“ZAM” is a registered trademark of NIPPON STEEL NISSHIN CO., LTD. in Japan (Reg. No. 4637134), the United States (Reg. No. 3254099) and other countries and regions. “ZAM” is the brand name of high corrosion resistance hot-dip coated steel sheets developed by NIPPON STEEL NISSHIN CO., LTD. © 2019 NS Wheeling-Nisshin, Inc. All Rights Reserved.
Highly Corrosion Resistant Coated Steel

Chemical Treatment

Zn-Al 6%-Mg 3% Coating Layer

Steel
Corrosion Mechanism Of ZAM®

- Mg & Al form a fine, tight protective film

Thin Zinc-Aluminum based film containing Magnesium.

Corrosion of coating layer suppressed

Excellent Corrosion resistance
Corrosion Resistance of ZAM®

- **Steel Base**
- **ZAM® Coating Layer**
- **GI Coating Layer**

Progress of corrosion:

1. **ZAM® Coating Layer**
2. **GI Coating Layer**
3. **Steel Base**

- Zinc and zinc-aluminum based protective surface film containing magnesium
- White rust composed primarily of zinc oxide

Red Rust
ZAM® fine dense corrosion products

<table>
<thead>
<tr>
<th>GI (Zn)</th>
<th>Galfan(Zn-5%Al)</th>
<th>ZAM® (Zn-6%Al-3%Mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porous &amp; coarse</td>
<td>Porous</td>
<td>Fine &amp; compact corrosion products</td>
</tr>
</tbody>
</table>

Appearance of corrosion products after 4hrs salt spray test  (Coating mass : 0.30 oz/ft²)
ZAM® Corrosion on Flat Side

Red rust occurrence after salt spray test (untreated)

![Graph showing red rust occurrence over time for different coating types.](image)

<table>
<thead>
<tr>
<th>ZAM®</th>
<th>Galvanized</th>
<th>Zn-5%Al</th>
<th>55%Al-Zn</th>
</tr>
</thead>
</table>

*2,500 Hours of Salt Spray (Coating Weight: .30 oz/ft² on one side)*
Corrosion Mechanism on Cut Edge

ZAM® coating layer

Initial exposure period

Long exposure period

Enlarged picture

Substrate

Fine zinc-based Mg film flows over cut edge

Protective film changes to gray then gray-black
**ZAM® Cut Edge Corrosion Resistance**

<table>
<thead>
<tr>
<th></th>
<th>1000h</th>
<th>4000h</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZAM®</td>
<td><img src="ZAM_1000h.png" alt="Image" /></td>
<td><img src="ZAM_4000h.png" alt="Image" /></td>
</tr>
<tr>
<td>GI</td>
<td><img src="GI_1000h.png" alt="Image" /></td>
<td><img src="GI_4000h.png" alt="Image" /></td>
</tr>
<tr>
<td>Zn-5%Al</td>
<td><img src="Zn-5%Al_1000h.png" alt="Image" /></td>
<td><img src="Zn-5%Al_4000h.png" alt="Image" /></td>
</tr>
<tr>
<td>55%Al-Zn</td>
<td><img src="55%Al-Zn_1000h.png" alt="Image" /></td>
<td><img src="55%Al-Zn_4000h.png" alt="Image" /></td>
</tr>
</tbody>
</table>

*Appearance of cut edge after salt spray test (Gauge: 0.091”; Coating .30 oz/ft² on one side)*
ZAM® Replaces Post Hot Dip GI

ZAM® Eliminates Process = Cost Reduction
ZAM® Best Applications & Target Markets

Best Applications:
- Heavy GI coating → ZAM®
- Post dipped GI → ZAM®
- Heavy gauge GL → ZAM®
- Stainless steel → ZAM®
- Environmental → ZAM®

Targets
- Agriculture Related
- Animal confinement
- Swimming Pool Walls
- Solar Racking (UL2703)
- Architectural Panels
- Highway Construction
- Fence / Railing
- Automotive

Nippon Steel Nisshin Examples:
- Construction framing
- Green house tubing
- Solar racking
- Automotive parts/covers
- Electrical panel/cabinet
- A/C panels / base tray
- Agriculture building
Benefits of ZAM®

• Longer life than other coatings
• Cut edge rust protection
• Thinner coating yet more protection
• Excellent in severe environments
• Eliminates need for post dip galvanizing
• Superior formability – harder coating
• Cost savings through less maintenance
• Bridge between stainless and heavy galvanized