

# CORROSION PROTECTION ADVISORY



Triple Zinc G-185



Hot-Dip Galvanized



Gold Coat




Connectors, including anchors and fasteners, installed in corrosive environments or exposed to corrosive materials, or chemicals, can be damaged possibly resulting in the reduction of load capacity. The selection of the proper connector coating can be a complicated task. Environments can vary greatly regionally and are also influenced by variables such as fertilizer, animal waste, and wet cycle durations. If an electrolyte is present, such as water, a metal will form an electric circuit with a dissimilar metal and galvanic corrosion can take place. Zinc is the metal used in the hot-dip galvanizing process due to its ability to sacrifice itself while protecting the base steel underneath. When the zinc and copper are in electrical contact with each other the copper will have a tendency to extract electrons from the highly reactive zinc at a greater rate, therefore corrosion will take place at a greater rate. That being the case it is impossible to prescribe a reasonable uniform solution which will serve all environments adequately.

In cooperation with the Environmental Protection Agency, chemical producers in the treated wood industry agreed to discontinue the use of Chromated Copper Arsenate (CCA) for most residential applications at the end of 2003. In place of CCA, treated wood suppliers use copper based alternative treatment chemicals such as Amine/Ammoniacal Copper Quat (ACQ-C, ACQ-D), and Copper Azole (CBA-A, CA-B). Sodium Borate (SBX, DOT) is used primarily in sill plate applications. Testing conducted by USP and others in the industry have concluded the ACQ and Copper Azole wood treatments are more corrosive to metals than traditionally used CCA treatments are.

Recently some wood preservative manufacturers have introduced new wood preservative formulations. These formulations include new micronized copper products as well as carbon based PTI wood preservatives. Testing by USP has found some of these formulations are less corrosive than ACQ and CA-B products, but not necessarily the same as untreated wood.

USP Structural Connectors currently offers four different corrosion resistant finishes to cover a range of corrosion performance:

**Triple Zinc (TZ)** –  galvanizing provides a prefabrication coating of 1.85 (G-185) ounces of zinc per square foot of surface area measured in accordance with ASTM A 653.  
*Fastener:* Hot-dip galvanized fasteners

**Hot-Dip Galvanized (HDG)** – coating provides an after-fabrication hot-dipped zinc coating. The coating thickness is dependent on the connector material, but generally ranges from 1.1 to 2.3 ounces of zinc per square foot of surface. Hot-dip products meet requirements set forth in ASTM A 123.  
*Fastener:* Hot-dip galvanized fasteners

**Gold Coat (GC)** –  Gold Coat is a proprietary multi-layer protection system. It is comprised of an organic top coat barrier layer and a zinc layer placed over a steel substrate.  
*Fastener:* Gold Coat fasteners

**Stainless Steel** – is the best option for corrosion protection. Quality stainless steel (316SS grade steel) is used to fabricate connectors. Although costs are higher, some applications may need the virtual corrosion proof quality of stainless steel.  
*Fastener:* Stainless Steel fasteners

The coating recommendations, listed in the chart on page 2, have been developed by reviewing both field service performance and accelerated corrosion testing results. While accelerated corrosion testing is a valuable tool to help predict relative performance, both the particular testing method used by the industry and the different wood treatment products tested are relatively new and there is little actual field service life data to correlate to the test results. In addition, actual service environments are much more complicated than accelerated tests. In accelerated tests influencing variables are typically minimized and manipulated to cause reactions to occur more quickly. Consequently this may result in reactions which are not completely representative of actual service conditions. Because of this it is difficult to assign an expected service life to a given coating in an environment based on the results of accelerated testing.

# COATING RECOMMENDATIONS

## Structural Connectors Coating Recommendations

Connectors used in contact with preservative treated wood shall have a coating as prescribed in the table below. Fasteners in contact with preservative treated wood shall be as required by section 2304.9.5 of the 2007 CBC. For fasteners no special coating is required when used with borate treatments (SBX-DOT).

AWPA Use Category	Service Conditions	Use Environment	Example Applications	Preservatives and Retentions <sup>6,7</sup>	Minimum Coating Requirements <sup>1,2,3,4</sup>
UC1	Interior construction, Above ground, Dry	Continuously protected from weather or other sources of moisture	General framing, interior construction	Untreated	G90
UC2	Interior construction, Above ground, Damp	Protected from weather, but may be subject to sources of moisture	Sill plates	SBX-DOT, Organic ACQ-D (0.25), CA-B (0.10), CA-C (0.06), MCQ (0.25), $\mu$ CA-C (0.05)	G90 Triple Zinc (G-185) <sup>8,9</sup>
UC3A	Exterior construction, Above ground, Rapid water runoff	Exposed to all weather cycles, not exposed to prolonged wetting	Exposed exterior beams or columns in an open, covered structure	ACQ-D (0.25), MCQ (0.25), CA-B (0.10), CA-C (0.06), $\mu$ CA-C (0.05), Organic	Triple Zinc (G-185) or USP Gold Coat
UC3B	Exterior construction, Above ground, Poor water runoff	Exposed to all weather cycles, including prolonged wetting	Deck beams and joists	ACQ-D (0.25), MCQ (0.25), CA-B (0.10), CA-C (0.06), $\mu$ CA-C (0.05), Organic	Triple Zinc (G-185) or USP Gold Coat
UC4A	Exterior construction, Ground contact, General use	Ground contact or fresh water exposed to all weather cycles	Deck posts	ACQ-D (0.40), MCQ (0.40), CA-B (0.21), CA-C (0.15), $\mu$ CA-C (0.14)	Triple Zinc (G-185) or USP Gold Coat <sup>5</sup>
UC4B	Exterior construction, Ground contact, Critical structural	Ground contact, fresh or salt water exposed to all weather cycles	Permanent wood foundations, critical structural members	ACQ-D (0.60), MCQ (0.60), CA-B (0.31), CA-C (0.25), $\mu$ CA-C (0.23)	Stainless Steel

### Notes

- G90 and G185 refer to galvanization requirements for ASTM A653 material.
- Connectors galvanized to ASTM A123 may be used in place of either G90 or G185 coatings.
- Other coating may be suitable for a given environment if the conditions are known and predictable.
- For G90 or G185 connectors use fasteners galvanized per ASTM A153. For Gold Coat connectors use Gold Coat fasteners, and for stainless steel connectors use stainless steel.
- If the environment has the potential to contain elements which may make it more corrosive, the use of stainless steel is recommended.
- MCQ is a micronized copper treatment such as *Micro Pro* by Osmose.  $\mu$ CA-C is a dispersed copper treatment manufactured by Arch Treatment Technologies. Organic preservatives include L3 from Arch Treatment Technologies and EcoLife II from Viance, LLC.
- For wood treatments not shown contact USP or the wood preservative manufacturer for recommended coatings.
- Testing by USP has found that in interior applications where the treated wood will remain relatively dry during its service life the use of G90 connectors with MCQ or  $\mu$ CA-C treated wood is appropriate.

The formulations used by wood preservative manufacturers are constantly changing and improving. USP Structural Connectors continues to test new wood treatments as they become available and will continue to update its recommendation as appropriate. Neither the 2006 International Residential Code or 2006 International Building Code specifically prescribe a recommended coating weight or type for connector products such as joist hangers, column caps, etc. In cases such as this we advise following the connector manufacturer's recommendations.

### Corrosion Protection Guidelines:

- USP recommends stainless steel connectors for the highest level of corrosion protection. As an economical alternative to stainless steel our new Gold Coat connectors are specifically designed for exterior application when in contact with preservative treated wood.
- Triple Zinc G-185 connectors are available as an economical alternative for exterior applications which will provide a minimum level of protection.
- The use of correct fastener with the connector is critical. Stainless steel connectors require stainless steel fasteners. For exterior applications, hot-dip galvanized fasteners (HDG) must be used with both Triple Zinc and Hot-dip galvanized finishes. Gold Coat connectors require gold coat fasteners.
- USP's zinc dichromate WS Wood Screws are not recommended for use with preservative or fire-retardant treated wood. Some wood screws are available in Gold Coat.
- USP Structural Connectors clearly differentiates standard G90 connectors from the corrosion resistant connectors. Gold Coat connectors are distinguishable from other connectors because of their concealing color. Examples of our carton labels, bin cards for retail displays, and individual product labels are found on page 4.

# CORROSION RESISTANT PRODUCT OFFERING

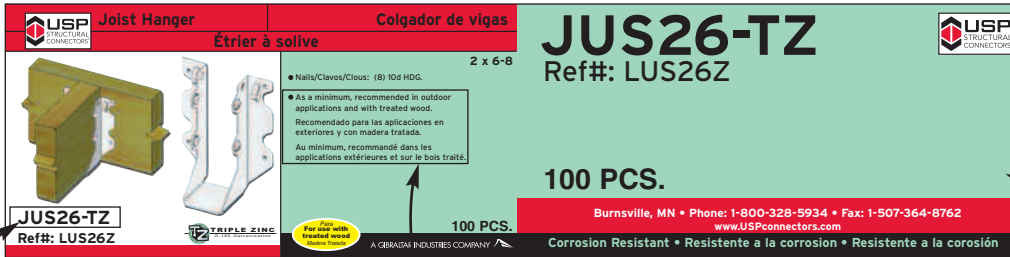
## Corrosion Resistant Products as of November 3, 2008

USP Stock No.	Triple Zinc (TZ)	Hot-Dip Galvanized (HDG)	Stainless Steel (SS)	Gold Coat (GC)	USP Stock No.	Triple Zinc (TZ)	Hot-Dip Galvanized (HDG)	Stainless Steel (SS)	Gold Coat (GC)	USP Stock No.	Triple Zinc (TZ)	Hot-Dip Galvanized (HDG)	Stainless Steel (SS)	Gold Coat (GC)	USP Stock No.	Triple Zinc (TZ)	Hot-Dip Galvanized (HDG)	Stainless Steel (SS)	Gold Coat (GC)
<b>Fasteners / Anchors</b>					<b>Embedded Truss Anchors</b>					<b>Column / Post Caps</b>					<b>Framing Plates &amp; Angles</b>				
AB1212-HDG		X			HTA20	X				KECC46		X			A3	X			
AB126-HDG		X			HTA24	X				KECC64		X			AC5	X			
AB128-HDG		X			TA20	X				KECC66		X			AC7	X			X
BP1		X			TA24	X				PB44-6	X			X	AC9	X			X
BP12		X			<b>Stud Plate Ties</b>					PB66-6	X			X	JA1	X			
BP58		X			RSPT4	X				PBC44-TZ	X				MP3	X			
BP582		X			RSPT6	X				PBC66-TZ	X				MP34	X		X	
BP583		X			RSPT6-2	X				PBES44	X				MP4F	X			
BP78		X			SPT4	X				PBES66	X				MP5	X			
HBPS12		X			SPT6	X				PBS44	X				MP7	X			X
HBPS34		X			SPT22	X				PBS66	X				MP9	X			X
LBP12-TZ	X				SPT24	X				PCM44	X				MPA1	X		X	X
LBP34-TZ	X				SPTH4	X				PCM4416	X				<b>Straps</b>				
LBP58-TZ	X				SPTH6	X				PCM46	X				KRPS18	X			
LBPS12-TZ	X				<b>Column / Post Bases</b>					PCM4616	X				KRPS22	X			
LBPS58-TZ	X				CBS44		X			PCM66	X				L6	X			X
N8-GC				X	CBS566		X			PCM6616	X				LSTA24			X	
N8C-GC				X	CBSQ44-TZ	X				<b>Joist Hangers</b>					MSTA9	X			
N10-GC				X	CBSQ46-TZ	X				HUS26	X				MSTA12	X		X	
N10C-GC				X	CBSQ66-TZ	X				HUS28	X				MSTA15	X		X	
N16C-GC				X	D44	X				HUS28-2IF	X				MSTA18	X		X	
NA11		X	X		D46	X				HUS210	X				MSTA21	X			
NA16D		X			D66	X				HUS210-2IF	X				MSTA24	X			
NA20D		X			EBG44	X				JUS24	X		X	X	MSTA30	X			
NA21		X			EPB4408		X			JUS26	X		X	X	MSTA36	X			
NA25		X			KCB44		X			JUS26-2	X		X	X	PS218-HDG		X		
NA250		X			KCB46		X			JUS28	X		X	X	PS418-HDG		X		
NA9D		X			KCB48		X			JUS28-2	X				PS720-HDG		X		
STB16		X			KCB66		X			JUS28-3	X				RS150	X			
STB20		X			KCB68		X			JUS210	X		X	X	RT24F	X			
STB24		X			KCB88		X			JUS210-2	X		X	X	T6	X			X
STB28		X			KCB1010		X			JUS210-3	X				<b>Twist Straps</b>				
STB34		X			KCB1212		X			JUS44	X				LTW12	X		X	
STB36		X			PA44	X				JUS46	X				LTW18	X		X	
STBL16		X			PA44E	X			X	JUS48	X				LTW20			X	
STBL20		X			PA46	X				JUS410	X				MTW12	X			
STBL24		X			PA46E	X			X	JUS414	X				MTW16	X			
STBL28		X			PA66	X				LSSH15-TZ	X				MTW20	X			
STBL34		X			PA66E	X			X	LSSH210	X				MTW30	X			
THR125-HDG		X			PAU44	X				LSSH31	X				RT24T	X			
THR126-HDG		X			PAU46	X				SKH26R/L	X			X	<b>Miscellaneous</b>				
THR128-HDG		X			PAU66	X				SKH28R/L	X				ANJ44S		X		
THR5816-HDG		X			PAU88	X				SKH210R/L	X			X	DC50-TZ	X			
WS15-GC				X	WAS44	X				<b>Hurricane / Seismic Anchors</b>					CSH-TZ	X			
<b>Holdowns / Foundation Anchors</b>					WAS46	X				HHCP2	X				ERB24-TZ	X			
FA3	X				WAS66	X				LFTA6	X				FB14-TZ	X			
HPA35		X			WE44	X				RT3A	X		X		FB16-TZ	X			
PA18	X				WE46	X				RT4	X		X		FB23-TZ	X			
PA23	X				WE66	X				RT5	X		X		FC24-TZ	X			
PA28	X				<b>Column / Post Caps</b>					RT7	X		X		FRB24-TZ	X			
PA35	X				C44	X				RT7A	X			X	ICPL58	X			
ST1-TZ	X				C46	X				RT10	X		X		ICPL516-TZ	X			
ST2-TZ	X				C66	X				RT15	X		X	X	PRT2-TZ	X			
TA51	X				EPCM4416	X				RT16	X		X		SCA9-TZ	X			X
TA71	X				EPCM4616	X				RT16-2	X				SCA10-TZ	X			X
TDL5	X				KCC44		X			RT20	X				SDJT14-TZ	X			
TDL10	X				KCC46		X			<b>Truss Hangers</b>					SDPT5-TZ	X			
TDX2	X	X			KCC64		X			MSH418	X				SDPT7-TZ	X			
TDX6		X			KCC66		X			THD210-2	X								
TDX8		X			KECC44		X												

**USP Structural Connectors®** clearly differentiates our Corrosion Resistant (Triple Zinc, Hot-Dip Galvanized, Stainless Steel) and Gold Coat products from the Standard G90 products. These are examples of our Triple Zinc and Gold Coat carton labels, bin cards for retail displays, and individual product labels.

All available on our Web Site @ [www.USPconnectors.com](http://www.USPconnectors.com)

**Corrosion Resistant Carton Label (Triple Zinc, Hot-Dip Galvanized and Stainless Steel)**



Part number is referenced with a TZ for Triple Zinc, HDG for Hot-Dip Galvanized, SS for Stainless Steel, or GC for Gold Coat products.

USP recommendation and standards that are met with the Triple Zinc or Gold Coat coating.

Light green or yellow wood background color indicates a corrosion resistant product.

**Gold Coat Carton Label**



**Corrosion Resistant Bin Card (Triple Zinc, Hot-Dip Galvanized and Stainless Steel)**



USP recommendation and standards met with Triple Zinc or Gold Coat coating.

Part number is referenced with a TZ for Triple Zinc, HDG for Hot-Dip Galvanized, SS for Stainless Steel, or GC for Gold Coat products.

**Product Corrosion Advisory Bin Card**



Yellow oval boldly highlights "for use with treated wood."

TZ - Triple Zinc logo identifies products with G-185 galvanization.

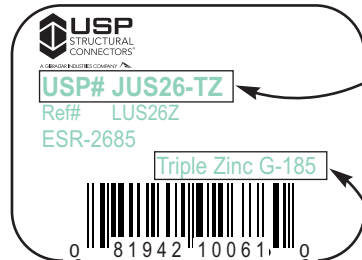
Red burst boldly highlights "Double Protection."

GC - Gold Coat logo identifies products with Gold Coat finish.

**Gold Coat Bin Card**



**Individual Product Label**



Part number is referenced with a TZ at the end for Triple Zinc (GC for Gold Coat) products.

Triple Zinc G-185 or Gold Coat is referenced above the bar code.