

# KODAK RELIABLE IMAGE TIP # 53

## Diazo Duplicate Film Selection

The choice of your duplicate film should be based on your system requirements. The following guidelines may be of some assistance in selecting the best film

**Photo speed:** this characteristic is dependent on coating weight and image color.

First, high density (heavy coating weight) film will always run slower than lower density films; we are assuming both films are of the same color. Second, black films are always slower, assuming equal density, when compared to blue films.

Example: high density black films ( $D_{max} > 1.60$ ) will be the slowest. Low density blue films ( $D_{max} < 1.50$ ) will be the fastest. The ARMM speed for Intelicoat diazo films are:

2956/3956 = 42 ARMM Speed  
(Black Diazo film with a  $D_{max}$  of 1.50-1.60)

2957/3957 = 52 ARMM Speed  
(Blue Diazo film with a  $D_{max}$  of (1.60-1.70)

2463/3463 = 50 ARMM Speed  
(Black Tonal Diazo film with a  $D_{max}$  of 1.15-1.20)

**Color:** the color should be chosen based on system requirements. For example, blue films are faster than black films. If production speed is the sole criteria a low density blue film would be an ideal candidate. Throughput is seldom the only criteria. Black films may be slower but they have a number of potential benefits. Users prefer black film for documents because they look more like their silver originals. Black films have superior fade resistance. Black film can be used as intermediate master if the silver film original is lost.

**Contrast:** the contrast of diazo film is controlled almost exclusively by the coating weight ( $D_{max}$ ). The higher the density, the higher the contrast. A diazo film with a density of 1.60 will have a contrast index of 1.40. Finally, the tonal diazo

products with a density of 1.20 will have a contrast index of 1.0.

A general guideline for contrast is that high quality images benefit from high contrast films. An original with variable density benefits from lower contrast film. The choice should be based on a careful evaluation of diazo output. Remember that the eye is very susceptible to contrast; higher contrast images are easier to read. Keep your eye on information transfer.

### Setting up the duplicator

**Development:** on a 16mm diazo duplicator development is part of the continuous process, unlike silver film, where a separate process is employed. The first step is to determine if the duplicator is fully developing film at typical print speeds. To do this test you need to either; turn the lamp off (this is not possible on some duplicators) or place a 4" section of opaque tape on a 50' section of scrap film. If you can turn your lamp off, and still run the drive, run diazo film through the developer chamber at typical print speeds (100 fpm for example). Once the film has exited the chamber cut off a small section and check and record the  $D_{max}$  (dynamic density). Next, run a diazo sample into the chamber and let it set for 30 seconds. This sample, unless something is dreadfully wrong, will be fully developed; record the  $D_{max}$  (static density). The dynamic density and the static density should be within 5% of each other. If there is a dramatic difference call your hardware service representative.

**Correct exposure speed:** the prime measure of correct print speed is your  $D_{min}$  reading. A high reading indicates you are probably running too fast while a very low reading indicates you are running too slow. As a guideline:  $<$  than .05 is too low, while  $>$  than .08 is too high. I normally aim for 0.06 to 0.07. It is very helpful to have incorporated a target somewhere on your master to allow for  $D_{min}$  readings. A second technique is to use a silver step wedge.

These strips come in two versions; 0.10 step increments starting at 0.04-0.05 and a version with 0.15 step increments. The Dmin should be measured off the clear 0.04-0.05 area. A second reading can be made in the 0.30-0.35 region (either the second or third step depending on the particular tablet). The 0.30-.035 region will range from 0.35 to .60 depending on the contrast of the duplicating film. Tonal, with a contrast index of 1.0 will reproduce the silver at the same density. 0.35 to 0.35. Higher contrast will raise the value on the duplicate. A film with a contrast index of 1.7 would reproduce the .035 step as 0.60. Verify your speed settings by looking at prints on a reader. With a negative appearing image, the characters should not bloom (overexposure) nor should the clear areas appear filled in (underexposure). The ideal copy maintains the delta between the dark and clear areas.

**Image color:** blue is blue and of little concern. Black can be problematic. First, black films attempt to emulate silver halide films. This is never completely successful because silver films are comprised of a metal where diazo films are comprised of dyes. The Dmax of these two dissimilar products can never match exactly. Second, the silver Dmin is comprised of a slight metallic gray tint. The natural Dmin for diazo film is a slight yellow tint. The color of silver film is more or less the same regardless of viewing conditions. Diazo film is very much influenced by the type of viewing source. In the lab we always use a 5000° K. source. In the field it is impossible to find a standard viewing source. Once you have adjusted your color using fluorescent or window light make your final determination in the reader; that is where your client will view the film.

**Adjusting the color:** black films are a combination of blue dyes and brown dyes. In the

right ratio they can produce a satisfactory black image color. Temperature has universal effect; higher temperatures, > 175° F. will promote a blue color. Temperatures < 160° F. will promote a brown color. Incidentally, green always indicate UNDER DEVELOPMENT. For most duplicators 160-180° F. is a good starting point. The second variable in the equation is moisture. Moisture acts as an accelerator for development. All 16mm duplicators inject water as part of the aqueous ammonia or via separate water feed. The amount of water, on most duplicators, the Scott 700 excepted, is not easily changed. On a duplicator using aqueous ammonia, the norm today, the amount of water can only be increased by increasing the ammonia flow which may lead to a fume problem. A switch to a lower ammonia concentration, 20° Baume instead of 24° would allow for increased flow with no increase in fumes. Before messing with your ammonia concentration make sure your ammonia is fresh and your pump is working to specification; your service representative can measure flow. Normally, correct temperature will provide the greatest improvement in image color.

Finally, color is seldom a "film defect". When users have been unable produce an acceptable image color on a 16mm duplicator the problem is usually the duplicator or the supplies used for development. Diazo duplicators should receive regular preventative maintenance. Percent development should be checked, as should exposure speed. Duplicator lamps lose 5% efficiency per 100 hours of operation thus gradual changes in exposure are necessary to compensate for lamp aging.