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, 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)
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.

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.

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.
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.
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.

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.

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**UPC Specifications**

- **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)

**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)

![Image of 100% UPC on Aluminum with Bar Width Adjustment and Stayaway (enlarged)]
**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)

**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.