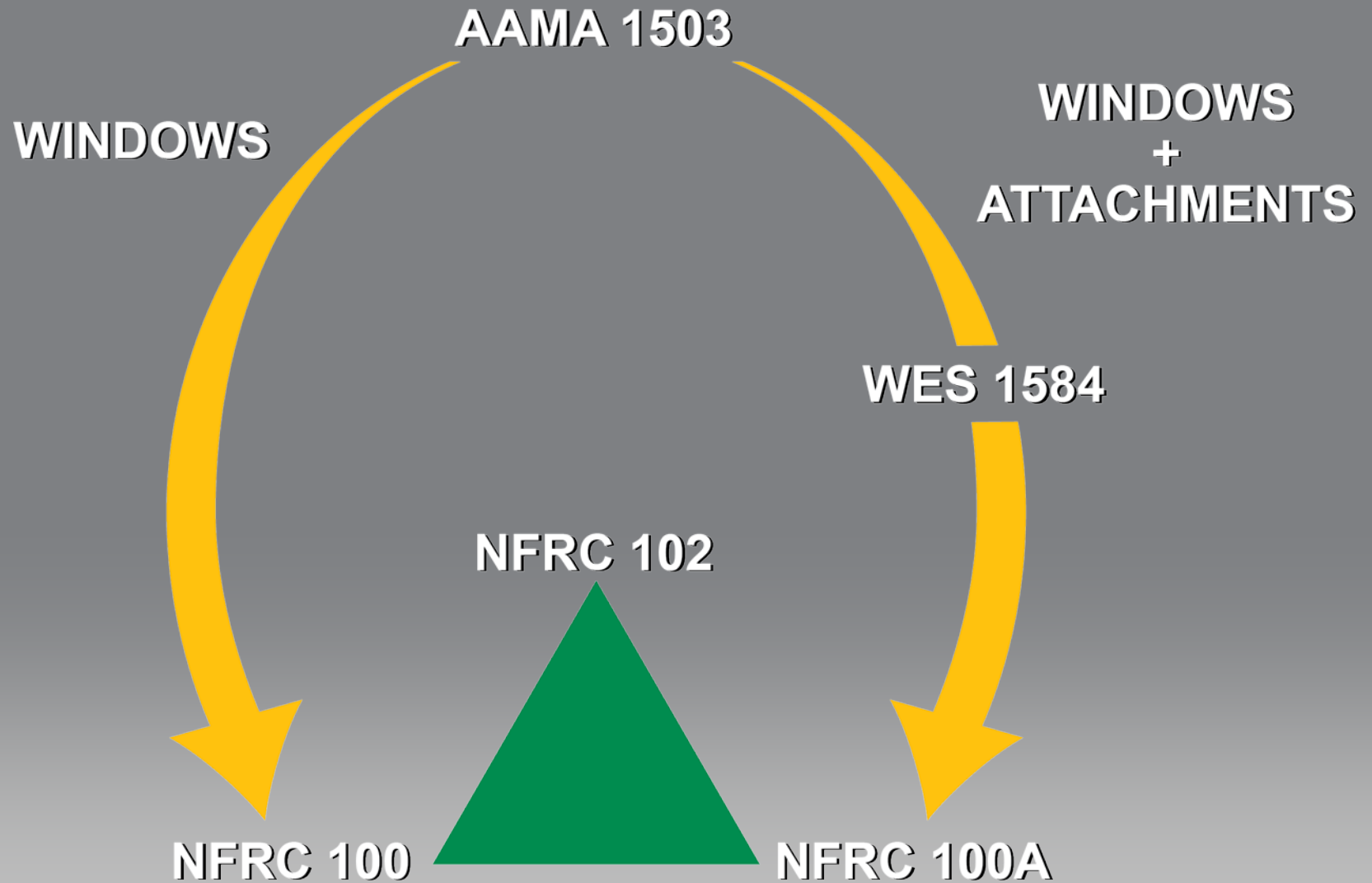


**U-Factor and SHGC  
Testing of Interior  
Window Attachments**

September 24, 2010

*This presentation was prepared by Hunter Douglas, an NFRC member company. Mention of specific testing and simulation laboratories does not constitute endorsement by NFRC. For a complete listing of NFRC accredited simulation laboratories and accredited testing laboratories, visit <http://www.nfrc.org/labsagencies.aspx>*

# Coming Together

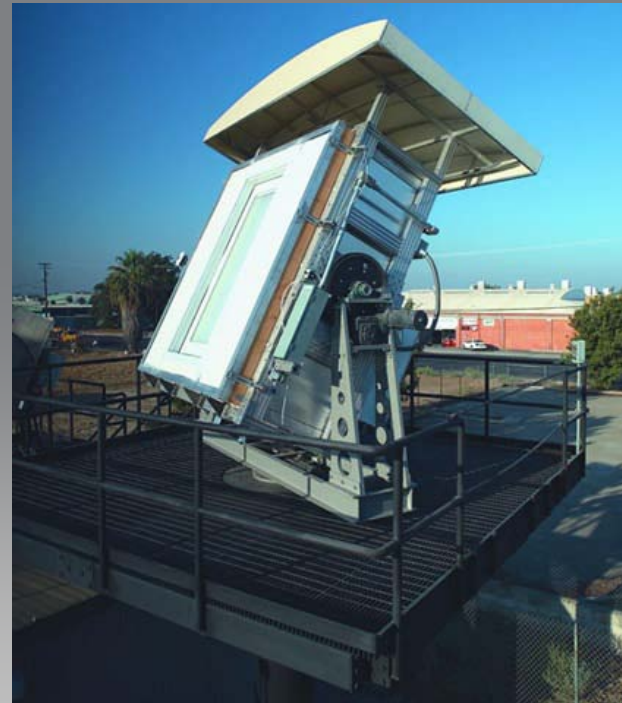


# Never Far Apart

Historically, there have been no substantive differences in methodology between testing windows using NFRC standards and testing of windows with attachments.

# Never Far Apart

Even the testing laboratories have been the same.



# Purpose of Presentation

During the 2010 Virtual Meeting, the NFRC Attachments Subcommittee promised an overview of attachments testing to address validation and research questions.

# Purpose of Presentation

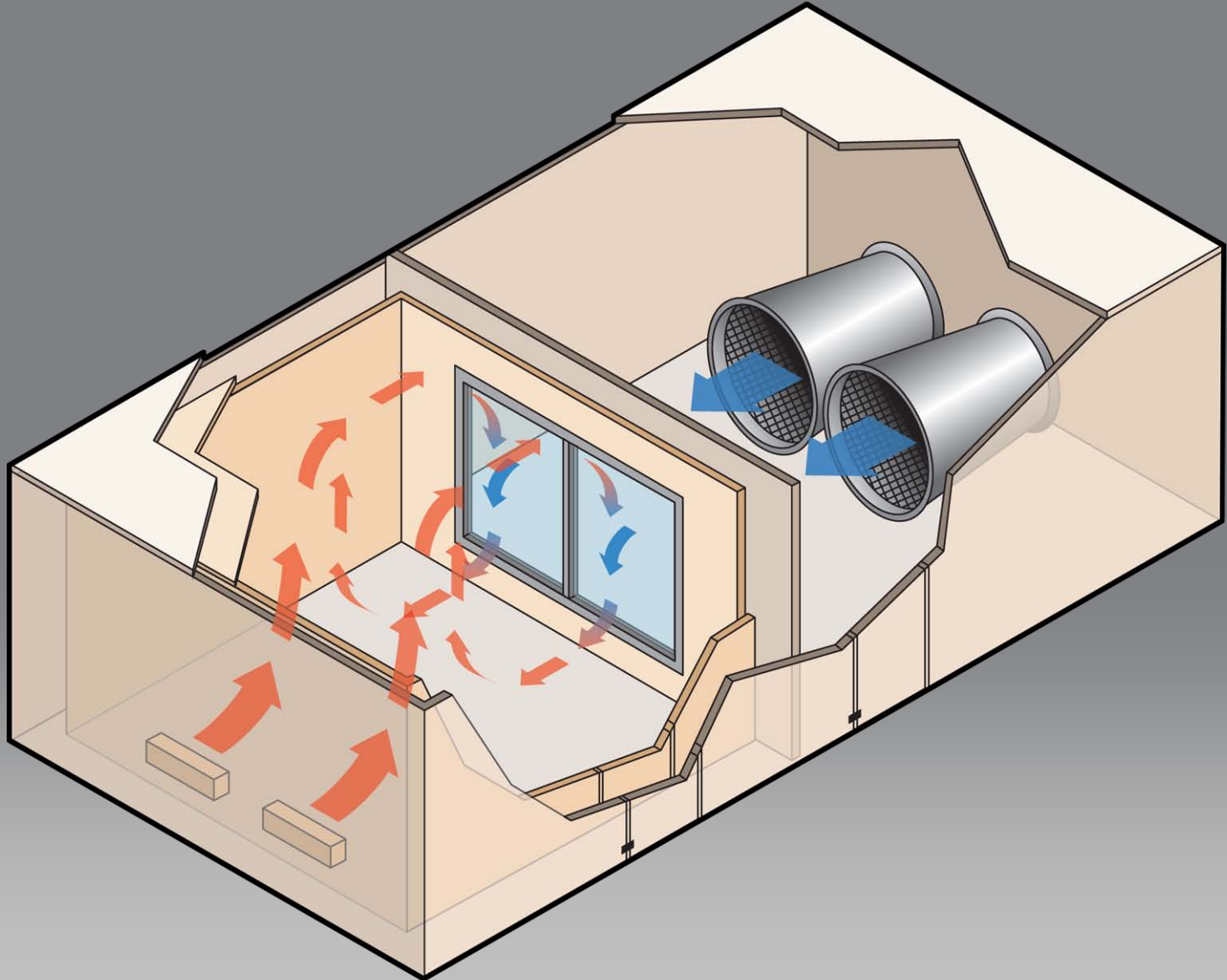
You will see many familiar test facilities and testing protocols.

You will also see decades of attachments testing history with high levels of accuracy and repeatability.

# U-Factor and SHGC Testing

- Basic testing set-up
- History of testing and repeatability
- Based on AAMA 1503 test standard
- Very high confidence level with low uncertainty

# Thermal Testing



# Solar Heat Gain Testing



# History of Attachments Testing

- Architectural Testing, Inc. (ATI) has been conducting thermal testing on attachments for 25+ years
- Since 2001, ATI has performed 700+ WES 1584 U-factor tests
- 300+ SHGC tests on interior/exterior attachments and window film

# History of Attachments Testing

- More SHGC testing on attachments than on full window assemblies by a factor of ten
- Before ATI, Tait Solar Co., Inc., performed SHGC tests on both windows and attachments
  - NFRC-funded research paper (*ASHRAE Transactions*, July 2006)

# Attachment Test Standard

- WES 1584 is a modified version of AAMA 1503, from which NFRC 102 was also adapted
  - Addition of standard test window frame (or base)
  - Stricter tolerances for calibration

# WES 1584

- Developed to provide an avenue for comparing dissimilar constructions of the same general type
- Test results show equivalent repeatability as with AAMA 1503 or NFRC 102

# Comparison with NFRC Methods

- Negligible differences using WES calculations/parameters versus NFRC calculations/parameters

Calculations	Conditions	Base	+ Shade	Reduction
<b>NFRC</b>	<b>NFRC</b>	<b>0.289</b>	<b>0.248</b>	<b>14.31%</b>
<b>NFRC</b>	<b>WES</b>	<b>0.276</b>	<b>0.233</b>	<b>15.63%</b>
<b>WES</b>	<b>NFRC</b>	<b>0.317</b>	<b>0.269</b>	<b>14.94%</b>
<b>WES</b>	<b>WES</b>	<b>0.304</b>	<b>0.256</b>	<b>15.78%</b>

# High Confidence, Low Uncertainty

- Uncertainty analysis to 95% confidence level with single cell white cellular shade and **NFRC dual glazed low-e base**
  - U-factor base only: 1.82%
  - U-factor base + attachment: 2.04%
  - SHGC base only: 2.65%
  - SHGC base + attachment: 2.90%

# High Confidence, Low Uncertainty

- Uncertainty analysis to 95% confidence level with single cell white cellular shade and **NFRC dual glazed clear base**
  - U-factor base only: 1.67%
  - U-factor base + attachment: 1.78%
  - SHGC base only: 2.45%
  - SHGC base + attachment: 2.67%

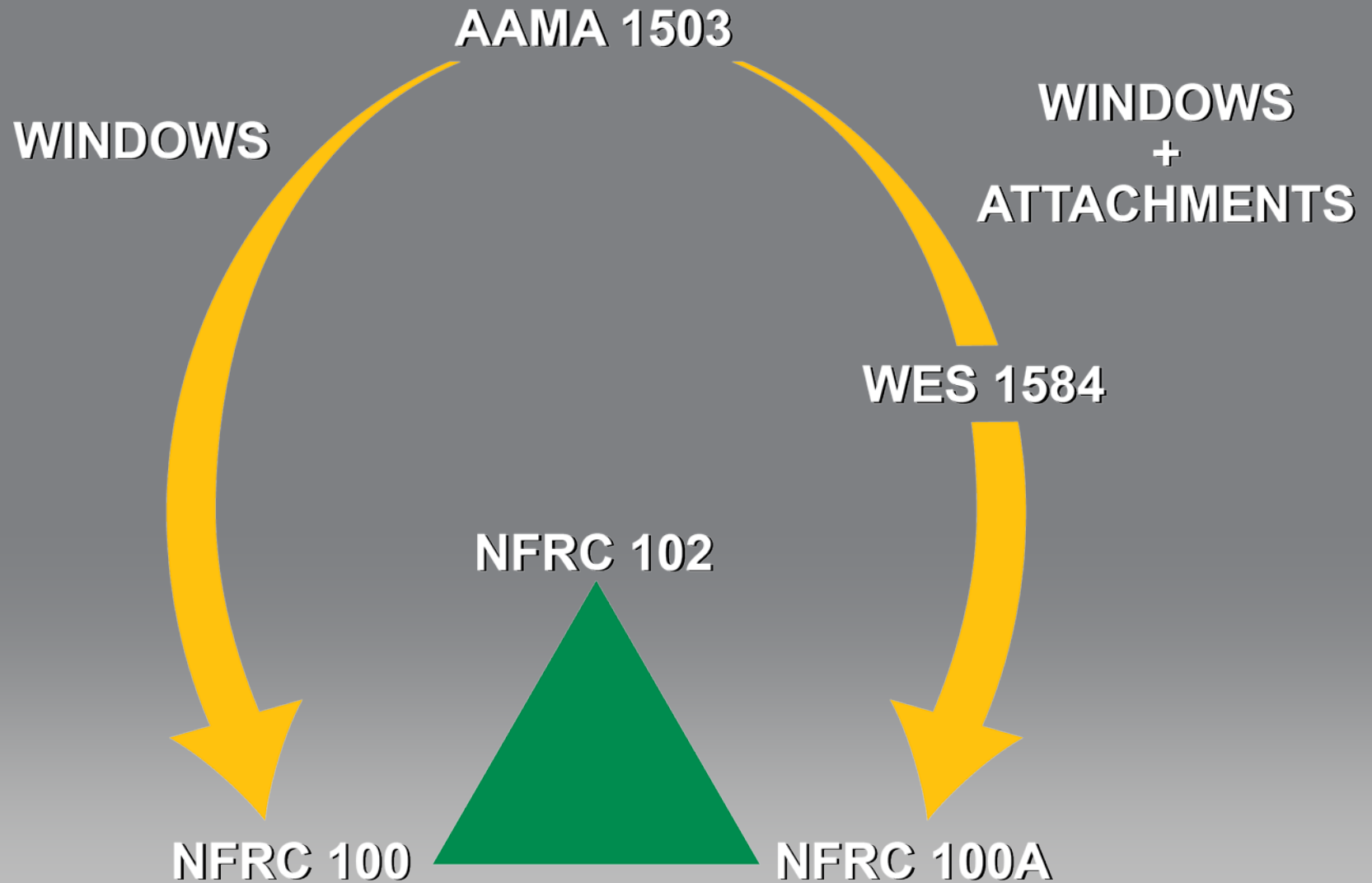
# High Confidence, Low Uncertainty

- Uncertainty analysis to 95% confidence level with single cell white cellular shade and **NFRC single glazed clear base**
  - U-factor base only: 1.54%
  - U-factor base + attachment: 1.63%
  - SHGC base only: 2.20%
  - SHGC base + attachment: 2.86%

# Summary

- Common roots for standards
- Common labs and equipment
- Years of experience and test results
- Alignment in results between NFRC 102 and WES 1584
- High confidence, low uncertainty

# Coming Together



# Acknowledgements

- Our thanks to Tyler Westerling and Kenny White of Architectural Testing, Inc., along with many others for their help in gathering the information shared in today's presentation to membership.
- See you at the NFRC fall membership meeting in November!

**U-Factor and SHGC  
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# Presentation to NFRC Membership

- This will be shared in a webinar presentation scheduled for:
- September 24, 2010, 1:00pm Mountain time
- And repeated in person during the NFRC Fall 2010 Membership meeting