

## Technical Data Sheet No: LD-100.3

### Design Considerations

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In order to provide our clients with the best possible solutions, Valmont® Structures Architectural Facades presents the following information to help you with your material and finishing selection.

Please be advised that this information is provided as a guide only and was prepared using resourced technical data and market based experience. Talk to your Valmont Structures Architectural Facades technical representative to further discuss your design requirements.

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### Material Considerations:

#### Mild Steel

Mild Steel contains the same properties as iron, with an increased carbon content. Mild Steel is the most common form of steel as it is relatively low cost and provides material properties acceptable for many applications. When the material comes in contact with water and oxygen, it's susceptible to rusting. Where salt is present, usually in salt water, the effect is exaggerated.

Due to the nature of the material, Valmont Structures recommends that the product be coated prior to installation. Typical protection methods include hot-dip galvanizing and electro-plating. These processes cannot guarantee against corrosion as any scratching or minor damage can re-expose these raw materials.

#### Aluminum

Aluminum, around one third the weight of steel, carries the advantages of a light weight material. It is a soft metal, and as such can be prone to surface blemishes during manufacturing processes. Valmont Structures may recommend the material be coated prior to installation, if necessary. Aluminum naturally generates a protective oxide coating and is highly corrosion resistant. Different types of surface treatment such as anodizing, painting or lacquering can further improve this property. Surface treatment is particularly useful for applications where protection and conservation are required, such as external applications.

#### Stainless Steel

All Stainless Steels have a high resistance to corrosion. This resistance to attack is due to the naturally occurring chromium-rich oxide film formed on the surface of the steel. Although extremely thin, this invisible, inert film is tightly adherent to the metal and extremely protective in a wide range of corrosive environments. The film is rapidly self-repairing in the presence of oxygen and damaged by abrasion, cutting or machining is quickly repaired.

The two main grades of Stainless Steel used are 304 and 316; and both have high corrosion resistance. Grade 316 has excellent corrosion resistance. Its main advantage over grade 304 is its increased ability to resist pitting and crevice corrosion in warm chloride environments. It resists ordinary rusting in virtually all architectural applications and is often chosen for more aggressive environments such as sea front buildings and fitting on wharves and piers.

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Although Stainless Steel has a high corrosion resistance, it is still susceptible to surface damage. The main problem is an issue called tea staining. This discolouration is caused by a buildup of contaminants on the surface of the material. The closer to a marine environment, the more severe the effect becomes; within 3.11 miles of the coast, grade 316 or above should be used. Lesser resistant grades such as 304 will be subject to more damage in less time.

Valmont® Structures Architectural Facades recommends that Stainless Steel be passivated or electro polished to minimize the effects of tea staining installation.

Maintenance also plays a key role in the defense against Stainless Steel corrosion. Washing the material regularly prevents buildup of contaminants and extends the life of the product dramatically. Although tea staining may occur, it does not affect the structural integrity of the material and can be controlled.

### **Titanium**

Titanium is characterized by an excellent resistance to corrosion, from the most oxidant acids to saline atmospheres. However these increased capabilities come at an increased price point.

### **Copper**

Copper is often used as an electrical conductor in cables, but is also used as a decorative building material. Copper is a very malleable and corrosion resistant material.

### **Brass**

Brass is a term used to describe a wide range of copper-zinc alloys that have a combination of properties including strength, ductility, hardness, conductivity, wear resistance and corrosion resistance. These properties ensure that brass can be easily punched, fabricated and formed.

### **Galvabond**

Galvabond G2 steel is hot-dip galvanized, zinc-coated, commercial forming steel with a spangled surface, suitable for general manufacturing. As the material is pre coated, manufacturing processes such as expanding and perforating can leave raw material beneath exposed. This can result in rusting of the exposed material which may spread over time. Valmont Structures does not recommend using Galvabond material over 0.064in thick for this reason. Additionally, pre-galvanized materials such as Galvabond are recommended by Valmont Structures for indoor use only, due to the risk of corrosion.

### **Zincalume**

Zincalume G250 steel is a hot-dip zinc/aluminium alloy coated, structural steel with a regular spangled surface. The coating is a blend of aluminium and zinc, which greatly enhances its corrosion resistance. Zincalume has been found to have a lifespan of up to four times that of ordinary galvanized steel.

As the material is precoated, manufacturing processes such as expanding and perforating can leave the raw material beneath exposed. This can result in rusting of the exposed material which may spread over time. Valmont Structures does not recommend using Zincalume material over 0.064in thick for this reason.

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### **Zincanneal / Zincseal**

Material such as Zincanneal and Zincseal are hot-dip zinc/iron alloy coated and are suitable for coating prior to installation. As the material is pre-coated, manufacturing processes such as expanding and perforating can leave the raw material beneath exposed. This can result in rusting of the exposed material which may spread over time. Valmont® Structures Architectural Facades does not recommend using this material over 0.064in thick for this reason.

Galvabond®, Zinalume®, Zincanneal®, Zincseal® are registered trademarks of BlueScope Steel Limited.

## **Coating and Finishing Considerations:**

### **Anodizing**

Anodizing converts the surface of aluminum from its natural state to another; with markedly different properties. This new surface is not a coating in the traditional sense as it is produced from the parent material and is integral with it. This provides highly effective corrosive resistance.

Due to manufacturing processes surface scuffs and scratching may be visible. Although care is taken to prevent this, Valmont Structures cannot guarantee against it and light scratching and other marks are often emphasized by the anodizing process.

Understanding that anodizing itself is a translucent finish, any inconsistencies within the supplied aluminum (including metallurgy, surface texture or grain structure) can become evident or accentuated after anodizing. Valmont Structures ensures where practical, that raw material for any job is sourced from the same mill run, thereby reducing the variation in the level of impurities. However, even with this extra care Valmont Structures are unable to guarantee a consistent surface finish.

For more information refer to LD-101.3 - Anodizing Aluminum.

### **Electro Polishing**

Electro Polishing is a process of removing a layer of metal from the surface, leaving a smooth and bright finish, generally used on stainless steel. Maintenance is required to prevent build-up of contaminants, which can lead to corrosion and tea staining.

### **Powder Coating**

Powder Coating is a decorative and durable plastic coating which can be provided in an almost unlimited range of colors. Powder Coating is an environmentally friendly process, as it does not give off any Volatile Organic Compounds, which are evident in other liquid based coatings. Scratching or chipping the coated surface of the product after it has been powder coated can leave the raw material exposed. This can cause corrosion to the product over time.

### **Passivating**

Passivating is a method of removing surface contaminants from Stainless Steel. It does not usually affect the surface color of the material. Maintenance is required to prevent build-up of contaminants, which can lead to corrosion and tea staining.

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### Electroplating

Electroplating is an electro chemical process used to deposit a metallic coating on the base material, and is done after the manufacturing process. Scratching of the product after it has been electroplated can leave the raw material exposed. This can cause corrosion to the product over time.

### PVC Coating

Material may be supplied with a PVC protective coating to protect against marking to the material. This can interfere with machinery during the manufacturing process. As a result of this, Valmont Structures may be forced to remove the coating, which may result in surface markings to the material. Valmont Structures will not be held responsible if this occurs during the manufacturing process.

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