



Louver Requirements, Codes, and Specifications In Hurricane Prone Regions

AMCA *insite*™ Webinar Series | AMCA International | www.amca.org



LAS VEGAS
JAN 31 - FEB 2, 2022

Lisa Cherney

Education Manager, AMCA International
Session Moderator

- Joined AMCA in February 2019
- Responsible for development of AMCA's education programs; staff liaison for the Education & Training Subcommittee
- Projects include webinars, online education modules, presentations at trade shows, AMCA Speakers Network and other duties as assigned.



Participation Guidelines

- Please place your cell phone on silent or vibrate.
- There will be Q&A at the end of the session.
- To receive PDH credit for attending:
 - Be sure to have your badge scanned by a room monitor so a complete attendee list can be generated.
 - You must be present for the entire session and complete a post-session online evaluation. Partial credit cannot be given for anyone who arrives late, leaves early or does not complete the evaluation.
 - The post-session evaluation will be emailed to everyone within 7 days, and it must be completed to qualify for today's PDH credit. If you do not want PDH credit, completing the survey is optional.

Special Gift!

Attend 5 or more of AMCA's educational sessions at AHR Expo and receive a special gift!

- Do not forget to get your booklet stamped by AMCA staff in each session.
- Present your stamped booklet at the AMCA Booth–
C3628 – to claim your gift.

Gift supplies are limited; first come, first served.

AMCA International has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.

*Attendance for the entire presentation
AND a completed evaluation are required
for PDH credit to be issued.*



DISCLAIMER

The information contained in this education session is provided by AMCA International as an educational service and is not intended to serve as professional engineering and/or manufacturing advice. The views and/or opinions expressed in this educational activity are those of the speaker(s) and do not necessarily represent the views of AMCA International. In making this educational activity available AMCA International is not endorsing, sponsoring or recommending a particular company, product or application. Under no circumstances, including negligence, shall AMCA International be liable for any damages arising out of a party's reliance upon or use of the content contained in this education session.

COPYRIGHT MATERIALS

This educational activity is protected by U.S. and International copyright laws. Reproduction, distribution, display and use of the educational activity without written permission of the presenter is prohibited.

© AMCA International 2022

Michael Bulzomi

Director of Marketing- Louvers and Dampers,
Nailor Industries, Inc.

- Over 15 years experience in the HVAC industry
- Has held positions in sales, marketing and application engineering across the U.S. for HVAC product manufacturers and Sales Reps
- Holds an MBA, and a Bachelors in Earth Science and Atmospheric Science
- Active member of ASHRAE, NFPA & AMCA, serving on multiple committees



Louver Requirements, Codes, and Specifications In Hurricane Prone Regions

Purpose and Learning Objectives

The purpose of this presentation is to review the different types of severe duty louvers and the testing protocols that pertain to them.

At the end of this presentation you will be able to:

1. Identify what geographic areas are located within the hurricane prone and wind-borne debris regions.
2. Describe the different 'hurricane'-type testing protocols.
3. Identify the difference between AMCA-540 impact testing and TAS-201 impact testing.
4. Differentiate between the different types of Hurricane Louvers.

What is a Louver?

AMCA Publication 501

Louver Application Manual And Design Guide

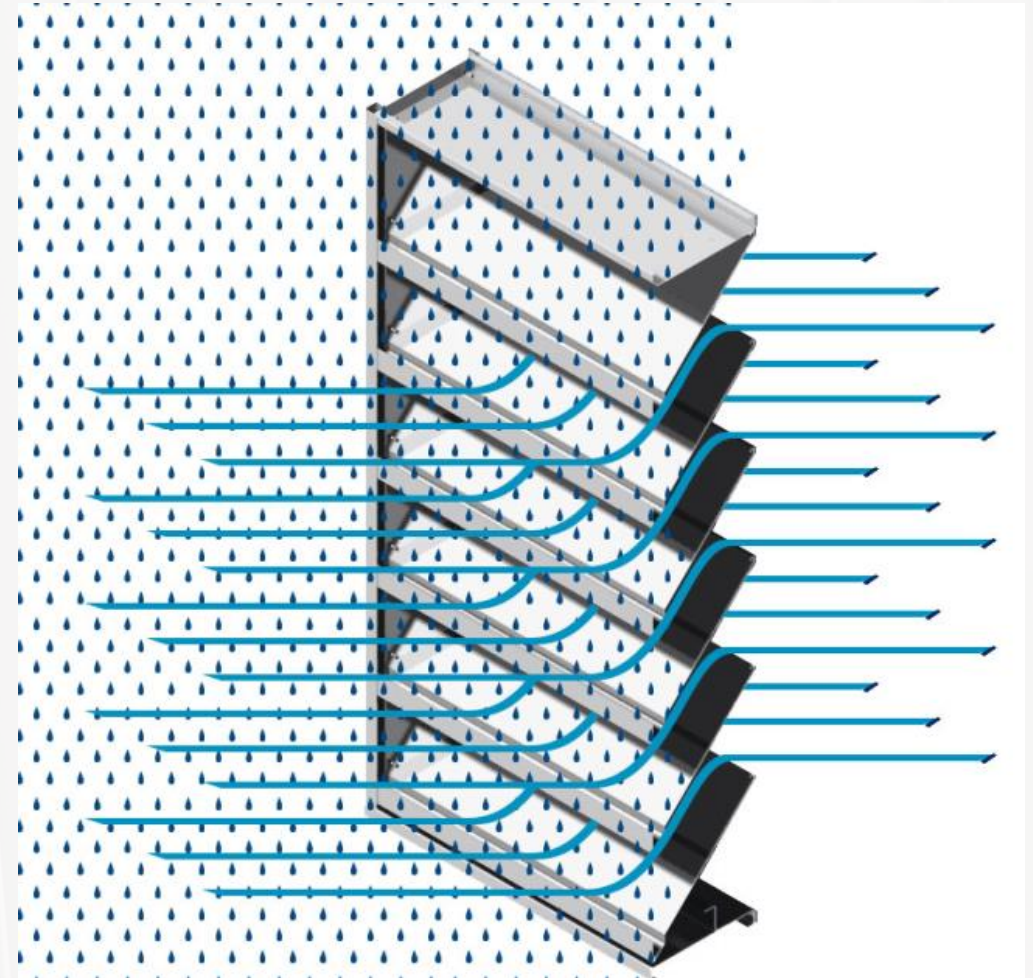
“A device comprising multiple blades, which, when mounted in an opening, permits the flow of air but inhibits the entrance of water or other elements.”



General Louver Applications

Used in air moving systems for:

- ***Intake***
- ***Exhaust***
- ***Ventilation***



Hurricane Louvers: Code Requirements



Hurricane Louvers: Code Requirements

IBC The International Building Code (2021)

- ***1609.2.1 – In wind borne debris regions... Louvers protecting intake and exhaust ventilation ducts not assumed to be open that are located within 30 feet of grade shall meet the requirements of AMCA-540.***

IMC The International Mechanical Code (2021)

- ***401.4/501.3.2 – Louvers that protect air intake/exhaust openings in structures located in hurricane-prone regions, as defined in the International Building Code, shall comply with AMCA-550.***

International Building Code (IBC)

Definition per the IBC:

- **Hurricane prone regions** – Areas vulnerable to hurricanes defined as: The US Atlantic Ocean and Gulf of Mexico coasts where design windspeeds are 115 mph or greater, and Hawaii, Puerto Rico, Guam, Virgin Islands, and American Samoa.



International Building Code (IBC)

Definition per the IBC:

- **Wind Borne Debris Regions**
 - Areas within the hurricane prone regions located:
 - Within one mile of the coastal high-water line, where the ultimate design speed is 130 mph or greater.
 - In areas where the ultimate design load is 140 mph or greater.

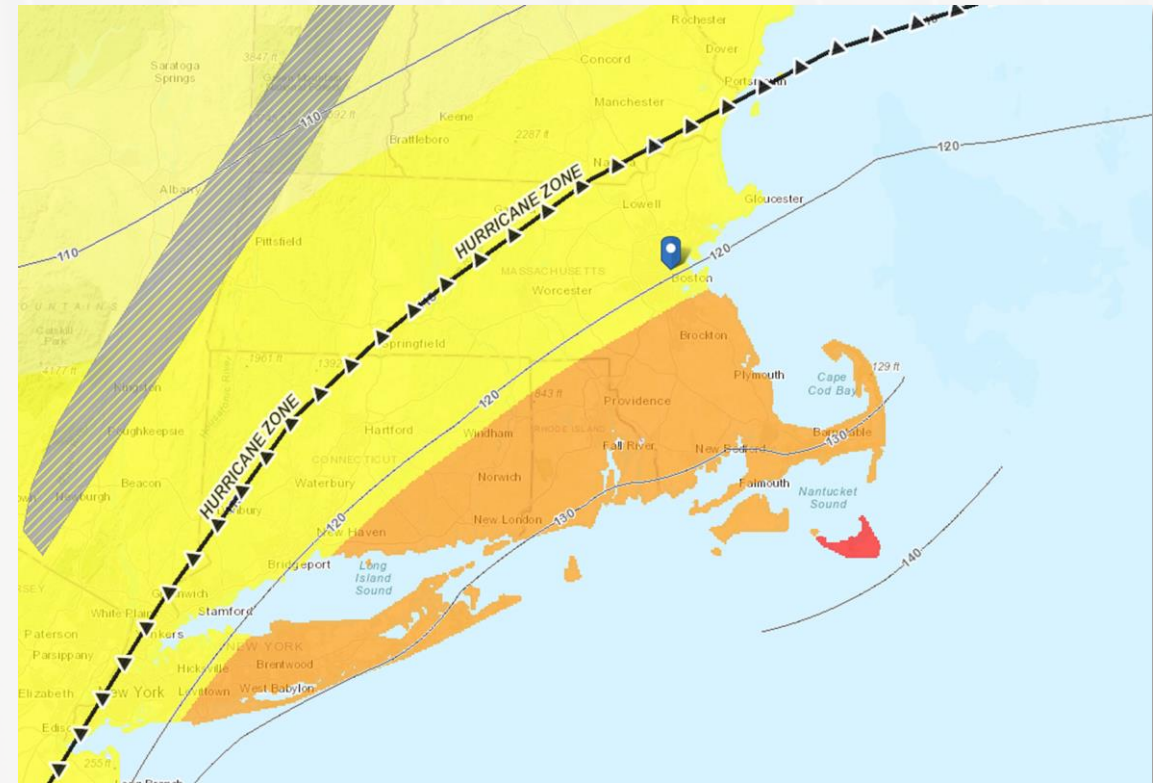


Hurricane Louvers – not just Florida!

Hurricane Prone Region includes:

- Houston, TX
- Long Island, NY
- Hartford, CT
- Boston, MA
- Wilmington, NC
- Coastal Maryland

... and More!!!



Hurricane Louvers

Hurricane Andrew ravaged much of Florida, and much of the gulf coast, in 1992.

- One of only (5) category 5 hurricanes to make landfall in the US.
- Caused \$25.3 billion in property damage (\$46.23 billion when adjusted for inflation).
- Resulted in 65 deaths.
- Led to building code reforms intended to strengthen building resilience.



Hurricane Louvers

FBC Florida Building Code (2020)

- ***1609.1.2.1 – Louvers protecting intake and exhaust ventilation ducts not assumed to be open that are located within 30 feet of grade shall meet the requirements of AMCA-540... Louvers required to be open for life safety purposes such as providing a breathable atmosphere shall meet the requirements of AMCA 540***

FBC Florida Building Code, Mechanical (2020)

- ***401.5/501.3.2 – Louvers that protect air intake/exhaust openings in structures located in hurricane-prone regions, as defined in the International Building Code, shall comply with AMCA 550.***

Hurricane Louvers

Miami Dade Product Control Check list

The following current laboratory tests and test reports in compliance with protocol TAS 301.

Louvers that protect air intake openings in structures:

- ❑ AMCA 550 per FBCM 401.5
- or
- ❑ Wind Driven Rain test per TAS 100(A)- 95 with the following modifications:
 - 1) Testing shall be done using a vertical test frame consisting of CBS blocks.
 - 2) All fasteners used shall have verifiable published literature.
 - 3) There shall not be any water infiltration in excess of 1% of the total water sprayed.
 - 4) The test set-up shall be configured in the following manner:

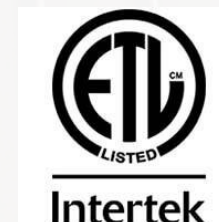
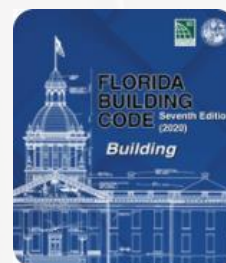
Louvers that protect air intake openings in structures and all other louvers:

- ❑ TAS202; structural loads only. The test sample shall be considered completely closed for the purpose of load distribution to anchoring of the louver system. Mullions must comply with L/180 maximum deflection.

If the room behind louver is not designed as an open structure, the following tests shall also be performed. (Operable louvers require these tests.)

- ❑ TAS201 and TAS203. After impact, there shall be no horizontally projected opening formed through which a 3 in diameter sphere can pass.

Severe Duty Louver Testing and Certifications



Testing, Listing, and Certifying Agents

AMCA

Air Movement and Control Association; the main certifying agent for louvers. The most common louver testing protocols, as defined in AMCA 500-L are:

- Pressure Drop
- Airflow
- Water Penetration
- Wind-Driven Rain

They have also recently developed testing protocols for severe weather louvers. They are as follows:

- Impact Resistance (540)
- Hurricane Wind-Driven Rain (550)



Testing, Listing, and Certifying Agents

Acts as a third-party testing agent for louver manufacturers in accordance with one or more of the following test standards:

- AMCA 540
- AMCA 550
- TAS Test Protocols
- ASTM E330
- ASTM E331
- ASTM E283
- ASTM E1996
- AAMA/WDMA/CSA 101/I.S.2/A440
- ICC-500



Testing, Listing, and Certifying Agents

- **Florida Department of Business & Professional Regulation** – maintain public Product Approval details on building products approved for Florida.
- **Miami Dade Building** – maintain public Product Approval details on building products approved for Miami-Dade county.
- **Texas Department of Insurance** – Product evaluation usually required for commercial buildings in the Texas Gulf Coast.



Louvers Specifications

- **Florida Product Approval** – FBC compliant, AMCA 540/550 listed, for use in FL outside of Miami-Dade and Broward counties. Some legacy louvers are AMCA 540 listed only and used outside of Florida. Listed on FL website.
- **AMCA 540/550 Listed** – Not listed on FL website, listed on AMCA website, for use outside of Florida.
- **Miami-Dade NOA Approved** – Listed on Miami-Dade website. AMCA 540 and/or TAS Protocols (some AMCA 550 as well). All ‘MD’ louvers are ‘FBC’ listed, but not all ‘FBC’ louvers are ‘MD’ listed.

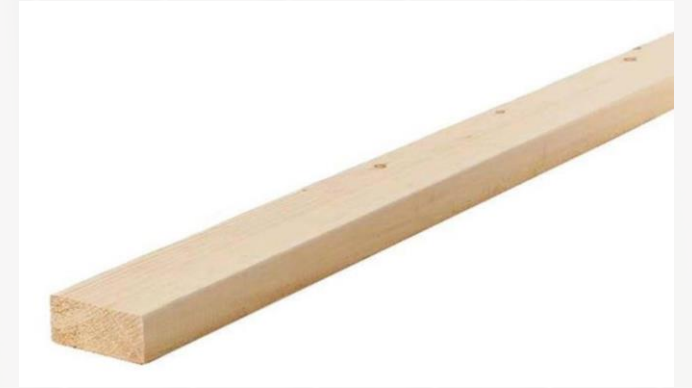
Severe Weather Testing



Severe Weather Testing

TAS-201: Large Missile Impact

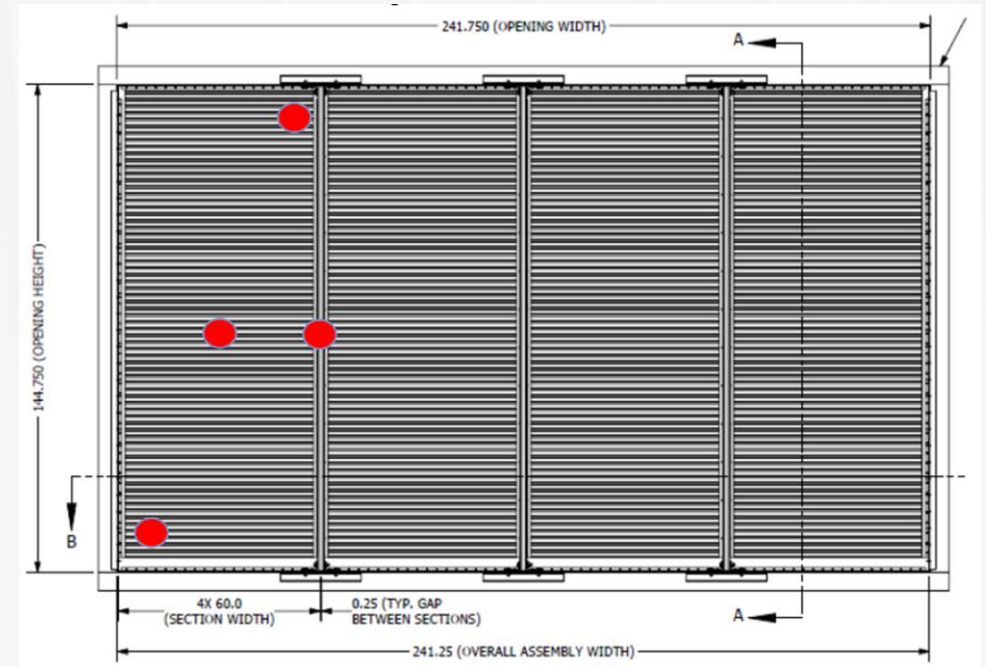
- Simulates a louver's ability to withstand impacts from wind borne debris.
- Testing consists of firing a 9-pound, 2 x 4 traveling at 50 feet per second (34 mph) at the specimen. Manufacturers test their largest specimen against several impacts to gain the certification.



Severe Weather Testing

AMCA 540: Large Missile Impact

- Like TAS-201, this test simulates a louver's ability to withstand impacts from wind borne debris.
- Testing consists of firing a 9-pound, 2 x 4 traveling at 50 feet per second (34 mph) at the specimen for Basic Protection, and 80 feet per second (55 mph) for Enhanced Protection. In addition to testing their largest spans, AMCA 540 also requires the testing of the smallest louver size to be offered.
- Is a requirement for any louver that is to be FBC listed.

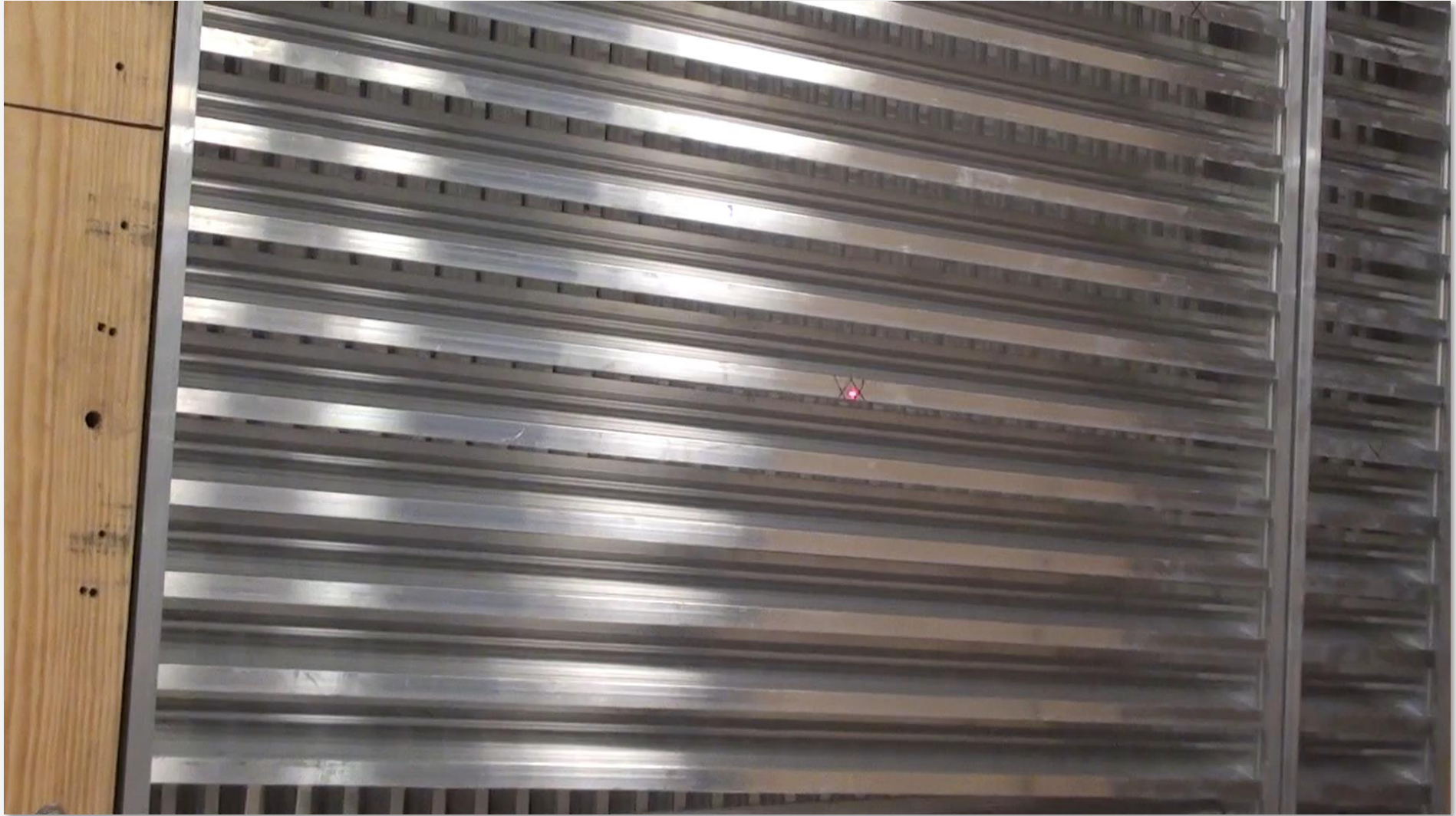


Severe Weather Testing

Large Missile Impact Test

Test Standard	AMCA 540 Basic	AMCA 540 Enhanced	TAS 201
Missile Material	2x4 Timber	2x4 Timber	2x4 Timber
Missile Weight	9 lbs.	9 lbs.	9 lbs.
Velocity of Missile	34 mph	55 mph	34 mph
Minimum Sample Size	Smallest Section to be Offered	Smallest Section to be Offered	NA
Maximum Sample Size	Maximum unsupported blade span Maximum height	Maximum unsupported blade span Maximum height	Maximum unsupported blade span Maximum height

Severe Weather Testing- Large Missile Impact Video



Severe Weather Testing

TAS-202: Uniform Static Air Pressure Test

- Simulates a louver's ability to resist pressure from hurricane force winds.
- Testing consists of subjecting the louver to both positive and negative pressure for 60 seconds. They are tested at 75%, 100%, and 150% of the product's design load. Passing the test is dependent on the louvers ability to resist deflection and retain integrity.



Severe Weather Testing

TAS-203: Uniform Cyclic Air Pressure Test

- Simulates a louver's ability to withstand repeated hurricane force wind gusts.
- Testing consists of subjecting the louver to 671 five second maximum cycles ranging from 1/2 design load, to 1.3 times the design load.
- Is a requirement for any louver intended to be Miami-Dade Certified.
- TAS-203 is required if the specimen will be listed as TAS-201, and the TAS-203 test is always performed after the impact tests.

Test Load vs. Design Load	Positive Pressure Cycles	Negative Pressure Cycles
0 to 0.6	300	50
0.2 to 0.5	3500	335
0.5 to 0.8	600	1050
0.3 to 1.0	100	50
1.3	1	1

Severe Weather Testing

High Velocity Wind Driven Rain

Qualifies louver's ability to prevent water penetration under severe rainfall and hurricane force winds.

Test Conditions: AMCA 550/TAS100A

- 48" x 48" Sample
- Rainfall Rate = 8.8 Inches/Hour
- Duration = 15 Minutes
- Louvers that protect air openings in hurricane prone regions must comply with AMCA 550, per FMC.
- No more than 1% of the overall sprayed amount of water can penetrate the louver for a successful test.
- Wind Speed & Water Penetration
 - 35 mph
 - 70 mph
 - 90 mph
 - 110 mph



The most difficult of the severe weather tests to pass. The only louver models approved are either vertical blade units or 'dual-module' units. There are some horizontal models approved, but they stipulate that a control damper must be in the closed position behind the louver.

Severe Weather Testing- AMCA 550 Test Video



This label does not signify
AMCA airflow performance
certification.



This label does not signify
AMCA airflow performance
certification.

Hurricane Louvers

- **Miami-Dade County Approved Louvers**

Louvers that have been approved for use in hurricane zones, specifically in Miami-Dade and Broward Counties in Florida. Miami-Dade approved louvers must be tested to several test standards that are designed to simulate severe weather conditions.

- TAS Test Protocols
- AMCA 550
- Higher than 'standard' wind loading

- **Florida Building Code Approved Louvers**

Louvers that have been approved for use in the state of Florida. Florida utilizes their own building codes that are based on the IBC.

- AMCA 540
- AMCA 550
- Higher than 'standard' wind loading



Hurricane Louver Design



**Horizontal Blade Louver
w/ Control Damper**



Vertical Blade Louver

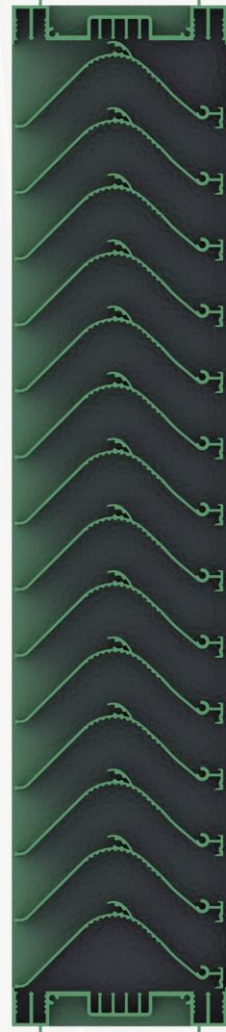


Hybrid Dual Module Louver

Hurricane Louver Design



Side (Profile) View



Top View



Top View

Resources

- **AMCA International:** www.amca.org
- **2019 AMCA *inmotion* Magazine:** <http://bit.ly/AMCAinmotion2019>
 - > Improving Building Resilience with Severe-Duty Louvers
- **AMCA Standards** (Available for purchase): www.amca.org/store
 - > **500-L-12:** Laboratory Methods of Testing Louvers
 - > **540-13:** Test Method for Louvers Impacted by Wind Borne Debris
 - > **550-15:** Test Method for High Velocity Wind Driven Rain Resistant Louvers
- **AMCA White Papers:** <https://www.amca.org/educate/#articles-and-technical-papers>
 - > Understanding the ANSI/AMCA Standard 500-L Tests



Q & A

Survey QR Code:



Thank you for your time!

*To receive PDH credit for today's educational session, you **must** complete the online evaluation, which will be sent to you via email within 7 days of this program.*

*PDH credits and participation certificates will be issued electronically **within 30 days**, once all attendance records are checked and the completed online evaluations are received.*

Attendees will receive an email at the address provided on your 2022 AHR Expo registration, listing the total credit hours awarded and a link to a printable certificate of completion.

If you have any questions, please contact Lisa Cherney, Education Manager, at AMCA International (lcherney@amca.org).