



PROFESSIONAL CARPET & UPHOLSTERY CLEANING STUDY GUIDE



SERVICE WITH INTEGRITY SINCE 1968

Established in 1968, The National Carpet Cleaners Association (NCCA) is the only nationally recognised trade association dedicated to the cleaning, restoration and protection of carpets, hard flooring and soft furnishings.

Our three-day Professional Carpet & Upholstery Cleaning Course will teach you the basic knowledge needed to give you the foundations of a career path. We hope you enjoy the three days and will continue your development in the industry with the NCCA.

Passing the exam at the end of the course will make you eligible to apply for NCCA membership. Successful candidates will receive their results and an invitation to join the Association via email. Please note, you are not permitted to make use of the Association name and logo until your application has been approved, payment has been arranged and you have received your welcome email.

This study guide will give you a basic understanding of some of the more difficult areas of study on the course, along with an explanation of some of the technical terms used. Some of the terms and subjects may be difficult to comprehend but please do not worry, as these will be covered on the course and explained in more detail. Please make sure you bring the guide with you on the day.

As part of our course, you will also be supplied with the NCCA's comprehensive training manual that will be yours to keep for future reference.

Welcome to the NCCA Training Programme.

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Cleaning Principles and Methods

Cleaning is the process of removing soil. Soil is defined as: “Any unwanted materials in the fabric / carpet”. Soil can be Insoluble, Water Soluble or Solvent Soluble.

Dry Soil Removal - Dry vacuum in two directions using an upright vacuum cleaner with a motor driven beater bar. Fabrics should be vacuum cleaned using tools designed for this purpose.

Soil Suspension - CHAT

- **Chemical Action** - separates soil from fibres, emulsifies oils.
- **Heat / Temperature** - increases cleaning product activity.
- **Agitation** - distributes products evenly and physically assists soil removal from fibres.
- **Time** - chemicals need dwell time to work effectively.

If one activity is decreased, at least one other must be increased to maintain the effectiveness of cleaning.

Soil Extraction - Removal of suspended soil by:

- **Wet Extraction / Hot Water Extraction (Steam Cleaning)** - Hot water is injected in to the carpet pile / fabric under pressure and removed using suction and airflow to extract the suspended soils.
- **Bonnet / Adsorbent Pad** - A bonnet or pad is passed over the carpet using a rotary machine lifting the soil in to the pad.
- **Rotary shampoo / Encapsulation / Dry Foam** - A low-foam or encapsulating detergent is applied to the carpet using a rotary brush machine. High foam products are used for Dry Foam cleaning, and only the foam is applied. Once dry, soil is extracted using a vacuum cleaner.
- **Dry Compound** - A carrier containing solvents and surfactants is spread over the carpet, worked in using a rotating cylindrical brush machine and allowed to dry. The carrier is then vacuumed out.

Setting the Pile (Nap) - The removal of marks (often referred to as sharks teeth or chevrons) following soil extraction, by brushing the pile in one direction, improves appearance and opens / lifts pile to assist drying.

Drying - Use of ventilation / air movers / heating system to reduce drying times.

Chemistry of Cleaning

pH - Potential for Hydrogen.

Water, H₂O, can separate in to Hydrogen Ions (H⁺) and Hydroxyl Ions (OH⁻). pH measures the levels of H⁺. Only water based solutions have a pH. Solvent based solutions such as dry cleaning products have no pH value.

The pH scale measures how acidic or alkaline a substance is. The scale ranges from 0 to 14. In pure water, the number of H⁺ and OH⁻ ions is equal, this is pH 7, which is neutral - neither acidic or alkaline.

The pH scale represents the relative concentration of hydrogen ions in a solution. The concentration of hydrogen ions is commonly expressed in terms of the pH scale. Low pH corresponds to high hydrogen ion concentration and vice versa. A substance that when added to water increases the concentration of hydrogen ions (lowers the pH) is called an acid. A substance that reduces the concentration of hydrogen ions (raises the pH) is called a base. Finally some substances enable solutions to resist pH changes when an acid or base is added. Such substances are called buffers. Buffers are very important in helping organisms maintain a relatively constant pH. The pH scale is a scientific classification of how acidic or basic a substance is. The scale ranges from 0 to 14 -- a pH reading of 7 is neutral in nature , a pH less than 7 is acidic in nature and a pH greater than 7 is basic in nature.

The pH scale measures how acidic or basic a substance is. It ranges from 0 to 14. A pH of 7 is neutral. A pH less than 7 is acidic, and a pH greater than 7 is basic. Each whole pH value below 7 is ten times more acidic than the next higher value. For example, a pH of 4 is ten times more acidic than a pH of 5 and 100 times (10 times 10) more acidic than a pH of 6. The same holds true for pH values above 7, each of which is ten times more alkaline-another way to say basic-than the next lower whole value. For example, a pH of 10 is ten times more alkaline than a pH of 9.

Most soils are acidic, so cleaning agents tend to be alkaline to neutralise this acidity, making soil suspension more effective. However, many dyes are acidic, so the use of high pH products can affect dye stability leading to colour bleed.

To avoid these problems, it is recommended that alkaline products are removed using an acidic rinse agent to bring the pH back to

neutral or slightly acidic. The final pH of fibres following the cleaning process should be between 5.5 and 7.

Some dyes can change colour as a result of the cleaning process. This can often be attributed to a change in pH. If this occurs the problem can usually be restored by reversing the pH, e.g. acid product, rinse with alkaline or vice versa.

Concentration of Hydrogen ions compared to distilled water		Examples of solutions at this pH
10,000,000	pH = 0	Battery acid, Strong Hydrofluoric Acid
1,000,000	pH = 1	Hydrochloric acid secreted by stomach lining
100,000	pH = 2	Lemon Juice, Gastric Acid Vineger
10,000	pH = 3	Grapefruit, Orange Juice, Soda
1,000	pH = 4	Tomato Juice Acid rain
100	pH = 5	Soft drinking water Black Coffee
10	pH = 6	Urine Saliva
1	pH = 7	"Pure" water
1/10	pH = 8	Sea water
1/100	pH = 9	Baking soda
1/1,000	pH = 10	Great Salt Lake Milk of Magnesia
1/10,000	pH = 11	Ammonia solution
1/100,000	pH = 12	Soapy water
1/1,000,000	pH = 13	Bleaches Oven cleaner
1/10,000,000	pH = 14	Liquid drain cleaner

Measuring pH - pH can be measured accurately using a pH meter, but for cleaning purposes a good indication of pH can be obtained using pH papers, obtainable from most cleaning product suppliers. The area will need to be damp to measure pH which is best done using distilled water and carry out an extract onto a pH indicator strip.

Compound- a substance that contains two or more elements that have been bonded together by a chemical reaction. Soap for example is a compound.

Mixture - a substance containing two or more different elements mixed together, that can be separated easily but is not subject to a chemical reaction. Soil in your vacuum cleaner bag is a mixture.

Solubility/solvent – a solid that dissolves in a liquid is called a solute and is said to be soluble. The liquid that dissolves the solid is called a solvent and the resulting mixture is called a solution. For example, sodium chloride (salt) is soluble. It dissolves readily in water forming a colourless solution. Sand on the other hand, is insoluble, it does not dissolve in water or solvent.

Suspension – most insoluble solids settle to the bottom of a liquid, but some split into tiny particles that spread throughout the liquid. This type of mixture is called a suspension. Milk is a suspension of fat particles in water.

Emulsifier – process of dispersing one liquid into another liquid with which it is immiscible (do not mix such as oil and water). Emulsifiers are important in cases where oily or fatty soils are encountered. The main ingredient in emulsification is the surfactant, with a little help from the builders.

Surfactant – (surface-active-agent) chemical that when added to a liquid, changes the properties of that liquid at the surface. It allows penetration into the material being cleaned. It makes the water wetter. Surfactants are classified as **Anionic (negative), non-ionic (no charge), Cationic (positive)**. Anionic and non-ionic are good

cleaners. Cationic are normally biocides, anti-stats, bactericides & disinfectant surfactants.

Builders – are materials that enhance or maintain the cleaning efficiency of the surfactant by tying up the hard water minerals. It also supplies additional alkalinity for neutralisation of the acidic soils, aids in keeping soil from redepositing on the carpet or fabric and emulsifies oily & greasy soils.

Saponification – The process of converting fat into soap by treating it with an alkali. It comes in handy in dealing with greasy soils such as found in restaurants, pubs & clubs.

Buffers – Is a solution which is resistant to changes of pH.

Fibres

Fibres are made up of thin filaments. Filaments can be *continuous* (one long strand) or *staple* (short lengths). Fibres are *spun* (twisted together) to form yarn. Synthetic fibres are made by *extrusion* (forcing liquid polymer through small holes to form filaments).

Fibres can be classified as *natural* or *synthetic*.

Natural

- **Protein fibres** - e.g. Wool, Silk.
- **Cellulosic fibres** (from plants) - e.g. Cotton, Linen, Jute, Sisal.

Synthetic

- Nylon, Polyester, Acrylic, Polypropylene (Olefin).
- Viscose / Rayon (synthetic cellulosic fibre).

Fibre Facts

Wool - Dissolves in chlorine bleach, absorbs water readily, damaged by alkalis and enzymes.

Silk - Damaged by acids, bleaches, alkalis and enzymes, the only natural continuous fibre, very absorbent.

Cotton/Linen - Acids rot fibres, resistant to alkalis, stronger when wet, susceptible to shrinkage and cellulosic browning.

Jute - Swells and rots when wet, used as weft fibres in some woven carpets, subject to cellulosic browning.

Viscose (Rayon) - Synthetic cellulosic fibre, susceptible to mildew, strong alkalis cause loss of strength, water sensitive.

Nylon - Strong fibres resist abrasion, alkali resistant, weakened by UV light.

Polyester - Strong fibres resist abrasion, absorbs oil and grease, UV resistant, not absorbent, alkali resistant.

Acrylic - Resembles wool, resists alkalis, acids, bleaches and solvents, flammable, very UV resistant.

Olefin (Polypropylene) - Solution dyed, stain resistant, will not shrink, low melting point, absorbs oil, floats.

The Burn Test - A small sample of fibre is introduced to a flame. How it reacts and the resulting ash will indicate the type of fibre.

Dyeing Methods

- **Solution Dyeing** - Pigment added to liquid polymer before extrusion. (**Think carrot solid colour all the way through**)
- **Stock Dyeing** - Filaments are dyed before being spun in to yarn.
- **Yarn Dyeing** - Yarn is dyed by immersion in a vat of pigment.
- **Piece Dyeing** - Part finished carpet or fabric is soaked in dye.
- **Printing** - Similar to an ink jet printer, dye is sprayed on to carpet or fabric to form a pattern.

(Think cucumber with regards all the above colour absorbed into the fibre)

Crocking - Dye transfer due to physical action (can be wet or dry).

Bleeding – One colour moves into another, from moisture.

Carpet Construction

Woven - Made on a loom. A Jacquard loom produces Axminster carpet; a Wilton loom produces Wilton carpet. Warp fibres run the length of the carpet, weft fibres run across the width of the carpet. Face or pile fibres make up the surface of the carpet and are held in place by the warp and weft. Stuffers and fillers are extra fibres which may be used to create bulk or stiffness in the carpet. All these elements are brought together in a single process on the loom.

Tufted - The face or pile fibres are pushed through a primary backing (scrim) by needles. A latex adhesive is used to hold the tufts in place and a secondary backing is applied to stiffen the carpet.

Bonded - Pile fibres are glued to a primary backing and a second backing is added for stability.

Face fibres can be a loop pile, a cut pile or mixture of both cut and loop (sculptured).

Fabric Construction

- **Plain weave** - A flat fabric used for print dyeing or other effects.
- **Flatweave** - Made on a Jacquard loom giving pattern to the weave.
- **Velour / Velvet** - Fabric with a pile face which can vary in length.
- **Jacquard** - Multi warp and weft weave e.g. tapestry, damask.
- **Stitch-bond / Quilt** - Two or more layers of fabric stitched together during the weaving process.
- **Chenille** - Using crimped novelty fibre to give a pile like finish.
- **Bonded / Flock** - Short pile glued to a backing fabric. Solvents should not be used

Fabric construction is not related to fibre type. For example, velvet may have a cotton, viscose, acrylic, polyester or nylon face fibre, or even a blend of two or more of these fibre types

Microfibre - Extremely fine filaments made using a mixture of nylon and polyester. Extremely absorbent, these fibres will retain moisture from the cleaning process and dry very slowly. May be used in flock fabrics.

Health & Safety

PPE – Personal Protection Equipment

SDS – Safety Data Sheet

- should be carried in the vehicle with the products

RCD – Residual Current Device. (Circuit Breaker)

COSHH – Control of Substances Hazardous to Health

Cables to be fully extended and kept neat to reduce trip hazards.

Use caution walking from a damp carpet to a hard floor.

When making up solutions add concentrate/chemical to water.

Prevent equipment breakdowns by keeping items clean, checking operation regularly and follow makers service schedule.

Terms / Glossary

BLEACHING - The removal of colour by an oxidising or reducing agent.

BRIGHTENERS - Optical whitening agents which emit a bluish colour under UV light.

BROWNING - A yellow / brown discolouration of cellulosic (plant based) fibres such as cotton or linen. Usually associated with over wetting or residues of high pH products following cleaning.

CATALYST - A substance which speeds up a chemical reaction.

CELLULOSE - A complex carbohydrate molecule which forms the basic framework of plant cells.

DEFOAMER - A product used to prevent the formation of foam, usually silicone based.

DELAMINATION - The separation of the primary and secondary backings of a tufted carpet.

DETERGENT - A substance capable of dislodging or emulsifying solids, a general term for products containing surfactants, builders, solvents etc.

EMULSIFIER - A chemical which aids the suspension of one liquid within another.

ENCAPSULATION - A process by which some cleaning products surround soil particles, preventing their re-attachment to the fibres following suspension.

FLOUROCARBON - Fabric protector which resists both oil and water based stains.

HYDROPHILIC - "Water loving" - the part of a detergent molecule which has an affinity for water.

HYDROPHOBIC - "Water hating" - the part of a detergent molecule which has an affinity for oils.

MICROSPLITTER - Detergent free cleaning agent based on Sodium Tripolyphosphate (STPP).

OXIDISING AGENT - A chemical capable of removing or changing colours by adding an oxygen atom to the dye substance - e.g. Hydrogen Peroxide.

PATHOGEN - An infective agent which can cause disease including bacteria viruses and fungi.

PEROXIDE - An oxidising agent used for bleaching processes, typically Hydrogen Peroxide.

POLYMER - High molecular weight compound formed by linking large numbers of smaller units (monomers) in to chains. Polymers used in fibre production include Nylon, Acrylic, Polyester, Polypropylene, etc. Commonly called plastic.

REDUCING AGENT - A chemical capable of removing or changing colours by removing an Oxygen atom from the dye substance - e.g. Sodium Hydrosulphite.

SURFACE TENSION - Molecular forces at the surface of a liquid which cause it to form a bead rather than spread as a film.

SURFACTANT - A Surface Active Agent, used to reduce surface tension, enhance wetting and aid emulsification.

SUSPENSION - A mixture of two liquids which would not normally mix (e.g. oil and water) by the formation of droplets of one liquid held within the other.

TAMPING - A method of agitating products into fibres without causing damage.

VOLATILE - A compound which evaporates or vaporises completely at ordinary temperatures on exposure to the air.

WETTING AGENT - A compound which reduces surface tension of a liquid.

We hope you enjoy the course, good luck with the exam.

NOTES

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