



## **DHI Article for May issue of Door and Hardware Magazine**

### ***US10A (640 / 641) & US10B (613) – The Misunderstood Finish***

#### **History of this Finish:**

As a finish in the hardware industry US10B (613) is one of the most misunderstood due to the fact that when this finish is requested, the final product will continue to change. This finish is basically not consistent from one manufacturer to another, and it is not intended to be, based on the process used to attain the finish. It is my wish here to explain why this finish is misunderstood and supply information to architects, designers, and hardware specifiers that will clarify that this is an unstable finish and will continue to change in appearance from the day the product is manufactured.

The procedure for finishing US10B (613) on various types of hardware products (flat plates, locks, exit devices, and several other products), is to use an oxidation process. 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. Various hardware products are desired with dark oxidized finishes, as viewed on BHMA match plates.

Whether plating or oxidizing, the various materials, many factors must be considered in the final outcome of this finish. The base metal is critical. Is the material brass, bronze, or steel? Steel based material is not oxidized but electro-plated, and is intended to be compatible with, not match, the final outcome to have an oxidized appearance. Even with this appearance being similar to an oxidized product, the fact is that the process is different and the results will react differently. More on this point will be discussed later.

The following charts provide an idea of the non-ferrous material compounds established for the base materials that are used to manufacture various pieces of the finish hardware we use daily. The cast and wrought brass used in the hardware industry is often referred to as yellow brass. The more copper included in the base material the redder or darker the final product.

**Base Materials:****Cast Bronze (Red Brass)**

Compound	Percent
Copper	85.0
Tin	5.0
Zinc	5.0
Lead	5.0

**Cast Brass**

Compound	Percent
Copper	70.0
Tin	None
Zinc	27.5
Lead	2.5

**Wrought or Commercial Bronze**

Compound	Percent
Copper	90.0
Tin	9.0
Zinc	1.0
Lead	None

**Wrought Brass**

Compound	Percent
Copper	60.0 to 80.0
Zinc	20.0 to 40.0
Lead	None

**Oxidizing Process:**

Chemical oxidizing is a surface 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. Materials naturally oxidized over time. Wear from use naturally polished the hardware where it was touched, but oxidized areas were seldom or never touched. Hence these areas did not change naturally over the course of use and the dark appearance remains.

According to the ANSI / BHMA Standard A156.18, 2000 US10B (613) is dark oxidized satin bronze, oil-rubbed (commonly referred to as antique bronze). This standard calls for a color, not a process.

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 the oxidized process.

**Electroplating Process:**

Electroplating is the deposit of a metallic coating onto an object of hardware by putting a negative charge onto the product and immersing it into a solution, which contains 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 to change the color of the surface of the product.

Part of the 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 electro-plating 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. 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 electro-plated, has an under-plating of copper or nickel, followed by two coats of plated bronze. Then a coat of black nickel is applied and 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, or lacquered for steel based material. 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 match. This is the area that is most misunderstood.

According to ANSI / BHMA A156.18 – 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.”*

Oxidized hardware provides the appearance of an old or antique look often selected for esthetic reasons by the owner or the architect. However, this finish, although it may appear to be uniform, is not an exact match. However, each manufacturer does follow finishing methods that are fairly consistent within the products that they manufacturer. Once products are originally installed, product appearance will change rapidly with use, normal wear, and exposure to the elements. US10B (613) is a finish compatible with the architectural colored anodic aluminum finishes.

For example an escutcheon plate on a lockset is seldom touched but the lever or knob is touched during use of the product constantly. 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 kickplate. People kick kickplates that is their purpose. However, when US10B (613) material is specified, the kicking process through use will remove the oxidation from the plate where kicked. Where the plate is not kicked, it still remains oxidized and a darker finish shows.

### **When Specifying US10B (613)**

The most common problem in misunderstanding this finish is to think that all products will appear to be 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.

### **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, and clear coated

### **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 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.