

BUILDING DIGEST

CENTRAL BUILDING RESEARCH INSTITUTE INDIA



REMOVAL OF STAINS FROM CONCRETE FLOORS

Practically all types of stains can be removed from portland cement concrete floors without appreciable injury to either texture or colour of the concrete. A stain may be eradicated by dissolving the staining matter and drawing it out by capillary suction; by driving it back from the surface or by converting the colouring matter into a form which does not show as a stain. It is not always possible to determine what the staining matter is and hence the treatment sometimes has to be a matter of experimentation. Often the staining matter will be found to exist in a stable form and its removal may require several applications of the treatment. This is particularly true in the case of stains which have been long neglected. Considerable patience is, therefore, required to eradicate such stains. It is often a matter of repeating the treatment day after day until the desired results are obtained.

A considerable variety of chemicals may be applied to concrete without appreciably injuring it, but acids or chemicals which develop an acid condition should be used with utmost care. Even weak acids such as oxalic acid and acetic acid may show their effect on concrete if left on the surface for a considerable length of time.

Except on non-absorbent surfaces, the stain usually penetrates to such an extent that it cannot be readily removed by merely applying the proper chemical to the surface or by scrubbing the stained part. It is then necessary to employ a poultice or bandage type treatment.

Stains and their treatment

A wide range of stains are encountered on concrete floors but the more common ones are ink, iron and rust, oil, paint and varnish, bitumen and asphalt, coffee and tea, tobacco and cigarette, fire and blood. Methods to remove these and some other less common stains are described below:

Ink: Inks are of various compositions and many chemicals are used for removing ink stains. Ordinary writing inks consist essentially of the gallotannate of iron and a synthetic blue dye.

Some of the chemicals suitable for removing ink stains are:

- i) A ten percent solution of oxalic acid, ammonium oxalate, citric acid, sodium citrate or ammonium citrate.

- ii) A five percent solution of sodium perborate.
- iii) A one percent solution of potassium permanganate followed by a ten percent solution of sodium bisulphite.
- iv) Aqueous extract of bleaching powder acidified with acetic acid.
- v) Ammonia solution.
- vi) Hydrogen peroxide (25 percent).

The solution of one of these is applied over the affected area and is left there for some time. Acid solutions should always be followed by an application of ammonia solution. If the stain is fairly old and has penetrated into the surface, a 5 mm thick poultice of whiting in sodium perborate solution or a flannel cloth well soaked in acidified bleaching powder extract is applied over it, covered with a glass or polyethylene film to prevent rapid drying, and left in position for 24 hours. Ammonium citrate poultice is also suitable. The treatment should be repeated till the stain disappears. Any residual brown stain caused by iron compounds may be removed with ten per cent oxalic acid solution.

Most synthetic dye ink stains can be removed by ammonia water.

Iron and Rust: A careful application of an acid solution is usually the most effective way of removing iron stains. A ten percent solution of hydrochloric acid or phosphoric acid may be used. Wet the concrete before applying the acid and finally remove all residual acid by washing down with water thoroughly. A slight roughening of the concrete is inevitable. As an alternative treatment which avoids roughening of the surface, a ten percent solution of ammonium oxalate or sodium citrate may be used but this may require repeated application.

If the stain is old and intense then the more effective treatment would be to apply a poultice. One part of ammonium citrate is dissolved in six parts of water and mixed thoroughly with an equal volume of glycerine. A part of this liquid is mixed with whiting to form a paste just stiff enough to adhere as a thick coating to the sur-

face. This is applied to the stained area and kept wet for a few days by the addition of more of the liquid. Wetting the stained area with a solution of sodium citrate followed by a solution of sodium hydrosulphite prior to application of the poultice will give better results.

Oil: Oils penetrate readily into concrete and if dropped accidentally on the surface it should be mopped off immediately with a cloth and the area covered with a powdered material such as hydrated lime, Fuller's earth or whiting. Where oil has penetrated into concrete, sponging with solvents is usually not successful. A means of drawing the oil from the pores is needed. This is accomplished best by a poulticing method and for deep seated stains the operation may have to be repeated several times at suitable intervals.

A thick piece of white cloth or a layer of cotton batting is placed over the oil stain to cover a little more than the stained area and it is saturated with a mixture of acetone and either amyl acetate or carbon tetrachloride. A stiff paste of whiting, talc or any other inert powder and the solvents cited above is sometimes preferred. Evaporation of the solvent carries the penetrated oil to the surface of the poultice which is removed by brushing when dry. To check rapid evaporation of the solvent a glass or metal cover is placed over the poultice.

A drying oil stain, such as that of linseed oil, gets oxidised after some time and resists the action of solvents unless the oil residue is first saponified. In such cases a thin paste made by mixing one part trisodium phosphate, one part sodium perborate and three parts talc in a strong solution of soft soap in hot water should be applied over the stained area and left until dry. Repeated application of the treatment may be necessary.

Paint and Varnish: Fresh stains of varnish and paint can be removed by the judicious application of carbon tetrachloride, benzol, amyl acetate, etc. For an old stain a caustic or strong alkaline paint remover should be used. It may result in a certain amount of salting that presents an unsightly appearance. But the effect is temporary and disappears after a few days.

Emulsion paint stain can be removed by softening with water first and then rubbing gently.

Bitumen and Asphalt: The stain is softened by rubbing with warm kerosine oil and finally removed by carbon tetrachloride, trichloroethylene, etc. Kerosine oil itself may remove the stain completely.

Coffee and Tea: A thick cloth, saturated in a solution of one part glycerine and one part water is placed over the stained portion and the treatment repeated till the stain is removed. Addition of two parts isopropyl alcohol to the mixture will hasten the action. Some obstinate stains may require bleaching with hydrogen peroxide or sodium perborate.

Alcoholic Beverages and Soft Drinks: These sometimes cause tannin stains which may be almost unnoticeable at first but turn brown if allowed to stand.

For removal, the process for coffee and tea stains may be adopted.

Tobacco, burnt Cigarette, Fire, Fruits, etc.: The original appearance may sometimes be restored by scrubbing with powdered pumice, grit or similar material. For more difficult cases a poultice method is more effective.

One part trisodium phosphate is dissolved in 5 parts of water and the solution is added to a suspension of one part of bleaching powder in 5 parts of water. It is stirred and allowed to settle. Some talc is worked into a stiff paste with the clear supernatant liquid and applied as a poultice about 5 mm thick over the stain. It is scraped off when dry. Several treatments may be necessary for deep stains.

Blood: Blood stain can be removed by treating with one of the following chemicals dissolved in water: sodium hydrosulphite, trisodium phosphate, hydrogen peroxide and ammonia.

Urine: The stain is soaked with a ten percent solution of citric acid and washed with plenty of hot water. If the stain does not respond, the treatment recommended for tobacco stain may be employed.

Disinfectants: Phenol and cresols in some disinfectants react with traces of iron in white cement to produce an indelible pink stain. To remove such stains the method cited for ink stains may be used. For removing DDT deposits alkaline detergents are effective.

Copper: The stain is nearly always green being due to the formation of carbonate of copper. The stain is covered with a paste consisting of one part ammonium chloride four parts talc and ammonia water and left until dry. Old stains may require several repetitions of the treatment.

Cement Slurry: There is no satisfactory way to remove the stain once the cement has set. Most of it can be removed by moderate rubbing and washing with water and the remaining can be cleaned by the judicious application of ten percent hydrochloric acid after wetting the stain with water.

Fade Film: Calcium hydroxide produced during hydration of cement and carried to the surface when concrete dries, becomes calcium carbonate and may be conspicuous as a fade film on tinted floors. There is no treatment for its removal except rubbing with abrasives. If slight roughening of the surface is not objectionable the fade film can be removed by washing carefully with weak hydrochloric acid.

Maintenance of Concrete floors

Concrete floors may be swept with a soft broom using a sweeping compound based on softwood sawdust if desired. Hardwood sawdust is not suitable because it may contain tannin which causes brown stains to develop in the floor. Concrete floors may be washed with a wet

mop or scrubbed with a brush and then rinsed with clear water. For a thorough cleaning 25 to 75 g washing soda or trisodium phosphate is added to a bucket of water and washed with a mop or scrubbing brush. Non-soapy detergents may also be used. The use of soap is not recom-

mended because it builds up a fatty film on the surface which, when damp or wet, becomes greasy and slippery. The film also tends to hold dirt. Industrial concrete floors are often cleaned with hot water or by steam hosing.

There is a demand for short notes summarising available information on selected building topics for the use of Engineers and Architects in India. To meet the need this Institute is bringing out a series of Building Digests from time to time and the present one is the 42nd in the series. Readers are requested to send to the Institute their experience of adopting the suggestions given in this Digest.

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