

### General Information – Coating -Weight Test

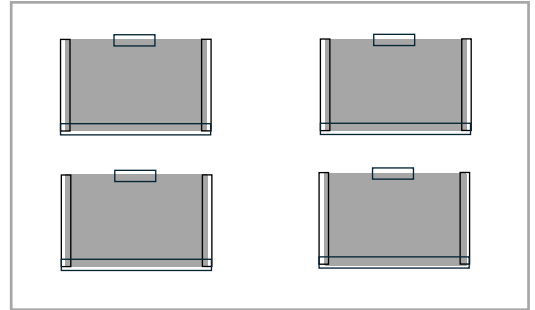
<p><b>Scope</b></p>	<ul style="list-style-type: none"> <li>- This test is used to calculate the amount of dry/cured coating being applied by the coating system using a specific coating product and all other process materials/settings/variables of the coating-unit.</li> <li>- Coating is applied to aluminum foil 'patches' for coat-weight measurement/calculation.</li> <li>- Test results for dry/cured coat-weight can be expressed as <b>dry lb/1000 ft<sup>2</sup></b> OR <b>dry lb/3000 ft<sup>2</sup></b> (most commonly used expression).</li> <li>- Coat-weight results can be used to correlate actual coating performance as a troubleshooting tool OR as a proactive means of tracking coating system conditional changes for variance/deviation.</li> <li>- This test is applicable for use with Waterbased and Energy-Cured coating products.</li> <li>- This test can be used on various types of press/coater equipment.</li> </ul>
<p><b>Test Instruments</b></p>	<ul style="list-style-type: none"> <li>- Aluminum foil roll – use foil rolls that are smooth, avoid using foil that has wrinkles/defects</li> <li>- Disposable gloves – powder-free</li> <li>- Tape – 3M Scotch 810 recommended</li> <li>- Measuring Tool – for regular testing, it is recommended to have precisely sized templates created that can be traced with a cutting tool</li> <li>- Cutting Tools – exact sized samples need to be cut for testing</li> <li>- Analytical Balance – covered/closed scale calibrated and capable of measuring 0.0001g</li> </ul>
<p><b>Testing Considerations</b></p>	<ul style="list-style-type: none"> <li>- Coating is pre-mixed thoroughly prior to testing – viscosity is measured and determined to be compliant per product TDS</li> <li>- No ink/varnish is applied to the foil patches during testing – printing blankets are cleaned prior to testing</li> <li>- No spray powder is applied to the foil patches during testing</li> <li>- Proper drying/curing is used during testing – coating must be fully dry/cured prior to measurement</li> <li>- Test is conducted at a typical press production speed for accuracy – transfer characteristics of the coating system can change based on press speed/interface dwell</li> </ul>
<p><b>Testing Procedure</b></p>	<ol style="list-style-type: none"> <li>1) Determine the substrate to be used for the test:             <ul style="list-style-type: none"> <li>• Use a substrate size that allows for surveying the maximum length/width of the press/coating area.</li> <li>• Allocate enough substrate to allow for the press to reach a typical production speed prior to the foil test patches reaching the coating unit – press speed can influence the coat-weight results.</li> <li>• It is recommended to prepare and coat multiple foil test patches to create a large sample area for coat-weight testing – larger sample size/area can create a more accurate coat-weight result:                 <ul style="list-style-type: none"> <li>□ In sheeted applications, this may require preparing multiple sheets (2 – 3) with foil patches.</li> <li>□ In web applications, this may require affixing foil test patches to multiple places on the web.</li> <li>□ It is recommended to apply foil to the sheet/web to measure both OS and GS of the press – this can determine if coater settings are unparallel.</li> </ul> </li> </ul> </li> <li>2) Prepare foil patches for testing:             <ul style="list-style-type: none"> <li>• Use powder-free gloves when handling the aluminum foil to avoid contamination with skin-oils.</li> <li>• For each foil patch remove a wrinkle-free piece of aluminum foil from the roll that is 12x12" in dimension.</li> <li>• Fold over the foil piece in half with the 'shiny' side out to achieve a 6x12" folded test patch – avoid creating any wrinkles/creases in the foil patch.</li> <li>• Create enough folded foil test patches to survey multiple areas on OS and GS of press – for sheeted presses, create enough foil test patches to create 2 – 3 sheets (4 foil pieces/sheet).</li> </ul> </li> <li>3) Determine placement of foil patches on sheet or web:             <ul style="list-style-type: none"> <li>• For sheeted applications, mark the gripper edge of each test sheet to be used for foil patch placement.</li> <li>• Lay the folded foil patches out on each sheet considering the location of any double-sheet detectors at the feeder/infeed, and sheet travel monitors within the press that may become disrupted by the foil placement</li> </ul> </li> </ol>

and stop the press – most detectors/sensors are located in the center of the press/sheet area.

- Be cautious of sheet cleaning devices that may tear or wrinkle the foil patches and disable if needed.
- If a patterned coating plate/blanket is being used, align the foil patches in areas of most significant solid coating areas for measurement – use a previously coated sheet as a reference for foil placement.
- For web applications, find areas along the web path where the foil patches can be easily placed – allow enough web distance prior to the coating-unit for a reasonable press speed to be achieved prior to coating application.

4) Affix the foil patches to the substrate using tape:

- Keep in mind to use a thin tape so as not to smash the coating blanket/plate – 3M Scotch 810 tape is suitable for keeping the patch attached to the substrate surface.
- When attaching the folded foil patch, place the folded edge facing the gripper (sheetfed) or web direction.
- Tape securely across the entire folded/lead edge and outside edges of the foil patches – do not tape across the entire rear edge since the foil patch has been folded over and there can be air trapped between the foil surfaces that needs to escape as it passes through the blanket/impression nip.
- Secure the open/rear edge with tape by ‘tacking’ in the center – leave openings on either end of the tape to allow for air to escape to avoid wrinkling of the foil.



5) Prepare sheets or web for coating application:

- Insert foil affixed sheets into the feeder pile with 25 blank sheets on top to bring the press up to production speed prior to the foil sheets reaching the coating unit.
- If multiple foil test sheets are being used, separate each foil test sheet with 5 blank sheets.
- Leave 25 blank sheets beneath the bottom foil test sheet for continued feeding after the last foil test sheet has entered the press infeed – do not immediately stop the press after the last foil sheet has entered the press, run the additional 25 sheets after the final foil sheet.
- For web applications, locate areas along the web path furthest from the coating unit to apply the foil patches – this allows the web to reach production speed prior to the foil patches passing through the coating unit.

6) Conduct coat-weight test on press:

- Make certain that all printing blankets are clean and free of ink/varnish/powder.
- Make certain coating blanket/plate is clean.
- Make certain all printing units are ‘off’ – do not leave any printing units with impression ‘on’.
- Make certain the spray powder device is ‘off’.
- Coat all foil test sheets at a typical production speed with proper drying – do not reduce press speed until the final foil test sheet has cleared the coating-unit.
- Using Waterbased coating – DO NOT immediately remove the foil test sheets/patches from the delivery-pile or web as this may result in set-off/scuffing/scratching if the coating film is not sufficiently dry:
  - Removing any coating from the foil will invalidate the measurement results.
  - Allow foil test sheets to remain in the delivery-pile for >5 minutes before removing to ensure no defects in the applied coating film which may influence the results.
- When removing the foil patches from a web, it may be necessary to inch the press to an open position/ location of the web path to access the foil pieces.
  - A razor may be needed to cut the tape for foil piece removal to avoid damaging the foil or web – be careful not to wrinkle the foil pieces during removal from the web.

7) Document coat-weight samples for testing:

- Once the foil test sheets/patches have been removed, examine that there is even/complete coating coverage over the entire foil patches and that no voids/defects in the coating film exist.
- IF submitting to INXCAC for coat-weight measurement – document the following information to accompany the test sheets/patches:
  - Company
  - Date

- Coating product/batch number
- Coating temperature/viscosity
- Press manufacturer/model
- Press ID/Number (internally used identifier)
- Coater details – anilox engraving specifications if available

**Measurement/  
Calculation  
Procedure**

- If performing coat-weight measurements internally, access to an analytical balance with values extending to 0.0001g is required.
- Additionally, a sized template will be helpful for precise cutting of coated foil samples prior to measurement to ensure accurate and repeatable results – exact cutting of foil samples to size prior to measuring is imperative as small deviations in size can drastically affect the results when extrapolated out to 3000 ft<sup>2</sup>.
- When using Waterbased coating products, make certain that the coating film is completely dry on the foil patch prior to conducting coat-weight measurements:
  - Establish a process control procedure to ensure moisture removal/drying of the coating film:
    - Allow foil patches to age >24 hours by open air drying prior to measurement.
    - IF measuring immediately after creating foil patches – force-curing foil samples using a lab oven or hot-air drier with specific operational settings/time will ensure proper drying of foil patches prior to measurement.

**Foil Coat-Weight Calculation - Comparative Method**

- 1) Determine the measurement size based on available coating area on the foil samples, example 4x6":
  - It is recommended to create a precise sized die for tracing using a cutting tool.
  - When cutting foil from different areas of the sheet/web, make certain to keep organized/separate to compare different sheet/web areas for coat-weight results.
- 2) Cut each foil patch to the desired measurement size:
  - After cutting to size, separating the folded foil patch produces one piece with coating and a corresponding piece of the same size without coating.
  - Keep the respective coated/uncoated samples together for measurement to create a deviation between the samples.
  - When measuring multiple samples, it may be necessary to create a chart to document results for coat-weight calculations.
- 3) Separately weigh the coated foil piece and corresponding uncoated foil piece for each sample and document the weight results.
- 4) Subtract the uncoated foil weight result from the coated foil weight result for each patch to calculate the actual coat-weight for that sample area – this is the deviation between the coated/uncoated pieces.
- 5) Calculate the coat-weight in **g/in<sup>2</sup>** by dividing the actual coat-weight result (weight difference between coated and uncoated foil) by the foil piece area in in<sup>2</sup>.
- 6) Use the following formula to convert to lb/3000 ft<sup>2</sup>:  **$g/in^2 \times 144 \times 3000 / 453.6 = \text{dry lb}/3000 \text{ ft}^2$**