Avoiding Poor Air Barrier Audits

Robert F. Mimmo

Gale Associates, Inc.
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Avoiding Poor Air Barrier Audits

- Review the Quality Assurance Program (QAP)
- Review the ABAA Field Audit Process
Quality Assurance Program (QAP)

What is the QAP?

What is an ABAA Audit?

Who Benefits from QAP?

Why are ABAA Audits Necessary?
What is the QAP

- Developed by building professionals
- Increase the level of installed quality air barrier systems
- Greater assurance to the building owner and design professional
- Prequalification of contractors and installers
Who Benefits from the QAP?

- Contractors/Subcontractors
- Manufacturers
- Architects/Engineers/Consultants
- Building Owners
- Facilities/Utilities
What is an ABAA Audit

Independent 3rd Party Consultant

Field Check of Installer’s QAP

Monitors Compliance to the Specifications
Why Are ABAA Audits Necessary

- Maintain same standards and requirements for all involved
- Installer compliance
- Value to the building owner
- Basic principles of air barriers
- Project specifications
Project Specifications
Project Specifications

1.8 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance. Submit qualifications of firm including name, qualifications of supervisor for this project, and location of three projects where similar work was performed by both firm and supervisor. Installer for air and vapor barrier membranes shall be Air Barrier Association of America (ABAA) certified.
# Installer Compliance

## Section 2 - Audit Preparation

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installer(s):</td>
<td>On-site at time of audit?</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Applying air barrier?</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Registered Installer(s):</td>
<td>On-site at time of audit?</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Applying air barrier?</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Are the installer(s) certified by ABAA to install self-adhered air barrier materials?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see back of installer’s card for certification(s))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are daily job site reports on site and in installer’s possession?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Are daily job site reports complete and accurate?</td>
<td>X</td>
<td>5</td>
</tr>
<tr>
<td>Do all installers have ABAA photo identification card(s) on site and in installer’s possession?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Are all installer photo identification card(s) current?</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

### What is the primary air barrier material on this project?

705FR-A

### Are the air barrier accessories (e.g., transition material, mastics, primers) used listed by the manufacturer in their master specification?

X

### If no, have they been approved by the manufacturer in writing?

X

### What is the percentage of ABAA QAP-specified air barrier assembly installed at time of audit?

70%

### What is the percentage of ABAA QAP-specified installed air barrier assembly available for visual inspection?

75% of installed material

## Section 2 - Audit Preparation Observations and Mandatory Corrections

### Observations:

Daily Job Site Reports (DJSR) dating back to 1/14/2017 are on site for review. Based on the reviewed DJSR, adhesion tests have not been performed since approximately January 16, 2017. The installer’s test apparatus was not on site since January 16th.

### Corrections:

Adhesion tests need to be performed each day that AVB membrane is installed. The installer should fail back to perform adhesion testing on membrane that had remained exposed since January 16th.
Basic Principles of Air Barriers

- Continuous
  - Withstand positive/negative wind, fan, and stack pressures
- Durable and maintainable
  - Air permeability – 0.004 cfm/sf under pressure differential of 0.3 under water
- Transfer load to the structure
- Accommodate movement in the structure
Construction Sequencing

- Coordination of sub-trades
- Impacts on final product
Construction Sequencing

- Roof – Installed?
- Tight seal to the wall?
- No roof?
ABAA Field Audits
ABAA Field Audits

- Fluid applied
- Self adhering
- Board stock
- Spray-polyurethane Foam (SPF)
ABAA Field Audits

- Air barrier assembly
- Audit preparation
- Substrate conditions
- Visual inspection
- Physical testing
- Foam thickness (SPF)
- SPF equipment / material application (SPF)
- Safety
- Waste disposal (SPF)
- Installer awareness
## Air Barrier Assembly

### Section 1 - Air Barrier Assembly Materials

#### Fluid-Applied Air Barrier Material:
- Manufacturer name:
- Primary air barrier material trade name:
- Lot/batch number:
  - Is the material being installed one of the materials in the project specifications or has it been approved by the specifier?
  - Are manufacturers installation instructions on site and in installer's possession?
  - Installed material expiry date within limits?
  - MSDS sheets on-site and in installer's possession?

#### Transition Material:
- Manufacturer name:
- Transition material trade name & type (FA or SA):
- Transition material lot/batch number:
- Primer manufacturer:
- Primer trade name:
- Primer lot/batch number:
  - Are manufacturers installation instructions on site and in installer's possession?
  - Installed material expiry date within limits?
  - MSDS sheets on-site and in installer's possession?

#### Mastic/Sealant:
- Manufacturer:
- Mastic/sealant name:
- Lot/batch number:
  - Are manufacturers installation instructions on site and in installer's possession?
  - Installed material expiry date within limits?
  - MSDS sheets on-site and in installer's possession?

### Section 1 - Air Barrier Assembly Notes

**Observations:**
(any boxes checked above with "NO" or "N/A" shall be explained as well as deficiencies noted during the audit)

**Corrections:**
Air Barrier Assembly

- Materials
- Primary Air Barrier Material
- Sheet / fluid applied
Air Barrier Assembly

- Materials
- Transition Membrane
Air Barrier Assembly

- Materials
- Primer / Adhesive
Air Barrier Assembly

- Materials
- Mastic / Sealant
Air Barrier Assembly

- Material Storage
- Away from the elements?
- Heated containers / job trailers?
- Original containers?
Audit Preparation

## Section 2 - Audit Preparation

<table>
<thead>
<tr>
<th>Certified Installer(s):</th>
<th>On-site at time of audit?</th>
<th>Applying air barrier?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered Installer(s):</td>
<td>On-site at time of audit?</td>
<td>Applying air barrier?</td>
</tr>
</tbody>
</table>

- Are the installer(s) certified by ABAA to install self-adhered and fluid-applied air barrier materials? (Yes/No?)
- Are daily job site reports on site and in installers possession?
- Do all installers have ABAA photo identification card(s) on site and in installers possession?
- Are all installer photo identification card(s) current?
- Are the air barrier accessories (ie. transition materials, mastic, primer) used listed by the manufacturer in their master specification?
- If no, have they been approved by the manufacturer in writing?

- What is **project specifications** for thickness of the fluid-applied air barrier material (in wet mils)?
- What is **manufacturer master specifications** for application thickness of the fluid-applied air barrier material (in wet mils)?
- What is the percentage of ABAA QAP-specified air barrier assembly installed at time of audit?
- What is the percentage of ABAA QAP-specified **installed** air barrier assembly available for visual inspection?

### Section 2 - Audit Preparation Observations and Mandatory Corrections

**Observations:**

*(any boxes checked above with "NO" or "N/A" shall be explained as well as deficiencies noted during the audit)*

**Corrections:**

*(indicate if corrections are recommended or mandatory as per project or manufacturer specifications)*

**POINTS**

<table>
<thead>
<tr>
<th>Installer</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>
Audit Preparation

- Certification Cards
- Up to date?
- Certifications?
Audit Preparation

- Daily Job Site Reports
- Current?
- Completed?

---

Audit Preparation

- Daily Job Site Reports
- Current?
- Completed?
### Substrate Conditions

<table>
<thead>
<tr>
<th>Substrate Material(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Block (CMU)</td>
</tr>
<tr>
<td>Concrete (poured)</td>
</tr>
<tr>
<td>Exterior Gypsum Wallboard</td>
</tr>
<tr>
<td>OSB</td>
</tr>
<tr>
<td>Plywood</td>
</tr>
</tbody>
</table>

Other: __________________________

<table>
<thead>
<tr>
<th>Ambient Conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature: _____ °F</td>
</tr>
<tr>
<td>Humidity: _____ % R.H.</td>
</tr>
<tr>
<td>Wind: _____ mph</td>
</tr>
<tr>
<td>Full sun, partial shade, full shade?</td>
</tr>
</tbody>
</table>

Is temperature, wind and humidity within limits of manufacturers instructions? [ ]

<table>
<thead>
<tr>
<th>Substrate Conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°F):</td>
</tr>
<tr>
<td>Moisture content (MC):</td>
</tr>
</tbody>
</table>

Is temperature and moisture content within limits of manufacturers instructions? [ ]

<table>
<thead>
<tr>
<th>Substrate Preparation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry from bulk water and surface moisture?</td>
</tr>
<tr>
<td>Clean and free of grease, oil, wax, rust and loose scale solvents and other contaminants that may impair the bond of the air barrier materials?</td>
</tr>
<tr>
<td>Unit masonry and cast-in-place concrete free of excess mortar, flush and free of voids?</td>
</tr>
<tr>
<td>Unit masonry joints smooth, flush and free of voids?</td>
</tr>
<tr>
<td>Joints on plywood, gypsum board and other substrates prepared in accordance with self-adhered air barrier manufacturer's master specification?</td>
</tr>
<tr>
<td>Substrate primed in accordance with self-adhered air barrier manufacturer’s master specification?</td>
</tr>
<tr>
<td>Are substrate joints being prepared in accordance with self-adhered manufacturer’s instructions?</td>
</tr>
</tbody>
</table>

If no, please describe in the observations section below. Is the substrate temperature within manufacturers requirements during application of self-adhered materials during the audit? [ ]

### Section 3 - Substrate Observations and Mandatory Corrections

<table>
<thead>
<tr>
<th>Observations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Any boxes checked above with &quot;NO&quot; or &quot;NA&quot; shall be explained as well as deficiencies noted during the audit)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Corrections:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(All deficiencies noted in Section 3 shall be accompanied by recommendations for corrective action and referenced photos shall be in final submitted report)</td>
</tr>
</tbody>
</table>

(Indicate if corrections are recommended or mandatory as per project or manufacturer specifications)
Unacceptable Substrates

- CMU
- Concrete
Unacceptable Substrates

- Gypsum Sheathing
- Plywood
Unacceptable Substrates

- Steel
Unacceptable Substrates

- Foundations
Acceptable Substrates

- CMU
- Concrete
Acceptable Substrates

- Sheathing
Acceptable Substrates

- Steel
Acceptable Substrates

- Foundations
### Section 4 - Visual Inspection

**Pictures taken by auditor?**

**Video taken by auditor?**

**Location of inspection:**
- North Wall: 
- South Wall: 
- East Wall: 
- West Wall: 

If any of the above listed as N/A, provide details in the observations section below.

**Self-Adhered Materials (abbreviation "MS" - Manufacturer Master Specification):**
- Were transition materials specified and used on this project? Yes, No, N/A
- If yes, explain in observations section.
- If yes, were they installed as per project specifications? Yes, No, N/A
- Was primer and transition material applied at a temperature in accordance with manufacturers specifications at time of audit? Yes, No, N/A
- Primer for transition materials used specified in accordance with MS? Yes, No, N/A
- Did the auditor observe the installer applying primer? Yes, No, N/A
- If yes, did sufficient time elapsed for self-adhered air barrier and transition membrane application over primer in accordance with MS? Yes, No, N/A
- Transition membranes and self-adhered air barrier materials applied at a temperature in accordance with MS at time of audit? Yes, No, N/A
- Self-adhered air barrier and transition membrane seams, and end joints overlapped in accordance with MS? Yes, No, N/A
- Transition membrane and self-adhered air barrier materials fully bonded to substrate, rolled smooth, free of wrinkles, not delaminated, free of "fish mouths" and voids? Yes, No, N/A
- Are damaged areas or voids from pull-adhesion testing repaired in accordance with MS? Yes, No, N/A
- All joints and exposed edges in transition materials and self-adhered air barrier materials terminated in accordance with MS? Yes, No, N/A
- Were transition membranes installed as per MS? Yes, No, N/A
- Width of transition membrane meets MS? Yes, No, N/A
- Has self-adhered air barrier materials been kept free of contact with non-compatible (physical or chemical) materials? Yes, No, N/A
- As per daily work sheets is transition materials and self-adhered air barrier material within manufacturers UV exposure time limit at the time of audit? Yes, No, N/A
- Were transition membranes installed at building envelope penetrations such as corners, joints, drains, penetrations and window/door openings as per MS or project specifications? Yes, No, N/A

---

**Section 4 - Visual Inspection Observations and Mandatory Corrections**

**Observations:**
- Any boxes checked above with "NO" or "N/A" shall be explained as well as deficiencies noted during the audit.
- Indicate if deficiencies of that specific work item are minor ≤10% or major >10% to facilitate the correct demerit points.

**Corrections:**
- All deficiencies noted in Section 5 shall be accompanied by recommendations for corrective action and referenced photos shall be in final submitted report.
- Indicate if corrections are recommended or mandatory as per project or manufacturer specifications.
Details...

You don’t need details. You’ve been doing this for 20 years…
Visual Inspection

Primer Application

- Is primer applied?
- Is it consistent; transparent; still tacky?
THE INSTALLER...in

THE GOOD AND THE BAD AND THE UGLY

air barrier
abaa association of america
The Good...

- Fluid applied
The Good...

- Sheet applied
The Good...

- SPF
The Bad...

- Fluid applied
The Bad...

- Sheet applied
The Bad...

- SPF
The Ugly...

- Fluid applied
The Ugly...

- Sheet applied
The Ugly...

- SPF
Physical Testing

Section 5 - Physical Testing

### Adhesion Testing by ASTM D6441

- **Disc:**
  1. **Adhesion:**
     - Force (lbs from gauge):
     - Diameter of disc (inches):
     - Pull-off strength (psf)
  2. **Adhesion:**
     - Force (lbs from gauge):
     - Diameter of disc (inches):
     - Pull-off strength (psf)
  3. **Adhesion:**
     - Force (lbs from gauge):
     - Diameter of disc (inches):
     - Pull-off strength (psf)

### Thickness Testing

- **Test:**
  1. **Thick Test:**
     - Test:
     - Thickness (inches)
  2. **Thick Test:**
     - Test:
     - Thickness (inches)
  3. **Thick Test:**
     - Test:
     - Thickness (inches)
  4. **Thick Test:**
     - Test:
     - Thickness (inches)
  5. **Thick Test:**
     - Test:
     - Thickness (inches)
  6. **Thick Test:**
     - Test:
     - Thickness (inches)

### Average Thickness Tested

- **Average Thickness:**
  - Thickness (inches)

---

Section 6 - Physical Testing Observations and Mandatory Corrections

- **Observations:**
  - (any boxes checked above)
  - (all deficiencies noted in (a))

- **Corrections:**
  - (all deficiencies noted in (a))

---

Air Barrier Association of America (ABAA)
Physical Testing

- Discs properly sized?
Physical Testing

- Installer / Auditor
- Membrane remain on the substrate?
- Membrane / substrate facer release?

air barrier
association of america
SPF Equipment / Material Testing

Section 5 - SPF Equipment & Material Application

| SPF Equipment: |
| Machine model and description: |
| Gun model: |
| Mixing chamber size: |
| Hose length (ft): |
| Primary temperature A-Side (iso) (°F): |
| Primary temperature B-Side (Resin) (°F): |
| Hose temperature (°F): |

| Temperature gauge in good condition? |
| Temperature controllers accessible? |
| Primary heater free of leaks? |
| Pressure gauges in good condition? |
| A-Side (iso) cylinder lubricant acceptable? |

| Pressure settings A-Side (psi): |
| Pressure settings B-Side (psi): |
| Lot number: A-Side (iso) |
| E-Side (Resin) |
| Manufacture date: A-Side (iso) |
| E-Side (Resin) |

| Is A-side (iso) within expiry dates? |
| Is B-side (Resin) within expiry dates? |
| Material drums stored with manufacturers required temperature range? |

SPF Application:

| Is the spray gun a proper distance from the substrate? |
| Is the spray gun perpendicular to the substrate? |
| Cream time with manufactures specifications? |
| Set time with manufactures specifications? |

Section 5 - Equipment & Material Application Observations and Mandatory Corrections

Observations:

Date Issued: 03/11/2012

A score of the form √ will be accepted as a full check mark. The form SPF
SPF Equipment/Material Testing

- Equipment / Materials
### Section 7 - Foam Thickness

<table>
<thead>
<tr>
<th>Number of passes:</th>
<th>(MUST list values from spraying during audit or from density core sample)</th>
<th>Are all passes of SPF ≤ 2?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>North Elevation:</strong></td>
<td>1) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td><strong>AVERAGE: 0.00</strong> inch(es)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meets minimum project-specified thickness?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>East Elevation:</strong></td>
<td>1) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td><strong>AVERAGE: 0.00</strong> inch(es)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meets minimum project-specified thickness?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>South Elevation:</strong></td>
<td>1) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td><strong>AVERAGE: 0.00</strong> inch(es)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meets minimum project-specified thickness?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>West Elevation:</strong></td>
<td>1) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6) (MUST list tested value) inch(es)</td>
<td></td>
</tr>
<tr>
<td><strong>AVERAGE: 0.00</strong> inch(es)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meets minimum project-specified thickness?</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For large multi-story projects, conduct additional thickness testing and submit to ABA with this report.

Is an additional thickness testing document submitted to ABA for large multi-story buildings? Do areas around windows, doors, protrusions, and penetrations meet project-specified thickness?

If no, explain in observations section.

### Section 7 - Foam Thickness Observations and Mandatory Corrections:

**Observations:**

(Any boxes checked above with “NO” or “N/A” shall be explained as well as deficiencies noted during the audit)

**Mandatory Corrections:**
Foam Thickness

- Core cuts
- Thickness per lift
### Installer Awareness

#### Section 7 - Installer Awareness

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installer</td>
<td>Contractor</td>
<td>Installer</td>
</tr>
</tbody>
</table>

ABAA installer(s) aware of any deficiencies in the applied air barrier assembly?  
Was the ABAA contractor informed of deficiencies, post-audit?  
Does the ABAA contractor and installer(s) have a proper corrective action plan in place to address deficiencies?

#### Section 7 - Installer Awareness Observations and Mandatory Corrections

Observations:  
(any boxes checked above with "NO" or "N/A" shall be explained as well as deficiencies noted during the audit)

corrections:
Installer Awareness

Post-Audit Deficiency Sheet

- Installer
- General Contractor

---

**Post-Audit Deficiency Details:**

The following conditions were observed during this audit:

- **Installation Observations:**
  1. Blistered FA AVB membrane on the south elevations of Buildings A and B;
  2. Stumped FA AVB membrane on the west, south and east elevations of Building A, and the south elevation of Building B;
  3. Wrinkled transition membrane on the south elevation of Buildings A and B, and on the east elevation of Building A;
  4. Trapped water behind window-sill transition membrane on the west elevation of Building A;
  5. Un-patched / non-repaired transition membrane that had been sliced to release trapped water on the west elevation of Building A;
  6. Missing transition membrane at isolated location on the east elevation of Building A;
  7. Unsealed (no termination mastic) transition membrane seam on the east elevation of Building A;

- **Testing Observations:**
  8. plywood test discs are not the minimum 2-1/4" diameter as required by ABAA. Discs were 2" diameter. Adhesion tests performed during the audit need to be repeated using properly sized discs;
  9. Thickness testing indicates material thickness of the Air-Bloc MR 16 is less than the project and the manufacturer's requirements. Additional material application is needed.

- **Documentation Observations:**
  10. Daily Job Site Reports for FA membrane do not show wet-mil thickness readings. Readings must be taken and documented to confirm the Installer's awareness of material thickness during application.

---

**Audit Details:**

- **Auditor Name:**
- **Auditor Signature:**
- **Air Barrier Contractor Name:**
- **Air Barrier Contractor Signature:**
- **General Contractor Name:**
- **General Contractor Signature:**

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**Date of Issue:** 01/31/2013

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QUESTIONS???
Thank You!