“ZAM” is a registered trademark of NIPPON STEEL CORPORATION 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 CORPORATION

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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®

ZAM® Coating Layer
Steel Base

GI Coating Layer
Steel Base

Progress of corrosion:
- 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><img src="image1" alt="GI (Zn) sample image" /></td>
<td><img src="image2" alt="Galfan (Zn-5%Al) sample image" /></td>
<td><img src="image3" alt="ZAM® (Zn-6%Al-3%Mg) sample image" /></td>
</tr>
<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)

- Zn, Zn-Al basic corrosion products containing Mg
- Zn/Al/MgZn₂
- Coating layer
- Base Steel

![Scale bar 5 µm](image4)
ZAM® Corrosion on Flat Side

Red rust occurrence after salt spray test (untreated)

Lapse of time before occurrence of red rust (hours)

One-side coating weight (oz/ft²)

<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

**Initial exposure period**

- **ZAM® coating layer**

**Long exposure period**

- Fine zinc-based Mg film flows over cut edge
- Protective film changes to gray then gray-black

**Enlarged picture**
# ZAM® Cut Edge Corrosion Resistance

<table>
<thead>
<tr>
<th></th>
<th>1000h</th>
<th>4000h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ZAM®</strong></td>
<td><img src="image1" alt="ZAM sample after 1000h" /></td>
<td><img src="image2" alt="ZAM sample after 4000h" /></td>
</tr>
<tr>
<td><strong>GI</strong></td>
<td><img src="image3" alt="GI sample after 1000h" /></td>
<td><img src="image4" alt="GI sample after 4000h" /></td>
</tr>
<tr>
<td><strong>Zn-5%Al</strong></td>
<td><img src="image5" alt="Zn-5%Al sample after 1000h" /></td>
<td><img src="image6" alt="Zn-5%Al sample after 4000h" /></td>
</tr>
<tr>
<td><strong>55%Al-Zn</strong></td>
<td><img src="image7" alt="55%Al-Zn sample after 1000h" /></td>
<td><img src="image8" alt="55%Al-Zn sample after 4000h" /></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