Specifying Flagpoles: Exploring standards and common errors

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[1]
Photo courtesy Delaware River and Bay Authority

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Flagpole specifications commonly found in institutional, commercial, and other requests for proposals (RFPs) have numerous errors, which, albeit not catastrophic, affect the aesthetic and functional life of the flagpole, as well as the project cost.

MasterFormat's April 2016 update included two new section titles in Division 10−Specialties. These were 10 75 26−Roof-mounted Flagpoles and 10 75 29−Plaza-mounted Flagpoles, bringing the total count of level-three specification sections regarding flagpoles to six. This article focuses on 10 75 16−Ground-set Flagpoles, often specified as 10 75 00−Flagpoles, with some commonality amongst all flagpole sections. (While the authors recognize many readers may be in the United States, it is very common for *MasterFormat* specifications to be used throughout the world. As such, some of the comments and recommendations in this article also refer to the international aspects of flagpole design and erection. Differences in practice and approach should be considered when using a master specification guide for international projects.)

Although construction projects have similarities, every property is different. After ascertaining owner project requirements, the first order of business in specifying ground-set flagpoles—particularly above standard heights—is to obtain a geo-technical report. This may be Section 00 31 32−Geotechnical Data or Section 02 32 00−Geotechnical Investigations. Should a project's particular situation indicate unusual soil and weather conditions, the typical ground setting using a sleeve and burial—with or without concrete—may not be appropriate. Instead, one should specify a base plate with anchor bolts embedded into a concrete foundation.

It is also prudent to be consistent with practices prevalent in the local area. For instance, most flagpole installers and manufacturers in the United States prefer the sleeve-and-burial method due to its simplicity and cost-effectiveness, while flagpole installations in Europe and the Middle East generally employ a shoe base plate with anchor bolts and a typical concrete foundation. Both the mounting method and the fabrication of the flagpole are different in these two situations. Specifying something outside the local norm may increase project costs needlessly due to special orders and unavailability of specified material.

[2]
Stainless-steel flagpoles, standing 15 and 12 m (49 and 39 ft), are featured at the Meydan Horse Race Course in Dubai.
Photos courtesy Trident Support Co.

Understanding the NAAMM standard

American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM) FP1001-07, *Guide Specifications for Design of Metal Flagpoles*, has become the recognized U.S. standard for the structural design of metal flagpoles. NAAMM's fifth edition since 1985, it provides wind speeds for design purposes in the United States, and—in its appendix B—appropriate flag sizes for varying pole heights, up to 24 m (80 ft).

While there are other international standards and specifications used in the design of flagpoles, the unique aspect of NAAMM FP1001 is it considers
both the loads of the pole itself and the wind loads associated with the flag. As an example, European standard BS EN 40-3-1:2013, *Lighting Columns: Design and Verification−Specification for Characteristic Loads*, is sometimes used by manufacturers as the standard for poles outside the United States. While this specification is appropriate for a pole (*e.g.* lighting mast or sign pole), it does not specifically consider the load of the flag, as the NAAMM FP1001 standard does. As stated in its introduction, "a flagpole's function is to fly flags"—therefore, a standard accounting for both the loads of the pole and the flag provides an added degree of safety for a flagpole.

The NAAMM standard uses actual flight-testing of flags of various sizes and wind speeds to obtain data on the loading of flags, which were used as the basis for the development of the flag drag formulas in the guide specifications. As such, this article's authors consider it entirely appropriate and prudent to require NAAMM FP1001 as the basis of the design of any flagpole, regardless of its ultimate location, either in the United States or elsewhere in the world.

[3]
A series of 12-m poles has been mounted on Yas Marina Circuit Grandstand nearby.

Nonetheless, for locations outside the United States, the owner project requirements or schematic design documents should indicate design wind speed. This is to facilitate structural calculations outlined in NAAMM FP1001, and to be consistent with local building codes and other conditions unique to the property. The flagpole design must account for the wind speeds in the location at which the flagpole is to be installed, and the NAAMM FP1001 only lists wind speeds for locations in the United States. Regardless of location, if a larger-than-normal flag (as indicated in Appendix B of the NAAMM standard) is anticipated or required to be flown, then this should also be noted in the owner project requirements, as it also affects the design and structural calculations of the flagpole.

The loads as determined by the calculations using the methods of NAAMM FP1001 will also determine appropriate mounting strategies, regardless of whether the pole is to be mounted on the ground or to a building structure such as a roof or wall. Foundations and concrete bases are a structural consideration, based on soil conditions. NAAMM FP1001 references American Association of State Highway and Transportation Officials (AASHTO) *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* (current version is 2013 6th Edition, with 2015 Interim Revision) to inform its design calculations for mounting flagpoles on the foundation or building structure to which it is secured.

Challenges with specifications

Commercially available master specifications typically provide for several different materials or types for the flagpole. As such, specifiers should be attentive in project specifications, so they can tailor or customize the master specification guide to specify which option or feature is actually desired by the project requirements. In other words:

- specify aluminum, fiberglass, or steel type—not all of the above;
- specify internal halyard or external halyard—not both; and
- specify a single finish (*e.g.* brushed satin, clear anodic, color anodic, or powder-coated), not more than one finish, and ensure it is consistent with the material of the flagpole.

There are several other areas of confusion, inconsistencies, or errors the authors have encountered with master specifications. For example, some specs have confused ASTM B221-14, *Standard Specification for Aluminum and Aluminum-alloy Extruded Bars, Rods, Wire, Profiles, and Tubes*, with ASTM B241/B241M-16, *Standard Specification for Aluminum and Aluminum-alloy Seamless Pipe and Seamless Extruded Tube*. The latter refers to aluminum piping for pressure applications, and is not generally intended for structural applications. The correct standard for flagpole specifications is ASTM B221—

the common reference for structural tubing.

[4]
The Delaware Bridge Memorial Veterans' Memorial Park features a flag for each brand of the United States military, standing as tribute to the diverse span of men and women who have served in the armed forces. Erected in 1993, these flags were dedicated to celebrate the 75th anniversary of the Armistice that ended World War I. The larger American flag that stands proudly in front represents unity and patriotism.
Photo courtesy Delaware River and Bay Authority

The authors have also seen specifications unnecessarily complicating and over-specifying the choice of aluminum finishes—that is, calling out multiple finishes. The Aluminum Association (AA) has published DAF 45, *Designation System for Aluminum Finishes* (reaffirmed January 2009), to help specifiers name a finish, but DAF 45 should not be construed as a performance specification. A typical standard mechanical finish for aluminum flagpoles is "Natural Satin Finish," specifically AA-M33 Coarse Satin Directional Textured. AA-M33 is considered the standard for flag shafts and light poles; by way of example, it allows for an aluminum oxide grit finish of 80 to 100 size, accomplished by wheel or belt polishing. Specifying finish designations such as AA-M20 Buffed [Unspecified] or AA-M32 Medium Satin Directional Textured [aluminum oxide grit finish of 180 to 220 size], is useful for small-scale projects like handrails, but is unnecessarily expensive for flagpoles.

Some specifiers incorrectly require sealing of flagpole and flagpole component aluminum surfaces with clear hard-coat wax. This might be suitable for handrails and signage, but not flagpoles in an exterior environment. In those circumstances, the wax quickly degrades and must be reapplied at regular intervals to maintain a seal. The authors know of no flagpole manufacturers or consultants in the United States or Europe that can present a sound cost/benefit analysis for sealing a flagpole with a hard-coat wax.

Some specifications needlessly increase the cost and complexity of a flagpole. One example of this would be a requirement for a "Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard" for small flagpoles (*i.e.* those shorter than 12 m [40 ft]). While taller flagpoles typically come with a manually operated winch system (with a break/stop device and removable handle) and aircraft-grade stainless steel wire rope due to the size and weight of the flag being flown, it is not recommended for smaller poles. While this may be a subjective matter, in the authors' opinion, the weight of the flag for smaller poles is not heavy enough to need a winch mechanism, and the winch provides little benefit in assisting with raising and lowering the flag. It is technically feasible to put a winch and stainless-steel cable halyard on these smaller flagpoles, but this increases the cost of the pole significantly with little overall benefit. It is more economical and practical to use a standard polypropylene halyard with a jam cleat (still a high-quality internal halyard system), since the low weight of the flags on smaller poles make it difficult to get the wire rope to spool properly on the winch.

Conclusion

Flagpoles are beautiful in their own right. They are constructed to provide for the dynamic visual effect of flying a flag that evokes an emotional response. As an architectural centerpiece, they should enhance the landscape of the property. Flagpoles do not need cellular antennae, weathervanes, or other distractors from their inherent aesthetics and functionality, but they do need to be designed and installed to be structurally sound and safe. Careful design and installation of an appropriately sized flagpole will enhance building occupants' and visitors' satisfaction for years to come.

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Endnotes:

1. [Image]: https://www.constructionspecifier.com/wp-content/uploads/2017/02/DSC6389.jpg
2. [Image]: https://www.constructionspecifier.com/wp-content/uploads/2017/02/Meydan-HorseRace-15m.jpg
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