U. S. Steel Galvannealed Sheet is carbon steel sheet coated with zinc on both sides by the continuous hot-dip process described in Production Methods. Immediately as the strip exits the coating bath, the molten zinc coating is subjected to an in-line heat treatment that converts the entire coating to a zinc-iron alloy. (The iron diffuses from the steel into the coating.) The galvannealed surface has a non-spangled matte finish, a finish very different than the highly metallic appearance of the galvanized coating. At times, the galvannealed coating may appear similar to uncoated cold rolled steel.

One of the primary attributes of the galvannealed coating is that the surface accepts paint very readily. It can be painted without the application of a pretreatment, although a pretreatment will enhance the performance after painting.

Other attributes of the galvannealed coating versus a galvanized coating include:

1. the zinc-iron alloy coating can be welded more easily than galvanized, and
2. the coating is harder than a galvanized coating and is thus more resistant to scratching and manufacturing damage.
The zinc-iron alloy coating on galvannealed product behaves very differently than the soft galvanized coating. During fabrication, there is almost always some degree of powdering of the coating. Heavier coatings will exhibit more powdering. For this reason, typical galvannealed coatings are thinner than most galvanized coatings. Since galvannealed product is intended to be painted, a thinner coating can be successfully applied to provide long product life. Additionally, the coating is less reactive when exposed to the atmosphere, and as a result, the dissolution that occurs during corrosion occurs more slowly than for a galvanized coating. Thus, the coating does not have to be as thick as a galvanized coating to provide the same level of protection. The synergy between the lower overall corrosion rate of the galvannealed coating and the paint can provide a long life product.

Galvannealed steel sheet can be readily postpainted, i.e., painted after fabrication of a part. It is not intended to be prepainted, i.e., painted in coil form and then formed into a shape. The brittle nature of the coating makes forming after painting a difficult task to avoid degradation of the corrosion performance in subsequent service.

As stated previously, galvannealed sheet is specifically designed to be used in the painted condition. The presence of iron aids to reduce the rate of corrosion of the coating. However, because the coating contains iron, typically from 8 to 11%, it tends to exhibit a slight reddish-orange appearance when exposed to moisture in the unpainted condition. After painting, only very slight staining is found at sheared edges and other paint-film discontinuities. As a result, the product performs excellently, and is used for such aesthetically demanding applications as automobile
exposed-body panels.