



PVC Use Grows As Technology Advances

Strong Standards Have Helped Spark a Materials Revolution

BY RICHARD RINKA

A landmark in the industry's historic progression beyond fenestration framing made of either wood or aluminum was AAMA 303, *Voluntary Specification for Rigid Polyvinyl Chloride (PVC) Exterior Profiles*. Issued 20 years ago, it was the first among today's polymeric material specifications, which now include six formulations in addition to PVC (fiberglass, ABS, composites, etc.).

The Basics

To be deemed as conforming to the North American Fenestration Standard (NAFS) AAMA/WDMA/CAS 101/IS.2/A440 (and therefore certifiable under the AAMA Certification Program), vinyl windows *must* be made from extrusions that comply with AAMA 303. Such compliance is established through certification under the AAMA Extrusion Certification Program, in which randomly selected production-line samples of extrusions are tested by an accredited third-party laboratory.

The foundational requirements for uncoated base profiles (mono-extrusions) made from a single homogeneous stream of rigid PVC compound are:

- Dimensional stability and impact resistance at weathering intervals;
- Color fastness under extended weathering;
- Heat resistance (30 minutes of exposure to 300°F with no visible blistering, cracking, crazing, flaking or delamination);
- Heat build-up tolerance (no permanent deformation in excess of 0.4 percent of span), and;
- Absence of lead.

AAMA 303 extensively references ASTM D4726-15, *Standard Specification for Rigid Poly (Vinyl*

Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors.

The requirements and testing for laminated profiles are the same as those for base profiles, plus adhesive bond strength. The latter is determined by static mass and tensile test methods and a boiling water test detailed within AAMA 303. For organic coated profiles, the requirements are the same as for base profiles, plus compliance with the applicable coatings standard among AAMA 614, 613 or 615, which specify dry film thickness, color and gloss retention, dry film hardness and dry adhesion.

For profiles with a co-extruded Poly(methyl methacrylate) (PMMA)—aka acrylic, Plexiglas, Lucite etc.—capstock, the requirements are the same as for base profiles, except that a different impact test is specified.

In-plant quality-control sampling frequency, test requirements and record-keeping are spelled out in AAMA 303 for both coated and laminated window profiles. The minimum requirements include testing of production-line samples of basic or co-extruded profiles for dimensional stability, impact resistance, heat resistance and weight tolerance.

The Latest Updates

New in the 2017 issue of 303 is the requirement that applicators of organic coatings to rigid PVC, cellulosic composite or PVC-clad profile coatings must additionally meet the requirements of AAMA 663-14, *Voluntary Specification for In-Process Quality Control Requirements for Applicators of Organic Coatings to Polyvinyl Chloride (PVC) Exterior Profiles*. While coatings must com-

ply with all requirements of one or more of AAMA 613, 614 or 615, to meet AAMA 663, the applicator must test representative samples at regular intervals and whenever changes are made to colors or paint lots.

Also new in 2017 is a section spelling out requirements for co-extruded profiles.

In addition to base mono-extrusions, three extrusion categories are defined according to how the substrate (base) extrusion is separated from the visible surface layers that are exposed to UV radiation and the detriments of extended weathering: center core co-extrusion, cap layer co-extrusion, and center core and cap layer combination co-extrusion.

Co-extruded profiles must meet base profile requirements as described earlier, except weatherability and heat build-up testing apply to the visible areas of the profile, but not the PVC material used in the non-visible areas and center core area of the profile.

Another important document, AAMA 320, *General Guidelines for Troubleshooting Welded Vinyl Corners*, helps window manufacturers identify and correct the many factors that can affect the integrity of welded corners.

Obtaining profile certification to standards such as AAMA 303 and following guidelines such as AAMA 320 lends the credibility of consensus methodology and third-party verification to claims of quality and relieves manufacturers of having to perform their own acceptance testing and/or evaluating test results. ■

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