

SECTION 425

MANHOLE CONSTRUCTION, COATING OF FIVE FOOT SANITARY MANHOLES

425.1

Part 1 General

425.1.1 Description

Scope: this section specifies the lining of sanitary sewer manholes to provide protection against corrosion of the manhole interior and sewer located below the manhole.

A. Requirements

1. Contractors shall furnish all labor, materials and equipment required to clean and line the manholes.
2. Contractor shall comply with the local authority and all occupation safety and health administration (OSHA) requirements for confined space entry.
3. All materials specified by name brand or manufacturer shall be delivered unopened to the job in original containers.
4. All safety precautions recommended by the manufacturer in printed instructions or special bulletins shall be obtained and followed.
5. The work shall be carried out after the sewer is installed.

425.1.2 Quality Assurance

- A. Standardization: Materials and supplies provided shall be the standard products of manufacturers. The standard products of manufacturers other than those specified will be accepted when it is demonstrated to the Engineer that they are equal in composition, durability, and usefulness for the purpose intended. Requests for submission shall include directions for the application, descriptive literature, safe storage, handling and disposal of the product.
- B. Bonded Warranty: The coating applicator shall supply a five-year bond, payable to the City of Peoria (COP), for the coating that is approved by the COP. The five-year bond shall cover both the material costs and the labor costs associated with installing the approved coating. The bond shall also be unconditional in nature covering any type of failure in the coating and agreeing to repair or replace it at no cost to the COP at any point during this five-year period. The coating applicator shall also supply a warranty from the coating manufacturer addressed to the bonding company and the COP. This warranty shall state, at a minimum, if the coating is applied in accordance with the manufacturer's instruction, the coating will not fail for a period of five-years. The definition of a coating failure is blistering, cracking, embrittlement, or softening of the coating is starting to occur.

425.1.3 Submittals

A. Contractor shall submit:

1. Manufacturer's Data

- a) Manufacturer's technical literature on coating material.
- b) Description of installation method including:
 - I. Product material safety data sheets (MSDSI).
 - II. Maximum storage life and storage requirements.
 - III. Mixing and proportioning requirements (as applicable).
 - IV. Environmental requirements for application and worker safety, including ventilation, humidity and temperature ranges.
 - V. Application film thickness PM coat of primer and finish coat.
 - VI. Curing time required.

2. Sample of finished product showing final color. Lining color shall be white.

Part 2 Products

425.1.4 Coating Material

A. Approved Materials: Coating materials shall be one of the following pre-approved types or an approved material equal to or better:

1. Sauereisen corrosion-clad polymer lining No. 210, Sauereisen underlayment.
2. No. F-120, as manufactured by Sauereisen Cements, Pittsburg, PA 15238. The underlayment shall be used to repair the cleaned surfaces in accordance with the manufacturer's recommendations. The number 210 lining shall be applied to a minimum thickness of 1/8-inch (125 Mills) according to the manufacturer's recommended procedures.
3. Sewer shield 101A topcoat with C120 Calcium Aluminate Cement underlayment as manufactured by Environmental Coating, Mesa, AZ 85027. The C120 Calcium Aluminate Cement shall be trowel applied to repair the cleaned surfaces in accordance with the manufacturer's recommendations. The sewer shield 1-1A topcoat shall be spray applied to a minimum thickness of 1/8-inch according to the manufacturer's recommended procedures.

425.1.5 Product Data

A. The Contractor shall provide the following information:

1. Manufacturer certification of applicators used for the coating installation work, including spray operators as applicable.
2. Samples of coating and color chart.
3. Coating applicator shall be an Arizona licensed Contractor.

Part 3 – Execution

425.1.6 Manhole Cleaning

- A. Cleaning shall remove all sediment, rocks, debris, roots, grease accumulations and obstructions from the manholes. Cleaning of the manhole walls, bench, and channel shall remove all grease, scale encrustation and loose mortar so that no foreign intrusion shall cause imperfections in the coating. Cleaning methods shall include washing with high-pressure water, mechanical removal, or other as approved by the Engineer.
- B. The Contractor shall use water blasting with a minimum water pressure of 3,000 PSI to clean the manhole prior to applying the coating. Contractor shall also be responsible for any additional surface preparation beyond water blasting as required by the coating system manufacturer. Where additional preparation is required, the Contractor shall provide all labor materials and equipment as necessary at no additional cost to the City.
- C. Before Installation of the coating system, the surface must be clean. Excess water shall be blown from the surface using compressed air equipment with oil-trapping filters. Suitable heaters shall be used as needed to produce a surface-dry condition. The surface shall be vacuumed to make sure that loose particles are not present.
- D. Any sediment or debris from cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer. Sedimentation deposited downstream, as determined by the Engineer, shall be removed at no cost to the City.

425.1.7 Inspection and Testing

- A. Contractor shall give Engineer a minimum of three days advance notice on start of field surface preparation work or coating application work, and a minimum of seven days advance notice start on any shop surface preparation work.
- B. All work shall be performed in the presence of an Engineer, unless the Engineer has granted prior approval to perform work in his absence. **The Contractor shall provide testing performed by an independent Special Inspection Testing Agency or Laboratory approved by the City of Phoenix. Cost of this special inspection and testing shall be the responsibility of the Contractor.**
- C. Inspection by Engineer or waiver of inspection in any particular portion of work shall not relieve the Contractor of responsibility to perform work in accordance with Specification.
- D. Scaffolding shall be erected and moved to locations to facilitate inspection by Engineer. Additional illumination shall be furnished when Engineer requests.
- E. Contractor shall furnish (until final acceptance of coatings), inspection devices in good working condition for detection of holidays and measurement of wet and dry-film thickness of protective coatings. Wet and dry-film thickness gauges shall be available for Engineer's use until acceptance of coating process is complete and final acceptance of coatings made. Contractor shall furnish services of trained operator in holiday detection devices until final acceptance of coatings. Holiday detection devices shall be operated in presence of an Engineer.
- F. Contractor shall holiday test in presence of an Engineer all coated surfaces. Holiday testing equipment and procedures shall be performed in strict accordance with latest edition of NACE "Standard Recommended Practice-Discontinuity (Holiday) Testing of Protective Coatings." Areas containing holidays shall be marked repaired or re-coated and re-tested in accordance with coating manufacturer's printed instructions. Holiday detectors shall be:
 - 1. High voltage pulse-type holiday detectors as manufactured by Tinker & Rasor, or D.E. Stearns Co. Unit shall be adjusted to operate at voltage required to cause sparks jump across air gap equal to twice specified coating thickness.

- G. Wet film thickness measurement shall be supplemented by report submitted by Contractor or Engineer. The report shall be presented after completion of underlayment, top coating operations, and shall state number of manufacturer's product units used and total square footage of surface area covered. Engineer shall have option of requiring Contractor to document number of units (coating materials) on hand before and after coating operations to verify actual minimum dry film thickness applied.

All film thicknesses not meeting required minimums will be re-coated per the manufacturer's recommendations.

H. SANITARY SEWER MANHOLE TESTING

All new sanitary sewer manholes installed shall be tested for exfiltration either by a Watertightness test or by a negative air pressure (vacuum) test. Exfiltration testing shall be performed in accordance with MAG Section 615.10(B) and Arizona Department of Environmental Quality (ADEQ) Engineering Bulletin No. 11, Chapter 4, Section B.

When using the watertightness test method, exfiltration loss shall not exceed 0.1 gallons per vertical foot of manhole in a 24-hour period.

Negative air pressure (vacuum) testing shall be performed in accordance with ASTM C 1244. Testing shall be performed at the top of the manhole cone for manholes located in paved areas. Manholes outside paved areas shall be vacuum tested at the ring and cover. A negative air pressure of ten inches of mercury shall be drawn on the manhole. The time shall be measured for the vacuum to drop from ten inches to nine inches of mercury. The manhole shall pass this test if the time to drop in mercury meets or exceeds the following values:

MANHOLE DEPTH	MINIMUM TEST DURATION (SECS) 48-INCH DIAMETER MANHOLE	MAXIMUM TEST DURATION (SECS) 60-INCH DIAMETER MANHOLE
10 feet or less	60	75
Greater than 10 feet to 15 feet	Not Applicable*	90
Greater than 15 feet	Not Applicable*	105

*Manholes greater than 13 feet in height shall be 60-inch diameter.

If manhole joint compound is pulled out during the vacuum test, the manhole shall be disassembled and the joint repaired or replaced as necessary. The vacuum testing shall then be repeated until the manhole passes.

Exfiltration testing of sanitary sewer manholes is considered incidental to the cost of furnishing and installing the manhole. There will be no separate measurement or payment for this testing.

425.1.8 Correction Period Inspection

- A. Inspection shall be conducted during eleventh month following completion of all coating work. Contractor and representative of coating manufacturer shall attend inspection. Defective Work shall be repaired in accordance with specifications and satisfaction of owner. Owner may, by written notice to Contractor, reschedule warranty inspection to another date within one-year correction period, or may cancel warranty inspection altogether. If warranty inspection is not held, Contractor is not relieved of responsibilities under Contract Documents.