Door Hardware Testing

It’s An Open-and-Shut Case

BY DEAN LEWIS

With product performance focusing heavily on energy efficiency and green attributes, a relatively mundane (but nevertheless critical) aspect of a door or window is its operating hardware—the items that provide the product’s basic functionality. They must operate repeatedly for many years while withstanding the forces of nature and human misuse. And the only way to ensure that they can do this is to have meaningful performance standards that apply test forces which simulate actual use and operating environment.

NAFS and Component Verification

The foundation for performance quality for most fenestration products is the code-mandated AAMA/WDMA/CSA 101/1S.2/A440, the North American Fenestration Standard/Specification for Windows, Doors, and Skylights (NAFS), which covers 36 types of products including exterior side-hinged doors (SHD) and sliding doors (SD).

NAFS defines both basic and type-specific performance attributes for all of these fenestration types. If a door or window is to be AAMA-certified under NAFS, hardware and other components used to assemble that product must also be verified through testing as meeting the listed standards through the AAMA Component Verification Program.

The Special Case of Doors

Side-hinged doors (SHD) have presented a special case for establishing performance targets and product certification criteria, owing to unique properties of both the product and its end-use environment. For doors, these differences stem primarily from accessibility requirements, water penetration susceptibility and operating frequency. Specialized performance standards and test methods beyond the typical NAFS Performance Class qualifications account for the distinct functional differences and application realities of SHDs.

Assurance of sustained hardware functionality is the key to long-term durability, and any verification of hardware quality under continued use must accurately simulate applied forces and accelerate operating frequency. AAMA hardware standards and test methods focus on these aspects. For doors specifically, these standards are:

- **AAMA 903 - Multipoint SHD Handle Sets** features a handle torque load test, a handle pull-out load test and handle open/close cycle testing to 100,000 cycles;
- **AAMA 906 - Sliding Glass Door Roller Assemblies** includes a drop shock load test and 10,000 full-open/full-close cycles; and
- **AAMA 909 - Cycle Performance of SHD Multipoint Locking Hardware** for representation of real-world lock use, including the effects of 100,000 test cycles. Other standards cover the function of a fully assembled door. While not hardware standards per se, they are intended to establish the hardware’s durability.

- **AAMA 920 - Operating Cycle Performance for Side-Hinged Doors** calls for cycle testing of a complete SHD system and its associated hardware under accelerated operating conditions. The total number of applied cycles increases with the Performance Class for which the door is intended, ranging from 25,000 for R Class doors up to 500,000 for AW Class doors.
- **AAMA 925 - Vertical Loading of Side-Hinged Doors** enables evaluation of a SHD’s ability to withstand a vertical load applied along the lock stile of the open door leaf mounted in a typical door frame. The average force to latch is determined and reported. If the door will not latch, a note is recorded in the test report.
- **AAMA 930 - Structural and Water Penetration Resistance of SHD Locking/Latching Hardware** calls for water penetration resistance under wind-driven rain when tested per ASTM E331 and for resistance of the locking bolt to forces applied per ANSI/BHMA 156.2, 156.12 or 156.13.
- **AAMA 910 - Life Cycle Testing of Windows and Doors** is intended to model, through accelerated testing, the normal wear that can be expected during the life of a typical AW Class door or window. It includes testing of basic functionality parameters and established criteria (structural performance, air and water leakage), before and after vent/sash/door leaf cycle testing, and locking hardware cycle testing.

These and additional standards by AAMA and others will ensure that an exterior door will be up to the challenges of daily use for years to come.

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