

BLACK OXIDE SURFACE FINISH

Black Oxide on steel fasteners is a conversion process that creates a black surface on the fastener. The black oxide does not cause a change in the dimensions of the part (due to a material build up) or in the physical properties of the surface of the fasteners.

The formation of the black oxide can be produced in several ways, the two most common methods are:

1. Quench and Temper

Fasteners that are heat-treated by the “quench and temper” process will form a black oxide on their surface when the quenching operation is controlled. The finish can vary from a deep black to a dark gray in color. Examples of fasteners that become black from heat treatment: Grade 8 Cap Screws, Grade 5 Cap Screws, Alloy Steel Socket Head Cap Screws, Grade 8 Nuts and Hardened Flat Washers.

2. Coater

Black Oxide can also be formed in a secondary operation at a “Coater”. The fasteners are immersed in a chemical solution that will cause the surface of the fasteners to form a black oxide finish. This operation will create a more uniform glossier black appearance than can be produced by heat treatment. There are two chemical processes available for creating black oxide on fasteners.

A. “Hot” Black Oxide

This procedure uses a caustic solution that is heated to approximately 275° F. The fasteners are initially subjected to a cleaning process and are then dipped into the heated solution for a specified time that causes the surface to turn a uniform black.

B. “Room Temperature” Black Oxide

Fasteners are initially cleaned and the surface is activated (usually in an acidic solution) then dipped into a solution that causes the surface to turn black at room temperature. In both cases the chemical process turns the surface of the material black and does not change the dimensions or physical performance of the material. This coating is not designed to provide any additional corrosion protection; it does provide a surface that subsequent coatings can be applied on top of to enhance corrosion protection (oils, waxes, topcoat sealers, etc.).

When a fastener, that is to be heat-treated, is specified with a Black Oxide Finish, many manufacturers will supply what is technically a plain finish part that has a black oxide on its surface that was created by the heat treatment process. If the part is not a heat-treated part, then the manufacturer will send the part out to a coater to be black oxide treated. End users of fasteners need to be aware of the different processes available to create a black appearance to the fasteners they are specifying. When a black appearance is required on a fastener that is heat-treated, the black oxide that is formed in heat treatment is usually sufficient for most customers. The additional cost associated with having the part sent to a plater for a secondary operation can then be avoided.