

Preparing Brick Masonry Manholes for Bonded Rehabilitation Systems

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Brick masonry manholes made from clay or shale brick and laid with portland-cement mortar are still used in North America. Although typically historical, they are often found in manhole rehabilitation projects. With proper surface preparation, these manholes can be rehabilitated using bonded cementitious and polymer linings.

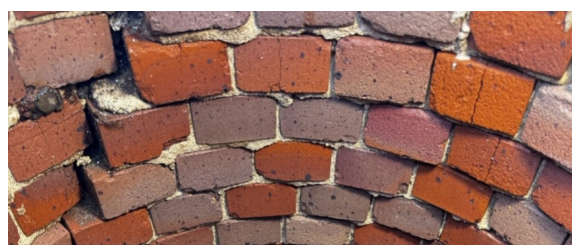
Manhole bricks are ceramic products made from clay, shale, or similar materials and fired at high temperatures. While the bricks are relatively resistant to corrosion, the portland-cement mortar is susceptible to biogenic sulfide corrosion. In sewer headspace exposures, the mortar is typically corroded, leaving the bricks etched but mostly unaffected and suitable for structure rehabilitation.

There are no specific guidelines for cleaning and preparing brick masonry manholes before applying cementitious or polymer bonded linings, however, concrete surface preparation standards are often used before applying.

To address this need, NASSCO's Sewer Structure Rehabilitation committee developed "The Brick Surface Preparation Guideline". This document provides guidelines for cleaning and repairing brick masonry manholes to ensure effective rehabilitation. Surface preparation removes contaminants before applying cementitious and polymer materials.

Surface preparation includes cleaning to remove contaminants like fats, oils and grease (FOG), dirt, loose material, residues, and existing coatings. This exposes the brick texture for protective linings without damaging or altering the surface profile of the brick.

Other necessary repairs include replacing missing bricks, repointing mortar joints, eliminating water



infiltration using fast-setting hydraulic cements or polyurethane injection grouts, and cutting existing manhole steps. These must be completed before applying bonded linings.

High-pressure cleaning involves using a minimum of 5,000 psi and four gallons per minute through a rotating spray or fan nozzle. The spray tip should be kept 6-12 inches from the surface and held at an angle between 45° and 90°. Cleaning should start from the frame surface and progress down to the bench.

If the surface is especially dirty or has buildup of FOG, biodegradable cleaning agents or heated water (up to 210°F) can be used.

After preparing the surface, check to make sure all contaminants are removed and the surface is clean. The surface should be free of debris, dust, dirt, FOG, and other contaminants. The brick surface should be clean, free of coatings, sound, and have a natural texture.

If there are any remaining contaminants or unsound areas, remove them with additional surface preparation. You can check the surface's soundness by lightly pushing a flathead screwdriver across it at a 30° angle. If the screwdriver slides over the surface without loosening any particles and leaves only a shiny mark, the surface is sound. If it gouges or removes



loose material, the surface is not sound. You may need to use impact tools like chipping hammers to remove unsound mortar.

You can also test the surface pH to ensure it has been properly prepared. The pH should be at least 8, as recommended by the lining manufacturer.

Stop any active water infiltration using chemical injection grouts or hydraulic cement water stop materials. Remove any unreacted materials.

Replace any missing or displaced bricks and mortar. Use an approved material compatible with the lining or a repair mortar to fill the voids. Before applying the linings, make sure the surface is clean according to the guideline. If the brick manhole has been exposed to sewer service after preparation, re-clean it to remove any contaminants.

Test the brick masonry for residual moisture as per the manufacturer's guidelines after cleaning and drying, but before applying the lining. If the protective lining requires a specific moisture percentage for proper performance, dry the manhole surface until the brick masonry's moisture content is within acceptable limits.

And lastly, when preparing brick masonry manholes for coating with cementitious and polymer linings, consider using proper personal protective equipment (PPE) such as eye/face protection, respiratory protection, hearing protection, gloves, proper footwear, hard hat, and Tyvek-type coveralls. Ensure proper ventilation and inspect tools and PPE before use. Employers should conduct a written risk assessment for each task to determine the appropriate PPE and confined space entry.

A summary of the guideline is as follows:

- **Brick manholes overview:** Brick masonry manholes, primarily constructed from clay or shale, are common in North America and often require rehabilitation due to corrosion of the mortar.
- **Surface preparation scope:** The guidelines outline necessary surface preparation methods, including pressurized water blasting and additional techniques for removing brick glazing, to ensure a suitable surface for topcoating.
- **Importance of cleaning:** Effective surface preparation is crucial to remove contaminants such as fats, oils, grease, and existing coatings to prepare the brick masonry for protective linings without damaging the surface.
- **Inspection procedures:** Prior to surface preparation, a thorough inspection of the manhole is required to identify issues such as infiltration, loose bricks, or deteriorated mortar that need attention.
- **Preparation methods:** High-pressure cleaning and glaze removal techniques are specified to ensure a clean, dry, and sound surface. Methods like abrasive blasting and acid etching may be necessary for glaze removal, if present on the brick face.
- **Post-preparation checks:** After surface preparation, the condition of the surface must be visually inspected to confirm the removal of contaminants and ensure it meets cleanliness standards before applying coatings.
- **Safety requirements:** The document emphasizes the need for appropriate personal protective equipment (PPE) during surface preparation to safeguard workers from various hazards.

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