



Making the Most of ASTM F3706 for Spray-Applied Mortar Linings

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Spray-applied mortar linings (SAPL) have become a go to trenchless method for restoring large diameter stormwater and sewer infrastructure. With the publication of ASTM F3706-25, asset owners and engineers finally have a unified standard that explains how SAPL mortar systems should be specified, designed, installed, and verified. But as with any new standard, the real challenge is translating its technical content into practical, job-ready guidance. Below are the key takeaways, tips, and dos and don'ts for applying ASTM F3706 effectively in the field and in project specifications.

1. Don't Skip the Basics — Know What the Standard Covers

ASTM F3706 applies to cementitious and geopolymer spray-applied mortar linings used for structural, semi-structural, or protective rehabilitation of conduits 30 inches and larger. It covers:

- Material and contractor qualifications
- Minimum physical properties
- Structural design guidance
- Installation practices
- On-site quality control

Tip: Use ASTM F3706 as the baseline but expect to supplement it. The standard intentionally leaves room for project-specific engineering judgment.

DO: Combine ASTM F3706 with the NASSCO Performance Specification Guideline (PSG) for a more complete spec package

DON'T: Assume the standard alone provides a complete specification.

2. Strength Requirements Matter — Don't Under-Specify

Section 6.3 of F3706 establishes minimum physical properties for SAPL mortars.

These include:

- Compressive strength: $\geq 8,000$ psi
- Flexural strength: ≥ 800 psi
- Tensile strength: ≥ 675 psi
- Bond strength: $\geq 2,500$ psi
- Shrinkage: $\leq 0.02\%$

Tip: These numbers are minimums, not complete recommendations. Stronger materials can reduce required lining thickness and improve durability.

DO: Ask for independent lab data (NASSCO PSG recommends accredited labs).

DON'T: Specify elastic modulus from ASTM C469 for structural design — it does not correlate with flexible pipe modulus and will produce incorrect designs.

3. Demand the Right Submittals — and the Right Contractor

ASTM F3706 lists basic submittal needs: SDS, product data, test reports, equipment certifications, installer approval. But this is the bare minimum.

Tip: Prequalification can prevent low-quality bidding and helps owners verify experience upfront.

DO: Add these items for a more robust specification:

- Minimum 3 years SAPL experience with similar size and configuration
- Documented project references
- Manufacturer-issued installer certification
- Warranty expectations for both material and installation
- Contract requirement for prequalification of materials and contractors

4. Use the Right Design Approach — Don't Use Flexible Pipe Methods

ASTM F3706 takes a major step forward by clearly stating that SAPL systems must be designed using rigid or semi-rigid methods. Key design rules include:

- Failure is defined as first longitudinal crack per ASTM C497.
- Designs must limit deformation to $<1\%$ (semi-rigid).
- Buckling and flexible pipe equations (ASTM F1216, ASCE MOP 145) are not acceptable.

Tip: Use the two Design States in the Appendix to decide whether the liner operates alone (Design State II) or with the host pipe (Design State I). Minimum thickness guidance from NASSCO PSG:

- 1.0 in for <54 "
- 1.5 in for 54–96"
- 2.0 in for >96 "

These are safeguards — not substitutes for real calculations.

DO: Require calculations that directly align with F3706's defined failure criteria.

DON'T: Let contractors "design to the minimum thickness."

5. Installation Starts with Surface Condition — Don't Skip Prep

Sections 8–9 of F3706 outline essential installation practices.

Key best practices:

- Host pipe must be clean, structurally stable, and free of moving water.
- Surface condition should be surface saturated dry (SSD).
- Mortar must be prepackaged with all additives and mixed per manufacturer rules.
- Verify whether CMP corrugations must be filled — this impacts material usage and hydraulics.

Tip: The SAPL contractor must use manufacturer-approved equipment and be trained in its use.

6. Quality Control Is Not Optional

ASTM F3706 provides clear QC expectations.

DO:

- Require compressive strength cylinders at set intervals (e.g., every 42,000 lbs of material).
- Use depth gauges to verify thickness frequently.
- Perform CCTV inspection after lining and curing.
- Require daily logs documenting mixing ratios, environmental conditions, and application rates.

DON'T: Rely only on visual inspection — spray-applied systems require documented testing.

7. When in Doubt, Use Both ASTM F3706 and the NASSCO PSG

Each document covers gaps in the other:

ASTM F3706	NASSCO PSG
Establishes minimum material properties	Provides broader chemical resistance guidance
Defines rigid/semi-rigid design approach	Provides minimum lining thickness framework
Outlines installation & QC basics	Expands submittal and contractor qualification requirements

Tip: Think of F3706 as the "technical how-to" and the PSG as the "project specification checklist."

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