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Introduction

The driving force behind the invention of better carpet cleaning methods and products was the need to improve public health, safety, sanitation and the efficiency of cleaning workers. In addition to these forces was the always-present desire to maintain a better appearance level of carpet while extending its useful life in a commercial or institutional facility.

A Brief History of Rugs and Carpets

Today, most carpet production (94%) is tufted carpet. Tufted carpet is produced 15 times faster than woven carpet. The faster production time greatly reduces the labor costs during the carpet manufacturing process.

In order to achieve dimensional stability in tufted carpet it is necessary to apply two layers of "backing" (double-backed tufted carpet) to the carpet. The backing directly beneath the pile yarn is called the "primary" backing. Attached to the primary backing by a layer of rubber or latex is the "secondary" backing. The original backing on tufted carpet was "jute." Jute is a natural burlap that when over-wet was subject to shrinkage dry rot and seam popping. Presently, the backing of tufted carpet is made from a synthetic material called polypropylene (olefin). Polypropylene backing will not accept moisture, so the shrinkage, dry-rot and seam popping associated with jute backing is impossible, even if the carpet is over-wetted in the cleaning process.

The Major Types of Carpet Fibers

The largest selling type of commercial carpet consists of nylon pile yarn. Nylon carpet has developed and improved over the years. Each succeeding breakthrough in nylon carpet manufacturing is called a "generation." The five generations of nylon carpet are:

Generation 1 Delustered or dull fiber. Round fiber in cross-section.

Generation 2 Soil-hiding. Multi-lobal, or multi-sided fiber in cross-section. These fibers produced static electricity.

Generation 3 Anti-static, multi-lobal, soil-hiding.

Generation 4 Stain and soil resistant. Covered with a coating of fluorocarbon similar to Scotchgard or Teflon. Anti-static, multi-lobal, and soil hiding.

Generation 5 Stain resistant, antimicrobial, anti-static, multi-lobal, and soil hiding. These fibers are anionic, or negatively charged, and should be cleaned with anionic or non-ionic cleaning solutions (not cationic solutions). Dry cleaning solvents may cause the stain repellant to lose its efficacy.

Types of Carpet Fibers:

Polypropylene (olefin)

A synthetic pile yarn fiber used extensively for outdoor carpeting.

Polyester

An inexpensive carpet pile yarn that is used principally in residential installations.

Wool

A minor (1% of the market) but important fiber in carpets is the oldest carpet fiber, wool. Wool is beautiful, expensive and must be maintained properly and carefully.

When cleaning wool carpet, extreme care should be taken to avoid over-wetting and the use of high-alkaline cleaners. Improper chemical usage on wool carpets can cause "alkaline browning discoloration." Browning is an easily remedied by applying a "brown-out" treatment to the carpet. Over-wetting a wool carpet can cause jute-bleeding discoloration from the backing yarns used in carpet weaving processes.

The Importance of Chemical pH to Carpet Fiber

An important factor that affects the cleaning of stain-resistant 4th and 5th generation nylon carpets is the pH of the detergents or shampoos used in the cleaning process. Chemical pH may adversely affect the performance of the carpet, so it is important to understand the basics of pH as they pertain to carpet care.

In chemistry, pH is a quantitative scale for measuring the acidity or alkalinity of liquid solutions. The scale runs from the number 0 to 14. The number 7 on the pH scale is neutral, not acidic or basic. The number 0 on the pH scale is a strong acid; 14 is a strong alkali. (In the cleaning industry the word "alkali" is used to denote a "base".) So the pH scale runs from 0 (acid) to 14 (alkali).

On the pH scale each full number increase represents a tenfold increase of the acidity or alkalinity of the solution. It is a geometric progression by the number 10. So pH of 1 is 10 times more powerful than pH of 2. The pH of 2 is ten times more powerful than the pH of 3 and 100 times more powerful than pH of 4.

The numbers on the scale denote the "strength" characteristics of the solution not the "quantity" or dilution of the solution. Whether you have a drum of lye or a tablespoon of lye they both have the same strength characteristics (pH).

In order to prevent damage to carpet, the carpet cleaner should leave the carpet as close to 7 on the pH scale as possible. The manufacturers of all stain-resistant and 4th or 5th generation nylon carpets require a cleaning solution with a pH of 10 or below. Also, the major fiber producers on most nylon carpets require a water temperature of below 150° F.

The Importance of Chemical pH to Carpet Fiber

If a chemical with a higher pH than 10 is used, it will void the guarantee of these carpets from the manufacturer. Highly alkaline detergents and shampoos will also damage wool carpet. On other types of carpet, a pH of 12 is the maximum that should ever be used.

Carpet pile fibers are dyed in acids with a pH of 2. That is why highly alkaline cleaners may cause alkaline browning of light pile fibers.

Preventive Maintenance

Preventive maintenance refers to reducing or preventing soiling of the carpet. The three elements of preventative carpet care are:

- Catch Dirt at the Door
- Remove Loose Soil Frequently (Vacuuming)
- Spot Carpets Effectively

Catch Dirt at the Door

Approximately 70 percent of carpet soil is tracked in from outdoors via foot traffic. The rest of the building stays cleaner if dirt is collected and held at the entry point. To catch dirt at the door there are two important strategies. The first is to keep entrances clean outside. Clean entrances that are free from dust and litter outside reduce what may be tracked or blown into the building and carried throughout the building. Frequent sweeping and cleaning around building entrances will reduce the amount of damaging soil that enters any facility.

Sweeping entrances is accomplished with brooms or mechanical and powered sweepers. Waterbrooms, pressure washers and automatic scrubbing machines aid washing the entrances.

The second element that keeps dirt at the door is to provide adequate, clean mats and matting at all entrances to the building.

Entrance mats and walkoff mats catch and hold large amounts of tracked in outside soil. A 12 to 15 foot entrance mat at the door traps 30 percent of the incoming soil within the first three feet, and 85 percent is trapped within 15

feet. Also, walk-off mats should be placed in front of service elevators, which are also the source of soil entering a building from the outside.

Methods of Key-Area Cleaning

Carpet Bonnets or Spin Pads

Bonnet or Pad cleaning features the use of a standard speed single disk rotary floor machine (usually 175 rpm). A pad driver is attached to the floor machine at the clutch plate to hold and drive the bonnet or spin pad. Either a yarn bonnet or a synthetic carpet cleaning pad is treated with cleaning solution and placed underneath the driver pad on the floor machine.

Bonnets are thick, mop-like products that are blended of cotton and synthetic yarn, and designed to both clean and absorb cleaning solution on the carpet. Synthetic pads are thinner disks and similar to the buffing pads used in hard floor maintenance. Pads are made of white, non-woven polyester fiber, and are designed to clean and absorb without abrasion.

Chemical cleaning solutions formulated for the bonnet cleaning operation generally have two major requirements: the cleaning solution should be low suds or suds-less, and it should contain a high proportion of carpet cleaning solvents and a lower amount of detergents. The solvents remove greasy soil and detergents clean the fibers. A pH range of 7 to 9 is recommended for the cleaning chemical.

The cleaning solution may be spray-misted directly on the carpet area to be cleaned, or applied through a shampoo tank that is attached to the handle of the machine and is dispensed through a "flow-through" type assembly on the machine. An aerosol product may also be used to apply cleaner from a specially mounted applicator on the floor machine.

Soil is loosened from the carpet through the chemical and mechanical action of the process and is absorbed into the bonnet or pad. The process wipes up attached soil and grease off the top portion of the carpet. Bonnets and pads need to be turned over or exchanged for clean ones periodically as they

become soiled. Later, the soil is cleaned out of the bonnet or pad by rinsing or washing it thoroughly. No vacuuming is required after a bonnet-buffing cleaning procedure has been performed.

Drying time is affected if the cleaning operator uses the spray-type method versus the tank flow-through method. The spray-type method has virtually no drying time; the tank flow method requires a dry time of approximately 30 minutes to one hour.

Dry Foam Cleaning

Another method of key-area cleaning is a dry-foam cleaning. In this process, carpet shampoo solution is generated into cleaning foam. This dry foam is massaged into the carpet using a brush attached to the foam machine. After the foam has been brushed into the carpet it is removed into a vacuum shoe. Some dry foam machines are fitted with a vacuum so that the foam generation, brushing and vacuum pick-up are accomplished during one pass of the machine. Other machines require a separate vacuum pick-up, after the dry foam machine has completed the cleaning process.

The shampoo used in the dry foam machines breaks down greasy soils and absorbs some sandy soil that is removed through the vacuum process.

Extraction Cleaning

Most carpet fiber manufacturers and carpet mills recommend periodic, thorough cleaning of carpets performed by well-trained and experienced carpet cleaning personnel. Hot water extraction is the method of deep rinse cleaning the entire carpet. Hot water extraction has also been called "steam cleaning" but actual live steam (gas created at water's boiling point) is not employed in the cleaning process. Hot water extraction is a deep cleaning process that removes embedded soils that have been carried or blown into the carpet.

A hot water extraction machine has a pump which dispenses water under pressure through spray nozzles into the carpet. The spray is an emulsion of heated water, solvents and detergents that are designed to dissolve greasy soils. The spray rolls sand and dirt into an attached vacuum shoe that sucks the dirty solution back into a holding tank on the extraction machine. Generally the cleaning process is aided by an attached scrub brush that is located between the spray nozzles and the vacuum shoe on the cleaning head of the extractor. The brush scrubs greasy, attached soils from the carpet fiber.

The removed soil is held in the tank until it may be disposed of later in a sanitary drain, toilet or proper waste facility. Solutions should not be dumped onto the ground outside, in storm sewers or in the streets.

In hot water extraction cleaning it is important to use detergents that are not too strong (or too alkaline). They may damage the carpet. A pH of 10 is preferred on many carpets (see the section about pH). With fine wool carpets an acid pH detergent or an acid rinse following the cleaning process is recommended. Care must be taken with wool carpet not to over-wet the fiber and cause shrinkage. If there is any question about the proper cleaning solution, contact the manufacturer of the carpet.

When carpet is extracted using the hot water extraction method remember the following tips:

1. Vacuum the area to be extracted thoroughly, before you use the extraction equipment. A cleaning solution will only carry a certain amount of soil. Don't use the valuable solution, time and equipment of the hot water extraction process to remove loose soil that could have been removed by vacuuming. Use the extraction process to clean deep, embedded soil. ([MARC 247 Xtractor](#))
2. Apply a traffic lane prespotter on heavily soiled areas prior to extraction. Wait the recommended time before beginning the cleaning process. ([MARC 313 Carpet Bonnet Cleaner](#))
3. Avoid overwetting the carpet. Prolonged dampness may promote growth of mildew and bacteria in the carpet or cause the carpet to delaminate from its two backings.
4. Dry the carpets as quickly as possible. Speed drying is aided by using carpet-drying fans to move air across the carpet.

Carpet Protectors

Carpet protectors can offer real tangible benefits in a carpet cleaning program. Carpet protectors significantly reduce the amount of various types of soil

accumulating on the carpet fibers. If a carpet is soiled it is necessary to clean it thoroughly with an extraction process before applying a carpet protector.

Carpet Sanitizing Cleaners

The soil in carpet is frequently laden with harmful microorganisms. Bacteria grow in a warm, dark, moist environment. This is the condition present down in the carpet fiber. The bacteria and pathogenic microorganisms that grow in the carpet fiber may be reduced each time the carpet is cleaned with a wet cleaning solution.

To reduce harmful bacteria levels it is necessary to use an EPA-registered carpet sanitizer. Sanitizers reduce bacterial to safe levels. They are not disinfectants or germicides that completely kill all existing harmful bacteria. ([MARC 10 Quatra-Cide](#))

To guarantee that you are using a carpet sanitizer when you clean or extract a carpet, check to see that it contains an EPA registration number on the bottle. Be sure to follow label instructions carefully when using a sanitizer. It is a violation of Federal law to use an EPA-registered product other than as directed on the label.

Sanitizing when cleaning the carpet adds another level of safety to those who come in contact with the carpet.

Spot & Stain Removal

All stains are either water-soluble or solvent-soluble. Solvent-soluble stains require solvents to redissolve the stain and release it from the carpet. Water-soluble stains are neutralized using alkaline and acid based spotting agents. Stains are neutralized by using a spotting agent of the opposite pH value of the stain.

Neutralize acid stains by using an alkaline spotting agent.

Neutralize alkaline stains by using an acid spotting agent.

Some stains have no pH because they are waterless stains. You must use a neutral product (solvent) to remove these stains.

Acid spotting agents work very quickly.

Alkaline spotting agents take a minute or so to work.

SPOT & STAIN REMOVAL

GENERAL SPOTTING RULES

1. Apply water before and after most spotting procedures except for inks!
2. Spot clean inks on the solvent or "dry" side.
3. Generally rinse all spotting agents free from the carpets, as these can set up their own stains if left in the fabric.
4. Remove obvious spots from the carpet before shampooing, buffing with a bonnet or extracting.
5. When in doubt concerning loose dyes or sensitive colors or fabrics, it is wise to first test the spotting agent in an inconspicuous area of the carpet.
6. Use [MARC 283 Carpet Spotting Towels](#) for general purpose spot cleaning.

CANDLE WAX

1. Scrape up all excess wax using a paint scraper or trowel.

2. Using white absorbent paper towels or cloth towels over the wax area, apply a hot iron to the top of the towel. The candle wax will transfer itself onto the paper, which is more absorbent than the carpet.

WATER STAINS

Water stains or rings are areas of concentrated foreign matter or dirt that have floated out or migrated forming a stain or ring that extends as far as the quantity of moisture or initial water allowed on the carpet. ([MARC 157 Spot Out](#) .)

GENERAL INK STAINS

Ink stains have many origins because of the highly variant formulations used in making different inks. Since most inks are removed on the "dry" side (with a solvent-type spotter such as [MARC163 Magic](#)), the use of any water should be initially avoided. Water used on the ink stain could have a spreading action.

CHEWING GUM

Spray [MARC 119 Gum-Off](#) directly onto the gum deposit until it becomes brittle. Chip and lift the brittle gum deposit from the carpet.

Carpet Tips

To find out the generation of the carpet, a simple test is to put a couple of drops of water on the carpet. If it absorbs it is IV generation or older. If the water remains on top, then it is V generation carpet

Whatever carpet stain is to be removed, low pH or high pH, acid or alkaline, use the opposite when "spotting".

"Browning" is a condition that sometimes occurs after the cleaning operation when the carpet has dried. It may appear as a yellowish brown spot. It can be caused by either of two conditions: (1) over-saturation from soaps or cleaners,

or (2) over-saturation with too high pH, alkaline detergent or cleaning solution. Be sure to shampoo or extract with a solution with a pH below 10.

Color change is a chemical reaction to either an alkaline or an acid agent. Blue carpets usually turn pink and green carpets usually turn blue. Applying a spotting agent of the opposite pH can reverse this color change.

Color loss is a chemical reaction that allows the dye to be removed by the cleaning process. The dye actually leaves the fiber and it cannot be reversed.

Carpet Cleaning Terms

ACID. Any substance, which when dissolved in water, yields a pH below 7.

ALKALI. Any substance which when dissolved in water, yields a pH above 7.

ANIMAL STAIN. Discoloration of the carpet caused by animal urine.

ANTIMICROBIAL. A chemical that prevents the growth of mold, bacteria, mildew, etc., reducing their destructive action to carpet and eliminating accompanying odors. Applied to carpet at the mill level and built into some fibers or applied on-location.

ANTI-STAT. A chemical substance applied to the carpet, or a special backing, to reduce static electricity to acceptable levels.

BASE. An alkaline substance.

BIODEGRADABLE. Has the capability of becoming decomposed by naturally occurring microorganisms.

BLEACH. An oxidizing or reducing agent used to remove color.

BLEEDING. This is a loss or transfer of color from one section of the carpet to another, usually under hot, wet conditions.

BRIGHTENERS. Optical whiteners or fluorescent whitening agents used in the cleaning process. Under the influence of ultraviolet light, they emit a visible blue-white light.

BROWNING. A yellow or brownish discoloration of the carpet's face, usually caused by impurities in cellulosic fibers, such as cotton and jute, which wick up to the face fibers on overwetting.

DEFOAMER. A surface-active agent that is used in cleaning to reduce detergent foaming.

DEGREASER. Solvent used in the cleaning process to remove heavy oils or grease from the carpet.

DEODORIZER. Products specifically formulated to destroy, mask or modify unpleasant odors from the carpet.

DETERGENT. Any substance that is capable of dislodging, removing or emulsifying soils. Generally, the term is used for formulated products that contain surfactant builders, solvents, etc.

DISINFECTANT. An agent used to completely destroy all harmful bacteria. Labeling for such materials requires proof of effectiveness for registration with EPA.

FATTY ACIDS. Oily, acidic materials that are formed by degradation of animal tissues.

MILDEW. Fungus growth that can occur on carpet fibers. Causes odor and fiber degradation.

MICRO. So small as to be undetectable to unaided human senses.

OZONE. A highly reactive gas and strong oxidizing agent formed by passing a high voltage current through air. Used as a deodorizing agent.

pH. A number in the range of 0 to 14 used to express the degree of acidity or alkalinity of a dilute solution. Below pH 7 the acidity increases as the number approaches 0. Above pH 7, the alkalinity increases as the pH approaches 14. pH 7 indicates a neutral solution.

SANITIZER. An agent which yields a significant reduction in the level of harmful bacteria. Legal labeling requirements for sanitizers are not as stringent as those for disinfectants.

SHAMPOO. Generally a high foam detergent preparation used for rotary cleaning.

SOIL RETARDANT. An agent that is applied to the carpet to retard or decrease the rate of soiling.

STAIN REPELLANT. An agent that is applied to the carpet's surface which primarily acts as a water repellent.

SURFACTANT. Specifically, a surface active material which changes the surface tension of water and is used in detergent formulations as a wetting or penetrating agent, emulsifier and dispersant.

TRAFFIC LANE CLEANER. A heavy-duty detergent specifically designed to use on traffic lanes.

WATER HARDNESS. The amount of metallic salts, such as calcium, magnesium or iron, dissolved in water. These can form insoluble "curds" with some surfactants and reduce the effectiveness of the cleaning.

MARC CARPET PRODUCTS

1. [MARC 10 QUATRA-CIDE](#)
2. [MARC 53 GOT-A-MESS](#)
3. [MARC 119 GUM-OFF](#)
4. [MARC 156 STAIN MASTER](#)
5. [MARC 157 SPOT OUT](#)
6. [MARC 163 MAGIC SOLVENT SPOTTER](#)
7. [MARC 203 "911"](#)

8. [MARC 208 BACTERIZER](#)
9. [MARC 226 BIO-ZYME CLEANER SPOTTER](#)
10. [MARC 227 CARPET DEFOAMER](#)
11. [MARC 229 CARPET DEODORIZER POWDER](#)
12. [MARC 247 XTRACTOR](#)
13. [MARC 256 ORANGE CRUSH](#)
14. [MARC 263 CARPET DEODORIZER POWDER-ORCHARD SPICE](#)
15. [MARC 283 CARPET SPOTTING TOWELS](#)
16. [MARC 313 CARPET BONNET CLEANER](#)
17. [MARC 827 CARPET BONNETS WITH STRIPES](#)

