U.S. General Services Administration

Removing Finishing And Curing Discolorations From Concrete

Procedure code:
371018S
Source:
Hstrc Concrete: Investigation & Rpr/Pre-Conf Training - 1989
Division:
Concrete
Section:
Concrete Cleaning
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PREFACE: The cleaning or removal of stains from concrete may involve the use of liquids, detergents or solvents which may run off on adjacent material, discolor the concrete or drive the stains deeper into porous concrete. Use the products and techniques described here only for the combinations of dirt/stain and concrete specified.

PART 1---GENERAL

1.01 SUMMARY

A. This procedure includes guidance on removing discolorations from concrete that develop during the finishing and curing operations. Guidance is provided for removing the following types of discoloration:
   1. Dark discoloration,
   2. Light discoloration, and
   3. Mottling.

B. Safety Precautions:
   1. DO NOT save unused portions of stain-removal materials.
   2. DO NOT store any chemicals in unmarked containers.
   3. EXCELLENT VENTILATION MUST BE PROVIDED WHEREVER ANY SOLVENT IS USED. USE RESPIRATORS WITH SOLVENT FILTERS.
   4. No use of organic solvents indoors should be allowed without substantial air movement. Use only spark-proof fans near operations involving flammable liquids.
   5. Provide adequate clothing and protective gear where the chemicals are indicated to be dangerous.
   6. Have available antidote and accident treatment chemicals where noted.

C. See "General Project Guidelines" for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:

1. Safety Precautions
2. Historic Structures Precautions
3. Submittals
4. Quality Assurance
5. Delivery, Storage and Handling
6. Project/Site Conditions
7. Sequencing and Scheduling
8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the Regional Historic Preservation Officer (RHPO).

PART 2---PRODUCTS

2.01 MANUFACTURERS

A. The Proctor & Gamble Co.
Cincinnati, OH

2.02 MATERIALS

NOTE: Chemical products are sometimes sold under a common name. This usually means that the substance is not as pure as the same chemical sold under its chemical name. The grade of purity of common name substances, however, is usually adequate for stain removal work, and these products should be purchased when available, as they tend to be less expensive. Common names are indicated below by an asterisk (*).

A. For Dark Discolorations:
   1. Hydrochloric Acid (30-35%):
      a. A strong corrosive irritating acid.
      b. Other chemical or common names include Chlorhydric acid; Hydrogen chloride; Muriatic acid* (generally available in 18 degree and 20 degree Baume solutions); Marine acid*; Spirit of salt*; Spirit of sea salt*.
      c. Potential Hazards: TOXIC, CAUSTIC TO FLESH; CORROSIVE TO CONCRETE, STEEL, WOOD OR GLASS, FLAMMABLE.
      d. Available from chemical supply house, drugstore or pharmaceutical supply distributor, or hardware store.

      -OR-
   2. Diammonium Citrate:
      a. Other chemical or common names include Ammonium citrate; Ammonium citrate secondary.
      b. Potential Hazards: CORROSIVE TO CONCRETE, STEEL, WOOD OR GLASS.
      c. Available from chemical supply house, drugstore or pharmaceutical supply distributor.
   3. Clean, potable water

B. For Light Discolorations:
   1. Neutral detergent such as "Orvus Paste" (Procter and Gamble), or approved equal, using dilution as determined by tests on material to be cleaned.
   2. Clean, potable water

      -OR-
   3. Acetic Acid:
      a. A colorless pungent liquid acid that is the chief acid of vinegar and that is used especially in synthesis (as of plastics).

b. Other chemical or common names include Vinegar acid*. (Vinegar itself, which contains about 4% acetic acid, may be suitable for some purposes requiring acetic acid.)
c. Potential hazards: CAUSTIC TO FLESH AND CORROSIVE TO CONCRETE, STEEL, WOOD OR GLASS.
d. Available from chemical supply house (both commercial and scientific), drugstore or pharmaceutical supply distributor, grocery store or supermarket, or hardware store.

4. Vinegar:
a. Potential Hazards: CORROSIVE TO CONCRETE, STEEL, WOOD OR GLASS.
b. Available from grocery store or supermarket.
c. Vinegar itself, which contains about 4% acetic acid, may be suitable for some purposes requiring acetic acid.

5. Phosphoric Acid:
a. A syrupy or deliquescent tribasic acid used especially in preparing phosphates (as for fertilizers), in rust-proofing metals, and as a flavoring in soft drinks.
b. Other chemical or common names include Orthophosphoric acid.
c. Potential Hazards: CAUSTIC TO FLESH; CORROSIVE TO CONCRETE, STEEL, WOOD OR GLASS.
d. Available from chemical supply house or hardware store.

6. Clean, potable water

C. For Mottling (light spots):
1. Sodium Hydroxide (NaOH):
a. A white brittle solid that is a strong caustic base used especially in making soap, rayon, and paper.
b. Other chemical or common names include Caustic soda*; Hydrate of soda*; Hydrated oxide of sodium*; Lye*; Mineral alkali*; Soda lye*; Sodic hydrate*; Sodium hydrate*.
c. otential Hazards: CAUSTIC TO FLESH AND FLAMMABLE (WHEN IN CONTACT WITH ORGANIC SOLVENTS).
d. Available from chemical supply house, drugstore or pharmaceutical supply distributor, hardware store, or paint store.

2. Clean, potable water

2.03 EQUIPMENT

A. Stiff, bristle brushes (non-metallic)

PART 3---EXECUTION

2.01 PREPARATION

A. Protection:
1. Provide adequate wash solutions (i.e. water, soap and towels) before starting the job.
2. Whenever acid is used, the surface should be thoroughly rinsed with water as soon as its action has been adequate. Otherwise it will continue etching the concrete even though the stain is gone.

3.02 ERECTION, INSTALLATION, APPLICATION

NOTE: DO NOT TRY MORE THAN ONE TREATMENT ON A GIVEN AREA UNLESS THE CHEMICALS USED FROM PRIOR TREATMENT HAVE BEEN THOROUGHLY WASHED AWAY.

A. For Removing Dark Discolorations:
1. If discovered early, dark discoloration caused by inadequate curing can sometimes be overcome by washing for a half hour at a time with hot water, allowing to dry, and repeating as necessary.
2. Dark discolorations caused by trowel burns are more difficult to remove.

a. Apply a solution of 1 part hydrochloric acid in 49 to 99 parts of water -OR- a solution of 25 to 35 ounces by weight of diammonium citrate in 1 gallon of water.
b. Scrub the solution on using a stiff non-metallic bristle brush. A white gel will form in the process. Dilute with water and continuously agitate during the treatment to avoid having it bond tightly to the concrete.
c. Rinse the gel off with clean, clear water and allow to dry. It may be necessary to treat the concrete two or three more times. It also helps if the concrete is cured with water between treatments.

B. For Removing Light (White) Discolorations:

1. Non-acidic treatments should be tried first, using water and a neutral detergent.
2. If this is insufficient, apply a solution of 1 part acetic acid in 19 parts water, undiluted vinegar, and 1 part phosphoric acid in 19 parts water.
3. Rinse with clean, clear water and allow to dry.
    a. Repeat the process as necessary.

C. For Removing Mottling (Light Spots):

1. Apply a solution of 12 ounces of sodium hydroxide by weight in 1 gallon of water.
2. Leave on the surface for 24 hours.
3. Rinse the surface thoroughly with clean, clear water and allow to dry.
4. Repeat the process as necessary.

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