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Miraclon Shine LED and FLEXCEL NXC plates, FLEXCEL NX Thermal Imaging Layer-R—Obtaining and optimizing the main exposure times

Overview

Perform a main exposure test series on a Kodak FLEXCEL NXC plate of a specific caliper to determine the minimum, maximum, and optimum exposure times.

This method for obtaining and optimizing the main exposure times provides consistent, predictable, and repeatable results with FLEXCEL NXC plates.

Benefits of optimizing the main exposure

- Optimum image quality, holding the finest positive plate detail while keeping the reverses open
- Improved overall plate uniformity and press-run longevity
- Enhanced print quality for fine lines, screen tints, reverse text
- Consistent overall plate-floor appearance and uniformity

When should this test series be performed?

The sensitivity of photopolymer plates to UV light changes over time—therefore, perform this test at the following recommended times:

- Weekly
- (Always) For each new plate lot
- (Always) When installing new UV exposure lamps
- When changing to a different washout solution
- (Always) When changing the criteria for image quality or for the desired relief results

General notes about FLEXCEL plate exposure

- Exposing a FLEXCEL plate to ultraviolet (UVA) light polymerizes—that is, hardens—the parts that need to be retained:
 - Back exposure polymerizes the parts that will become the floor (base) of the finished plate.
 - Main exposure polymerizes the parts that form the printing surface on the front side of a laminated plate.
- The main exposure establishes the relief characteristics that affect image details and quality, such as dot characteristics, shoulder angles, and reverse depths.
- During processing, any plate material that is not polymerized is washed away to create the plate relief.
- Plate thickness affects back and main exposure times.
 - Thicker plates require longer exposure times.

- A longer back exposure time produces a thicker plate floor and a shallower relief: floor thickness + relief depth = overall plate thickness

Finding related documentation and downloads

Requirements:

- Internet access
 - A valid business email address for an existing or new Partner Place user account
1. Log on to Partner Place at <https://partnerplace.kodak.com/> and select **Service & Support > Search Knowledgebase Answers**. (New users can click **Request an account**.)

Your Kodak service and support portal then opens at the default Search page.

Each answer in your Kodak service and support portal is a web page that may help you answer your own questions. Most answers provide specific content to read, search, and/or download. Convenient “links page” answers provide collections of related links.

2. In this and other documents, references to related content typically include an answer ID number— simply type that number (or any keywords or identifiers) into the **Search** box.

Note: Documents related to FLEXCEL platemaking may also be identified by an ID code such as FLEXNXRG_123.x (*x = revision*) or a number such as 731-12345v-xx-r (version-language-revision).

3. In the search results list, locate and click the item of interest.
4. If the answer that you open is a links page, locate and click the specific item of interest.

Tips

- Locate the applicable links page for your FLEXCEL plates—FLEXCEL NXH at answer 62381, FLEXCEL NXC at answer 72858, FLEXCEL NXUH at answer 72705, and FLEXCEL SR at answer 66942.
- At the bottom of a links page, click **Notify Me** to receive email notifications of any updates.

Before you start

Assemble the items that you will need, and make sure that the equipment is ready.

Requirements:

- TIFF Assembler Plus software
- The latest `NXC_Target_<version>.tif` test file containing the target image—see answer 69857.
- FLEXCEL NXC plates of the specific plate caliper being tested
- Thermal Imaging Layer-R for the plate size
- Kodak FLEXCEL NX system (imager and laminator)
- Masking material ≥ 4.0 Dmax—goldenrod material is ideal, or use pieces of Thermal Imaging Layer.
- Optimum processing speed and back exposure time obtained using the latest published procedure (which also provides the recommended relief depths)—see answer 72925 (FLEXNXRG_704).

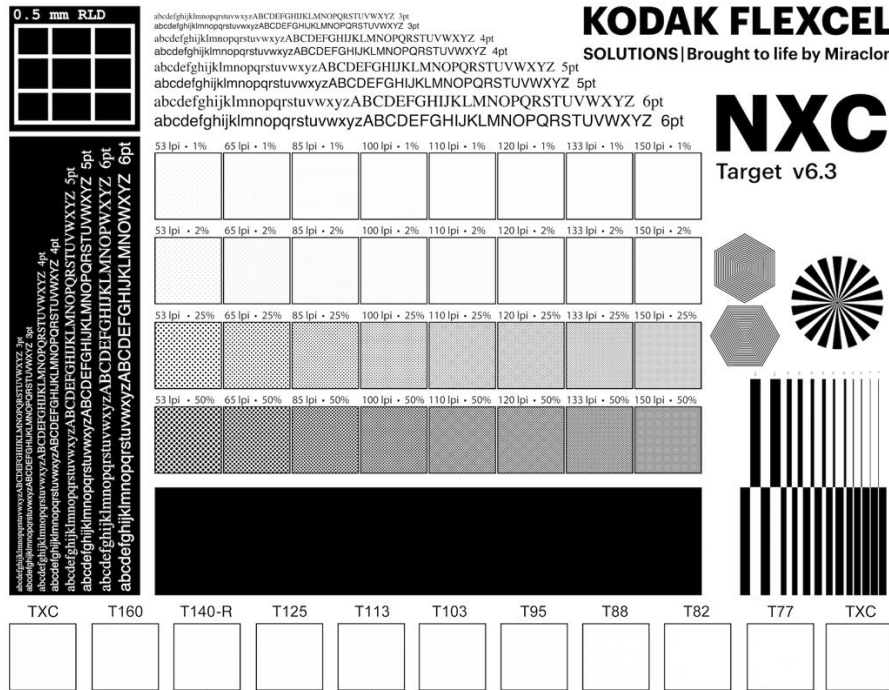
Equipment readiness

- LED lamp temperature fan cooling set at 23C for optimum output.
- It is recommended that the Integrator be turned off.
- Kodak FLEXCEL NX system (imager and laminator)
- Note: Use this document in conjunction with the visual reference guide (VRG) for your FLEXCEL NX system.

Downloading the test file

From answer **69857**, download the **latest** NXC_Target_<version>.tif test file, which contains the following target image.

NXC_Target_v6.3_140-113.tif:

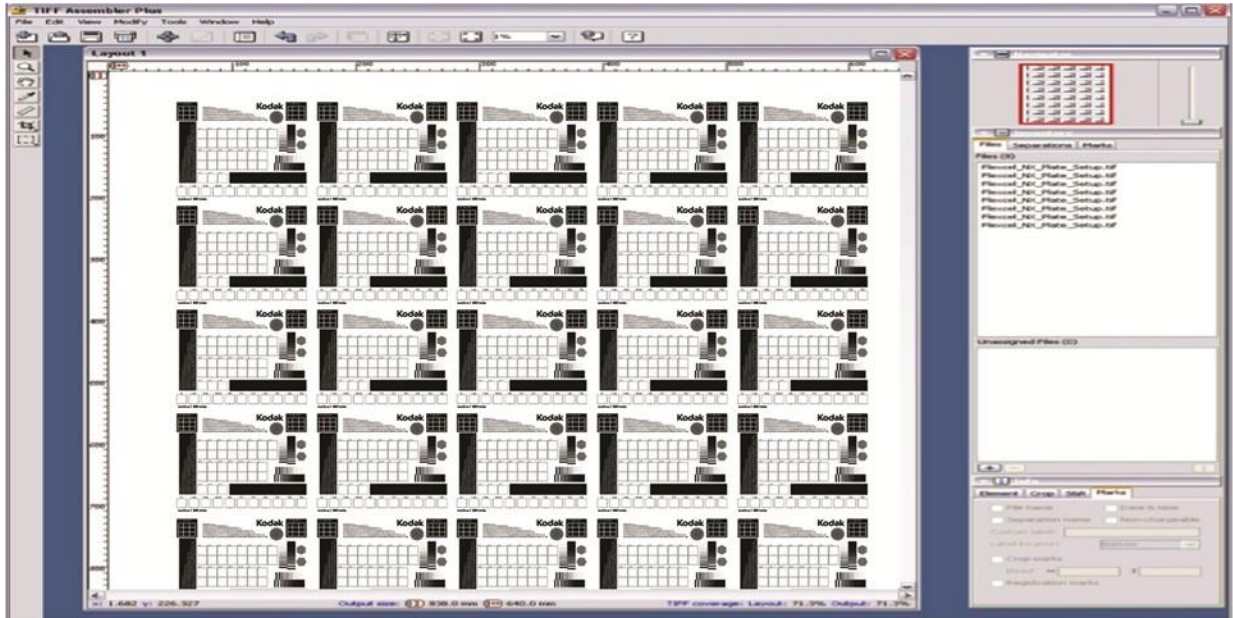


Note: This 1-bit TIFF file is already RIPPed and ready to use as-is. For valid results, do not resize or rotate other than 90°.

The main exposure series will be based on the row of targets at the bottom of the image.

Preparing an imaged test plate

1. In TIFF Assembler Plus, assemble the test file in a step-and-repeat layout to create a new output TIFF file:
 - a) Create a template with a 25 mm (1 in.) margin around all four sides for the output size of the FLEXCEL NXC Thermal Imaging Layer-R.
 - b) Step-and-repeat the test file into one full top-to-bottom column, and then repeat the column across.



Notes

- For valid results, do not resize or rotate other than 90°.
 - Each column of targets represents one incremental test strip.
2. Output and save the layout file.
 3. (As needed) Output additional layouts for imaging additional plates.
 4. In the imager, image the thermal imaging layer.
 5. On the laminator, laminate the imaged layer to the plate.
 6. Place the plate into the UV exposure frame, with the plate backside (polyester base) facing the bulbs.
 7. Expose the plate according to the optimum back exposure time that achieved the desired floor height in the previous test series.

The plate is now ready for the main exposure series.

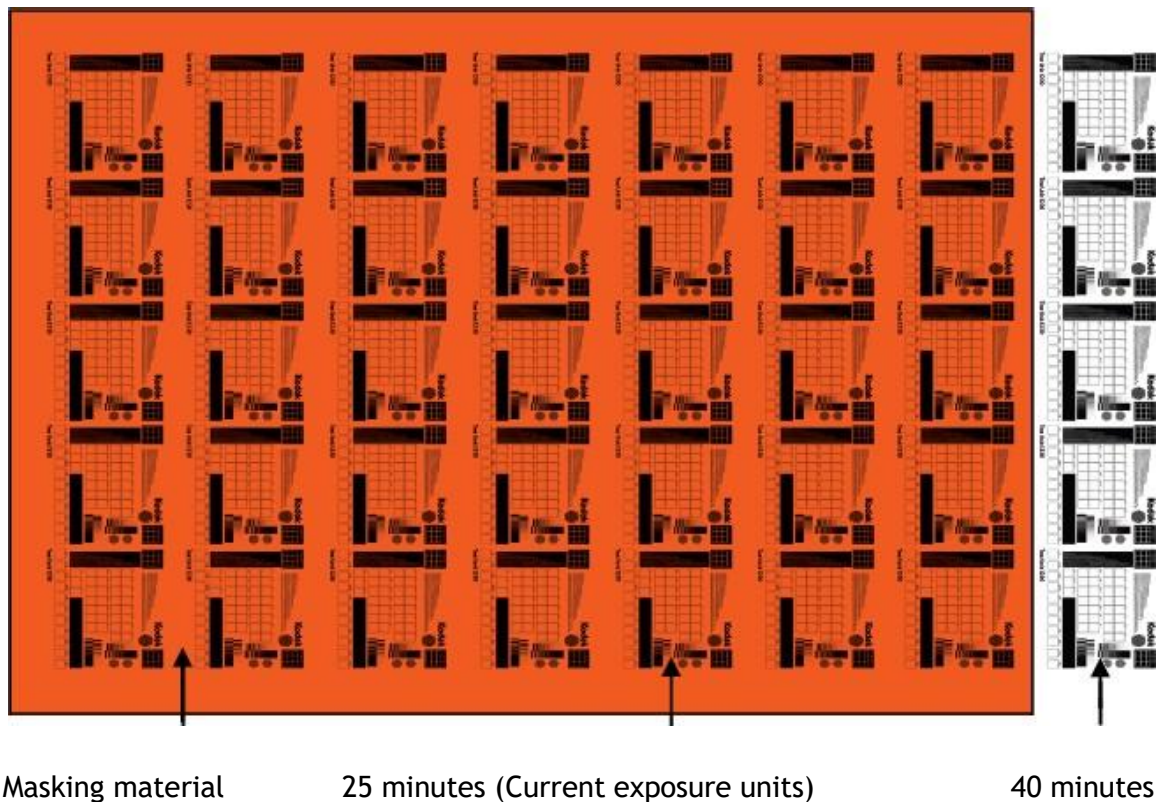
Performing the main exposure test series

The main exposure series is performed in 4-5 minute increments. Each column of targets represents one incremental test strip.

The center test strip should represent the typical exposure time for the caliper of plate—in the example provided, the increments increase to the right and decrease to the left of the strip marked for 25 minutes.

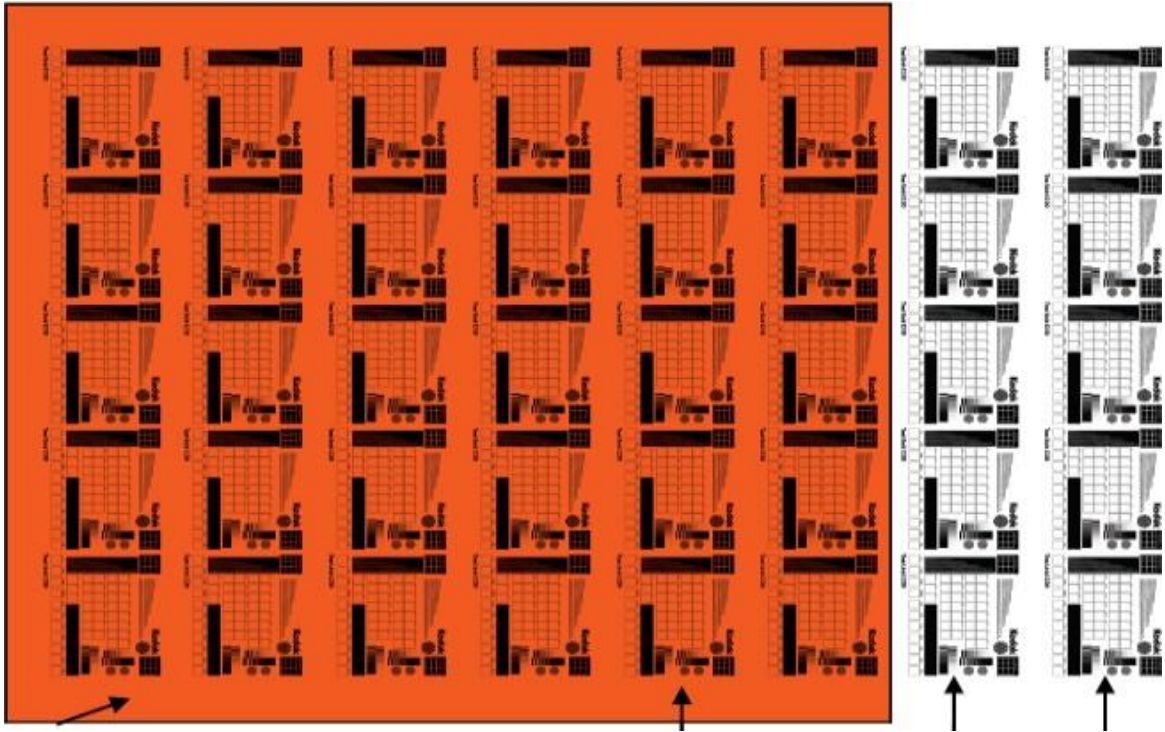
Note: The actual increment may vary by exposure frame configuration. Perform the following actions to expose the plate:

- a) To prevent premature exposure of the test strips, use the masking material to cover all test strips *except* the longest-exposure test strip—in this example, the test strip for 40 minutes is uncovered.



- b) Expose the plate for five minutes. (The total exposure time per test strip will increase incrementally.)

- c) Slide the masking material over to uncover the next test strip—in this example, the test strip that is for 35 minutes of exposure is now also uncovered.



Masking material

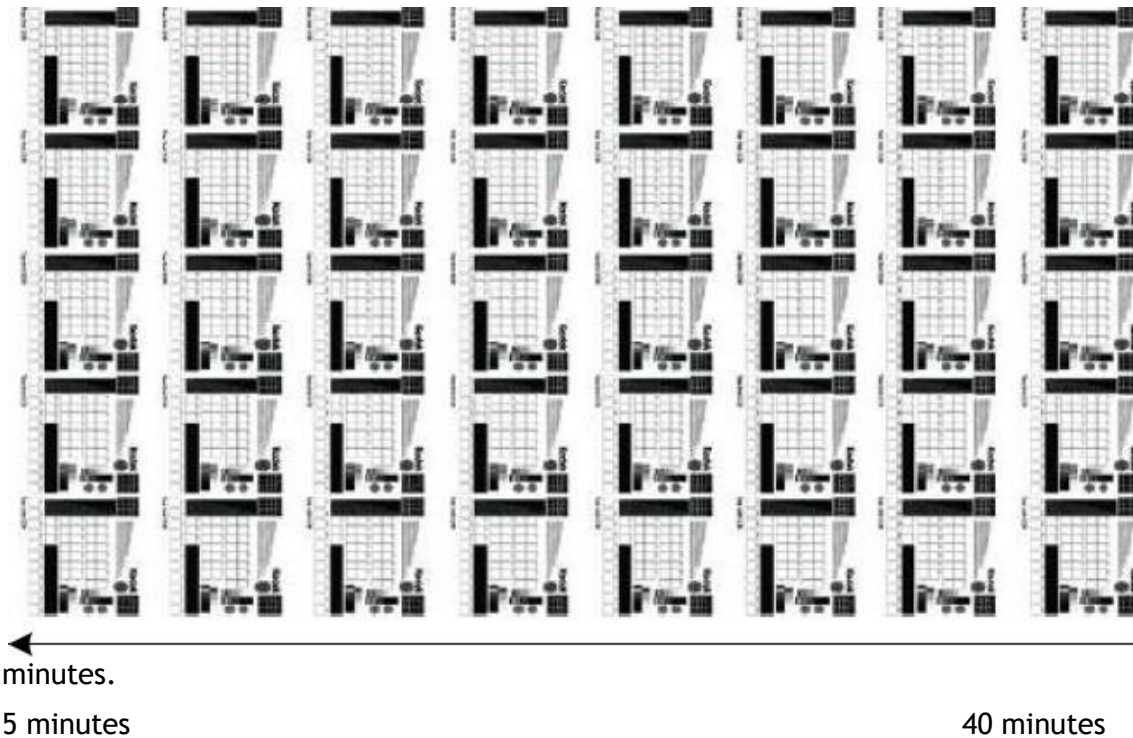
25 minutes

35 minutes

40 minutes

- d) Expose the plate for five minutes. The first test strip has now been exposed for a total of 10 minute. Incrementally uncover a test strip and expose the plate for 5 minutes at a time. Continue until all test strips *except* the first strip were exposed at least once.

- e) Remove the masking material and expose the entire plate for the number of minutes indicated for the first test strip—for this example, you would expose the plate for five



The main exposure series completed for this example ranged from 5 to 40 minutes. The actual exposure times will depend on your equipment—for this document, the example values were used to demonstrate what can be considered underexposed or overexposed.

1. Remove the plate from the UV exposure frame and place it on the laminator vacuum table—plate side down.
2. Turn on the vacuum.
3. Separate the imaging media from the plate by peeling the top layer away from the bottom layer in one slow, low-angled, and continuous motion.

The plate is now ready to be punched and processed.

4. Follow the instructions provided by the equipment manufacturer to perform the following actions:
 - a) Process the plate according to the previously-identified optimum back exposure time and processing speed.
 - b) Dry the processed plate at 51°-55° C (123.8°-131° F) for at least 30 minutes.
 - c) Remove the plate from the dryer and allow it to come to room temperature.
5. Perform a preliminary evaluation of the overall image quality.
6. If the desired image quality is obtained, complete the platemaking process as follows:
 - a) Return the test plate to the dryer and allow it to dry fully.

Note: Establish the dry times needed to achieve 0.012-0.025 mm (0.0005-0.0010 in.) above plate caliper. Verify the dry times whenever the solvent type, washout speed, or airflow is changed.

- b) Allow the plate to cool for 10-20 minutes before finishing and before measuring the caliper of the plate.
- c) Perform UVA post exposure—complete the plate polymerization by placing the plate in a UVA device for 4-5 minutes.
- d) Perform UVC de-tack—remove any remaining tack on the plate surface by placing the plate in a UVC device for approximately 5-9 minutes.

The test plate is now ready to be assessed.

Evaluating the main exposure quality of the test plate

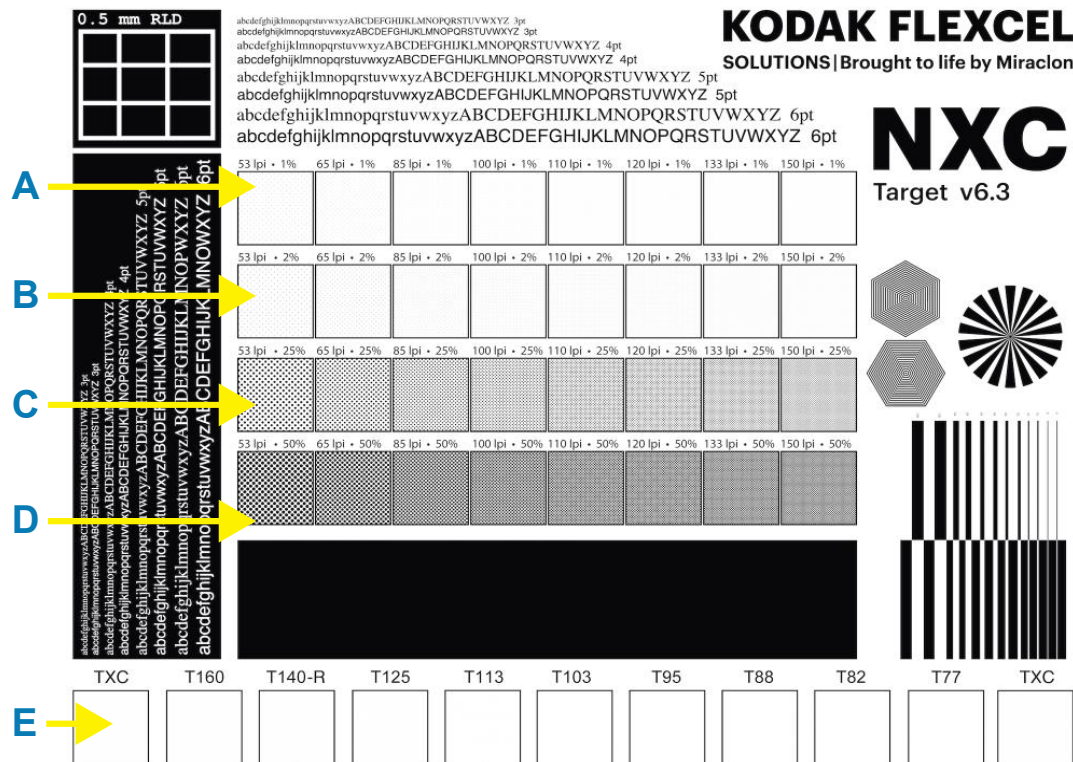
After taking the test plate through the entire plate production process, assess each test pattern to determine the exposure times that produced the best results, according to your criteria for quality.

You can determine the optimal minimum and maximum main exposure times from the appearance of the test patterns. In general, wavy lines or missing dots indicate underexposure. Shallow reverse areas indicate overexposure.

Assess the test patterns

Identify areas where the desired results were achieved or not achieved:

NXC_Target_v6.2_140-113.tif:



Area	Description	Resolutions	Desired result
A	1% dot	53 - 150 lpi (20-59 l/cm)	Perfect exposure with no missing dots
B	2% dot	53 - 150 lpi (20-59 l/cm)	Perfect exposure with no missing dots
C	25% dot	53 - 150 lpi (20-59 l/cm)	Perfect exposure with no missing dots
D	50% dot	53 - 150 lpi (20-59 l/cm)	Perfect exposure with no missing dots
E	The “pass / fail” targets for all FLEXCEL NXC plates with Thermal Imaging Layer-R		Correct dot-holding capabilities per test target (T-target) Note: Different plate calipers require different main exposures. For T-target recommendations, see the following chart.
All plate calipers		Thermal Imaging Layer-R T-targets	
PASS	T140 should hold 100% of the dots in alignment, and T113 should hold 100% of the dots irregular patterning.		
FAIL	If T140 is holding 100% of the dots and T113 is not holding 100% of the dots, the exposure time is incorrect.		

Assess other areas

- Assess the **text and line quality** by looking for wavy lines—there should be none. Wavy lines are another indicator that a plate is underexposed.
- In the **large solid area**, evaluate the shoulder angle. When the solid area is viewed from the side, you should see a steep volcano shape. If the base of the imaged area appears much wider than the solid area, the plate is likely overexposed.

Final steps

1. Store your test plate for future reference.
2. Make the necessary back and main exposure time adjustments to your plate production process.
3. Re-establish the processing speed, back exposure times, and main exposure times for each new lot of plates, after installing new LED lamps in the exposure frame, or when the desired relief results change.

Exposure examples of NXC plates

Use these photos to help you evaluate your test plate for main exposure quality.

Note: The main exposure results are based on the following row of target patches:

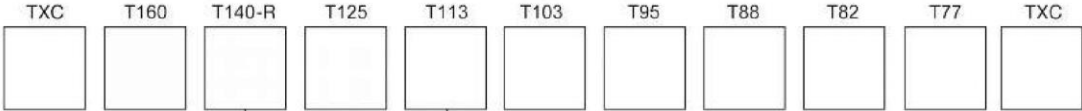


Figure 1: Shine LED Under Exposure

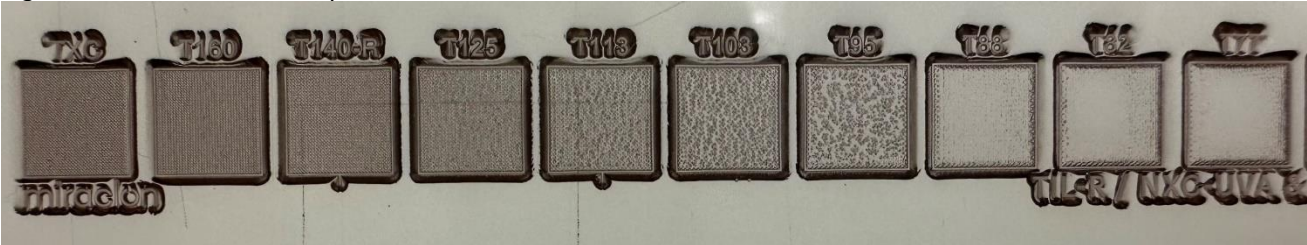


Figure 2: Shine LED Optimal Exposure

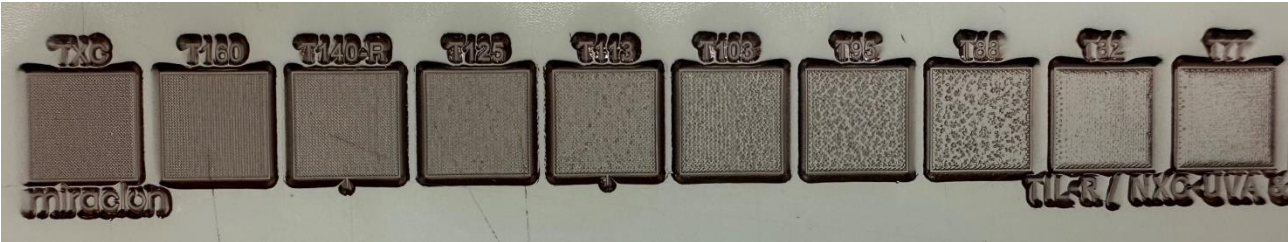
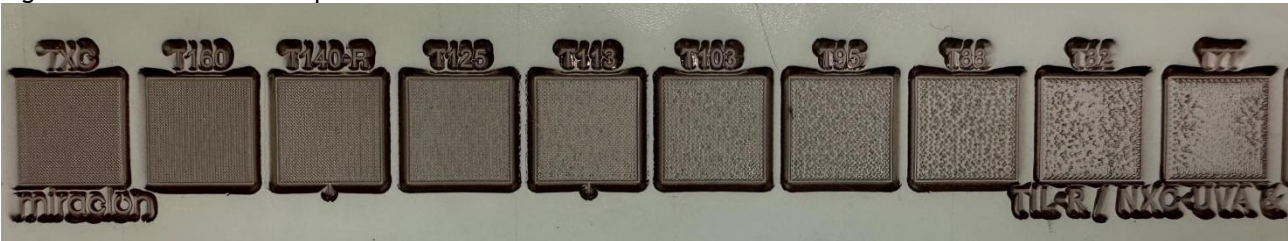


Figure 3: Shine LED Over Exposure



For more information...

To find additional documentation and advice about working with your Kodak plates, explore your Kodak services and support portal.

- Log on to Partner Place at <https://partnerplace.kodak.com/> and select **Service & Support > Search Knowledgebase Answers**. (New users can click **Request an account**.)
- Locate the applicable links page for your FLEXCEL plates—FLEXCEL NXH at answer **62381**, FLEXCEL NXC at answer **72858**, FLEXCEL NXUH at answer **72705**, and FLEXCEL SR at answer **66942**.

For more information about Kodak FLEXCEL NX flexographic systems and consumables for packaging applications, visit <http://www.graphics.kodak.com>.

See also	FLEXCEL NX Wide CR 4.1 upgrade: answer ID 69166
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