TECHNICAL C&A INFORMATION

COATINGS & ADHESIVES CORPORATION

Waterbased Softfeel Coating - Considerations v1.0

As a specialty product, Waterbased Softfeel coatings are subject to considerations/limitations which should be carefully followed to determine if they fit the intended application and that the desired results are achievable. It is advised to read and follow the below guidelines for successful use and results. Testing in advance to determine the correct combination of materials along with the intended print/application process is recommended when using a specialty coating product such as Softfeel to verify compatibility and results. In the event that the conditions for use fall outside of the below guidelines, please contact Coatings and Adhesives Corporation to confirm that Waterbased Softfeel coating is a suitable product for use in the desired application.

Softfeel Coating - Application Considerations

Applications/Uses

Due to the wide-spread appeal for the 'soft', velvety and smooth tactile aesthetic, the application of Softfeel coating has expanded to include printed-pieces where special care may be required during printing, finishing, storage and end-use:

- Folding-cartons
- Pocket-folders
- Book Covers
- Labels
- General commercial work including brochures, flyers, inserts, post-cards that are processed through mail service
- POP Displays
- Printed-pieces requiring long-term storage

Softfeel coating is suitable for use in most applications, however, a thorough understanding of the durability requirements of the printed-piece through production, storage and end-use should always be taken into consideration. While Softfeel coating can exhibit the same positive benefits of typical waterbased coating products in terms of creating a protective and non-yellowing film, it remains a specialty coating product with documented limitations that should always be accounted for in job planning/ preparation and execution.

Coat-Weight

A coat-weight of **1.0-1.5 dry lb/3000 ft^2** is recommended to achieve the desired 'soft' tactile feel and uniform coverage/appearance. Depending on the substrate, inks/ink coverage, application method and expectations, multiple-passes of Softfeel coating may be required to achieve the desired results for appearance and tactile feel.

Anilox Engraving Recommedation

While there are several anilox engraving patterns/types available, hexagonal engraving has proven to provide suitable results for Softfeel coating application. The below engraving range is recommended for use with Softfeel coating:

- 10-13 bcm / 150-180 lpi / 60° / hexagonal engraving

Blanket Material

Rubber blanket material has proven better for Softfeel coating application compared to polymer materials. Additionally, the use of a polyester-base coating-plate has experienced better results compared to a fabric-back coating-blanket for providing a uniform appearance of the Softfeel film. The below coating-blanket/ plate has generally proved successful when used with Softfeel coatings:

- *Bottcher BT1001*

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Softfeel Coating - Application Considerations - *continued*

Substrates	While Softfeel coating has compatibility across a broad-range of substrate types, experience has proven that dull/matte coated papers provide the best surface to optimize the lay/appearance and 'soft' tactile feel. Softfeel coating has proven compatible with synthetic substrates such as Yupo, however, preliminary testing is recommended to verify compatibility with the specific stock.
Ink	The below considerations for ink selection should be accounted for when using Softfeel coating: - Avoid using Softfeel coating in-line over printed areas of heavy/saturated ink films such as metallic inks, low pigment special colors, 'rich' black process builds or process inks run at abnormally high densities. Inks that require large amounts of fountain solution can create an unstable ink/dampening emulsion which can contribute to uneven transfer/coverage of Softfeel coating. In these cases, a 'primer' coating should be applied in-line over inks and Softfeel coating should be applied in a dry-trap application to achieve the best results. - When running two-sided work, make certain the ink/coating films from the first-side printing are completely dry/cured before turning the sheets and proceeding with printing/coating the second-side. - When using Softfeel coating over cured Hybrid-UV/UV inks, test and qualify that the inks do not contain silicone or non-imprintable waxes that can contribute to adhesion failure. Inks that contain silicone or high-levels of micronized, low molecular weight waxes will not gain or improve adhesion of Softfeel coating if the sheets are run under the UV lamps on a second-pass. - When Softfeel coating will be applied over Hybrid-UV or UV inks, it is important that the Softfeel film adhesion is tested and qualified prior to producing live-jobs. As individual ink colors can have varying degrees of adhesion capabilities when Softfeel coating is applied, each individual ink color should be tested for Softfeel adhesion; this includes process ink colors as process image ink coverage/ separations and ink sequence/rotation can vary. - Adhesion can be an issue when using Softfeel coating over digital ink/toner or dry-trapping over offset inks. Testing adhesion in each application is recommended to verify results. - The use of wax/silicone-free coatable inks are recommended when dry-trapping Softfeel coating.
Primer Coating	In instances when heavy/saturated ink films are unavoidable, gas/chemical ghosting is a strong possibility, or adhesion is a concern, it is recommended to use a primer coating prior to Softfeel coating application. CAC satin waterbased coating products such as 1428 and 1365 are suitable primer coatings for use with Softfeel coating, but this should be tested and qualified through your system prior to full production to account for all other process variables.
Press-Load/Pile Temperature	Care should be taken not to create excessive press-load temperatures when using Softfeel coating. Excessive press-load temperature, particularly when coating the second-side, can result in blocking of printed/coated sheets. Short press-loads or tiering of press-loads is recommended as not to create excessive weight of the pile. Captive pile-temperature measured in the sheet-center of the press-load should not exceed 95°F. Use of spray-powder can help effectively ventilate the pile and discharge heat.
Captive v Pull-sheets	Sheets that are left captive in the press-load for several minutes will generally have a better coating-film appearance compared to sheets that are immediately pulled from the press-delivery due to premature setting of the softfeel film on pull-sheets. Continued flow-out of the softfeel coating-film on captive sheets in the press-load can provide improved visual results and should be used to gauge actual results.
Rub Resistance	Rub resistence should be carefully tested and qualified prior to full production, particularly when using Softfeel coating on carton applications or applications in which the printed product will encounter significant handling and/or face-face movement and friction. All post-press applications/ processes should be taken into consideration as manual and/or mechanical handling, particularly through finishing equipment, can create polishing/burnishing of the Softfeel coating surface. Contact with belts, rollers,

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Softfeel Coating - Application Considerations - *continued*

Rub Resistance *(continued)*	suckers and other moving and non-moving mechanical parts can create an undesirable 'mark' on the Softfeel coating surface resulting in quality-issues. Care should be taken in the mechanical set-up of all equipment surfaces used in processing printed-pieces using Softfeel coating.
Additional Surface Applications	Softfeel coating can accept additional surface applications such as UV coating, foil-stamping and film-lamination if the Softfeel coating and any beneath ink/primer coating layers are fully dry/cured. In the event that any ink/coating films are not fully dry/cured, poor adhesion of any additional surface application may be the result. When using UV inks, verify that the Softfeel coating film has positive adhesion to the beneath cured ink layers if the additional surface application will be applied over areas of both ink/coating; lack of adhesion between the Softfeel coating film and beneath cured UV ink layers can result in poor adhesion after the additional surface application is applied. Due to the material and process variables of additional surface applications, testing is recommended to verify compatibility with Softfeel coating.
Ghosting	As a dull coating, Softfeel is susceptible to gas/chemical ghosting; precautions similar to running varnishes should be followed to prevent a ghosting occurrence. Below are some recommendations to follow in instances where ghosting is believed to have potential: - When using Softfeel coating on two-sided jobs, make certain the ink/coating films are dry/cured completely on the first-side before printing the ink/coating on the second-side. On two-sided jobs, if both-sides of the sheet are drying simultaneously in a stack/pile, ghosting can occur in the Softfeel coating film areas. Produce the first-side completely prior to producing the second-side. - Avoid running spot-UV coating over Softfeel on two-sided jobs, particularly when dark solid ink areas are involved. The result can be ghosting if the Softfeel coating film and ink films are not completely dry/cured prior to spot-UV coating application. - Avoid using absorbent stocks that can retain moisture/solvents that can continue to 'gas' over-time; high hold-out stocks would be recommended as a preventative measure. - Avoid using inks containing high concentrations of drying-oils. - Run small press-loads/lifts and monitor pile-temp as not to over-heat. Do not allow sheets to sit captive for and extended period; handle/wind sheets to ventilate immediately after second-side printing/coating.
Handling/Storage Printed Materials	Softfeel coating is a specialty product with the final dried film being softer and exhibiting a higher COF compared to general-use waterbased coating products. Therefore, printed-pieces using Softfeel coating should be handled more cautiously than those produced using general-use coatings, with consideration that they are formulated for a specific tactile 'feel' that is achieved by creating a soft, low-slip dried film. - After printing, despite the Softfeel coating film being dry, consideration should always be given to the condition of under-lying ink films that may remain set but not fully dry/cured. In this case, these ink films may require days or weeks to fully oxidize depending on variables in the materials and printing process. Jobs which require heavy ink-coverage, high/saturated ink-density, slow drying ink or ink/fountain solution combinations, poor drying system condition or operation, substrates which contribute to slow ink drying or ambient conditions that are not favorable for ink drying can impact the oxidative drying process of lithographic inks. In cases where the beneath ink films are not fully dry/cured prior to additional printing, finishing, packaging, transport or storage processes, quality-issues related to ink-condition can occur. - To ensure the most positive results, Softfeel printed/coated sheets should be completely dry prior to finishing, packaging, transport and/or long-term storage. - When using Softfeel coating, care should be used during finishing processes to avoid creating quality-issues such as scratching, scuffing, marring or ink/coating removal/transfer.

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Softfeel Coating - Application Considerations - *continued*

Handling/Storage Printed Materials *(continued)*

- Care should always be taken in ensuring that Softfeel coated-pieces are completely dry for ink/coating films prior to packaging for transport. Packaging Softfeel coated-pieces prior to the ink/coating films being fully dry/cured can result in blocking, sticking, clinging, ink-transfer/set-off or scatching/burnishing. Packaging methods should be determined for shipping and storage keeping in mind that the ambient conditions for temperature/humidity can have a negative consequence to the Softfeel coated-pieces.

Packaging considerations that can directly impact the results during transit/storage:

- Shrink-wrap selection which can trap moisture/humidity; perforated vs non-perforated
- Packaging too loosely which can result in in-transit movement/friction
- Packaging too tightly to not accommodate for material expansion due to changes in ambient conditions
- Packaging too tightly creating uneven pressure-distribution/pressure-points on printed-pieces
- Not 'nesting' pieces to most effectively and evenly distribute weight/pressure
- Binding exterior of packaging tightly creating excessive or un-even pressure on contained printed-pieces

Softfeel Printed/Coated Materials - Recommended Storage Conditions

- Temperature not to exceed 100°F for fully dried ink/coating films; recommended 65-80°F
- Humidity not to exceed 75%RH; recommended 35-55%
- Pressure not to exceed 4 PSI

**The above values are recommended guidelines after verifying that the ink and Softfeel coating used were properly dried and process controls and shipping conditions have been explored and identified to safe-guard the product longevity.*

Catalyst 1740 (Aziridine Cross-linker)

The addition of Catalyst 1740(Aziridine Cross-linker) to Softfeel coating immediately prior to use can benefit the dried film by imparting additional rub/block resistance. As C&A has a number of Softfeel coating products available, some products will benefit more from the addition of 1740 than others. It is recommended to use 1740 with Softfeel coating in the following circumstances:

- Two-sided printing/coating
- Heavy/saturated ink-film areas created by process ink builds and/or special ink colors
- Jobs requiring manual and/or mechanical handling/finishing which can result in scratching/burnishing of the Softfeel film
- Jobs which require additional surface applications involving heat and/or pressure
- Jobs which require additional surface applications such as UV coating, film/foil application
- Packaging/folding-carton pieces
- Products which require heavy end-user handling; example: pocket-folder
- Products which are prone to in-transit friction/abuse during transport
- Jobs which require long-term storage, particularly in non-climatized conditions for temperature/humidity or transport/storage in/through areas of extreme temperature/humidity
- Jobs which require short or long-term storage in conditions >100°F and up to 120°F. Printed/coated jobs stored in conditions >100°F without the use of Catalyst 1740 will be prone to blocking/sticking. The use of Catalyst 1740 with Softfeel coating can promote block resistence in temperatures up to 120°F.

Softfeel Printed/Coated Materials **WITH CATALYST 1740** - Recommended Storage Conditions

- Temperature not to exceed 120°F for fully dried ink/coating films; recommended 65-80°F
- Humidity not to exceed 75%RH; recommended 35-55%
- Pressure not to exceed 4 PSI

**The above values are recommended guidelines after verifying that the ink and Softfeel coating used were properly dried and process controls and shipping conditions have been explored and identified to safe-guard the product longevity.*

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Softfeel Coating - Application Considerations - *continued*

Catalyst 1740 (Aziridine Cross-linker) - Handling/ Safety Precautions

The use of Personal Protection Equipment(PPE) is recommended to prevent Catalyst 1740 contact with eyes, skin or clothing during handling/use. Protective safety glasses, chemical-resistant gloves, chemical-resistant smocks/aprons/footwear are recommended to prevent contact with the eyes/skin during handling/use. For more specific details regarding Catalyst 1740 safety and handling, please reference the product SDS with emphasis on the below sections prior to handling/use:

- Section 4: First Aid Measures
- Section 7: Handling and Storage
- Section 8: Exposure Controls/Personal Protection

Catalyst 1740 (Aziridine Cross-linker) - Addition/ Use Instructions

Use the following instructions for the additions of Catalyst 1740 to Waterbased Softfeel coating:

- Catalyst 1740 is typically added at a dosage of 1.0 - 2.0% by weight
- Determine how much coating will be used for the job and calculate the amount of Catalyst 1740 by weight; the pot-life of Catalyst 1740 once added to Softfeel coating is short, so it is recommended to not catalyze more coating than can be consumed in 8-hours. In the event that only a small amount of Softfeel coating is required for the job, it may be necessary to decant coating from a larger drum into a 5 gallon pail or empty drum, depending on the coating amount that will be required for a job. Try to minimize coating waste by only catalyzing the necessary amount for the job.
- Mixing Catalyst 1740 in a ratio of 1:1 with water prior to adding to the coating will improve the mixing process. Always mix Catalyst 1740 with the coating product thoroughly prior to use. When mixing into a drum, a drum-mixer should be used to ensure proper and adequate blending. For smaller containers such as pails, a drill with mixing-blade attachment is recommended. Paddles/sticks are not considered adequate for proper mixing/blending of Catalyst 1740 into the coating. Catalyst 1740 is a viscous material; prior dilution in water will lower the viscosity and avoid the material from settling to the bottom of the coating drum/pail creating gelled balls to occur if not adequately mixed.
- Coating that has been mixed with Catalyst 1740 should have continuous agitation.
- On long runs when a large quantity of coating and Catalyst 1740 has been blended, skinning or dried clumps can develop. It is suggested that an in-line filter be used when pumping from the drum/pail into the coating circuit to prevent contamination.
- Upon aging, the Catalyst 1740 that has been blended into the coating will loose its effectiveness and can react like a plasticizer and diminish the rub resistence of the dried coating film. *Additional Catalyst 1740 CANNOT be added to coating that has been previously blended with Catalyst 1740 as this can create poor rub resistence of the dried film.*
- Any catalyzed Softfeel coating that has not been used should be diluted by adding to fresh coating that has not had Catalyst 1740 added. Otherwise, the unused coating that has been previously catalyzed should be discarded.

Catalyst 1740 (Aziridine Cross-linker) - Press Use

1740 will result in increased film hardness and chemical resistance of the Softfeel coating film once the coating film has dried. Due to this, cleaning can be more difficult if the coating is allowed to dry in the coating system and on the coating blanket/plate. The following should be performed when using 1740:

- Clean the coating blanket/plate immediately after job completion or prior to extended down-time
- Do not allow coating rollers/anilox to stop for extended periods
- Clean the coating system completely immediately after job completion
- Use an in-line filter on the feed-side of the coating pump to avoid contamination of dried clumps that can develop in the coating container, particularly during long runs
- Coating with Catalyst 1740 should be constantly agitated during use
- When using anilox application systems, prolonged exposure to Softfeel coating with Catalyst 1740 can cause coating to dry within the anilox cells. On long runs that will require coating use over multiple shifts, it is recommended to stop periodically and clean the coating-circuit/anilox with warm water to

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Softfeel Coating - Application Considerations - *continued*

Catalyst 1740 (Aziridine Cross-linker) - Press Use *(continued)*

keep the anilox cells clean. Periodic cell cleaning with an anilox cleaner using an anilox brush can prevent cell contamination

- In cases where Softfeel coating with Catalyst 1740 has been used continuously for extended periods, it may be necessary to have the anilox roller professionally cleaned to remove dried coating and restore cell capacity/volume