Date Created: 2023-07 **Date Modified:** 2023-08-04 **Version ID:** TB_SL_MiraclonShineLEDNXHExposures_00103_EN

Miraclon Shine LED Exposures for FLEXCEL NXH plates: Obtaining and optimizing the main exposure times

Main exposure overview

Perform a main exposure test series on a Miraclon FLEXCEL NXH 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 NXH plates.

Benefits of optimizing the main exposure

- Optimum image quality, holding the finest positive plate detail while keeping the reverses open.
- Improved overall plate quality 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?

- Starting a new plate lot
- Introducing a new plate type or caliper
- Installing new LED exposure lamps (bulbs)
- Changing your criteria for image quality or for the desired relief results

Can the optimized setup be monitored during regular production?

Yes—instead of the using the full setup target, the small control strip of target patches can be imaged and measured on an ongoing basis.

- Ideally, the main exposure should be verified on every plate.
- At minimum, verify the main exposure times weekly.
- If the verification tests fail, re-optimization using a full test series may be necessary.
- However, always repeat the full test series after installing new bulbs, starting a new plate lot.

General notes about FLEXCEL plate exposure

- Exposing a FLEXCEL plate to ultraviolet UVA light hardens (“cross-links”) the parts that need to be retained:
    - Back exposure hardens the parts that will become the floor (base) of the finished plate.

    - Main exposure hardens the parts that form the printing surface on the front side of a laminated plate.
- During processing, any unexposed plate material is washed away, leaving the plate floor and 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. 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).
2. In the search results list, locate and click the item of interest.
3. 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 Ultra 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

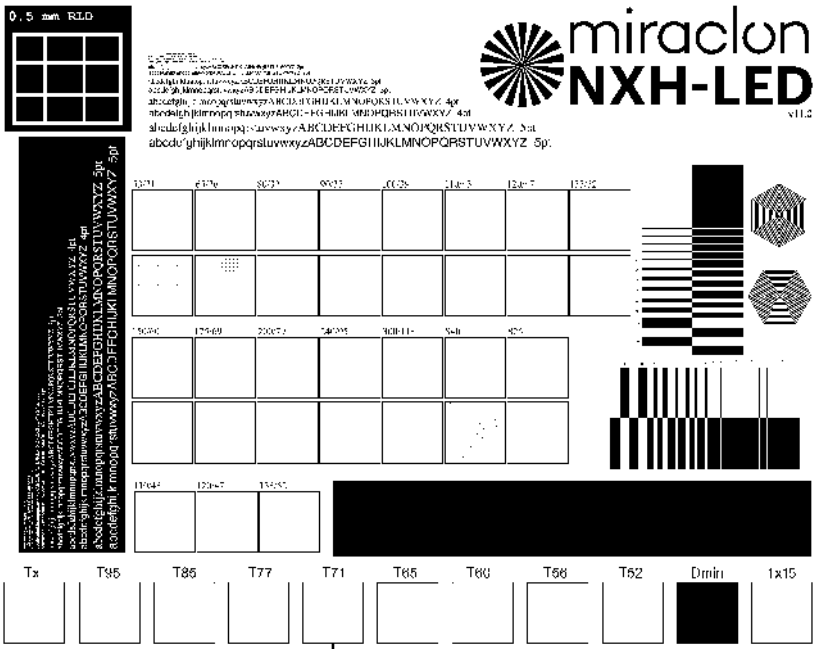
- TIFF Assembler Plus software
- The latest `Flexcel_NXH_LED_Plate_Setup_<version>.tif` test file for the target image.
- FLEXCEL NXH plates of the specific plate caliper being tested
- Thermal Imaging Layer/Layer-R for the plate size
- Masking material ≥4.0 Dmax—goldenrod material is ideal, or use pieces 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 62382 (FLEXNXRG_204).
- UVA lamp temperature setting is required to ≥21^{0}C (≥70^{0}F), for LED bulb cooling to maintain the highest lamp output. It is no longer recommended that the Light Integrator be **On** for LED exposures as there is no output drop.

- Kodak FLEXCEL NX system (imager and laminator)—Use this document in conjunction with the visual reference guide (VRG) for your FLEXCEL NX system.

Downloading the test file

Download the latest `Flexcel_NXH_LED_Plate_Setup_<version>.tif` test file, which contains the following target image.

`Flexcel_NXH_LED_Plate_Setup_v11.0.tif`:

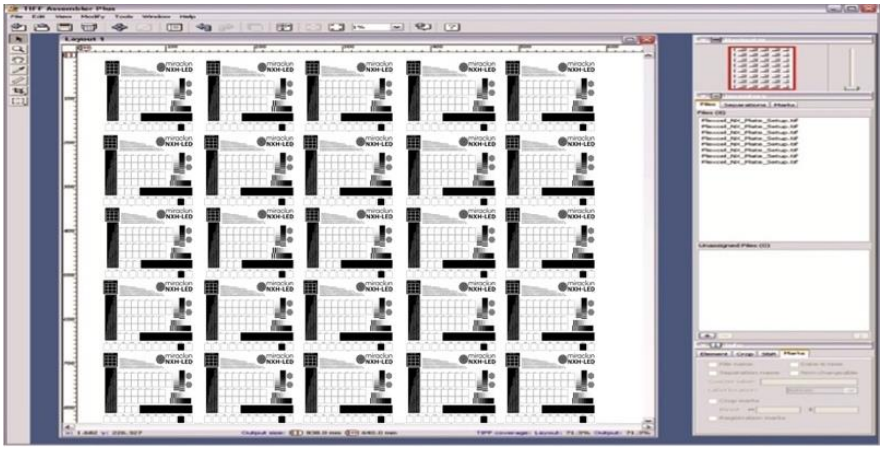


NOTE: This 1-bit TIFF file is already RIPed and ready to use as-is. For valid results, do not resize or rotate other than 90°.

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 50.8 mm (2 in.) margin around all four sides for the output size of the Thermal Imaging Layer/Layer-R.
   b. Step-and-repeat the test file into one full top-to-bottom column, and then repeat the column across.



NOTE: for valid results, do not resize or rotate other than 90°.

NOTE: each column of targets represents one incremental exposure test strip.

2. Prepare the image:
   a. Output and save the layout.
   b. Image the thermal imaging layer.
   c. Output and save additional layouts for imaging additional plates, as needed.
3. Back expose the plate:
   a. Place the plate into the UVA exposure frame with the plate backside (polyester base) facing the bulbs.
   b. Expose the plate according to the optimum time that achieved the desired floor height in the back exposure test.
4. Laminate the imaged layer to the plate.

   The plate is now ready for the main exposure series.

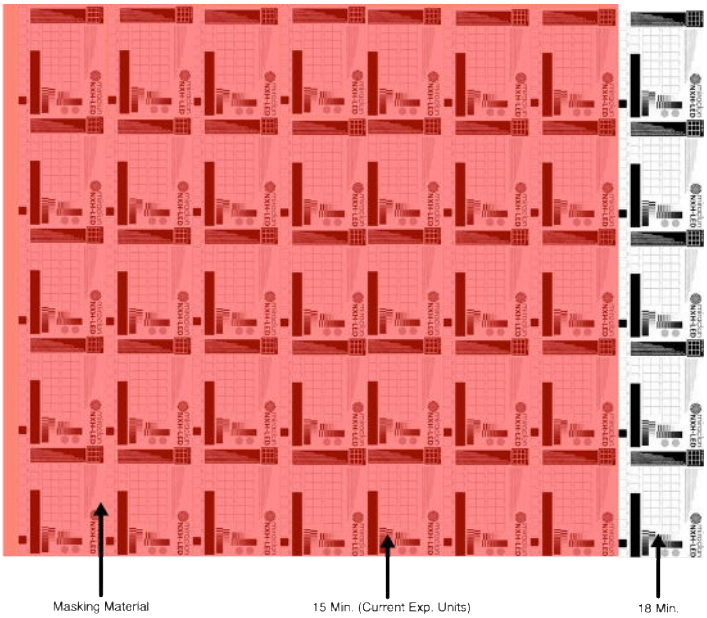
Performing the main exposure test series

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

The center test strip should represent the typical exposure time for the plate caliper—in the example provided, the increments increase to the right and decrease to the left of the strip marked for 15 minutes.

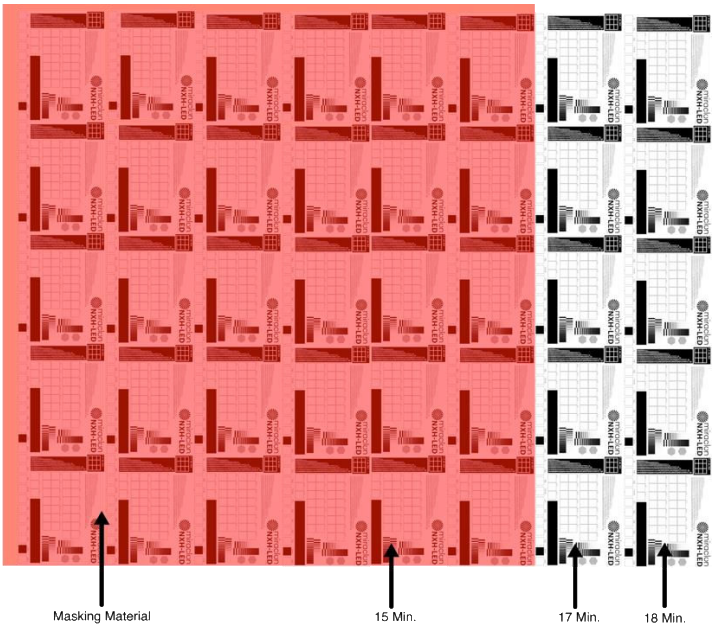
Note: The actual increments may vary by exposure frame type.

1. 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 18 minutes is uncovered.



   b. Expose the plate for one minute. (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

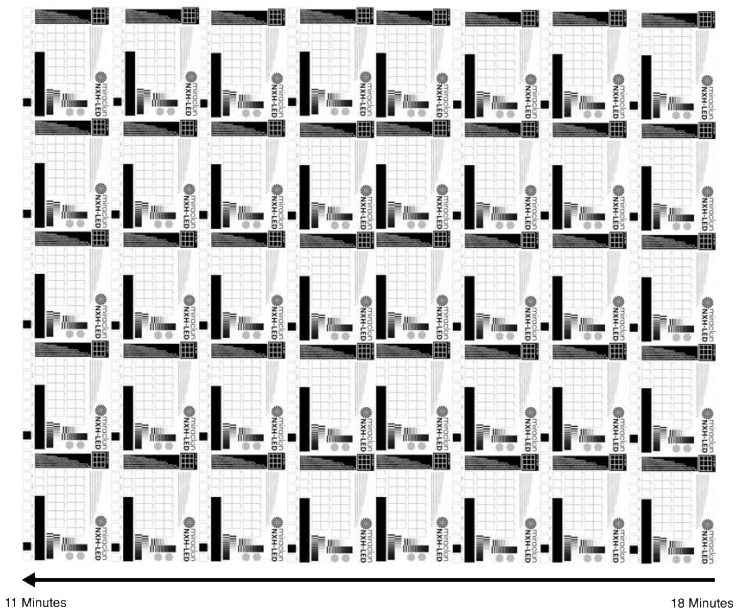
strip that is for 17 minutes of exposure is now also uncovered.



d. Expose the plate for one minute. The first test strip has now been exposed for a total of two minutes.

e. Incrementally uncover a test strip and expose the plate for one minute at a time. Continue until all test strips except the first strip were exposed at least once.

f. 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 11 minutes.



The main exposure series completed for this example ranged from 11 to 18 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.

2. Remove the plate from the LED exposure frame and place it on the laminator vacuum table according to the imaging layer type:

   - Thermal Imaging Layer (green)—imaging media down.

- Thermal Imaging Layer-R (blue)—plate side down.

3. Turn on the vacuum.
4. 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.

   NOTE: Thermal Imaging Layer (green)—the plate side is the top layer.

   NOTE: Thermal Imaging Layer-R (blue)—the imaging media is the top layer.

   The plate is now ready to be punched and processed.
5. 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°–53°C (123.8°–127°F) for 10–20 minutes.
   c. Remove the plate from the dryer and allow it to come to room temperature.
6. Perform a preliminary evaluation of the overall image quality.
7. 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 UVC de-tack—remove any remaining tack on the plate surface by placing the plate in a UVC device for approximately 15 minutes.

      NOTE: increase the UVC exposure time by one minute for every 200 hours of use, for a maximum of 20–22 minutes. Change the lamps at 600-800 hours. Verify the exposure times whenever you install new bulbs, introduce a new plate type, observe plate surface cracking, notice that the finished plate feels different, or observe poor ink transfer on press.
   d. Perform UVA post exposure—complete the plate polymerization by placing the plate in a UVA device for two minutes.

   The test plate is now ready to be assessed.

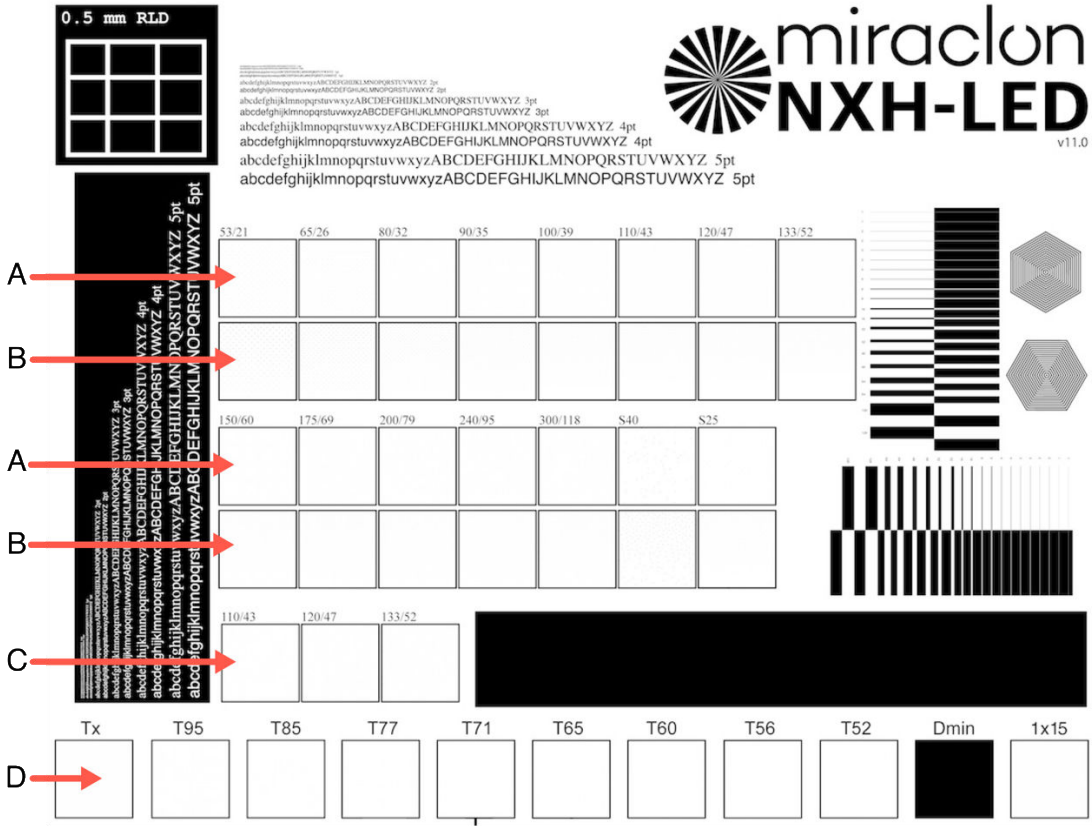
Evaluating the main exposure quality of the test plate

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:



Area	Description	Resolutions	Desired result
A	The lowest recommended gray level	53–300 lpi (21–118 l/cm)	Perfect exposure with no missing dots
B	“Micro vignettes”	53–300 lpi (21–118 l/cm)	No scum dots at the end of any vignettes
C	No cut-off applied (will normally fail)	110–133 lpi (43–53 l/cm)	You must apply a cut-off point to eliminate scum dots.
D	The pass / fail targets for FLEXCEL NXH plates with Thermal Imaging Layer or Layer-R		Correct dot-holding capabilities per test target (T-target) **Note:** Different plate calipers require different main exposures.

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 exposure adjustments to your plate production process.
3. After you obtain the optimum main exposure time from a full test series, you must monitor its ongoing effectiveness.

   To verify exposure during regular production, include the small quality-control test target alongside the production images—for the TIFF test file, see answer 7676.
4. Always re-establish the processing speed, back exposure times, and main exposure times for each new lot of plates, after installing new UV lamps in the exposure, or when the desired relief results change.

LED Exposure target examples NXH plates

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

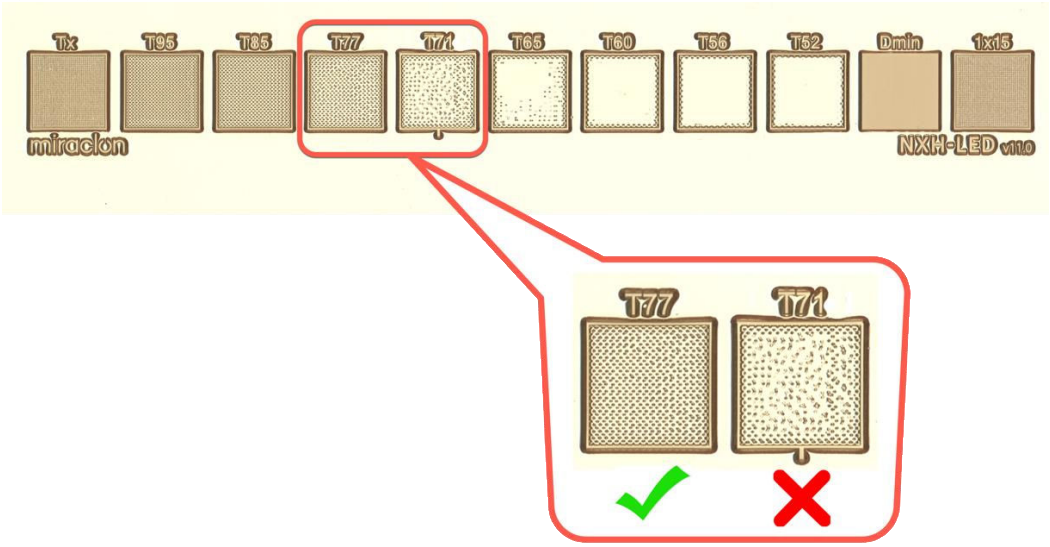
NOTE: The following plates were imaged using the Thermal Imaging Layer.

Selecting the Optimum LED Exposure

T targets fill in with a different look when using Miraclon Shine LED lamps than with fluorescent ones.

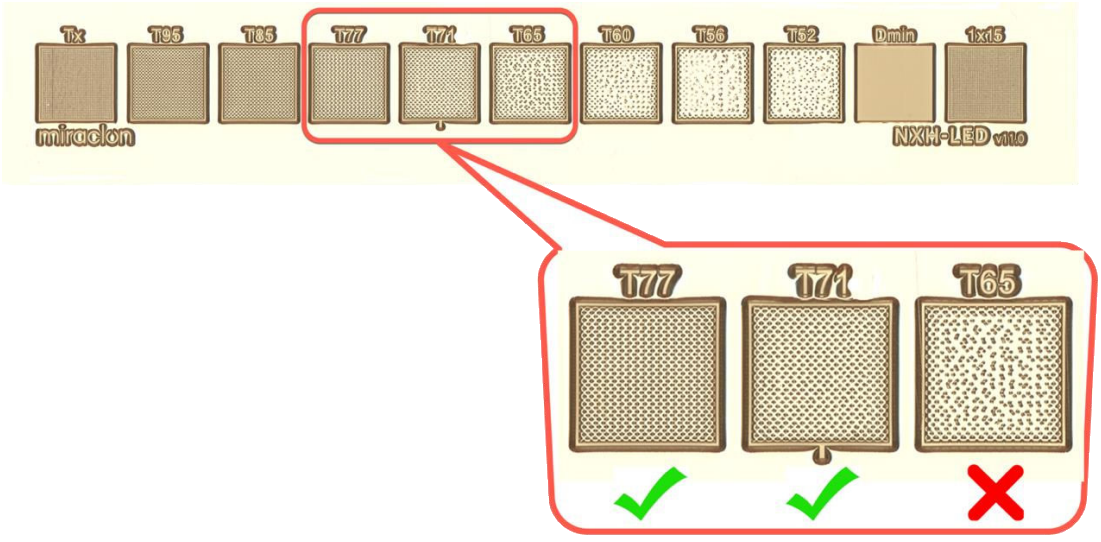
Under Exposure

Typically, the underexposed targets have formed dots that tend to “wander” instead of just not being present.



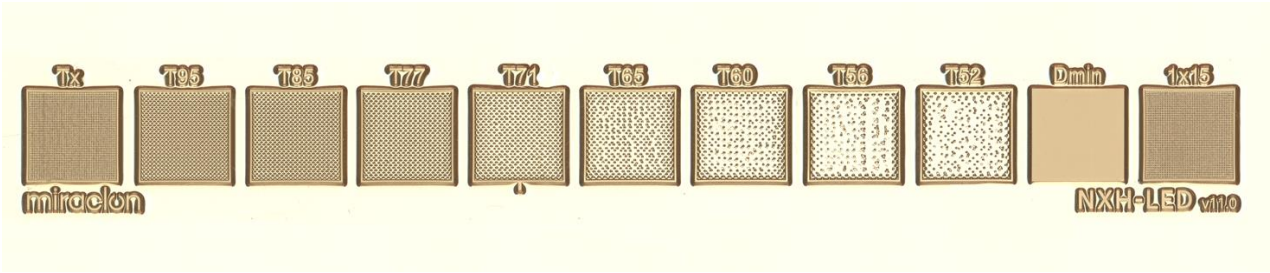
Optimum Exposure

Proper exposure level will be visually where the dots are “on pattern” vs. “off pattern”.



Ideally, the T71 target dots hold the pattern, with T Targets lower showing more random dot placement.

Over Exposure



Over exposure will continue to increase the random dot placement in the targets below T71 at a greater frequency.

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Date submitted	Jul 31 2023
Last updated	Aug 04 2023

miraclon