Graphics Specifications for Aluminum Cans

Artwork for aluminum can printing has a number of special requirements that must be addressed before it is ready for production.

The Printing Surface

The printing surface will be shiny **aluminum** or white **basecoat** on aluminum. Allowance for the surface type should be made when selecting colors and making adjustments to artwork.

Aluminum is highly reflective and its metallic sheen is readily visible through all colors.

Printing on white basecoat has more of the character of a white piece of paper, though the metallic sheen of aluminum is still apparent. Basecoat has the benefit of not needing white as a printing color but the cost is higher.

Spot Colors Only (No Process)

All elements in a design must be colored with spot colors. If a design utilizes process images, gradations, graduations, vignettes or blends they will need to be converted to spot colors.

Most can sizes accommodate up to 6 spot colors. A few sizes are limited to 4 colors.

Color Selection, Opacity and Contrast

Avoid very light colors. They are difficult to match and may be hard to see. Color opacity ranges from transparent to opaque. Selection of opacity is especially important when the surface of the can is aluminum. Contrast on aluminum is dramatically affected by color opacity.

Ink Contamination, Press Gain and Color Registration

In aluminum can printing colors are transferred to the surface of a can in a single pass. They are wet during the transfer and this creates the opportunity for colors that touch to contaminate each other.

There is also a significant amount of press gain inherent in the printing process and registration can vary between colors.

By adding a stroke of aluminum, referred to as **stayaway**, to each design element, artwork can be adjusted to compensate for contamination, growth and changes in registration.
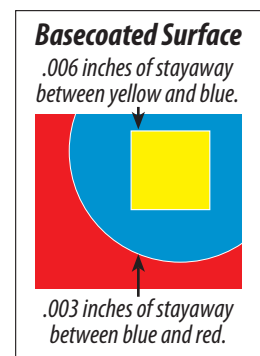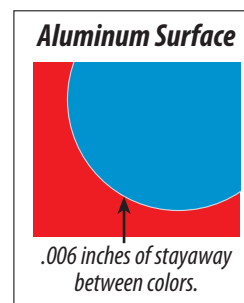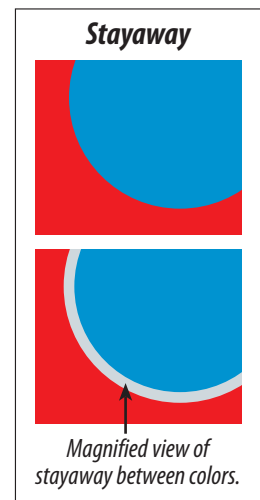
- Create a gray, non-printing spot color, to use as stayaway on aluminum. For basecoat, create a white non-printing spot color.

- Apply a stroke of stayaway to the edge of all objects in a design. Do not overprint these stayaway strokes.

Stayaway Size on Aluminum

For colors that touch, on aluminum: .006 inches (.432 points / .1524 mm)

Stayaway Sizes on Basecoat

For colors that touch, on basecoat: .003 inches (.216 points / .0762 mm)

Stayaway

Magnified view of stayaway between colors.

Aluminum Surface

.006 inches of stayaway between colors.

Basecoated Surface
.006 inches of stayaway between yellow and blue.

.003 inches of stayaway between blue and red.

For yellow or light opaque colors that touch darker colors, on basecoat:
**.006 inches (.432 points / .1524 mm)**

Stayaway Values that are Common for Aluminum and Basecoat

Growth Compensation / Reduction for colors that don't touch any other colors:
.002 inches (.144 points / .0508 mm)

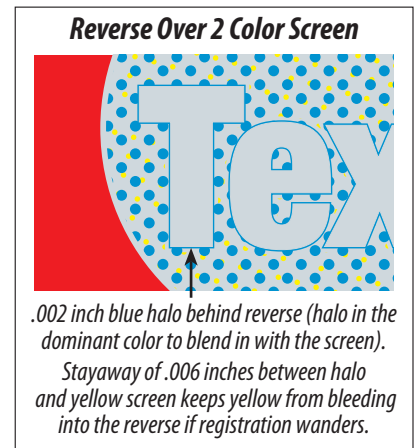**Reverse Expansion / Spread:**
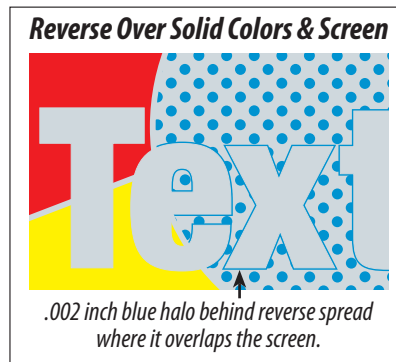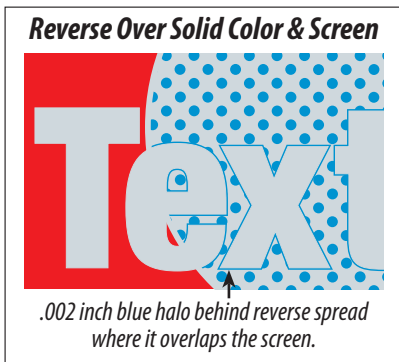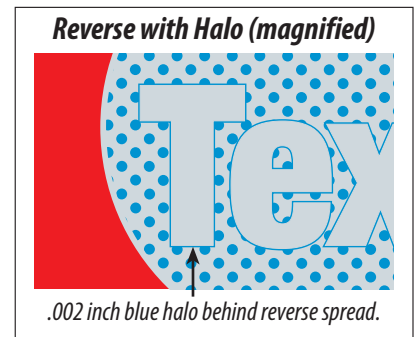**.003 inches (.216 points / .0762 mm)**

More spread can be used if the shape and/or legibility is not adversely affected.

Reverses smaller than .01 inches (.72 points / .254 mm) may fill in when printed.
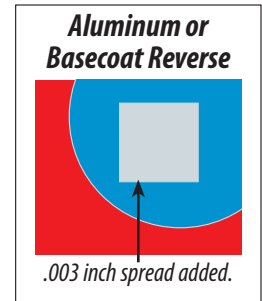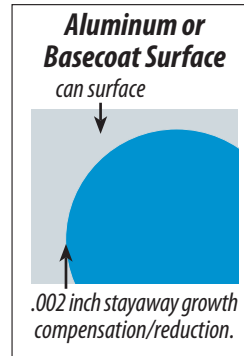
Halo reverse areas that overlap screens:
.002 inches (.144 points / .0508 mm)

Add a colored stroke under the spread of a reverse, to create a clean edge where it overlaps a screen tint or image. The thickness of the halo should be .002 inches, which is just enough to hold on a plate and not draw attention to itself. The color of the halo will vary depending upon the situation. Generally, a halo should be in the dominant color to blend in better with its surroundings.

Aluminum or Basecoat Surface
can surface

.002 inch stayaway growth compensation/reduction.

Aluminum or Basecoat Reverse

.003 inch spread added.

Reverse with Halo (magnified)

.002 inch blue halo behind reverse spread.

Reverse Over Solid Color & Screen

.002 inch blue halo behind reverse spread where it overlaps the screen.

Reverse Over Solid Colors & Screen

.002 inch blue halo behind reverse spread where it overlaps the screen.

Reverse Over 2 Color Screen

.002 inch blue halo behind reverse (halo in the dominant color to blend in with the screen). Stayaway of .006 inches between halo and yellow screen keeps yellow from bleeding into the reverse if registration wanders.

Exceptions

Stayaway is not used in **wet on wet** images where colors are intentionally mixed. Although stayaway is generally added to the outside of wet on wet images to limit contact with other elements, as in the case of fruit sitting on a background color.

Some inks are close enough in color that they can touch without creating contamination and so little or no stayaway is needed.

Other situations arise where space does not permit full stayaway. This is frequently the case with small text that has tight letter space, word space and/or leading. Some designs contain fine lines and other details that are too small to accommodate stayaway. Dither patterns can be rastered at too high a resolution to allow stayaway. In these instances, applying less stayaway may be the only alternative.

Images and Color Tints

For artwork that includes images and/or color tints, values should be lightened to compensate for dot gain. Lighten only values that are less than 100%.

Screen Values

**Minimum Screen Value:**
3%

Avoid values of less than 3% in images that have been adjusted for dot gain. Screen values below 3% may wash off during plate preparation or break off during printing.

3% values often grow to 20% or more when printed.

In Vignettes, Gradations, Graduations and Blends maintain a minimum value of:
3%
This will prevent visible edges where a color stops.

Graduation Edge (magnified)

Yellow stops, creating a visible edge.
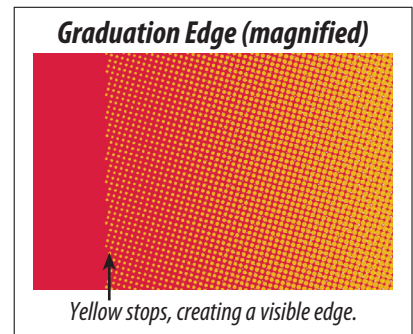
Screen Rulings

Maximum Screen Ruling:
100 lines per inch

Recommended Screen Ruling for tints and background blends:
85 lines per inch or lower

Lower screen rulings for background color blends are easier to print. They also exhibit less dot gain and look more uniform from can to can.

Spot Colors Only

Images must be converted to spot colors (no process colors).

Most can sizes accommodate up to 6 spot colors. A few are limited to 4 colors.

Dither Patterns

Preferred Raster Resolution for dither patterns:
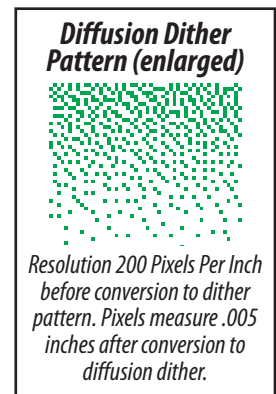**200 pixels per inch or lower**
Pixels measure .005 inches leaving room for .002 inches of stayaway.

Maximum Raster Resolution:
300 pixels per inch
Pixels measure .0033 inches across with no room for stayaway.

Keep dither resolutions at 200 pixels per inch or lower to allow room for stayaway. At higher resolutions, dots that are isolated (highlight values), don't have much support from surrounding areas and may break off during plate preparation or printing. Higher resolutions are more likely to fill in and become a solid mass due to press gain.

Diffusion Dither Pattern (enlarged)

Resolution 200 Pixels Per Inch before conversion to dither pattern. Pixels measure .005 inches after conversion to diffusion dither.

Object Size

Small objects that measure less than .003 inches may physically break off of a printing plate during preparation or printing. This is especially true for small, isolated, design elements.

Minimum Object Size / Diameter:
.003 inches (.216 points / .0762 mm)

Minimum Line and Fill Size:
.002 inches (.144 points / .0508 mm)
Larger lines and fills are preferred.

Preferred Reverse Size:
.01 inches (.72 points / .254 mm) or more
Smaller reverses may fill in when printed.

Text

Text must have compensation for growth, registration and contamination. Legibility of small text can become an issue when applying stayaway because of the limited space available. It is important to maintain the integrity of letter shapes in whatever color is actually read. Sometimes, this will be the background color as in the case of text with a light fill color on a dark background or reverses.

It is also important to keep the fill color of small text large enough to hold on a plate. Avoid fonts that have thick and thin extremes. Avoid tight letter space, word space and leading. Avoid overlapping stayaway where the stroke from one letter cuts into the fill of another.

Minimum Text Size:
6 point

Minimum Line and Fill Size:
.002 inches (.144 points / .0508 mm)
Maintain at least a minimum color thickness for fills, the spaces between letters and their centers.

Track out small text wherever possible. Avoid putting small text over screen tints. Avoid filling text with a screen.

Text Example (enlarged)

6 point white text on a dark blue background.

.006 inches of stayaway added to the text (dotted line shows the path). The white fill color is too small to hold on a printing plate.

.001 inches of stayaway added to the text (dotted line shows the path). Then the text is cloned. A stayaway stroke of .01 inches is applied to the clone and it is moved underneath the original.
The total stayaway is .0055 inches (the strokes split the edge of the path so only 1/2 is visible .0005 + .005 inches). A reasonable compromise. Legibility is preserved in both the foreground and the background colors.

Font with Thick and Thin Extremes at 6 Point (enlarged)

White letter fill is pinched in places and the integrity of letter shape is lost with a stayaway stroke of .006 inches. Affecting legibility in both the foreground and the background colors.

Same text with a stayaway stroke of .003 inches. A clone of the text with a stroke of .0055 inches has been pasted inside the letters. Legibility is improved but not perfect. "G" is still pinched inside. Total stayaway is .00425 inches.

Tightly Spaced Text (enlarged)

Text is too tightly spaced to accommodate stayaway and still retain a minimum of background color between letters for legibility.

Templates

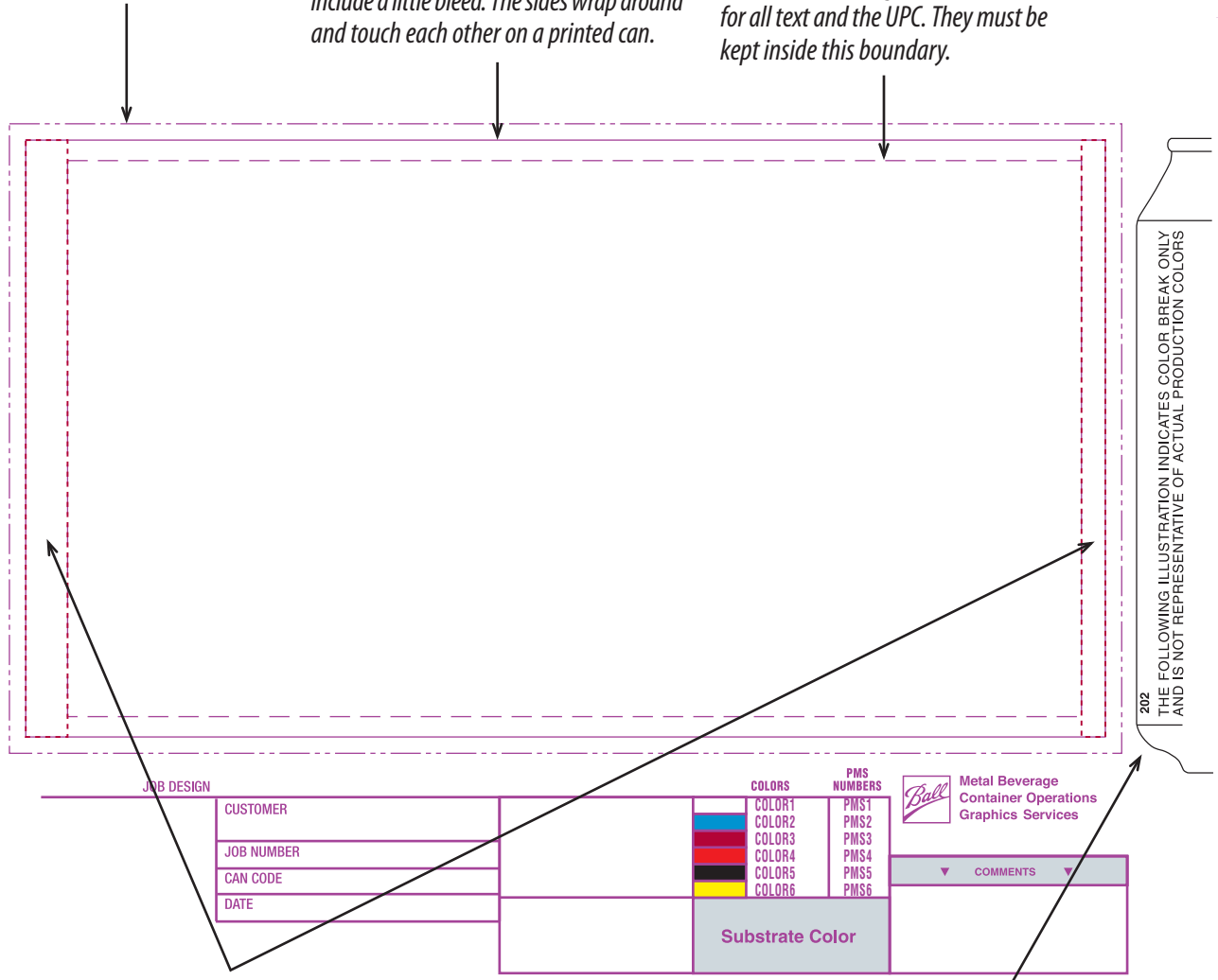Ball can templates all indicate the same basic information regardless of size.

*The **Bleed Area**
This outer box is the preferred
limit for artwork bleed.*

*The **Litho Limits** or **Window**
This second box shows the available visible
area for the graphics on a can. It may
include a little bleed. The sides wrap around
and touch each other on a printed can.*

*The **Copy Limits** or **Shaded Area**
This inner box designates the limits
for all text and the UPC. They must be
kept inside this boundary.*

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THE FOLLOWING ILLUSTRATION INDICATES COLOR BREAK ONLY
AND IS NOT REPRESENTATIVE OF ACTUAL PRODUCTION COLORS

JOB DESIGN

CUSTOMER

JOB NUMBER

CAN CODE

DATE

COLORS	PMS NUMBERS
COLOR1	PMS1
COLOR2	PMS2
COLOR3	PMS3
COLOR4	PMS4
COLOR5	PMS5
COLOR6	PMS6

Substrate Color

Ball Metal Beverage
Container Operations
Graphics Services

▼ COMMENTS ▼

*The **Overlap Area** occurs on either
side of the template. It is the place
between the window and the copy /
shaded area where graphics on either
side wrap around and touch on the
printed can. The actual amount of
overlap varies but it will include some
portion of each side of the graphics in
these areas.*

*Can Profile. This side view of a can
illustrates the preferred vertical position
of the graphics on the finished can.
It also gives the location of the lid,
the neck and the bottom edge.*

Litho Limits / Window

The window is the total area available for graphics for a particular can size. It is recommended that a design includes an extra .125 inches (9 points / 3.175 mm) of bleed beyond the window edge to allow for printing plant variations within a particular can size.
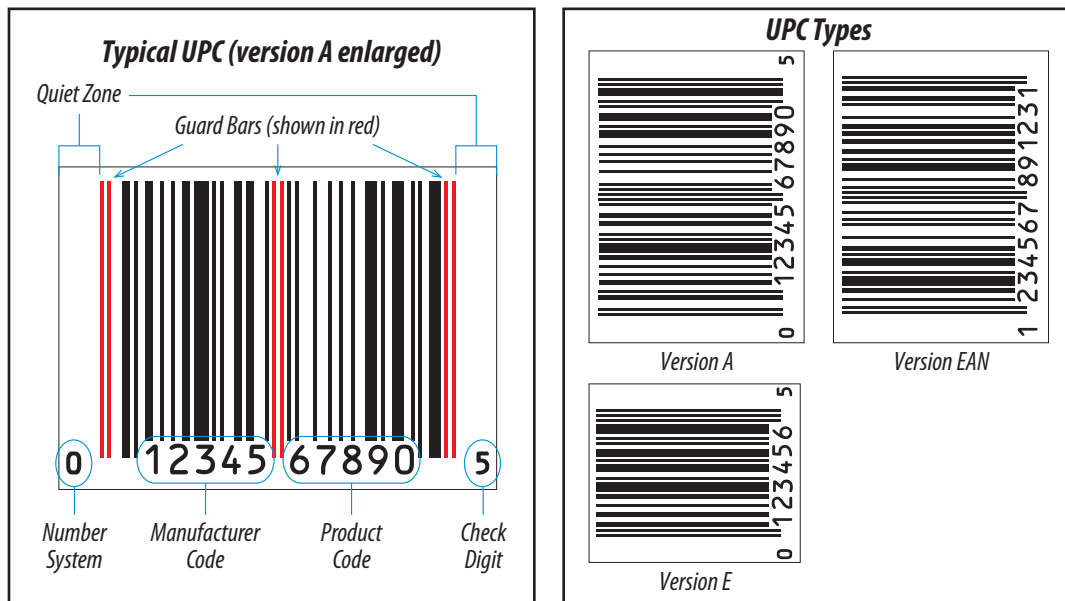
Copy Limits / Shaded Area

In general, do not extend text or other design elements beyond the copy limits / shaded area except for the background color.

Horizontal stripes can extend if the ends line up with each other and they do not mix with other colors.

If a design includes images these should be cut off at the overlap unless there is no background color and it would not wrap around onto other elements. If the image is designed for wet on wet printing and it would only mix with itself, it may extend into the overlap.

Do not mix colors any more than absolutely necessary.

UPC Specifications

Typical UPC (version A enlarged)

Quiet Zone

Guard Bars (shown in red)

0 12345 67890 5

Number System | Manufacturer Code | Product Code | Check Digit

UPC Types

Version A

Version EAN

Version E

Preferred UPC Size:
100%

Nominal Bar Width (measuring any guard bar with no bar width adjustment, size 100%):
.013 inches (.936 points / .3302 mm)

UPC Orientation:
Must be rotated 90 degrees so the bars run up the can

UPC Location:
Keep the UPC inside the copy limits / shaded area.
Never place a UPC in the neck area at the top of the can.

Minimum Background Pad Size (version A or EAN, size 100%):
1.12 inches (80.64 points / 28.448 mm) x 1.52 inches (109.44 points / 38.608 mm)

Minimum Pad Size (version E, size 100%):
.93 inches (66.96 points / 23.622 mm) x 1.1 inches (79.2 points / 27.94 mm)

Minimum Quiet Zone (size 100%):
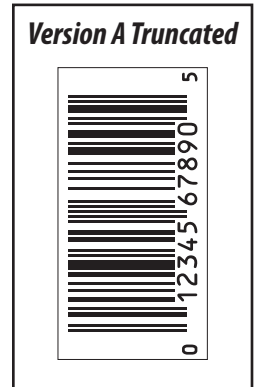**.11 inches (7.92 points / 2.794 mm)**
Do not allow any other design elements into this zone.

Maximum Truncation:
1/2 the length of the symbol

Bar Width Adjustment:
.0035 inches (.252 points / .0889 mm)

Version A Truncated

UPC Symbols on Aluminum

Stayaway + Bar Width Adjustment for Aluminum Bars (size 100%):
.0035 inches (.252 points / .0889 mm)

Symbols that have colored bars must first be inset to make room for stayaway. If a UPC is to be reduced the inset is always applied to the full sized symbol before reduction.

Bar Inset in FreeHand (colored bars, size 100%):
.00125 inches (.09 points / .03175 mm)

Bar Inset in Illustrator (colored bars, size 100%, using Offset Path...):
-.00125 inches (-.09 points / -.03175 mm)
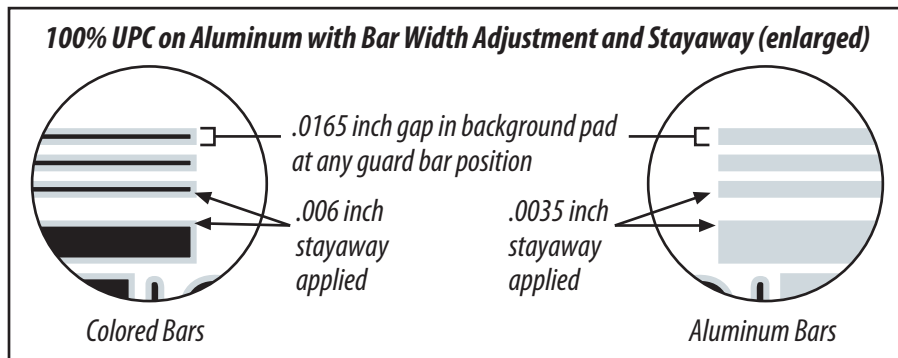**keep the reduced paths, discard the originals**

Stayaway + Bar Width Adjustment for Colored Bars (size 100%):
.006 inches (.432 points / .1524 mm)

Verify UPC bar width adjustment by measuring the gap in the white background pad created by the bars and their stayaway. The measurement should be made at any guard bar position.

Gap Measurement in Background Pad (+/- .001 at any guard bar position, with stayaway):

100%	.0165 inches (1.188 points / .4191 mm)	
95%	.01585 inches (1.1412 points / .4026 mm)	
90%	.0152 inches (1.0944 points / .3861 mm)	
85%	.01455 inches (1.0476 points / .36955 mm)	
80%	.0139 inches (1.0008 points / .35305 mm)	

100% UPC on Aluminum with Bar Width Adjustment and Stayaway (enlarged)

.0165 inch gap in background pad at any guard bar position

.006 inch stayaway applied

.0035 inch stayaway applied

Colored Bars

Aluminum Bars

UPC Symbols on Basecoat

Stayaway + Bar Width Adjustment for a symbols on Basecoat (size 100%):
.0035 inches (.252 points / .0889 mm)

Verify UPC bar width adjustment for printing on basecoat at any guard bar position.

Basecoat Bar Width Measurement (+/- .001 at any guard bar position, with stayaway):
      100%   **.0095 inches (.684 points / .2413 mm)**
       95%   **.00885 inches (.6372 points / .2248 mm)**
       90%   **.0082 inches (.5904 points / .2083 mm)**
       85%   **.00755 inches (.5436 points / .19175 mm)**
       80%   **.0069 inches (.4968 points / .17525 mm)**

100% UPC on Basecoat with Bar Width Adjustment (enlarged)

.0095 bar width
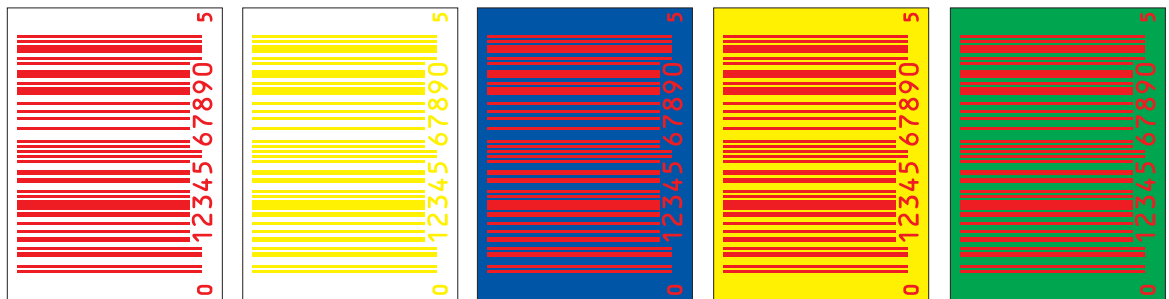
.0035 inch stayaway applied
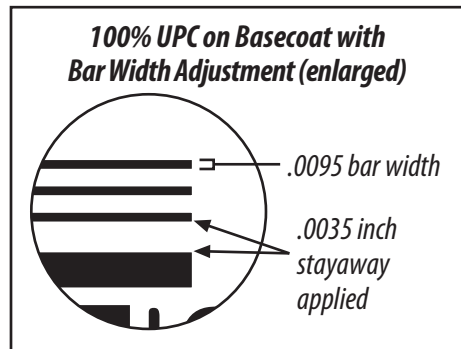
UPC Colors

Preferred UPC Colors on Aluminum:
black bars, white background pad
or aluminum bars, white background pad

Preferred UPC Colors on Basecoat:
black bars

Examples of some color combinations that Do Not Work:

Most scanners use a red laser which renders the color red invisible.

Aluminum is seen by UPC scanners as black.

In all cases it is the contrast between the background and the UPC bars that makes a code readable by a scanner.