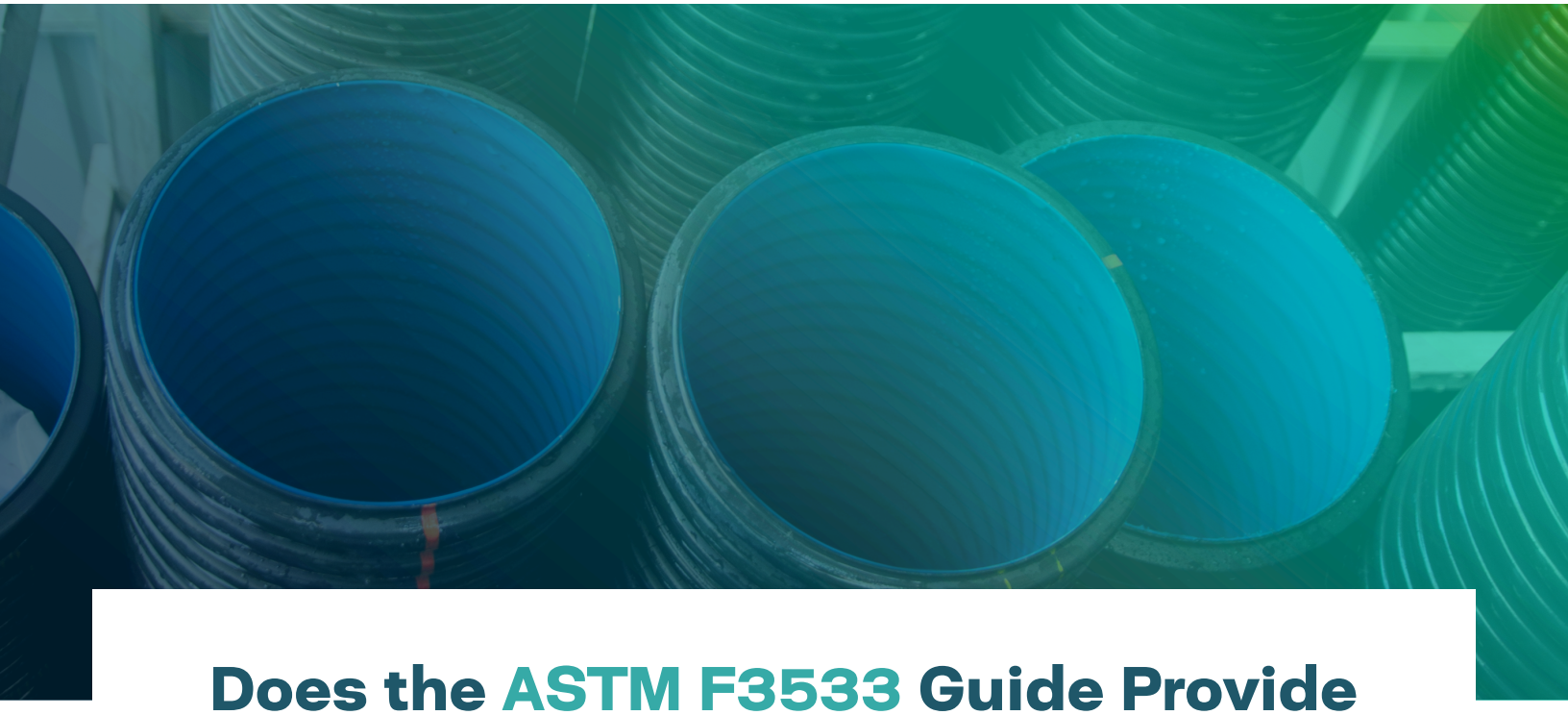
Guidance Assessment

ACPA
American Concrete Pipe Association



Does the ASTM F3533 Guide Provide the Appropriate Guidance for Inspecting Thermoplastic Sewer Pipe?

ASTM F3533, **"Standard Guide for Inspection and Acceptance of Installed Thermoplastic Storm and Sanitary Sewer Pipe"** operates as a guide, offering information, recommendations, and a series of options for the inspection and acceptance of thermoplastic storm and sewer systems.

The term "guidance" inherently carries a level of vagueness. F3533, being a standard guide, provides information and options without explicitly recommending a particular path. It presents a broad spectrum of possibilities without a clear directive.

Written with flexibility in mind, F3533 attempts to recognize diversity of engineering scenarios, allowing for some sort of customization in the application of its recommendations, it offers a versatile approach to inspection of thermoplastic pipe, with no specific criteria. This in essence allows individuals with varying levels of expertise to prepare inspection reports, as it offers recommendations and suggestions without prescribing any specific course of action.

We must remember that considerable guidance for inspection of thermoplastic pipe is already contained within the AASHTO specifications. It would be prudent if the recommendations found in F3533 enhanced the requirements in AASHTO. This is the case in many instances within F3533. Unfortunately, it is not always the case, and as such, an individual using F3533 may be led astray from significant requirements within AASHTO intended to verify the capability of an installed thermoplastic pipe.

Inspection of the amount of deflection in the installed pipe is one of the most obvious requirements of thermoplastic pipe inspection. However, in this evaluation, F3533 deviates from the requirements of AASHTO. F3533 suggests incorporating manufacturing tolerances, as well as out-of-round tolerances to the denoted diameter of the pipe when determining deflection levels. In other words, the inspector is allowed to take a guess at the actual diameter to which they are supposed to be applying the deflection requirement. Section 30, "Thermoplastic Culverts" of the AASHTO LRFD Bridge Construction Specifications makes it clear that you should not be guessing the diameter. Using the actual value of the pipe diameter by averaging the diameters at 8 equally spaced locations around the pipe before it is installed is much better guidance.

There are many ways to take deflection measurements within a pipe. They are often governed by the size of the pipe, with smaller diameter pipe using mandrel or video inspection, and larger diameter pipe using person-entry inspection. Mandrel and video inspection are methods that measure the deflection of the pipe over its entire length as they are pulled through it. Person-entry requires the individual to stop and take measurements as they progress through the length of the pipe. F3533 provides very little guidance on how this should be done, except to say measurements should be "taken at equal increments along the length of the pipeline". Unfortunately, this is insignificant guidance. For a document that is supposed to enhance the understanding of what is in AASHTO, this only serves to take away from the AASHTO requirements, which make it clear that the increments should be no longer than every ten feet, with a minimum of four measurements per pipeline.

AASHTO limits the allowable deflection of a pipe based on strain and serviceability requirements incorporated into the design. The design accounts for short and long-term pipe performance criteria that may not always reveal themselves shortly after the pipe is installed. Unfortunately, F3533 would have you believe that deflection is not a performance or integrity limit of the pipe, and simply guidance provided in ASTM manufacturing standards. This can lead the inspector to improperly judge the criticality of the pipe's deflection level or deflected shape, which is not addressed in F3533.

Perhaps even more importantly, deflection directly affects joint performance. Properly functioning joints are essential to prevent the loss of surrounding embedment soil, which supports the pipe. If excessive deflection occurs, joints may become misaligned or lose their ability to maintain a soiltight or watertight seal. This can result in soil intrusion or loss, undermining the pipe bedding and leading to settlement, infiltration, or even structural collapse.

The proper performance of the pipe joint ensures that none of the surrounding embedment soil supporting the pipe is lost through the joint. This simple, but critical requirement is lost in the discussion on joints in the F3533 inspection standard. In the design process, the engineer may classify a joint based on the anticipated soil around the pipe. If the soil surrounding the pipe is coarse, and/or there is filter fabric around the joint, then perhaps the engineer will only require a soiltight joint with the expectation that even if the joint allows fluid to pass through it, there will be no fines lost through infiltration. However, the engineer does not expect an installed pipe to lose silt or any other soil through its joint as a performance requirement. Thus, soil intrusion of any kind is cause for remediation, and should be noted as such by the inspector. ASTM F3533 would have you believe that soil intrusion may be acceptable. There is no case in which this is true.

Guidelines are developed to guide the user through a particular process that is established through standards and specifications. That process may either be complicated, unclear, or incomplete, and thus the individual benefits from the extra information in a guide. That is clearly the intent of ASTM F3533, to help guide an inspector through the process of inspecting an installed thermoplastic pipe. Unfortunately, the guidance in F3533 sometimes deviates from the inspection requirements already outlined in AASHTO that were developed through collaboration between industry and the nation's state departments of transportation. In some instances, it provides specific guidance that deviates from AASHTO, and in other cases it ignores requirements and guidance already provided by AASHTO. Thus, it is important for users of this guide to make themselves familiar with Section 30 of the AASHTO LRFD Bridge Construction Specifications.