STUART DEAN

WHITE PAPER

Oxidizing Stainless Steel (Blackening Stainless Steel)

The Stuart Dean Company has been a leader in the refinishing of Architectural metal surfaces for over 80 years. Formed in 1932, the Stuart Dean Company has witnessed the development of new materials, and has striven to maintain our leadership in providing new finishes for the marketplace. Beginning as a local firm, The Stuart Dean Company has evolved into an international enterprise with offices throughout the United States and in Canada.

MISSION STATEMENT

The Stuart Dean Company will provide innovative solutions to our clients for the Architectural and Ornamental metals that they have invested in their properties. By maintaining a close and ongoing relationship with our clients, we will insure the value of their investment over the long term, and utilize our varied experiences to enhance these investments.

STAINLESS STEEL REVIEW

Stainless steel is essentially a low carbon steel which contains chromium at 10.5% or more by weight. It is this addition of chromium that gives the steel its unique stainless, corrosion resisting properties.

The chromium content of the steel allows the formation of a rough, adherent, invisible, corrosion-resisting chromium oxide film on the steel surface. If damaged mechanically or chemically, this film is self-healing, providing that oxygen, even in very small amounts, is present. The corrosion resistance and other useful properties of the steel are enhanced by increased chromium content and the addition of other elements such as molybdenum, nickel and nitrogen.

There are more than 60 grades of stainless steel. However, the entire group can be divided into five classes. Each is identified by the alloying elements which affect their microstructure and for which each is named. For purposes of this discussion, it will be limited to the materials commonly used for architectural finishes, 304, 304L, 316 and 316L stainless steel. The use of the letter L after the grade number, i.e., 304L, means that the carbon content is restricted to a MAXIMUM of 0.03% (normal levels are 0.08% max. and in some grades can be as high as 0.15% max.). This lower level of carbon is usually used where “welding” will be performed. The lower level of carbon helps to prevent the chromium from being depleted (by forming chrome carbides at the weld site) and therefore allow it to remain over 10.5% so it can form the “passive” oxide layer that gives stainless its corrosion resistance.

EXISTING FINISHES

There are several finishes presently available to be applied to Stainless Steel. These finishes are originally applied by the fabricator, and field maintained by The Stuart Dean Company. The finishes that are most commonly used are as follows:

NUMBER 8 – Mirror Finish

Mirror polished surfaces, as the name implies, have a bright reflective surface which give a mirror like image. They are the most labor intensive mechanically finished surface with an obvious impact on cost and time of production. Additionally, when vandalized, this finish is the most expensive to restore to a high polished mirror state.

NUMBER 4 – Satin Finish

The easiest of the finishes to maintain, a number 4 finish is used for work surfaces, handrails and where appearance is important. A number 4 surface is produced by cutting the surface with abrasive belts to remove a very small amount of metal without affecting its thickness. For architects and designers, number 4 finish gives low gloss and best apparent flatness of panels. For fabricators, the No 4 finish is directional, allowing easy matching of surfaces and refinishing of welds. For end users, the surface can be repaired to remove any service damage.

NUMBER 6 – Angel Hair Finish

A finer, more random pattern than a number 4 finish. It is used in architectural applica - tions where a lower luster of material is desired, or to contrast with brighter finishes. This finish can be field repaired, however, due to its soft pattern and inherent random design, scratch removal is a timely process. In addition, the original finish may not be retained.

COMPARISONS TO OTHER ARCHITECTURAL MATERIALS

Stainless Steel vs. Aluminum

Stainless Steel is a far stronger and more durable material than Aluminum; however, it does have limitations. Design and color choices are limited to the original finish of the stainless steel. Aluminum is available in multiple colors and sizes. Previously, in order to add any color to the stainless steel, it would be necessary to roughen the surface sufficiently for adherence of a selected primer and paint. Although this process will add color, it masks the inherent beauty of the steel, and leaves the surface subject to the durability of the coating.

Stainless Steel vs. Bronze

Stainless Steel is also far stronger than, and it is also far less expensive than commercial Bronze. Stainless Steel is still limited to the original color finish. Bronze can be oxidized to numerous colors, from a light antique finish, all the way to a green patina. Also, bronze can be field refinished to change the existing color to match any future design changes.

OXIDIZING STAINLESS STEEL (BLACKENING)

Previously all "Blackening" of stainless steel was limited to either off-site factory applications, or through the application of a tinted coating. Invariably upon transport and installation, the blackened finish would be damaged (generally via scratching) and field repairs were limited to the application of a close matching color to mask the damage. With the use of any surface colors to alter or repair the finish, the beauty, of the stainless steel is diminished.

Stuart Dean can now offer a refinishing process that will allow the Stainless Steel to be refinished at one of our locations, or on the job site. Fabricators can now provide their clients with a finish that is not subject to the added costs of transportation, and limited on site repairs. Architects can provide clients with added design options by offering on site refinishing of the existing stainless steel, rather than having to replace with new material. Additionally, this process allows clients to have a finish placed upon their building's stainless steel, which will provide them with a unique look for either new construction, or building renovation.

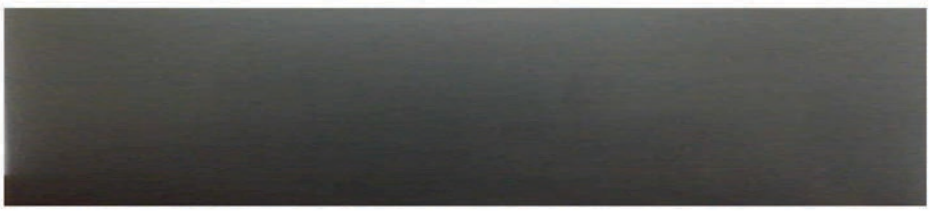
SOLUTION

The Stuart Dean Company now offers a cost effective method to oxidize stainless steel. Through a staged chemical process, a uniform oxidized (blackened) finish is achieved. The stainless steel does not have to be immersed in a chemical bath, nor are any coloring agents employed. This will offer Architects and Fabricators the ability to widen the range of finishes available to their clients. Using new and existing number 4 satin finish stainless steel, Stuart Dean can apply an oxidized (blackened) finish to the surface of the Stainless Steel. The oxidized stainless steel can also be used on the exterior of a building. This allows existing materials to be altered in place, removing the expense of replacement of the existing stainless steel. Also, any scratches or wear that may occur during the installation of new panels, can be repaired in the field.

Presently, Stuart Dean can offer two finishes for stainless steel.

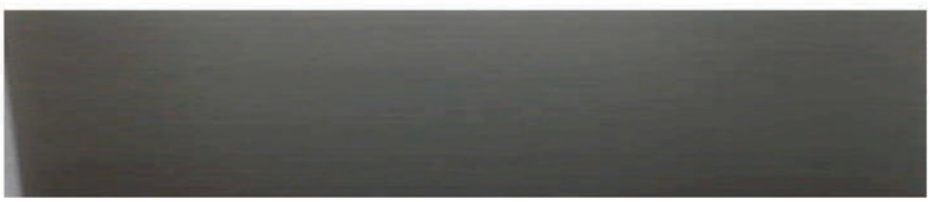
OM-1

This is a dark finish typically referred to as a blackened finish. It adds depth and luster, yet still retains the strength, durability, and beauty of the stainless steel.



OM-2

This is a lighter finish than OM-1, which allows Architects and Designers the ability to coordinate finishes for their clients.



Both of these finishes are readily available for application, and we would be pleased to discuss options with you.