



# Titanium Technical Data Overview



## InvariBold

### Product Description

InvariBold is a directional, linear ribbed titanium finish designed for use in architectural applications. Its moderate reflectivity lends itself to a variety of applications, including wall panels, coping and trim. Since InvariBold has no coatings to deteriorate, it will last indefinitely with little maintenance.

### Grade Selection

Optimal performance of InvariBold is assured by its highly engineered properties, which appear in Table I. Grade 2 is appropriate for most applications. Other grades may be considered where design parameters such as wind resistance require elevated mechanical properties. It should be noted that grades with higher mechanical properties will be somewhat more difficult to fabricate. For most applications, Grade 2 offers a practical balance between formability and strength. InvariBold is at home in severe environments, such as seacoast atmospheres subjected to salt water spray.

### Pounds Per Piece

Thickness (in.) x Width (in.) x Length (in.) x .163

### Available Sizes

Please refer to Table II. Coils and cut lengths up to 288" are available.

### Typical Surface Characteristics

Width of rib cycle (tooth and groove) ..... .04"  
 Depth of rib pattern..... .001"

Table I		Grade 2
<b>CHEMICAL ANALYSIS</b>		
Titanium	99.2% min.	
C, Fe, H, N, O	.705% max.	
<b>TYPICAL MECHANICAL PROPERTIES</b>		
Yield Strength (psi)	40,000	
Elongation in 2 inches	20%	
Hardness (Rockwell B)	80	
<b>PHYSICAL PROPERTIES</b>		
Density (lb./cu. in.)	.163	
Modulus of Elasticity in Tension (x 10 <sup>6</sup> lb./sq. in.)	15.0	
Mean Coefficient of Thermal Expansion per °F (x 10 <sup>-6</sup> )	32 - 212°F	4.8
	32 - 600°F	5.1
	32 - 1000°F	5.4
Melting Point Range °F	3,030	

Table II	Size Range (inches)				
	WIDTH				
THICKNESS	.75 - 18	>18 - <24	24 - 36	>36 - 48	>48 - 60
.0291 - .075	•	•	•	•	
.0178 - .029	•	•	•	•	
.015 - .0177	•	•	•	•	

## **Fabrication**

InvariBold is readily welded or soldered. While formation of a heat tint scale can be avoided through use of shield gasses, care must be taken to remove this scale through chemical means. Flux residue must be thoroughly removed after soldering. Since InvariBold is essentially non-directional, it is not necessary to orient panels in relation to the rolling direction. However, to avoid the possibility that any subtle directional differences will be visible, we recommend panels be fabricated to maintain orientation of the original sheet alignment.

Titanium's relatively low modulus of elasticity, compared to other metals like stainless steel, results in substantial springback behavior during forming. This must be accounted for in tooling setups. Further, bend radii that are more generous than those used for most other metals are recommended. Additionally, titanium is more susceptible to galling than other metals and may require a more aggressive lubrication technique.

## **Fire Resistance**

Titanium is a high melting point alloy which will provide superior resistance to fire damage than lower melting point alloys and combustible materials.

## **Flatness**

InvariBold is supplied to ASTM standard commercial allowances.

## **Installation**

InvariBold is supplied with a high grade UV resistant protective plastic covering designed to withstand the elements for several weeks. However, it is advisable to remove this material promptly after installation to prevent adhesive residue from remaining on the finish.

Despite the uniform finish, titanium has a certain degree of natural color variation. It should be further noted that any metallic surface, even a painted one, is sensitive to misalignment of panels on differing planes. Care should be taken to ensure installation within reasonable tolerances in order to maximize visual consistency in panels. After installation is completed, any rust stains from tools or construction debris must be removed.

## **Maintenance**

Designed to be essentially maintenance free, InvariBold will last indefinitely without requiring attention. It may, however, be appropriate to clean the surface to maintain its original appearance. Any detergent/ammonia solution can be effective for general cleaning. There are a variety of aerospace cleaners and solvents on the market that are appropriate to address stains and adhesive residues.

## **Environmental Impact**

Titanium is recyclable and extremely stable at ambient temperatures. Further, without VOC emissions, which are inherent in coated products, InvariBold is an environmentally sensible solution.

## **Warranty**

For warranty information, please contact a representative.