aim of finding the bad ones and throwing them out is too late, ineffective and costly”

“Quality comes not from inspection but the improvement of the process”

Dr. Edward Deming

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Quality Assurance vs. Quality Control

Quality Assurance

- Total Approach
- Control Errors
- Prevention
- Systematic

Quality Control

- Inspection

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Quality Assurance vs. Quality Control

Quality Assurance

- Built In

Quality Control

- Inspected In

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Quality Assurance vs. Quality Control

The Inspection Test

- Treat the letter “F” like a defect in the sentence on the next slide.
- You are the inspector. Count the number of defects (the number of F’s)
- Slide will be shown for 20 seconds

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**FLOORING, DRYWALL, AND FRAMING
FUNDAMENTALS ARE THE RESULT
OF YEAR OF SCIENTIFIC STUDY COMBINED
WITH
THE EXPERIENCE OF YEARS**

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So, how many did you see ?

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FLOORING, DRYWALL, AND **F**RAMING
FUNDAMENTALS ARE THE RESULT
OF YEAR **O**F SCIENTI**F**IC STUDY COMBINED WITH
THE EXPERIENCE **O**F YEARS

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So, what is the point ?

- Inspections are only effective at **finding problem area's**
- **Prevention** is the only **effective** method
 - Do it Right the First Time !

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The quality control process results in.....

- Constant Supervision
 - Mass Inspections
 - Continual Rework
-
- We treat the symptoms.... Not the cause !

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Quality Assurance vs. Insurance

Assurance

- Minimize Risk

Insurance

- Protect when things go wrong

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1 – 10 – 100 RULE

Prevention Cost

SAVES

Correction Cost

Failure Cost

\$1

\$10

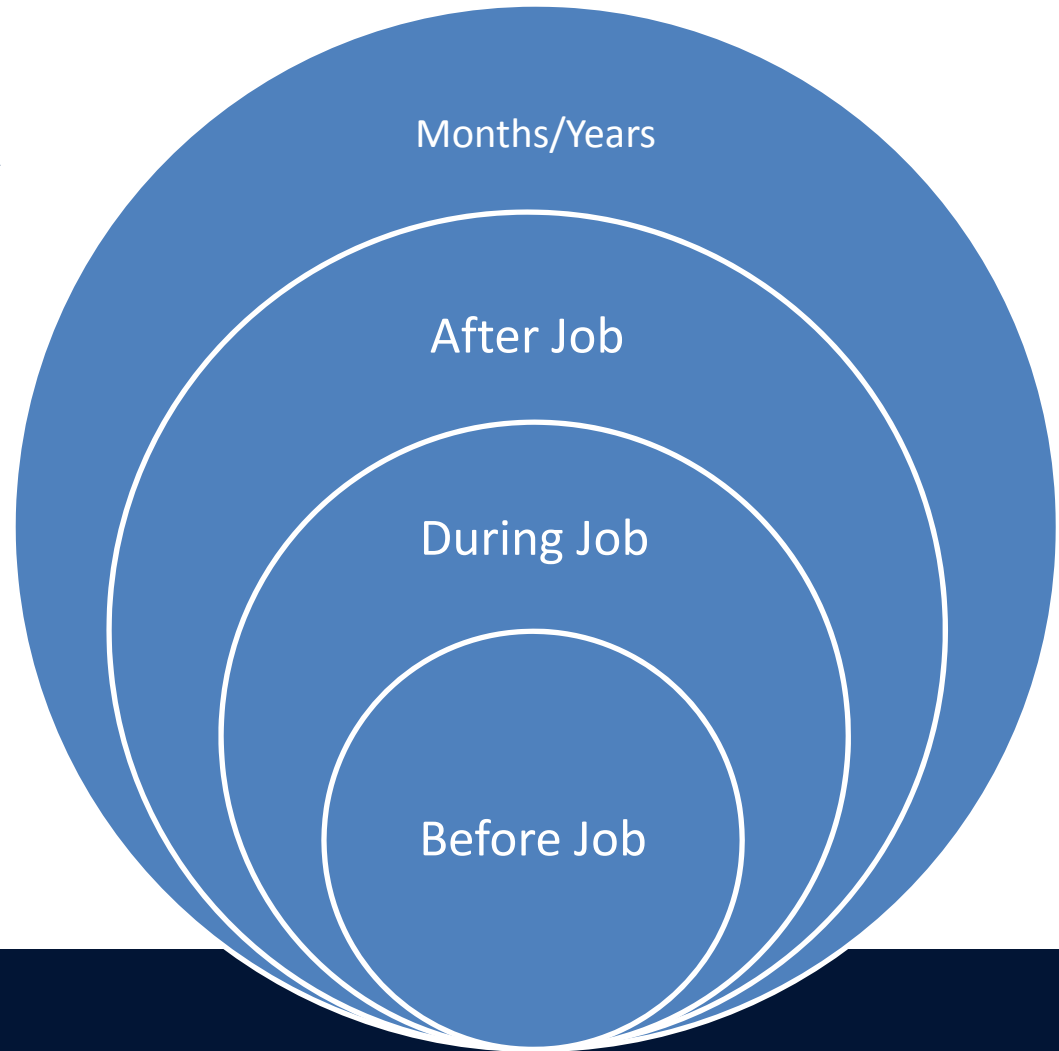
\$100

Source: Total Quality Management, Joel E. Ross

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Cost Scenerio's

During Construction

Time (GC, Design, trades, Manufacturer
Schedule

Re-work (removal, new material)
Additional testing and QC

After Construction

Time (more than during construction)
Remove cladding/Insulation

Remove AB

Repair Damage (substrate, structure,
sheathing)

Re-install Material

Re-install Cladding

Legal Fees

Feelings of Sadness and asking Why ?

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Better built
buildings
require:

Proper details and specs

Proper selection of materials

Proper Construction management

Proper Installation and Trades

Verification

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WHAT HAPPENS WHEN WE
DO NOT CONTROL
AIR LEAKAGE/WATER



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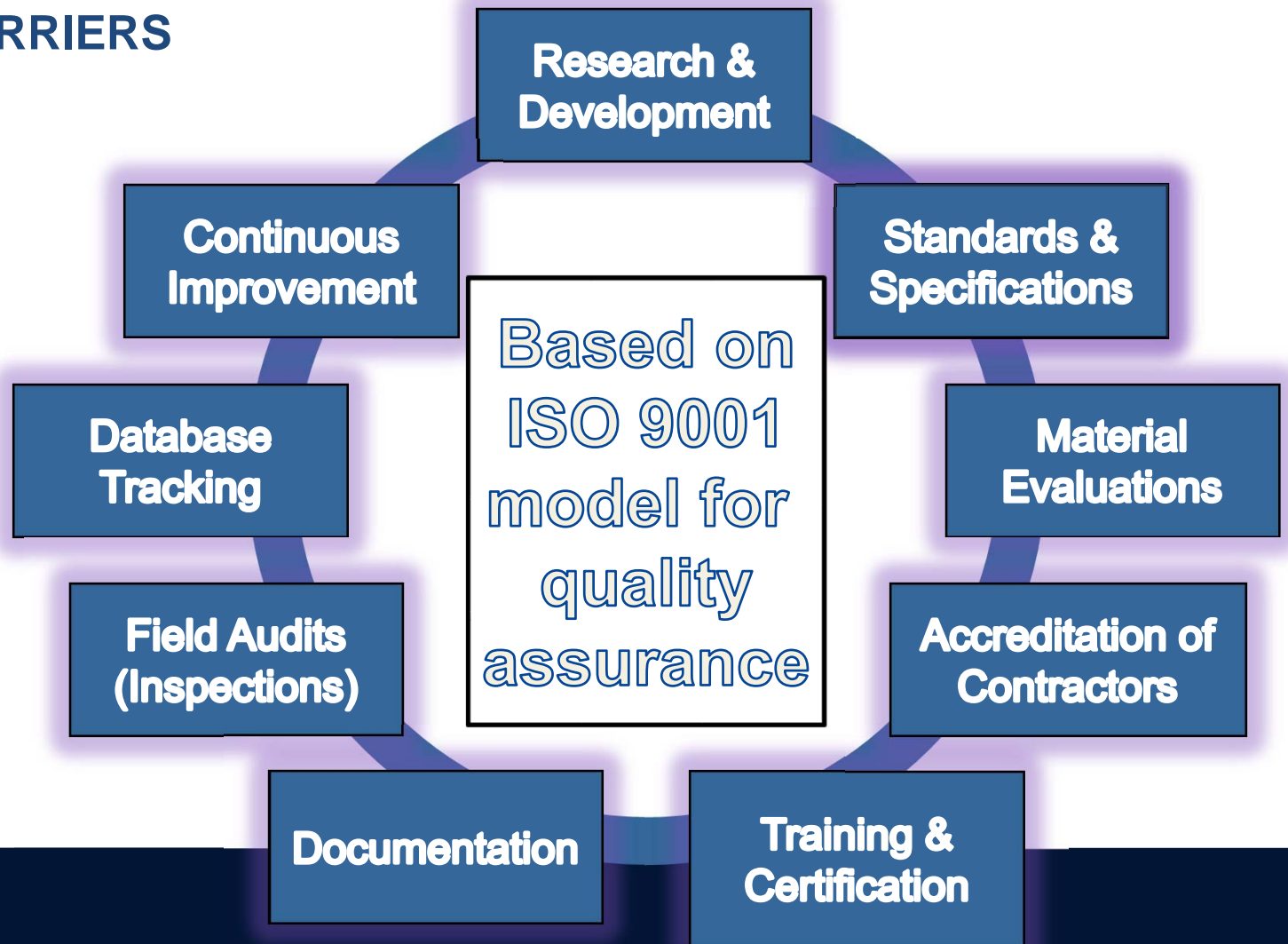


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**ABAA
Model
for
Quality**



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Good
Design

Good
Materials

Good
Contractors

ABAA Model for Quality

Good Installers

Good Auditors

Good
Documentation

Good Corrective
Action / Support

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Research

- Credible and Scientific research on product performance, key installation parameters, durability



Field test



Sub-assembly tests



Material characterization

Membranes



Interior



Mechanically-fastened



Self-adhered



Fluid-applied non-foaming

Sheathings



Non-insulating



Insulating



Sealants



Spray-applied foam

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Standards and Specification

- Guide specification
- Standards for materials, whole building testing, auditing
- ASTM and ISO
- Quality Assurance Program



US Army Corps
of Engineers®
Engineer Research and
Development Center

air barrier
abaa
association of
america

U.S. Army Corps of Engineers
Air Leakage Test Protocol for
Building Envelopes

Version 3 - May 11, 2012

Approved for public release; distribution is unlimited.

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Material Evaluation

- Standardized testing and performance criteria
- Listed on website and in abaa specifications

The screenshot displays the ABAA (Association of Barrier America) website. The header includes the ABAA logo, the tagline 'THE CENTER OF EXCELLENCE FOR THE AIR BARRIER INDUSTRY', a 'SITE SEARCH' bar, and a 'Subscribe to our Newsletter' link. Navigation links for 'MEMBER'S AREA', 'ABOUT ABAA', 'JOIN ABAA', 'EVENTS', 'CONFERENCE 2015', 'CONFERENCE 2016', 'NEWS & MEDIA', and 'HOME' are present. A main banner features a photo of two workers in hard hats and a blue air barrier material, with the text 'WELCOME TO THE AIR BARRIER ASSOCIATION OF AMERICA'S WEBSITE THE CENTER OF EXCELLENCE FOR THE AIR BARRIER INDUSTRY'. Below this is a section titled 'AIR BARRIER INFORMATION BY PROFESSION' with four categories: 'DESIGN PROFESSIONALS' (with a blueprint icon), 'MANUFACTURERS' (with a gear icon), 'CONTRACTORS' (with a hard hat icon), and 'INSTALLERS' (with a hard hat icon). To the right, 'ABAA NEWS' lists recent articles, including 'Air Barrier Technology & IECC 2015 Code Adoption: Education Event and Product Show' and 'Press Release - New Board of Director Members and Executive Committee'. A green box promotes a 'Free on-line course available through ABAA' with 'AIA CREDITS AVAILABLE'. At the bottom, a section titled 'AIR BARRIER/BUILDING ENVELOPE INFO' lists 'AIR BARRIER INFORMATION' (Code, Standards & Test Methods) and 'SUPPORTING DOCUMENT' (Air Barrier Master Specifications). On the right side of this section, three 'ABAA EVALUATED' items are listed: 'AIR BARRIER MATERIALS', 'AIR BARRIER ASSEMBLIES', and 'WATER RESISTIVE BARRIERS', each accompanied by a clipboard icon.

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WELCOME TO THE AIR BARRIER ASSOCIATION OF AMERICA'S WEBSITE
THE CENTER OF EXCELLENCE FOR THE AIR BARRIER INDUSTRY

ABAA NEWS

**Air Barrier Technology & IECC 2015
Code Adoption: Education Event
and Product Show**

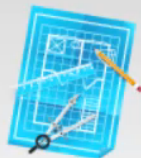
Posted on: August 20, 2015

**Press Release - New Board of
Director Members and Executive
Committee**

Posted on: July 14, 2015

**Free on-line course
available through ABAA**
AIA CREDITS AVAILABLE
[Click here for more information](#)

AIR BARRIER INFORMATION BY PROFESSION



DESIGN PROFESSIONALS

Information on air barriers, guide specifications, technical articles, and how to make sure you have a successful air barrier project.



MANUFACTURERS

Information on how to get your product evaluated by ABAA, as well as other resources for existing and future members.



CONTRACTORS

Information on how to obtain accreditation, what training is available, and what technical support is available for your project.



INSTALLERS

How to become a certified installer and information on applicable training.

AIR BARRIER / BUILDING ENVELOPE INFORMATION & RESOURCES

QUALITY ASSURANCE

FOR AIR BARRIERS

Contractor Accreditation

- Education
- Minimum standards (financial/insurance)
- Certified individuals
- Code of conduct
- Corrective Action / Defect resolution
- Internal quality control systems
- Can be lost for non-compliance



QUALITY ASSURANCE

FOR AIR BARRIERS

Training / Support

- Designers, Specifiers
- GC/CM
- Air Barrier Sub-trade
- Other trades
- Inspectors, Code Officials
- On-going and continuous
- Class room, hand's on and during audit process



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QUALITY ASSURANCE

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Certification of Installers, Auditors

- Confirmation of knowledge, skills and abilities
- Experience in installation of various products
- Written test / training
- Certified by product type (SA, FL, SPF, etc)
- Code of conduct
- Can be lost

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Trade Quality Control


- Internal check lists
- Daily testing program
- Site Quality Assurance Administrator

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FOR AIR BARRIERS

Documentation

- Daily Job site reports by product
- Standardized Audit reports
- Corrective Action Documents
- Processes

 air barrier abaa association of america	Fluid-Applied Air Barrier Assembly Audit Report
ABAA Assigned Audit Report #:	
Scheduled Project Audit X of X:	
Audit Date and Time:	
Project Name:	
Project Address:	
Auditor Name:	
ABAA Auditor Certification #:	
Phone #:	
Alternate Phone #:	
Accredited Contractor:	
Primary Contact:	
ABAA Contractor Member #:	
Phone #:	
E-mail Address:	
Certified Installer:	
ABAA Certification #:	
Expiry Date:	
Certified Installer:	
ABAA Certification #:	
Expiry Date:	
Registered Installer:	
ABAA Registration #:	
Expiry Date:	
Registered Installer:	
ABAA Registration #:	
Expiry Date:	
General Contractor:	
Primary Contact:	
Address:	
Office Phone #:	
Site Phone #:	
E-mail Address:	
Design Professional:	
Primary Contact:	
Address:	
Phone #:	
E-mail Address:	
Project Description:	

Page 1



Microsoft Excel
97-2003 Worksheet



Microsoft Word
Document

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Field Audits

- Quality Control and Inspection
- Intent is to help
- Identification of field issues which leads to modifying processes if required
- Standardized report / photo log
- Each report goes through internal QC
- Distribution: sub-trade, GC, architect, manufacturer

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Information Management

- Improving of key area's based on actual performance of system and key metrics
- Continuos improvement cycle
- Data on typical defects, adhesion, substrate issues

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How do I get it ?

- You have to specify it, does not happen automatically
- Very specific language should be used in your specification

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Specification Language:

1.3 SUBMITTALS

- A. Submittals: Submit in accordance with Division 1 requirements.
- B. Quality Assurance Program: Submit evidence of current Contractor accreditation and Installer certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program (QAP). Submit accreditation number of the Contractor and certification number(s) of the ABAA Certified Installer(s).
- I. Air Barrier Subcontractor Qualifications: Air barrier Subcontractor(s) shall be accredited at the time of bidding and during the complete installation period by the Air Barrier Association of America (ABAA) whose Installer(s) are certified in accordance with the site Quality Assurance Program used by ABAA.

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Specification Language:

- J. Manufacturer: Obtain primary ABAA Evaluated Materials from a single ABAA Evaluated Manufacturer regularly engaged in manufacturing specified self-adhered sheet air barriers. Obtain secondary materials from a source acceptable to the primary material manufacturer.
- N. Field Quality Assurance: Implement the site Quality Assurance Program requirements used by ABAA. Cooperate with ABAA Auditors and any independent testing and inspection agencies engaged by the Owner. Do not cover the air barrier assembly until it has been inspected, tested and accepted.

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Specification Language:

- B. Air Barrier Association of America Installer Audits: Cooperate with ABAA's testing agency. Allow access to work areas and staging. Notify ABAA in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is accepted. Arrange and pay for site inspections by ABAA to verify conformance with the material Manufacturer's instructions, the site Quality Assurance Program used by ABAA, and this section of the project specification.
1. Audits and subsequent testing shall be carried out at the following rate:
 - a. Up to 10,000 ft² of air barrier contract requires one (1) audit.
 - b. 10,001 – 35,000 ft² of air barrier contract requires two (2) audits.
 - c. 35,001 – 75,000 ft² of air barrier contract requires three (3) audits.
 - d. 75,001 - 125,000 ft² of air barrier contract requires four (4) audits.
 - e. 125,001 – 200,000 ft² of air barrier contract requires five (5) audits.
 - f. 200,001 ft² and over of air barrier contract requires six (6) audits.

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**How
much
does it
cost ?**

- Per Audit Costs: \$2,000
- Project Cost: 0.85/sq. ft
- Costs carried by accredited contractor



ABAA QUALITY ASSURANCE
PROGRAM **CALCULATOR**

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AIR BARRIER INFORMATION BY PROFESSION



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AIA CREDITS AVAILABLE
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AIR BARRIER / RISING RISES ENVIRONMENTAL INFORMATION & RESOURCES

QUALITY ASSURANCE

FOR AIR BARRIERS

How does it work ?

- Project Report
- Project Starts: contractor QC
- Auditor engaged
- Audit reports
- Corrective Action (if applicable)
- Field Support
- Documentation Submission
- Final documentation review
- Project Close Out

AIR BARRIERS

INSTALLATION

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INSTALLATION

VARIOUS AIR BARRIER MATERIALS



INSTALLATION

TYPICAL AIR BARRIER MATERIALS

- Self Adhered Membranes
- Liquid Applied Membranes
- Medium Density Sprayed Polyurethane Foam
- Board Stock – Rigid Cellular Thermal Insulation Board
- Factory Bonded Membranes to Sheathing
- Mechanically Fastened Commercial Building Wraps

INSTALLATION

TYPICAL AIR BARRIER MATERIALS

- Substrate Prep
is key to all
materials !



INSTALLATION

SELF ADHERED MEMBRANES

- Key Installation:
 - Proper overlap of joints and seams
 - Seal around all penetrations with mastic/sealant
 - Provide backing at deflection and control joints
 - Do not span gaps larger than recommended by manufacturer
 - Roll membrane to enhance adhesion



INSTALLATION

SELF ADHERED MEMBRANES

- Common Field Issues
 - “Fish mouths”, wrinkles
 - Unadhered material
 - Inadequate substrate preparation
 - Exposed to UV past limits



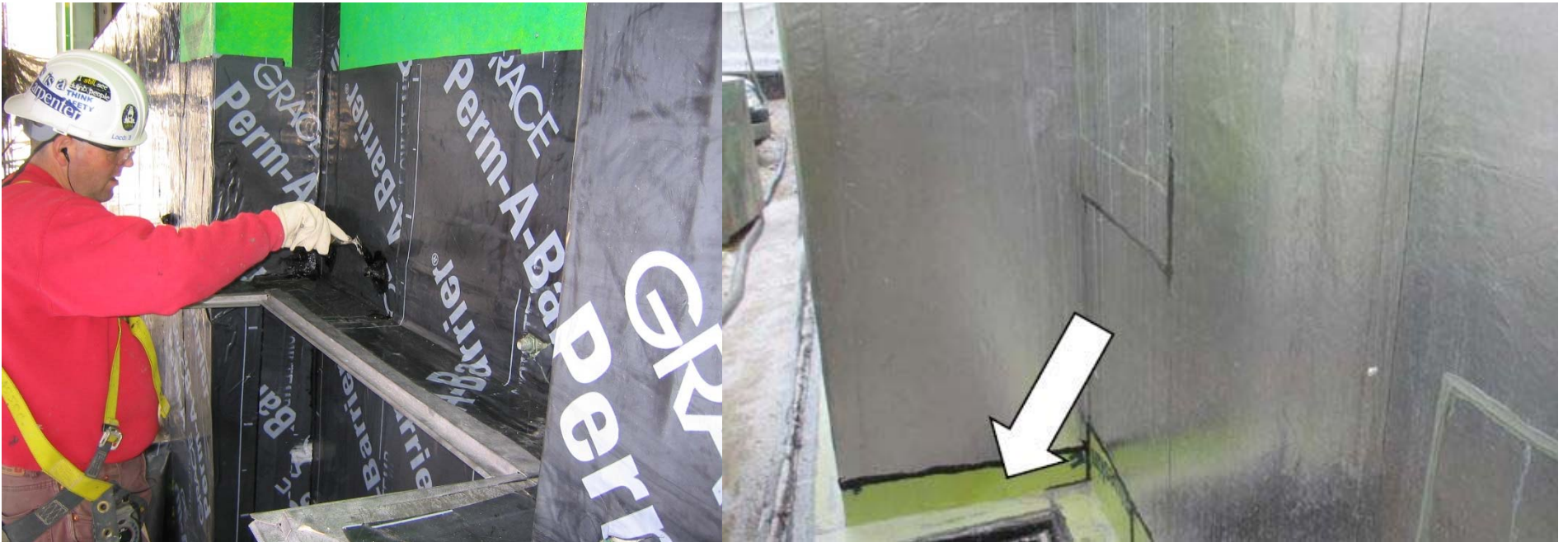
INSTALLATION

SELF ADHERED MEMBRANES – PROPER INSTALL



INSTALLATION

SELF ADHERED MEMBRANES – PROPER INSTALL



INSTALLATION

SELF ADHERED MEMBRANES – PROPER INSTALL



INSTALLATION

SELF ADHERED MEMBRANES – POOR INSTALL



INSTALLATION

SELF ADHERED MEMBRANES – POOR INSTALL



INSTALLATION

SELF ADHERED MEMBRANES – POOR INSTALL



INSTALLATION

LIQUID APPLIED MEMBRANES

- Key Installation
 - Ensure all detailing is completed before or after liquid material
 - Watch temperature limitations for application
 - Spray evenly and consistent and avoid slumping of material
 - Ensure thickness meets specifications



INSTALLATION

LIQUID APPLIED MEMBRANES

- Common Field Issues
 - Insufficient thickness
 - Slumping of material
 - Missed detailing
 - Poor substrate preparation
 - Blisters or pin holing
 - Application over gaps that have not been pre-treated



INSTALLATION

FLUID APPLIED MEMBRANES – PROPER INSTALL



INSTALLATION

FLUID APPLIED MEMBRANES – PROPER INSTALL



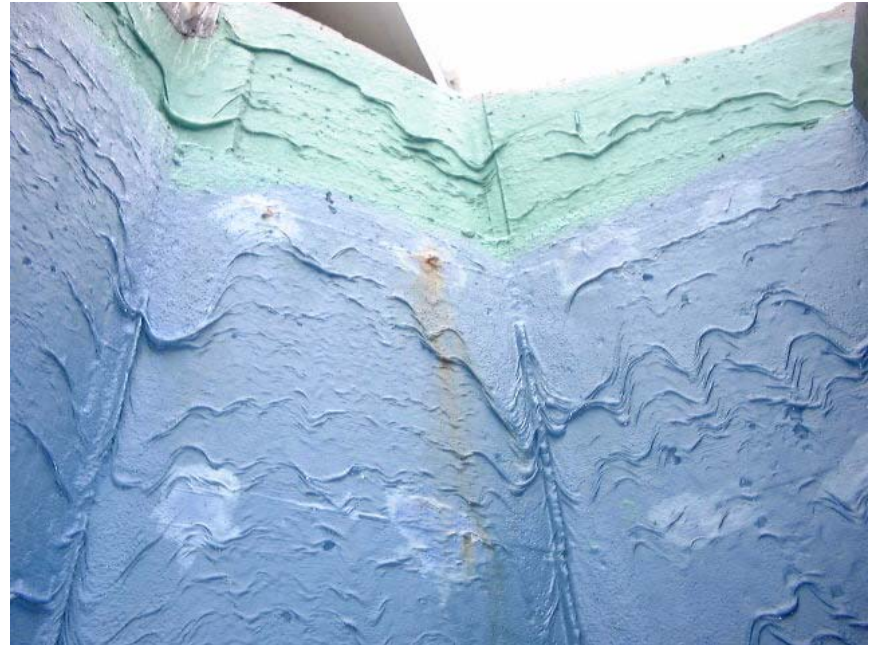
INSTALLATION

FLUID APPLIED MEMBRANES – POOR INSTALL



INSTALLATION

FLUID APPLIED MEMBRANES – POOR INSTALL



INSTALLATION

FLUID APPLIED MEMBRANES – POOR INSTALL



INSTALLATION

MEDIUM DENSITY SPF

- Key Installation
 - Environmental conditions (wind, temperature, humidity)
 - Health and Safety of applicator and work site
 - Thickness of passes
 - Equipment settings (pressure, temperature, 1:1 ratio)



INSTALLATION

MEDIUM DENSITY SPF

- Common Field Issues
 - Insufficient thickness
 - Off-ratio
 - Adhesion to transition membranes and substrate
 - Other trades entering spraying area
 - Missing transition membrane at window openings, roof/wall intersection



INSTALLATION

SPRAYED POLYURETHANE FOAM – PROPER INSTALL



INSTALLATION

SPRAYED POLYURETHANE FOAM – PROPER INSTALL



INSTALLATION

SPRAYED POLYURETHANE FOAM- POOR INSTALL



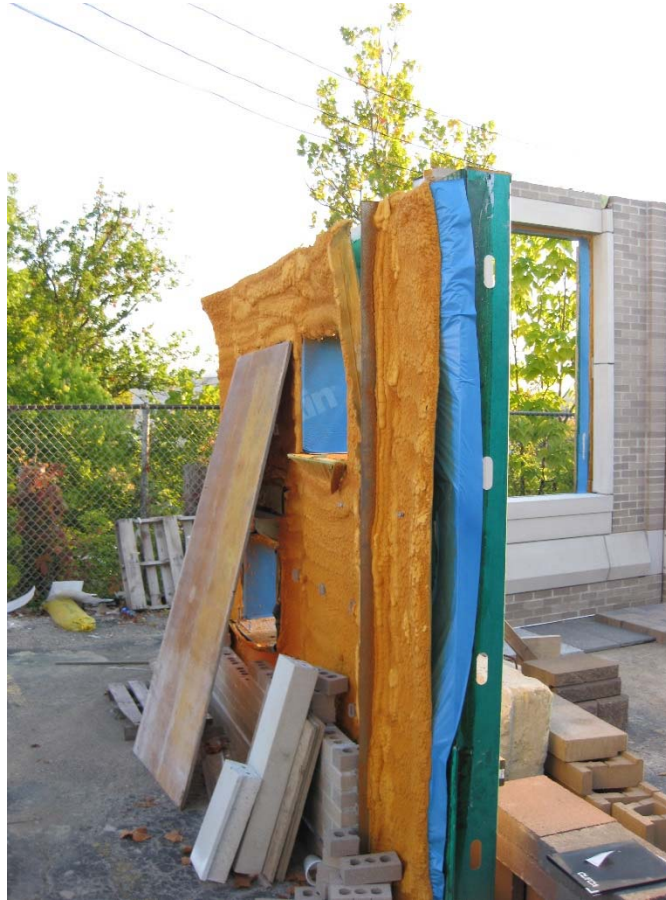
INSTALLATION

SPRAYED POLYURETHANE FOAM- POOR INSTALL



INSTALLATION

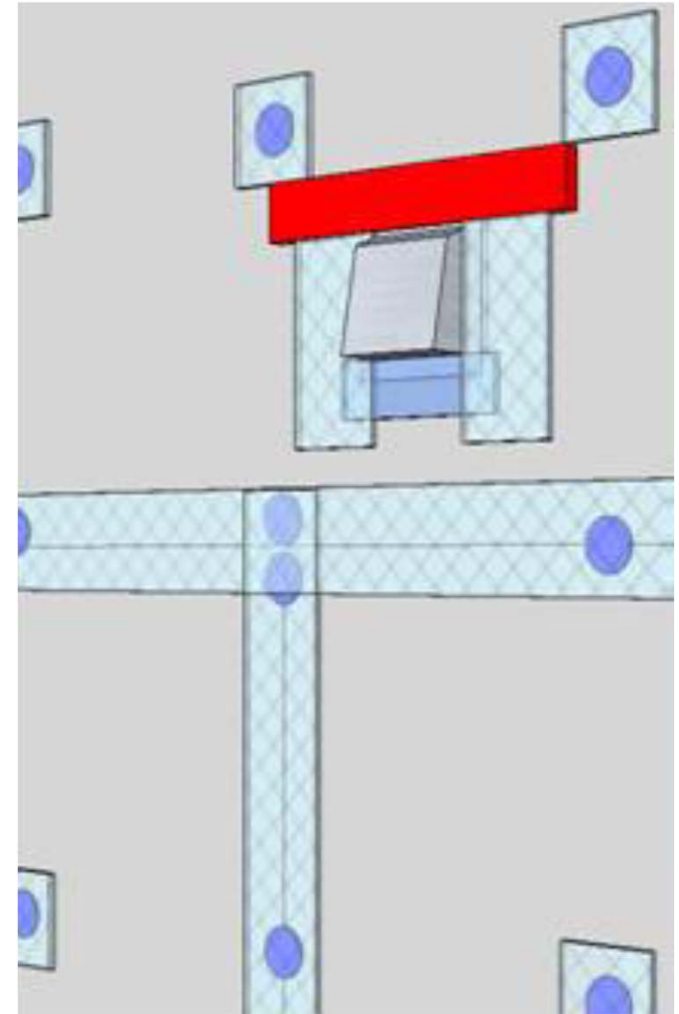
SPRAYED POLYURETHANE FOAM- POOR INSTALL



INSTALLATION

BOARD STOCK CELLULAR INSULATION

- Key Installation
 - Treating of seams, edges, end joints and through wall penetrations
 - Sealing penetrations and panel defects with sealant
 - Fastening of boards and types of fasteners
 - Integration with thru-wall flashing



INSTALLATION

BOARD STOCK CELLULAR INSULATION

- Common Field Issues
 - Lack of connection to windows, door and other details
 - Penetrations installed post-installation (electrical, mechanical)
 - Improper fasteners or sealants
 - Adhesion of tapes to board joints



INSTALLATION

BOARD STOCK– PROPER INSTALL



INSTALLATION

BOARD STOCK – POOR INSTALL



INSTALLATION

MECHANICALLY FASTENED COMMERCIAL BUILDING WRAP

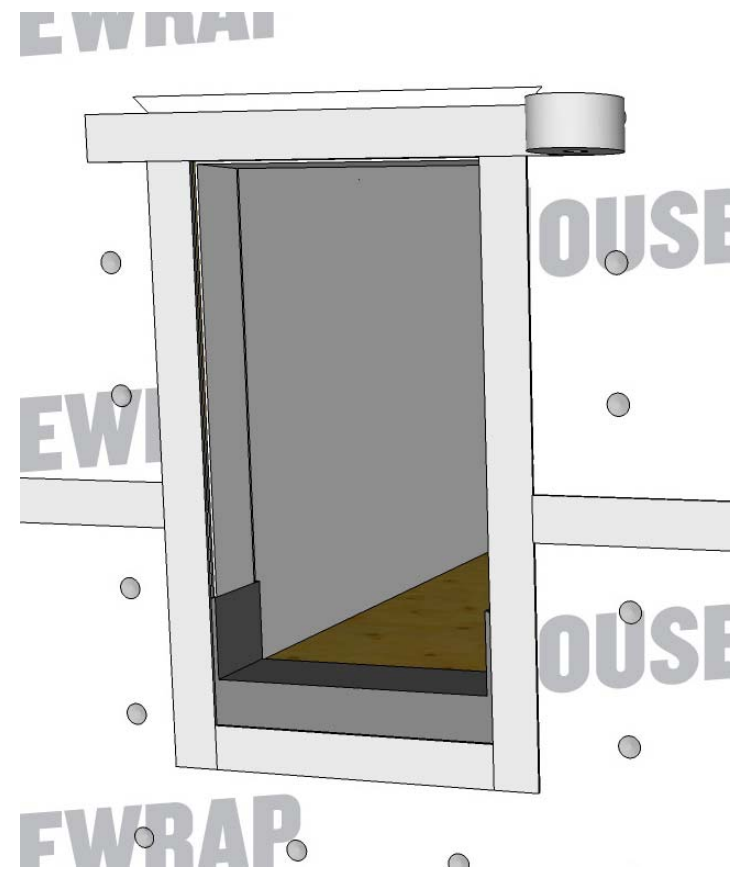
- Proper Substrate Preparation
 - Address protrusions that might puncture material



INSTALLATION

MECHANICALLY FASTENED COMMERCIAL BUILDING WRAP

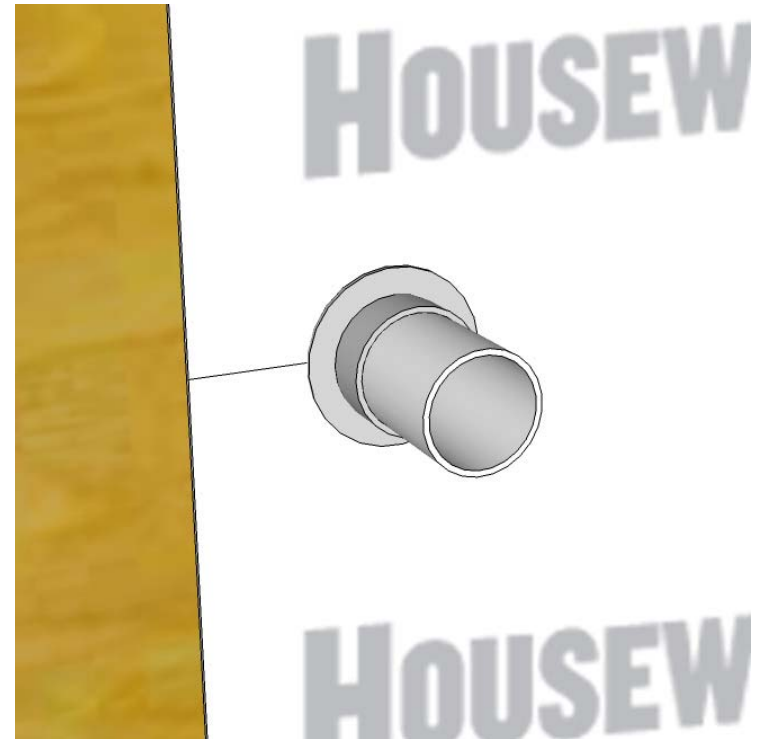
- Key Installation
 - Proper type of fasteners and fastening pattern
 - Proper overlap of seams and corners
 - Taping all seams
 - Detailing penetrations and details (windows, doors, etc)



INSTALLATION

MECHANICALLY FASTENED COMMERCIAL BUILDING WRAP

- Common Field Issues
 - Damage and tears during construction
 - Installation over sharp objects
 - Insufficient overlap of seams
 - Lack of integration into windows, doors and other openings



INSTALLATION

COMMERCIAL BUILDING WRAP – PROPER INSTALL



INSTALLATION

COMMERCIAL BUILDING WRAP – POOR INSTALL



INSTALLATION

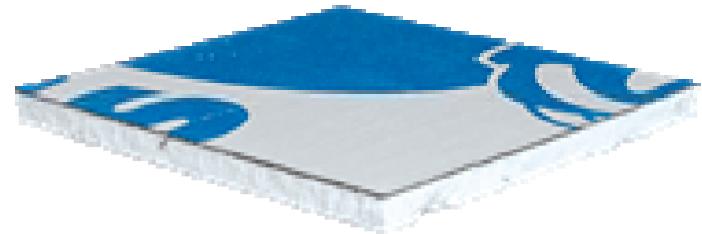
COMMERCIAL BUILDING WRAP – POOR INSTALL



INSTALLATION

FACTORY BONDED MEMBRANES TO SHEATHING

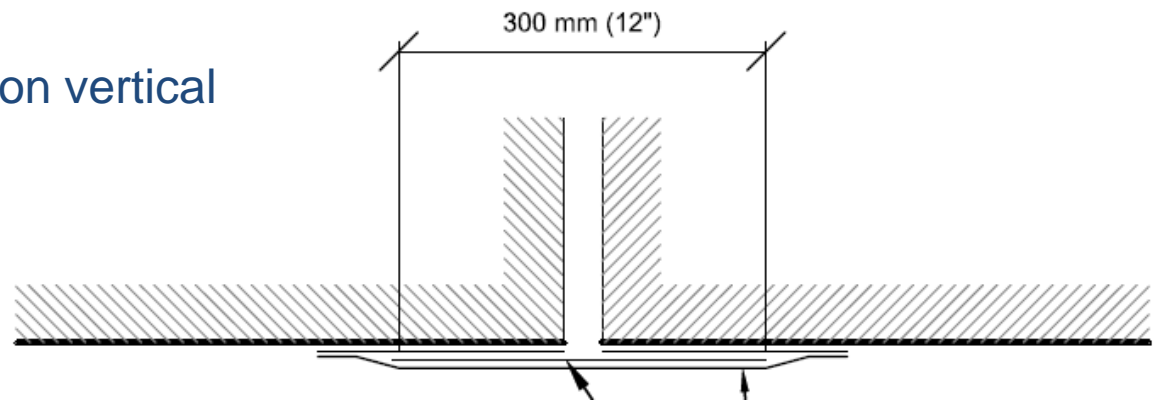
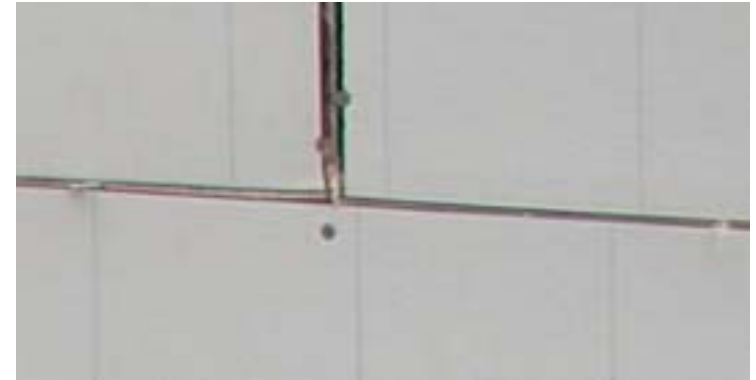
- Proper Substrate Preparation
 - Product is substrate
 - Proper fastening to substrate with recommended fasteners
 - Priming of membranes over sheathing



INSTALLATION

FACTORY BONDED MEMBRANES TO SHEATHING

- Key Installation
 - Treating of seams, edges, end joints and through wall penetrations with membranes
 - Off-set vertical joints
 - Membrane installation on vertical joints, then horizontal



INSTALLATION

FACTORY BONDED MEMBRANES TO SHEATHING

- Common Field Issues
 - Missed transition membranes or insufficient overlap
 - Over driven fasteners
 - Lack of primer for transition membranes



QUALITY ASSURANCE

FOR AIR BARRIERS

Summary

- Quality Assurance is different than Quality Control
- Prevention, Risk Management and standardization increase quality
- ABAA QAP needs to be specified

Thank you for your time!

Question and Answer Period

This concludes The American Institute of Architects
Continuing Education Systems Course

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