# Color Specifying for Product Identification

## A Practical Guide to Specifying Color

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# 1. Introduction

## Why Should I Read The Guide to Color Specifying for Product Identification?

**There is no shortage of information on the topic of specifying color. Plug the term into Google, and you will find pages of terminology, guidelines, and tips designed to help users manage and define color. While it is exciting to see the plethora of information on specifying color today, it can also be somewhat overwhelming to process and difficult to translate across substrates for your product.**

The goal of this guide is to arm designers, marketers, and engineers with a resource for specifying spot colors when developing product identification. The focus is on aluminum but many points can be carried across other substrates used in nameplates and labels such as stainless steel, brass, and plastics.

The Color Specifying Guide is designed to be informative and practical. It offers useful examples of color translations, comparisons of color on multiple aluminum substrates, and samples representing opaque color converted into transparent tints and metallic color. Use this guide as a workbook – take notes, highlight what you find helpful, share what you learn with your colleagues and start driving the process of specifying and managing color.

### Why Use Spot Color?

There are several guidelines that drive the decision to use spot color in product identification. Typically, spot color is appropriate when only one to four colors are needed and you do not require full-color photographs. Corporate colors are most often printed in spot. In addition, special effects such as metallic color and transparent tints use spot color. Backgrounds and large areas of color are more consistent when spot color is used.

Specifying a spot color means that any element assigned that color will appear on its own printing plate or screen. The name you assign to a color does not determine what ink will be used on press. Manufacturers use an optimum combination of ink formulation and substrate choice to match your target color.

# 2. How to Get Started and Specify Your Color

## Definition of Your Target Color

Color specifying begins with the definition of a master or target color. There are several options for communicating the information across suppliers. The most common method used is the use of a mass-produced, categorized color system such as the Pantone Matching System, or PMS Book. A second method is the use of an existing color sample on basically any substrate. The least used option is a verbal or written description, since it is the most subjective.

### Pantone Color Chips


PMS colors are the dominant spot color system used in a variety of industries, primarily printing, in the United States. Since the system is so widely used, colors can be designated by their PMS number eliminating the no need to send PMS color chips in when specifying color.

However, caution should be exercised since the age of the book and variations in the paper stock do cause color variance. The main drawback to the PMS system is the implementation of the colors across diverse substrates and printing scenarios.

### Other Color Matching Systems


Other color matching systems, such as Munsell, RAL, and NCS, are available. However, they are less widely used and will most often require the user to submit a color chip when specifying color.

### Custom Master

Custom color masters include everything from a paint chip created in a body shop to a piece of injection molded plastic. A trumpet, a fragrance bottle cap, or a piece

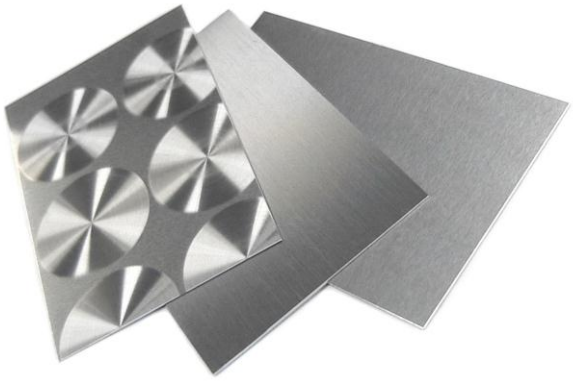
of fabric can all be the target in a color match. The thing that all of these items have in common is that they are a visual representation of the end intent.

### Description

A final option in specifying color is to communicate direction verbally or in writing. This option is not used often since the interpretation of the direction can be quite subjective. Examples of a description include: 80% of PMS 186, a color in between PMS 185 and 186, or 70% of PMS 186. Providing additional clarifying information makes the match less subjective and shortens the development cycle.

## Checklist of Additional Information Needed When Specifying Color

### Substrates



The base substrate a color is printed on affects the character of ink and thus the ink formulation may need to be adjusted. The same ink printed on bright and brushed aluminum may appear slightly different in color. This is why it is important to understand up front how a color will be used. Types of aluminum finishes available as a base for color development include bright aluminum, mill finish, and brushed aluminum. Additional options in mechanical finishes include engine turn and engine striped aluminum. In addition, the design of a nameplate may require development over a color such as black or white.

### Graphic or Background

Understanding how a color will be used is critical in determining which process will be utilized in printing the color (lithography, screening, or coating). It also is beneficial in determining the order in which colors will be printed and whether a color will overprint another color, which is often the case with fine

graphics. All of these factors impact color development. Finding out that a color needs to be printed over white rather than brushed aluminum after the color has been developed means that the color will likely need to be redeveloped.

## Gloss


Normally a protective topcoat is applied to product identification. In addition to protecting the color, the topcoat is used to create various gloss levels. Typically the gloss level of the master color chip is the desired gloss level of the color being developed. However, it is an option to specify a gloss level which differs from the master color chip. Gloss is specified in a scale ranging from no gloss (0°) to a mirror-like reflection (100°). Standard gloss levels are low gloss (approximately 20° to 30°), medium gloss (approximately 50° to 60°), and high gloss (approximately 90° to 100°).

Base color and substrate have an impact on gloss level. A high gloss topcoat applied over bright aluminum graphics against a black background will result in a higher gloss level reading on the bright areas. In addition, the gloss level has an impact on color. A higher gloss normally makes a color slightly darker. In contrast, a lower gloss lightens the color.

## Opaques, Transparent Tints, and Metallics

Special effect colors on aluminum create visual interest and add diversity to color schemes. The naturally reflective surface of aluminum makes it a natural choice for using transparent tints of color to take advantage of the metal substrate. When combined with standard opaque or solid colors they create eye-catching results. Metallics, colors which are developed with a metal flake, add to the possible color combinations.


## End Use and Specifications

Product identification is used for brand recognition on everything from automobiles and appliances to computers and cameras. All have unique requirements. Understanding these requirements, the environmental requirements and expectations for performance, is key information in determining the proper ink system and appropriate processes for manufacturing. This assures the nameplate will stand up to extreme conditions. Examples of environmental considerations include interior or exterior applications, chemical resistance, abrasion resistance, and UV requirements.

# 3. How to Specify the Gloss for Your Color

Consideration of the gloss level of a color is an important aspect of specifying color that is often overlooked. Colors can look dramatically different when the gloss level is changed. Therefore understanding the requirement up front helps to facilitate colors that successfully support your product identification. Two options are available for the specification of gloss level: a description and a target master.

### Description

Using a description to specify gloss typically involves designating high, medium, or low gloss. More specific gloss levels are defined as a percentage of gloss, e.g. 30% or 60%. Visually, you can distinguish between various gloss levels. However, accuracy and consistency are assured by reading gloss levels on a 60 degree gloss meter.

### Target master

A target color chip with the desired gloss level also clearly communicates your intention. The PMS system includes coated and uncoated colors which assist in specifying gloss along with color.

## Overall Gloss

Color chips illustrate the use of high and low gloss options in protective topcoats.

A protective topcoat is applied to most product identification. In addition to protecting the printing, the topcoat determines the overall gloss of the part. Standard or custom gloss levels are available to meet your specific needs.

## Selective Gloss

Application of a selective gloss is an attractive option for increasing contrast and adding visual interest when designing product identification. A simple, yet effective, option is using a low gloss background color contrasted with high gloss bright metal graphics. Selective gloss levels are also highly effective in creating subtle patterns. Pinstripes, grids or dot patterns printed in contrasting gloss on a color add detail and visual dimension.

# 4. Application of Your Color

Standard processes used in the application of color on metal and plastic substrates for product identification are lithography, screen printing, and roll coating. Each decorative process has advantages and limitations. The ability to combine all three to create product branding that reinforces your brand identity is key to successful product identification. Understanding the boundaries of these processes allows you to take full advantage of all they offer while pushing the limits of their capabilities.

## Offset Lithography

Lithography plays a critical role in the manufacturing of product identification. Specifically, fine lettering and detailed graphics require the precision of lithography. In addition, lithography and process color are used for the reproduction of full color photos. There are at least four areas where lithography offers advantages over screen printing:


Nameplates illustrate the use of offset lithography for halftone fades, process color, and fine detail.

- Fine details (lettering, graphics, patterns)
- Precise registration of graphics
- Subtle color variations achieved through use of halftones
- Process color (CMYK) and the wide spectrum of colors available

There are limitations to the colors that can be achieved with lithography. Lithography inks used in metal decoration are somewhat transparent. Since lithography prints a very thin layer of ink, many colors require multiple passes through the press to match the color master and achieve opacity. Some colors, typically light or bright colors, may require a base color printed prior to application of the target color. When using process color, not all Pantone colors are

reproducible. Additionally, lithographed colors require a topcoat to protect the printed areas.

## Silk Screening


Nameplates manufactured using screening to print metallics, selective gloss, texture, and masks for mechanical finishes.

The versatility of the screen printing process offers a distinct set of advantages in decorating metal. A significant characteristic of screen printing is that a greater thickness of the ink or coating (film thickness) can be applied to the substrate than is possible with other printing techniques. There are six primary advantages of the screen printing process on metal.

- Opacity of color means that typically multiple hits of color are not required
- Printed textures for patterns or graphics (clear or color, high or low gloss)
- Special effects such as metallics
- Durability of inks means that topcoat is not required in some applications
- Selective gloss levels or final topcoats
- Printed masks or resists are available for brushing and spinning

There are considerations when developing color for screen printing on metal. Due to the darkness of the substrate, a base color may still be required with light or bright colors. In addition, halftones and process color are not ideally suited for screen printing on metal.

# Roll Coating

Although the roll coating process is primarily used for the application of primers and top coats, it is also an option for applying overall color. Both transparent tints of color and opaque colors are achievable with this process. A major advantage of the roll coating process is the consistency in film thickness across the substrate. In addition, the speed of the process is attractive when considering high volume production. The changeover time between colors limits its application for lower volume applications.


Roll coating is used to print an overall color on nameplates.

# 5. Considerations in Color Development

## Translating PMS Colors to Transparent Tints

Translation of opaque color into a transparent tint of color is an effective option for taking advantage of the reflectivity of the metal substrate. Many target color chips are supplied as PMS colors chips, printed on a white substrate which impacts the overall color. The interpretation and translation of these colors is a subjective process with limitations and considerations.


### Basic Match

A wide variety of PMS colors can be successfully translated into transparent tints of color. Many are a rather straight forward process as illustrated in the blue color chip shown here.


### Pastel Colors

Translating a pastel PMS color into a transparent tint is a more subjective process since pale pastel colors rely on white for their muted effect. White is inherently opaque. Adding white to an ink formulation limits the transparency of the color. The challenge is to balance the transparency of the color with the muted pastel effect.


## Saturated Colors

Translation of a saturated PMS color into a transparent tint is a slightly subjective process. Transparent tints of color are formulated by adding clear to colors. Adding clear to a saturated color begins to dilute the pigment in the ink. The relative darkness of the base substrate also impacts the overall appearance of the color.


## Dark Colors

A guideline to keep in mind when specifying transparent tints of color is that the darker a color is, the less transparent it is. A dark tint requires more pigment and limits the transparency of the color.

# Opaque Colors Verses Transparent Tints of Color

Opaque color and transparent tints of color are both effective options in the design of product identification. Combining the two options expands upon the possibilities. Using a version of the same color in both opaque and transparent colors creates a tone-on-tone effect. Understanding the limitations in creating tints helps to make your project a successful one.


## Red

Typically reds translate well in to transparent color. However, saturated or pastel reds have limitations and the match becomes more subjective.


## Blue

Blues are similar to reds in that they are relatively straight forward to translate into transparent color. The same challenges exist when you consider saturated or pastel blues.


## Gray

Grey is by far the most popular color used in product identification. Because it is a neutral color it can be used on most products regardless of their color. It also combines with brushed and bright aluminum to create a clean look.


## Gold

Gold is the second most popular color used in product identification. The warmth of the color makes it an attractive option on many products. Typically transparent gold is used. However, combining the two is another effective option. Translating an opaque gold to a tint or vice versa is a subjective process.


## Black

Black is an opaque color. Adding clear base to the pigment to make it transparent begins to lighten the color. The greater amount of clear base added to black, the more transparent (and less black) it becomes.


## White

White presents the same challenge as black. Adding clear base to white to make it transparent makes it less white. A significant amount of clear base needs to be added to white to allow aluminum to show through. The dark substrate also impacts the color. The translation of white to a tint is a very subjective process.

# Transparent Tints of Color on Bright, Brush, and Spin

Transparent tints are available in a spectrum of colors which can be merged with metal finishes. The combination of transparent color and mechanical finishes results in a rich interactive surface which can be used in graphics or as backgrounds. Options in mechanical finishes include brushed, spun, and striped aluminum.

**Gold**

**Gray**

**Red**

**Blue**

# Translating Opaque Color to Metallic Color

Metallic colors, commonly used in the background of nameplates, rely on metal pigments (flakes, powders, or pastes) added to color formulations to create options ranging from fine to coarse metallic effects. The most popular choices are low gloss metallic silvers and grays used in contrast with high gloss graphics. Metallics create an etched appearance and can be effectively used in graphics. To ensure success, it is critical to understand the limitations in developing certain colors into metallics.


## Basic Match

Grey successfully translates into numerous metallic effects. Typically another metallic color is referenced when specifying how coarse the metallic should be.


## Black

As discussed in the section on translating opaque color to transparent tints, black is an opaque color. Adding any metal pigment impacts black making it lighter. The more metallic added to black, the lighter and less black it becomes.

## White

White is similar to black in that adding any metallic pigment to white impacts the color. Metallic pigments added to white darken the color. The more metallic pigment added to white, the greyer it becomes.


### Saturated

Adding metallic pigments to saturated colors begins to grey the color and lighten it. The result is a less chromatic color.

## Metallic Color Verses Transparent Tints of Color

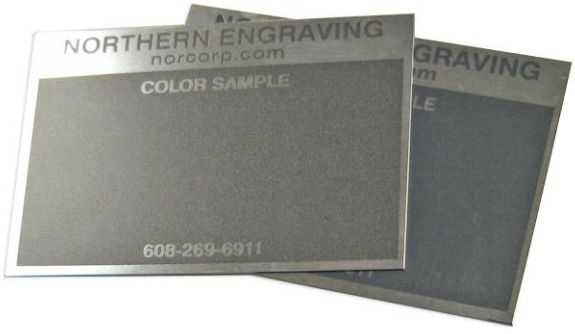
Transparent and metallic color used together in product identification is an attention getting combination. Typically the translation of a transparent tint of color to a metallic color or vice versa is a straight forward process.

### Gold


### Blue


### Lt Gray


### Dark Gray



# 6. How to Evaluate Your Color

The environment a color is viewed under has a profound impact on your color perception. Two primary factors in the perception of color are the type of light source in the viewing area and strongly colored nearby walls or objects. Perception of color also varies in individuals with a color vision deficiency or color blindness. This decreased ability to perceive differences between various colors is diagnosed with color vision tests. In addition, there are steps to help minimize problems in viewing and communicating about color.

## View Color Samples in a Light Booth

A color booth offers controlled light sources and a color-neutral environment for the comparison of newly developed color samples against the target color chip. It facilitates consistency of evaluation, improves communication, and minimizes product rejections. Three primary light sources are used in the development of color for product identification. Where the product will be used determines which light source is appropriate.

- Daylight (D65) – simulates daylight
- Cool White Fluorescent (CWF) – simulates commercial fluorescent lighting
- Ultralume (U30) – simulates energy efficient fluorescent lighting used commercially in U.S.

## View Color Samples Using Environmental Light

Color and light are inseparable. However, not everyone has a light booth. An alternative option is to use environmental lighting taking into consideration the appropriate light source. For example, color samples viewed under daylight in a light booth are also effectively reviewed outside. Overall, the key point is awareness of your environment and its potential impact on your perception of color.

## Consider Viewing Angle

The angle color samples are viewed at also impacts your perception of the colors. This is most evident in transparent tints of color and metallics. Two samples which match when viewed from one angle may fail to match when viewed from a different angle. Consideration of where the color will be used helps to guide decisions in determining the proper viewing angle. Is the end application horizontal? Vertical?

# 7. How to Assure Your Color Meets Your Durability Requirements

Deciding upon and specifying color is one step in the equation for successful product identification design. In addition, nameplates need to function perfectly for years, maintaining their original good looks under a broad variety of harsh environments. Therefore, the durability of your color is also a key consideration in nameplate design. Durability requirements are defined by the environment and conditions a nameplate is exposed to.

Durability of color is dependent on a combination of the ink system used and clear coat. Various tests are available to assure your color stands up to your demands.

## Consider the Environment Your Product will be Exposed to

Understanding the environment product identification will be used in helps guide decisions in development of color. Protective clear coats applied in combination with printed color bring the utmost protections against the elements. These durable top coats provide superior resistance to abrasion, sunlight, heat, and chemicals.

End application of the product determines which clear coat is required to meet the challenges of specific environments. For example, large appliance nameplates require resistance to stains and household cleaners. They need to stand up to ketchup and mustard while a nameplate for a beauty product requires testing for perspiration and fragrance. Each has unique requirements that determine which clear coat is appropriate for that product. Understanding requirements up front is important since overall color is a result of the combination of substrate, ink formulation, and clear coat. Changing one of these can have an impact on your color. Not all applications require a clear coat.


Test results of a color tested with and without protective topcoat.

Colors samples illustrate how a clear coat protects color from long term UV exposure. The left color sample does not have a clear coat while the one on the right does.

## Nameplate Testing

A variety of common tests are available to assure your product identification meets or exceeds your requirements. The ability to perform these tests assures colors produced meet your specifications. Environmental considerations such as hot or cold temperatures and various levels of humidity are tested in an environmental chamber. Accelerated UV testing provides data on how inks and materials stand up to extended UV exposure. Durability of materials and top surface printed inks are tested with a Taber abrasion wheel.

# 8. Glossary of Commonly Used Terms

**Hue**: quality of color which describes the color, red, green, blue, etc.

**Value**: quality that describes the lightness or darkness compared to a gray scale.

**Chroma**: purity of a color or the aspect by which it is free of white.

**Flip/Flop**: pertaining to the appearance of a material when viewed from a direction far from the viewing angle, evident when a sample is turned in the light and it may look light when held one way and dark when turned.

**Saturation**: the attribute of color perception that expresses the degree of departure from the gray of the same value.

**Metamerism**: a condition when colors match under one light source but do not match under another light source.

**Opaque**: ink that does not allow light to pass through it and has a good hiding power.

Transparent: inks which lack hiding power and permit transmission of light thus allowing previous printing or substrates to show through.

**Tint**: a transparent layer of color.

**Metallic**: inks which contain various sizes of flakes which have reflective properties and change the optical characteristics of color.

**Pearlescent**: colorant containing various pigments and exhibiting various colors depending on the angle of illumination and viewing.

**Shade**: adding black to a color.

**PMS** (Pantone Matching System): a standard for color reproduction allowing a color to be specified by a name and number.

**Munsell**: identifies color in terms of three attributes: hue, value and chroma. Recognized as a standard color specification in the U.S., Japan, Germany & Britain

**Light Source**: a standardized source of light for performing visual color evaluations and assessing levels of metamerism.

**CMYK**: an abbreviation for *cyan*, *magenta*, *yellow* and *black*; a standard for offset printing in full color; also referred to as *four-color* process.

**RGB**: stands for *red, green,* and *blue*; refers to the three hues of light that can mix together to form any color.

**LAB**: a color model used to describe all colors visible to the human eye; a uniform lightness scale.

**Colorimeter**: an instrument designed for the analysis of color through the measurement of light absorbed.

**Spectrophotometer**: a color analyzer which measures light absorbed at varying wavelengths.

**Densitometer**: a sensitive, photoelectric instrument that measures the density of images or color.