

B3106 Uniformity Testing Protocol

This is a dosimetry test that will assess the dose uniformity of an electron beam. Please read through the instructions thoroughly before opening the dosimetry packets. The dosimeters used for the test (GEX B3WINdose) are made of radiochromic film that is sensitive to UV light, temperature, humidity, and physical contaminants such as fingerprints. This protocol attempts to minimize the impact of these elements on the test, so please follow it carefully to achieve optimal results.

Materials

- **Dosimeters.** There are two 10-inch (250 mm) strips of dosimeters per package. Each strip consists of 10 dosimeters affixed 1 inch apart (25 mm) to a paperboard backing (Figure 1). Strips can be cut to accommodate different beams widths. For example, a 54-inch (1370-mm) wide beam would require 3 packages of dosimeters (five full 10-inch strips and one partial 4-inch strip).



Figure 1. An example dosimeter package and dosimeter strip.

- **Substrate/Web.** The web should be the full width of the beam. If not, the number of dosimeters used should be reduced to the web width. The use of scrap material may be preferred for this test.

- **Tape.** Any tape is acceptable as long as it securely adheres to the paperboard of the dosimeter strips and the chosen substrate.
- **Oven** (optional). The oven should be able to reach a temperature of 140°F (60°C).

Procedure

1. Clean any rollers or other parts of the web path with which the dosimeters may come in contact. The dosimeters are sensitive to physical contaminants such as inks, dyes, coatings, dirt, excessive dust, etc.
2. Thread the line with the selected substrate.
3. Set the electron beam to run at a dose of 3 Mrad (30 kGy). The voltage can be set at the typical setting for processing product. Speed selection is up to the user. Record the following parameters:
 - Web speed (ft/min or m/min, specify units in the record)
 - Beam current (mA)
 - Voltage (kV)
4. When the system is ready to run, open the dosimeter packaging (Figure 1). The dosimeters are sensitive to UV light, temperature, and humidity, so best practice is to limit the amount of time spent out of the foil packets. Save the foil packets to use for return shipment.
5. Unfold the dosimeter strips and secure to the web with the dosimeters facing up so they pass directly through the electron beam without obstruction (Figure 2). Avoid touching the dosimeters directly; instead handle the paperboard to which they are attached. Tape the leading and trailing edges of the paperboard down securely. If necessary, wind the web back onto the feed roller once the dosimeters are properly affixed to give enough material length that the line can come up to full speed before the dosimeters pass through the electron beam



Figure 2. Dosimeter strips securely taped to a paper web with the dosimeters facing upwards.

CAUTION! The dosimeter strips must be affixed securely to the material being processed to prevent possible damage to the foil and window of the electron beam processor and to ensure proper test results. Additionally, do not let the dosimeter strips hang off the sides of the web; they must be fully supported.

6. Mark the left edge (when facing toward the processor infeed) of the dosimeter strips with a pen or marker, labeling each strip sequentially (Figure 3). This labelling is important for understanding the orientation of the dosimeter strips when the dosimeters are read at PCT.



Figure 3. An example of how to number the dosimeter strips.

7. Run the test. If possible, have an operator at the HMI screen to confirm the full line speed and dose settings were reached before the dosimeters went through the beam.

8. Retrieve the dosimeter strips immediately after processing. The dosimeters should have turned a shade of pink (Figure 4). Remove the dosimeter strips from the web, taking care not to touch the dosimeters or allow any remaining tape to adhere to the dosimeters. Dosimeters should not remain on the web for any additional time to minimize light exposure.



Figure 4. Dosimeters should change color to a shade of pink after being exposed to the ebeam (though not necessarily to the exact shade in this photo).

9. (Optional). If possible, bake the dosimeters at 140°F (60°C) for 15 minutes. This bake sets the color change of the dosimeters. If it is not possible, please clearly label the dosimeters as 'not baked.'
10. Place the dosimeters strips back into the foil packets they came in. Include test settings from Step 3 in the return shipment. Label the return shipment: Dosimetry Test Materials / DO NOT X-RAY.
11. Send materials to: Attn: Customer Service Dept.
PCT Ebeam and Integration, LLC
8700 Hillandale Rd. Davenport, IA 52806