KIWO ExpoCheck™

Exposure & Resolution Calculator

For an explanation of the methods for determining 'No-Color-Change', see the technical article:

Using an Exposure Calculator: Determining the Degree of Resistance.

This article is available on KIWO's web page at www.kiwo.com.

Overview of the article, *Using an Exposure Calculator: Determining the Degree of Resistance*:

What is an exposure test?

An exposure test conducted with an exposure calculator helps to find the optimal production exposure time for stencil making. An exposure calculator combines 2 films - a neutral density film and an artwork film. When exposed to a stencil, each film produces separate results. The neutral density film's steps help to to evaluate the stencil's resistance; the artwork film's results are to evaluate the stencil's resolution. It is the screen maker's job to judge the results and establish the best balance of resolution and resistance for the specific production application.

This article provides an explanation of several methods used to judge the resistance of a stencil, as well as, the advantages and disadvantages of each method.

KIWO® ExpoCheck™

The KIWO® ExpoCheck™ exposure test film uses 9 neutral density filters + 1 clear area. These areas vary in density (or degree of darkness). When exposed to a screen, each filter/density area produces 10 varying degrees of exposure on the screen. The darkest filters/areas transmit the least amount of light; the lightest/clear areas transmit the most light. The resulting exposures would be: 100% of the original exposure, 90%, 80%, 70%, 60%, 50%, 40%, 30%, 20%, and 10% of the original exposure.

For example, a screen exposed with the KIWO® ExpoCheck™ at 120 units result in 10 different exposures on the screen 120, 108, 96, 84, 72, 60, 48, 36, 24, and 12 unit exposures.

These side-by-side exposures can be judged to help determine the exposure time needed to achieve the stencil's highest potential resistance. The traditional method used to make this judgement is called the 'Diazo No-Color-Change'. This method, however, is only one of several methods used to establish 'No-Color-Change' or 'No-Step-Change'.

The No-Color-Change (NCC) or No-Step-Change (NSC) refers to a comparison of side-by-side exposures on one screen to determine a step of exposure where there is no difference to the next.

Something to keep in mind. Each method produces a slightly different result in finding the point of NCC / NSC.

The important thing to remember is how each NCC / NSC is achieved and how it relates to the reaction of the stencil with UV-light.

INSTRUCTIONS FOR USE

KIWO ExpoCheck

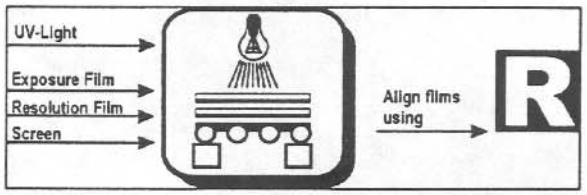
❶ Choose the appropriate Resolution Film.

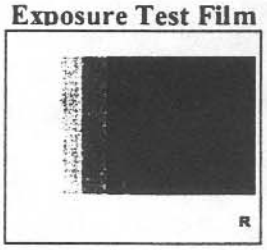
Choose the RESOLUTION FILM that best represents the artwork resolution used in production. Follow the guide below to determine the most appropriate match of resolution to mesh.

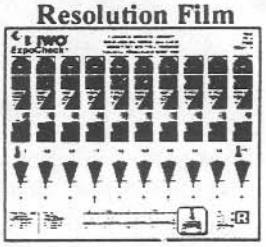
	Mesh	Thread Diameter
Fine Resolution	260 tpi (102 tpcm) and above	40 microns or less
Medium Resolution	110 tpi (43 tpcm) to 260 tpi (102 tpcm)	40 microns to 80 microns
Coarse Resolution	110 tpi (43 tpcm) and below	80 microns or greater

❷ Combine the Exposure Calculator Film with a Resolution Film.

- Place the chosen RESOLUTION FILM (artwork film) and the EXPOSURE TEST FILM (gray filter film) on the screen – according to the diagram to the right.
  NOTE: The surface of the film's artwork (the film's emulsion side) needs to contact the emulsion side of the screen.
- Using the 'R' of each film, align the RESOLUTION FILM and the EXPOSURE FILM.
- Place the screen with the 2 films in the exposure unit.







❸ Test Exposure Time.

- Calculate the Test Exposure time, by using the formula to the right. DOUBLE the Expected Exposure.
- The Expected Exposure could be the...
  - Regular exposure time (current production exposure time).
  - An estimate of the exposure time based on information from the stencil manufacturer.

Expected Exposure x 2 = Test Exposure

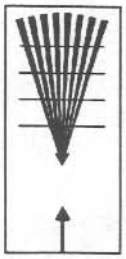
Example: **Expected Exposure = 100**

100 x 2 = 200

❹ Expose using the Test Exposure, Develop, & Dry.

- Using the TEST EXPOSURE time (calculated in Step 3), EXPOSE the screen under the same conditions used in production: the same intensity, the same lamp distance, the same amount of vacuum, etc.
- DEVELOP the screen under the same conditions used in production: the same pressure of developing, the same water temperature, the same time spent on each side of the screen, etc.
- DRY the screen under the same conditions used in production. Ideally, remove the excess water from the screen by vacuum or blotting with a chamois or paper. Dry in a screen dryer or other circulating air system.

5 Determine the EXPOSURE / full stencil hardness.

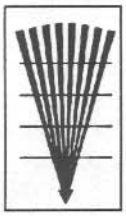


- By looking between the arrows of the artwork, determine the exposure area where 'No-Color-Change' is found for a DRY or WET screen. For an explanation of the methods for determining 'No-Color-Change', see the technical article: *Using an Exposure Calculator: Determining the Degree of Resistance*. This article is available on KIWO's web page at www.kiwo.com.
- Mark or note the FACTOR found above the arrows for FACTORS: 'x 0.9', 'x 0.8', 'x 0.7', 'x 0.6', 'x 0.5', 'x 0.4', 'x 0.3', 'x 0.2'.

6 RETEST.

- IF the 'No-Color-Change' is found in the farthest right or farthest left exposure area of the test film, RETEST using the factor suggested on the film.

7 Determine the RESOLUTION for the various exposures.



- Evaluate the RESOLUTION, EDGE DEFINITION, and MESH BRIDGING of the stencil for all 10 exposure areas.
- Determine the exposure area with the 'best' reproduction of the artwork.
- Mark or note the FACTOR found above the arrows.
- The arrow with the descending lines is a quick means to show resolution differences between under-exposure through over-exposure. With under-exposure, the smallest lines may wash away (not anchor to the threads). With over-exposure, the artwork 'fills-in'.

8 Calculating the Production Exposure.

- For both the Exposure and the Resolution, calculate the Production Exposure time using the following formula.

Test Exposure x (Factor) = Production Exposure

Example: **Test Exposure = 200, Factor = 'x 0.6'**

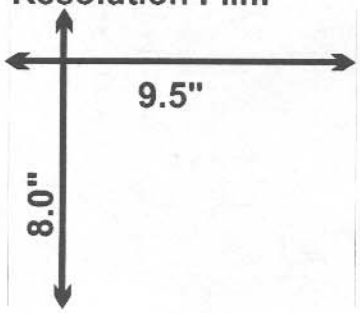
200 x 0.6 = 120

- The resulting Production Exposure(s) may be different for the Exposure and the Resolution. When considering what exposure time to use for production based off of information found by using an exposure calculator, keep in mind...
  1. The point of 'No-Color-Change' indicates high resistance.
     - Longer exposure times continue to **increase** resistance.
     - Shorter exposure times **decrease** resistance.
  2. The point of 'Acceptable Resolution' should be a balance of reproducing the same size positive and negative lines, text, and halftones.
     - Longer exposure times **fill** negative detail in the stencil, but **increase** the size of the positive detail in the stencil.
     - Shorter exposure times **open** negative detail in the stencil, but **decrease** the size of the positive detail in the stencil.
- Determine the best compromise between Full Exposure and the Best Resolution.

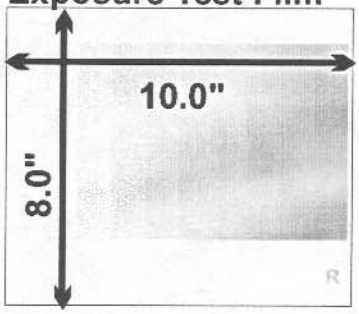
9 (Optional) Print and Evaluate results.

- Print the stencil to evaluate the artwork reproduced in the various exposure areas. Use these results to help determine the Production Exposure.

Resolution Film



Exposure Test Film



Fine Detail

50 um
75 um
100 um
125 um
150 um
175 um
200 um
225 um
250 um
300 um

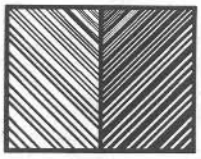
Medium Detail

100 um
125 um
150 um
200 um
225 um
250 um
300 um
350 um

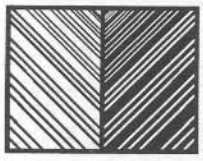
Course Detail

200 um
250 um
300 um
350 um
400 um
500 um

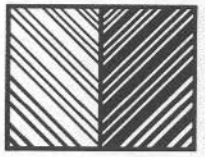
The line width increases to the next size with every 2 lines.



50 um
75 um
100 um
125 um
150 um
175 um
200 um
225 um
250 um
300 um



100 um
125 um
150 um
200 um
225 um
250 um
300 um
350 um



200 um
250 um
300 um
350 um
400 um
500 um

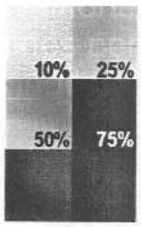
The line width increases to the next size with every 3 lines.

12 pt
10 pt
8 pt
6 pt
4 pt
3 pt

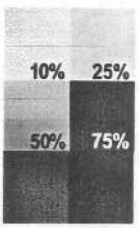
12 pt
10 pt
8 pt
6 pt
4 pt

14 pt
12 pt
10 pt

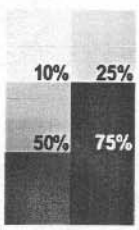
The text size is stated in points (each point is 1/72").



85 lpi
(33.4 lpcm)

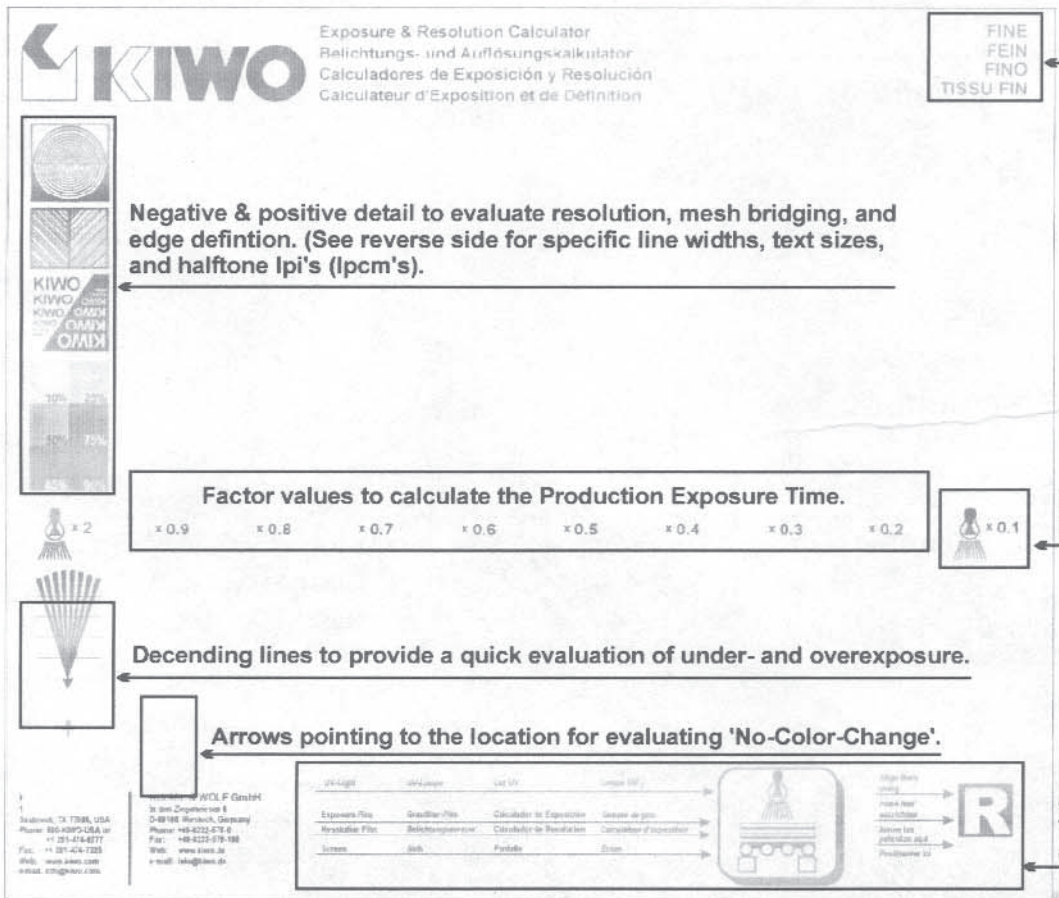


55 lpi
(21.7 lpcm)



35 lpi
(13.8 lpcm)

Halftone % in lines per inch (lpi) and lines per centimeter(lpcm).



Transmisssion %	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
Factor	(retest)	x 0.9	x 0.8	x 0.7	x 0.6	x 0.5	x 0.4	x 0.3	x 0.2	(retest)
Density Value	.05	.10	.15	.20	.28	.35	.45	.58	.75	1.05

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