

# US10A and US10B - The Misunderstood Finishes.

By Bouchard Jr., H. Matt

Publication: [Doors and Hardware](#)

Date: [Tuesday, May 1 2001](#)

AS A FINISH IN THE HARDWARE INDUSTRY, US10B IS ONE OF the most misunderstood. This is due to the fact that the product will continue to change over time. In addition, it is not consistent from one manufacturer to another, but it is not intended to be, based upon the process used to attain the finish. It is my wish here to explain why this finish is misunderstood and to supply information to architects, designers and hardware specifiers that will clarify that this is an unstable finish that will continue to change in appearance from the day the product is manufactured.

The procedure for finishing various types of hardware products (flat plates, locks, exit devices and several other products) with the US10B finish is to use an oxidation process. Oxidized hardware provides an old or antique look often selected for esthetic reasons by the owner or the architect. Hardware items with this finish may appear to be uniform, but are usually not an exact match. However, each manufacturer does follow finishing methods that are fairly consistent within the products that they manufacture. Once products are installed, product appearance will change rapidly with use, normal wear, and exposure to the elements.

For example, an escutcheon plate on a lockset is seldom touched, but the lever or knob is touched constantly during use of the product. The lever handle itself will become polished (wearing off any oxidizing that was applied), causing the lever to be a different color than the escutcheon plate immediately behind it. Another example would be of a kick plate. People kick kickplates. However, when US10B material is specified, kicking will result in removing the oxidation from the plate. Where the plate is not kicked, it will still remain oxidized, showing a darker finish.

The base metal used for US10B finished products is critical to the outcome of the finish. Is the material brass, bronze, or steel? Oxidation will change the surface color of the brass- or bronze-based material. The more copper in the base material, the darker shade the final finish will be. Many hardware products are desired with dark oxidized finishes, as viewed on BHMA match plates. US10B is a finish compatible with the architectural colored anodic aluminum finishes.

Steel must be electroplated with brass or bronze before it can be oxidized. Steel-based material that has been plated is intended to be compatible with--not match--brass- and bronze-based material to have a similar oxidized appearance. Even with its appearance being similar to an oxidized product, the fact is that the electroplating process is different and the resulting product will react differently. More on this point will be discussed later.

The following chart shows the brass and bronze compounds used to manufacture various pieces of the finish hardware that we use daily. Cast and wrought brass used in the hardware industry are often referred to as yellow brass. Bronze has a higher percentage of copper in it than brass, giving it a redder or darker appearance.

## Oxidizing Process

Chemical oxidizing is a treatment that colors the surface of the metal, Originally, most hardware had a base material of brass or bronze that did not have any protection or plating over it. Materials simply oxidized over

time. Wear from use naturally polished the hardware where it was touched, but other areas were seldom or never touched, and their dark appearance remained.

According to the ANSI/BHMA Standard A156.18, "Materials and Finishes," 2000, US10B (613) is dark oxidized satin bronze, oil rubbed (commonly referred to as antique bronze). This standard describes a color, not the process of how the finish was created.

To oxidize, there are three factors needed:

- \* The temperature of the solution for oxidation.
- \* The time for the product to be submerged in the solution.
- \* The alloy of the base material.

Today, some of our standard hardware products are still oxidized in this same manner, yet there are also some products that are electroplated to give the appearance of having been oxidized.

### Electroplating Process

Electroplating is the depositing of a metallic coating onto an object of hardware by putting a negative charge onto the product and immersing it into a solution containing an ingot of the metal to be deposited. The metallic ions of the ingot carry a positive charge and are attracted to the negatively charged parts. When the positive ions reach the negatively charged part, the deposit is made, and the surface color of the product is changed.

Part of this process includes product cleaning, polishing, pre-treatment and post-treatments. These steps are often more critical than the electroplating step itself. Consideration must also be given to safety issues in handling the various chemicals, proper waste treatment and disposal, and a host of other issues.

In the electroplating process of hinges and other products that do not receive oxidation, US10A (641)/US10B (640) is an imitation of the oxidizing process. US10A (641) is lacquered, a process commonly used for steel-based material. BHMA lists the three digit number of 641 but does not recognize the US10A finish commonly used in the industry. US10B (640) is plated and oil-rubbed, a process commonly used for brass-based material. However, several manufacturers will provide US10B (640) (oil-rubbed) on steel based material. One point of caution: when the oil dries, there is no protection on the steel based hinge except the plating material. This may cause the product to revert back to its natural state more rapidly. Steel products that are not protected against environmental elements will eventually begin to rust.

Hardware which is electroplated has an under-plating of copper or nickel, followed by two coats of plated bronze. Then a coat of black nickel is applied which is subsequently struck-off to provide the relieved appearance. If the product is of a brass- or bronze-based material, the product is then oil-rubbed; if it is steel-based, it is lacquered. This provides the desired appearance to be compatible with other hardware that has been oxidized. An important point here is that the finish is to be compatible, not be a perfect match. This is the area that is most misunderstood.

According to ANSI/BHMA A156.18, "Materials and Finishes," 2000, the finish referred to as US10B (613) is a category "B." To quote the category listing: "Category B finishes are those that are unstable and are applied to

the base material or are the base material defined by the description in 5.2. These finishes shall be compatible with the BHMA match plates, but these finishes cannot and do not match from one alloy or form of material to the next and from one manufacturer to the next."

This same standard also refers to US10A (641) Category (614E). To quote the category listing: "Category E finishes shall be equivalent in appearance when compared with the corresponding Category A, B, or C finishes. They shall be viewed using the formula specified in 4.3.3.1 and 4.3.3.2."

Section 4.3.3.1 reads: 'Comparative finishes shall appear the same when viewed two feet apart and three feet away, on the same relative plane.'

Section 4.3.3.2 reads: "Viewing Conditions. Place the specimen on a neutral background (middle gray to white) and illuminate it with natural or artificial daylight in 4.3.3.3."

### When Specifying US10B

The most common problem in misunderstanding this finish is to think that all products will appear identical. Most individuals will hold the products side by side and expect that the finishes will match precisely. This will not be the case. The time in the solution, the base metal, the composition of the solution, the humidity of the area where the process takes place, electrical currents in the plating baths, even local temperature and altitude will affect this finish. Additional causes for differences in color or hue will be the amount of oil applied (this is normally a hand operation) as well as the amount of time from manufacturing to end use. Once oil is applied to the product, it begins to dry. Depending on climatic conditions, the oil may dry faster and offer less protection.

Once the product is installed, the deterioration process will begin. First, the act of actually using the hardware will cause change. Where the products are touched, the oil and oxidation will begin to wear, Acids from the hands will begin to break down the finish as well. Areas that are not touched will remain fairly consistent to the condition of the products when they were received.

### Care and Maintenance

Care and maintenance of all finished hardware products should be as important as the proper selection and use of all construction materials. Abrasive cleaners, harsh chemicals or lacquer thinner should not be used to clean the surface of any door hardware. The most commonly used cleaner should be a lightly dampened, clean, cotton cloth, Most manufacturers will void their warranties when products are abused. The use of abrasives and harsh chemicals is often considered abusive treatment.

### Conclusion

An informed customer is normally a happy customer. Hopefully, this information may help architects, designers and end users in understanding the purpose and intent of a finish that may have been unexplained in the past. We are all customers of one another. The purpose of this article has been to fill in some of the blanks.

I wish to thank Ed Rottmann, Robert J. Jutzi, DAHC, and Keith Pardoe, AHC/CDC for their assistance in preparation of this article.

<b>Compound</b>	<b>Base Materials Percent</b>
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CAST BRONZE

Copper	85.0
Tin	5.0
Zinc	5.0
Lead	5.0

CAST BRASS

Copper	70.0
Tin	None
Zinc	27.5
Lead	2.5

WROUGHT OR

COMMERCIAL BRONZE

Copper	90.0
Tin	9.0
Zinc	1.0
Lead	None

WROUGHT BRASS

Copper	60.0 to 80.0
Zinc	20.0 to 40.0
Lead	None

### 35 Other Antique Finishes

Other finishes that react in the same manner as US10B (613) are:

- \* US5 (609) brass, (638) steel -- Satin brass, blackened, satin relieved, clear coated
- \* US7 (610) brass, (636) steel -- Satin brass, blackened, bright relieved, clear coated
- \* US15A (620) brass, bronze, (647) steel -- Satin nickel-plated, blackened, satin relieved, clear coated
- \* US17A (621) brass, bronze, (648) steel -- Nickel-plated, blackened, relieved, clear coated