Guidelines for screenprinting

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Storage and conditioning of material prior to printing

FasCal materials should be left in the original packaging and stored under conditions that are similar to those in the print shop. Self-adhesive films are supplied in rolls and sheets: in general, rolls are well protected aginst outside influences during storage once sored in the original packagig. Sheets can be supplied either in boxes or bulk (stack of sheets on a pallet). As self-adhesive films are flexible (as required for their use), prolongued storage under high pressure at relatively high temperatures may leave impression marks from the liner or pallets. Therefore, we recommend to:

- store preferably at moderate temperatures (18-23 °C) or even slightly lower. Storage is also possible at a min temp of + 5 °C, but requires longer conditioning of the film prior to printing. It is recommended that storage temperatures do not exceed 25 °C.
- do not stack pallets on top of each other
- the the oldest availbale material in stock with priority (First in – First out)

The shelflife of the film starts at the date of invoicing.

If the conditions in the store are different to those in the print room, it is of utmost importance that the sheets or rolls ***are left in the original packaging*** until they adjust to the print room temperature. Failure to do so may result in deformation of the edges, which in turn creates difficulties in sheet feeding.

The following table indicates the **minimum time in hours** required to condition material to print room temperature:

Number of sheets the stack	Temperature difference in store/print room 5 °C	10 °C	15 °C
250	3	6	10
1500	4	9	15

If stacks of sheets need to be left overnight between colour runs or prior to die cutting, we recommend that the sheets are once again wrapped in a moisture protective film. This will prevent moisture exchange during the night. In case of a significant drop in overnight temperature, the sheets may need some extra conditioning time in the morning before removing the wrapping.

Graphics Division
Rijndijk 86, P.O. Box 118
2394 ZG Hazerswoude – The Netherlands
Tel +31 71 3421500 – Fax +31 71 3421538

TECHNICAL BULLETIN 2.1

Edgewaving
Edgewaving or wavy edges may become apparent on self-adhesive materials oncesheets are cut from a roll or once a stack of sheets is stored or prior to be converted. In case of strong profiled waves at the edges of sheets, conversion becomes difficult as sheets may be:

- difficult or impossible to lay flat on vacume tables, both in screenprinting and signcutting
- difficult to position against register studs,
- difficult to run on automatic presses as the grippers may miss (part of) the sheets

Explanation
In most cases, edgewaving is caused by moisture pick-up of rolls or sheets that are **cooler than the air** that surrounds them. The liner at the edges of the roll/sheet absorb moisture that condensates to the sheets: as a result the liner expands **at the edges only.** This expansion causes a deformation of the edges that is realised under pressure of a stack of sheets or under the winding tension of a roll and is therefore almost a permanent deformation, which is difficult if not impossible to revert.
That's why, edge waving must be prevented.

Prevention:
Measures to be taken:

- always store material in original (moisture protective packaging)
- do not open packaging prior to balance the temperature of the rolls with ambient air.
- do not leave rolls or sheets in a room that may cool down at night under e.g. 15 °C or in a room which is heated up.

Slight edge waving can sometimes be reduced or even taken away by overnight exposure of the sheets in racks: this will balance the moisture content over the whole surface area.

Guillotine cutting of sheets from rolls:
If sheets have to be cut from a roll, the roll must be stored and conditioned as recommended. Leave the material in the original packaging until the temperature of the material on the roll is the same as the temperature in the print room. This will prevent uncontrolled moisture pick-up at the edges of the roll and/or sheets so edgewaving cannot occur.

Sheets cut from a roll should always be cut in the **same direction**. The best procedure is to cut the longest sheet edge parallel to the roll edge. This will reduce or eliminate register differences.

Material should preferably be guillotined at **temperatures** lower than 25 °C. Use a clean, sharp and undamaged knife blade that makes an angle of 18-20 °.

Try to limit the **use of silicone** as much as possible: never spray it directly onto the blade as it may 'travel' through the print room. Keeping the blade clean will prevent adhesive build-up on the blade, which may transfer to the subsequent stack edges.

The **bar pressure** should be adjusted to 2-2.4 kg/cm or 200-240 kPa.

Before cutting:

- clean the cutting bed, using a mild solvent.
- make sure that there is no adhesive residue on the blade (adhesive residuescan be wiped away with a mild solvent)

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Do not cut **stacks higher than 5 cm**: higher stacks may need higher bar pressure, which in turn may squeeze the adhesive out. If the bar pressure cannot besufficiently adjusted, put one or two sheets of chipboard beneath and on top of the stack to absorb excess pressure.

Print register

Good print register is of utmost importance for the final result. It is mainly influenced by the drying temperature and related air humidity. Avery films have been manufactured to be in balance at a temperature of 20-23 °C, relative humidity of 50-55 %. Oven drying will always, to a certain extent, reduce the humidity of the liner. In most cases this does not have an influence on the dimensions of the sheet and hence the print register. Excessive heating of the printed sheets has to be avoided. Generally, drying temperatures of 40-50 °C will dry the inks sufficiently so that the sheets can be stacked. In cases that retarding solvents have to be used, we recommend to dry the sheets in racks rather than increase the drying tunnel temperature to a too high level.

If sheets have released moisture and, as a consequence, have reduced size, a brief exposure to ambient conditions will often bring the sheets back to their normal size.

For ***exact*** print registration, e.g. for four colour half tone printing, we recommend that sheets are passed once through the press and drying oven without printing. This will stabilise the sheet and improve register.

If this first colour is not immediately followed by the second one, wrap the stack of sheets in moisture protective material. If there are long delays between individual colour runs, cover the stack to avoid moisture exchange which may result in sheet shrinkage or expansion. Avoid extreme drops in overnight temperature in areas where the sheets are stored.

Printing

Screen ink selection:

We recommend to select screenprinting inks that are recommended by the ink anufacturers for use on self-adhesive films. Please make sure, that inks are used

that match the performance of the films in terms of durability, flexibility etc. Always follow the instructions of the screen ink manufacturers. In case of doubt whether the performance of the printed film meets the end user requirements, please contact

Avery Dennison Technical Support Dept. or your screen ink supplier.

Ink drying:

For multicolour jobs we recommend to print with sufficient time between the colours so that the ink can properly dry. Temperature settings in the drying ovens have to be adjusted in line with the instructions of the ink supplier.

If the drying temperature in the oven is too high, the ink may:

- form a “skin” that prevents a good thinner evaporation from the printed ink
- dry too quickly, which in some cases may reduce a good ink key.

Only print a next layer of ink or a varnish if the preceeding layer of ink is sufficiently dry. Solvents that are “trapped” in the film+ adhesive may render negative effects on the performance of the film.

Too slow drying of inks, may cause too much solvents to penetrate into the film and the adhesive. High solvent retention in the film will cause an acceleration of plasticiser migration, which will make the film shrink and behave more brittle. It will also reduce the initial adhesion level. Well dried inks do not suffer from these negative effects. It is therefore recommended to use retarding solvents only if strictly necessary (at high ambient temperatures) while never exceeding the maximum amount that is recommended by the screen ink manufacturer.

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TECHNICAL BULLETIN 2.1

Screenprinting of Avery® 6551 Perforated Window Film

At screenprinting of Avery 6551 Perforated Window Film, ink transfer from the screen to the film is only taking place to the non-perforated film area. Therefore, ink may accumulate at the bottom of the screen, which in turn may result in uncontrolled ink transfer. To prevent this, we recommend to print a paper slip

sheet with regular intervals, to take this excess of ink away. The frequency of slip sheet printing needs to be established at each job, as it will depend on factors such as ink viscosity, screen mesh, squeegee pressure etc.

Film + ink

Screenprinted films are composed out of 2 different layers, that may influence each others properties. By carefully selecting the inks and following the screenprinting instructions, the required properties can indeed be realised in the
printed film. If the inks and the films are not 100 % compatible, some negative effects may become apparent. We would like to list some of them so that you may be able to recognise the things that may happen. It will help you to take corrective action whenever necessary.

1. Edge curl: may become apparent when the film is on the liner or when applied.
Generally, this is a result of an ink that is not as flexible as the film and that has been printed to the very edge of the decal. Combined with the presence of solvent in the decal, the ink layer continues to dry, while solvents continue to evaporate. This will cause the ink film to contract, which in turn will cause the edges to curl upwards.

There are several measures that can help to prevent edge curl:
Solvent inks:

A. Choose a more flexible ink
B. Improve the ink drying before diecutting the decals.
C. Make sure ink solvents have evaporated completely before application of the decal to a substrate.
D. Allow for an unprinted edge on the decal if the print design allows to do that.

UV inks:

A. Make sure that you have cured the inks for 100 %, prior to diecutting
B. Apply printed decals only if well dried: aftercure by sun radiation may promote edge curl.

2. Reduced adhesion level: most screenprinted self-adhesive films will show a slightly reduced adhesion level in the first period after printing. Generally, the adhesion level will become normal after the thinners have evaporated form the film. Extreme use of slow drying thinnners may damage the adhesion level permanently, while they also will render the film brittle as a result of accelerated plasticiser migration.

3. Increased adhesion level of removable adhesives: After extreme use of retarders, removable adhesives may show a significantly higher adhesion level that will make removal more difficult. Only use retarding solvents if necessary and never more than recommended by your screen ink supplier.

4. Film brittleness: Films, that are flexible by design may behave more brittle once printed with harder inks or varnishes. Especially UV inks and varnishes have to be selected carefully to prevent an embrittlement of the printed decal.

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