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GUILD OF CLEANERS AND LAUNDERERS

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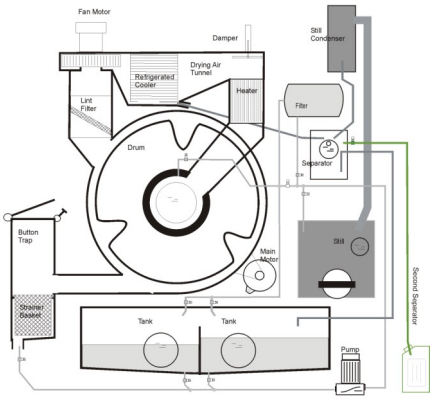
DRYCLEANING PROCESS SYSTEMS for Ⓟ and Ⓟ



Drycleaning procedures and systems can be varied to suit the requirements of the cleaner and many process variations are possible. There are however ***three*** commonly used processes or systems.

Straight solvent system

The articles are cleaned in solvent without the addition of water or detergent and preferably with continuous filtration.

Batch system

In this system the first part of the cleaning process is usually a wash over the filter. This initial stage is followed by a solvent dip to which is added a soap/water mixture or an emulsion. Most of the water is absorbed by the textiles, but to avoid the risk of water entering the base tank or the filter the dip is normally discharged to the still. The dip stage is often followed by a wash in filtered/distilled solvent.

Hybrid system

This is perhaps the most widely used cleaning system. In this system the base tank solvent is usually charged with between 2 - 5 g/ltr of detergent. The base tank charge is maintained by detergent additions based on the volume of distilled solvent. The first stage of the process is a dip which should be of short duration and is discharged to the still. This is followed by a second stage of continuous filtration during which distilled solvent from the previous load and detergent are added.

There are several ways in which dry cleaning detergents are used in the process:

Prespotting

The detergent, possibly blended with water, is applied directly to soiled or stained articles immediately prior to cleaning.

Batch system

The detergent concentration is not accurately controlled; additions of detergent (with water when required) are typically introduced during a solvent dip stage of the cleaning process, mixing with the dip solvent and the articles being cleaned.

Charge System

In this system there is a continuous flow of solvent containing a controlled percentage detergent (generally 1-4% on a volume basis). The moisture conditions are automatically controlled by a conductivity meter that measures the solvent relative humidity. Few charge systems are in use in the UK

Water

The presence of water in dry cleaning systems must be strictly controlled. Some textile fibres, in particular wool and silk are very sensitive to moisture during dry cleaning. In the case of free water, wool and silk can suffer serious damage. Water can be introduced a number of ways;

By solvent/soap mixtures or emulsions
From the garments
From the spotting reagents
By machine malfunctions

Provided that water is present in the form of a solution in the solvent it is generally safe. It is free water, or localised wet patches on garments due to incomplete drying out of spotting chemicals, that causes damage. It should also be remembered that garments may be wet when they are brought in for cleaning. The presence of free water is often indicated by cloudy solvent.

UNDERSTANDING THE MEANING OF Ⓟ ***and*** Ⓟ

It is not unusual to find that even experienced cleaners, are often unaware of the correct process structures and the modifications to the cleaning cycle in respect of Ⓟ **and** Ⓟ

A bar below the circle indicates that there are certain limitations on the process which may be used. These limitations relate to any or a combination of :

The addition of water
The restriction of mechanical action
Maximum drying temperature

The precise nature of the restriction is not always indicated and this is where the skill of the cleaner and additional information, such as the fibre content label, come in to play.

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Addition of water At a maximum this should never exceed 2% on the weight of the load. This particularly applies to the use of water on wool and wool mixture fabrics.

Mechanical action
The length of the process influences the degree of mechanical action. It may be necessary to limit the mechanical action because the article is made from delicate fabric, such as lace and in such cases the bar indicates the need for a short process (perhaps with the articles placed in a net bag). If the article has been made from soft open structured wool fabric then the bar indicates restrictions both on the addition of water and reduced mechanical action.

Drying temperature

In the standard tests which are carried out to assess drycleanability, the normal drying temperature for Ⓟ is set to a maximum outlet air temperature of 60°C. If an article is unsuitable for drying at this temperature but is suitable if dried at a lower temperature, for example 40°C, then the correct after-care symbol must include the bar. This restriction on drying temperature is applicable only to heat-sensitive fibres.

QUALITY OF WORK

The key to improved quality standards is a wholehearted commitment on the part of the staff and good inspection systems throughout production. Garments should be thoroughly inspected at the following stages:

Inspection at the counter
Examination before cleaning
Examination after cleaning
Final inspection

DRYCLEANING PROCESSES

Normal fabrics Ⓟ

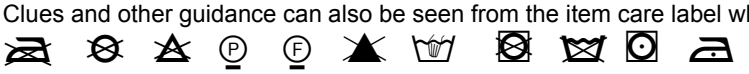
The normal dry cleaning process for robust garments involves cleaning in perchloroethylene for a period of at least 11 minutes with continuous rotation of the cage. Heavily soiled garments may require up to 15 minutes or more for adequate soil removal.
Additives such as detergents, water emulsions and water carriers may be added to improve dirt and stain removal. Water/soap solutions or emulsions are adjusted for the type of fibre and fabric. The outlet air temperature is restricted to a maximum of 60°C

Sensitive fabrics Ⓟ

Basically the process is similar to that used for normal fabrics. However moisture or water emulsions are not added to the solvent (or added only in a very restricted amounts). Cleaning times must be reduced to a maximum of 6 minutes and it is usual to underload the machine and where necessary protect garments with net bags. The outlet air temperature is normally restricted to a maximum of 50°C
This process is used for the following types of fabrics:
Knitwear (including polyester and acrylic fibres)
Fur fabrics
Crepe fabrics
Sensitive fabrics with a foam backing
Open set loose spun wool fabric
Pure silk fabrics
Embossed fabrics
Blankets

Very sensitive fabrics
Characteristics of this process are the total exclusion of moisture, severe restrictions on mechanical action by using small loads and short process times and/or a stationary cage, and the omission of tumble drying. At the operators discretion outlet air temperatures may be reduced to around 40°C
This process is used for the following fabrics:
Knitted/woven angora goods
Novelty tweeds
Novelty silks
Chunky knits
Some wool Raschel fabrics
Fluffy open structure wool fabrics
Wool lace fabric
Sculptured velvets and 'furs'
Especially weak trims
Delicate bead decoration

Clues and other guidance can also be seen from the item care label which may have



Whites
In terms of greying, (the deposition of solubles and particulates) whites have always been a problem in solvent drycleaning. From the outset the cleaner must understand that even the best and most effective process structure will still result in a small but ***measurable*** amount of re-deposition on white loads. These small amounts of re-deposition will build up over a number of cleaning cycles until the discolouration eventually becomes noticeable. Bearing this in mind it is imperative the drycleaner uses clean solvent and the correct process structure for white garments. Furthermore even very small quantities of free water in the system can lead to an increased risk of ***noticeable*** greying.
Modern drycleaning detergents are still not capable of suspending effectively all the particulate soil released during a drycleaning process. It is therefore critical that particulates are removed very quickly from the vicinity of the garments in the first 3 – 4 minutes of the cleaning cycle when the vast majority of particulate soiling is

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released. This can only be achieved by starting the process with a wash over the filter. The filter wash should be followed by a rinse in distilled solvent. ***It is critical that for the first stage of the process the filter is producing crystal clear solvent at a good flow rate, before the filtered solvent is introduced into the cage.***

The following process structure is appropriate for ***robust*** white loads.

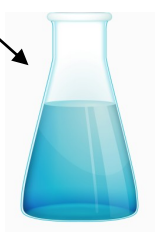
6 min filter wash, ***low dip*** using base tank solvent (solvent must be no more than a very light straw colour)
1 ½ min drain and extract to still,
3 min rinse in distilled solvent, drain and extract to base tank.
Dry at a maximum outlet air temperature of 60°c

The above process structure will need to be adjusted for sensitive white loads.

Many cleaners still clean whites in a single bath of distilled solvent without filtration. This type of process is often responsible for heavy greying on whites as the following analogy clearly illustrates.

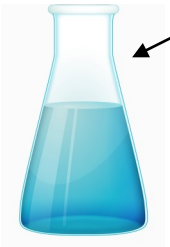
If a piece of fabric containing 100gms of oily and particulate soiling is cleaned in 1 litre of solvent

100 gms of oily soil and particulate soiling released into 1 litre of solvent



If 200mls of solvent is retained by the fabric after high speed extract
The soil concentration on the fabric is $\frac{1000}{200} = 5$

Therefore the soil left on fabric is $\frac{100}{5}$ = 20grms of soil



If two pieces of fabric are cleaned one with 100gms soiling the other with 10gms

100 gms of oily particulate soil + 10 grms released into the solvent

The fabric soiled with 10 gms will pick up 12 gms
Total soiling on each piece of fabric
$\frac{1000}{200} = 5$

Therefore soil left on each piece of fabric = $\frac{110}{5}$ = 22 grms of soil

It will be clear from the above that any relatively clean white garments in a load may actually end up with more soiling on them if they are cleaned in a single bath of distilled solvent and without filtration

PERCHLOROETHYLENE MACHINE PROGRAMMES

Outline process structures.

The following are suggested guidelines for programming perchloroethylene machines. These process structures will produce a very high standard of cleaning provided that drycleaning machines are well maintained and are operated by competent professionally trained staff.

While these programmes will be suitable for most machines they may need to be adjusted for specific machine types.

Process 1

Normal Work. Ⓟ Darks, Mediums, Medium/Lights

1. 3½ min circulating dip* from the BT. Drop to still followed by ½ min extract.
2. 8 min filter wash from DT + soap. Drop to BT followed by 2½ min extract. Dry at 60ºC

Process 2

Sensitive Garments Ⓟ Darks, Mediums, Medium/Lights

1. 2 min circulating dip* from the BT. Drop to still followed by ½ min extract.
2. 5 min filter wash from DT + soap. Drop to BT followed by 2½ min extract. Dry at 50ºC

Process 3

Whites Ⓟ or Ⓟ

The BT solvent must be in good condition – a very light straw colour is quite acceptable.

1. 6 min filter wash from the BT. Drop to still followed by ½ min extract.
2. 2 min circulating dip from DT + soap. Drop to BT followed by 2½ min extract. Dry at 50ºC

Note - on this process it is critical that where a pre-coat circuit is employed it is vital that the filter is producing crystal clear solvent before solvent is introduced into the cage.

Process 4.

Household. Ⓟ

1. 3½ min circulating dip* from the BT. Drop to still followed by ½ min extract.
2. 8 min filter wash from DT + soap. Drop to BT followed by 2½ min extract. Dry at 60ºC

Process 5.

Household. Ⓟ --- Dralon

1. 3½ min circulating dip* from the BT. Drop to still followed by ½ min extract.
2. 8 min filter wash from DT + soap. Drop to BT followed by 2½ min extract. Ideally dry at 40ºC and certainly no more than 45ºC.

Remove items from the cage immediately the cage stops rotating at the end of drying.

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Process 6.
Colour Bleeds

1. 7 min high circulating dip from the BT. Drop to still followed by 2½ min extract. Dry at 60ºC for Ⓟ and 50ºC for Ⓟ

The above programme structures are also recommended for hydrocarbon solvents. However, for optimum cleaning standards the cleaning times will need to be extended. As a guide, for heavily soiled garments labelled f lt is recommended that the cleaning time (the time garments are tumbled in a dip or flow of solvent) is extended to between 15 – 20 minutes.

* **Solvent Condition**

If the solvent is to be maintained in good condition, the filter must be working efficiently and the volume of solvent that is distilled must be sufficient to maintain soluble contaminants at an acceptable level. As a guide to the latter point extensive research has clearly shown that **a minimum of 2.5 litres** of solvent should be distilled **per kilogram** of work processed when cleaning with perchloroethylene.

The volume of solvent in the first stage of processes 1,2,4 and 5 should therefore be calculated to ensure this minimum requirement.

The quantity of detergent used in the second stage of a process should be based on the volume of solvent in the first stage circulating dip. For most products this will usually be between 3 – 5mls per litre.

Application of Textile Finishes

The main types of product available are :

Retexturing

The application of finishes which impart special properties to the fabric :

to compensate for undesirable changes in handle resulting from wear and/or loss of the stiffening effects of soils or finishes in cleaning to achieve a more satisfactory appearance after pressing

may also be used to impart special properties ie. Improved water or stain repellency.

Types of chemical used:

- Resins
- Waxes
- Plastic polymer eg. Polyvinyl acetate
- Fluorochemicals
- Softening agents eg. Cationics

Reproofing

The application of a water repellent agent:. This is commonly known as reproofing. However it should be clearly understood that the process ***does not impart a waterproof finish*** to textiles

The objective is to restore the high degree of water repellence which is the normal property of the new rainwear and which may have been lost as the result of wear or cleaning.

Types of chemical used:

- Wax/metallic salts
- Silicones
- Fluorochemicals

Softeners

The application of a reagent to impart a softer 'handle' to fabrics. These products also help to reduce static.

Note – Fabric softeners should not be used on fabrics with a flame retard finish.

Fabric softeners are normally substantive and can considerably increase the flammability of finishes such as 'Proban'

Types of chemical used:

- Cationic
- Anionic

These reagents are often incorporated into the retexturing compounds to improve fabric finish and drape.

Methods of application:

- Impregnation (ie. Standing bath)
- Substantive retexturing
- Spray techniques