



Pushing Performance

# HARTING Contact Plating Guide

People | Power | Partnership

## A Guide to Available Plating Options for HARTING PCB Connectors

Because of the variety of plating options available for PCB connectors, it can be difficult for a customer to identify the best fit. This document provides guidance in the HARTING PCB connector range by explaining standardized "performance level" plating and other plating options available on request.

At HARTING, standards driven, or performance level, plating is the norm for the majority of our PCB connectors. Demand from various customers in different industries, however, has resulted in a small but growing list of custom-plated connectors.

This document can be used in conjunction with the white paper "Contact plating material options for electronic connectors" available for download [here](http://harting-u.com/contact-plating-material-options-electronic-connectors/) (http://harting-u.com/contact-plating-material-options-electronic-connectors/). The white paper provides in-depth analysis of contact plating's technical aspects. The paper explores the qualities of different plating materials, and fretting wear caused by vibration.

Connector standardization ensures compatibility between connector manufacturers. In the area of contact plating, performance levels require manufacturers to deliver products that guarantee a specified number of mating cycles in accordance with a specific testing schedule. Sometimes referred to as "durability," performance level is used for various connector series even though the number of mating cycles is not common across all standards.

For instance, Hard Metric 2.00mm connectors are manufactured according to IEC 61076-4-101 with performance levels 1 or 2, while DIN 41 612 connectors are manufactured according to IEC 60603-2 with performance levels 1, 2 or 3. In these two examples, the performance levels for each type differ.

As shown in Exhibit 1, 2.00mm Hard Metric performance level 2 offers 250 mating cycles, while DIN 41 612 performance level 2 offers 400 mating cycles. While the specifications vary for different connector types, the standard specified for each type provides the end user with the assurance that a specific connector type from different suppliers will deliver the same mating performance durability.

### Exhibit 1: Performance level comparison

#### 2.00mm Hard Metric Connectors

IEC 61076-4-101: Performance Level 2 = 250 mating cycles in total  
*First 125 mating cycles*, then 4 days gas test using 0.5ppm SO<sub>2</sub> and 0.1 ppm H<sub>2</sub>S (at 25 +/- 2°C and 75 +/- 3% humidity).  
Measurement of contact resistance.  
The *remaining 125 mating cycles* are subject to measurement of contact resistance and visual inspection. No abrasion of the contact finish through to the base material.  
No functional impairment.

#### DIN 41 612 Connectors

IEC 60 603-2: Performance Level 2 = 400 mating cycles in total  
*First 200 mating cycles*, then 4 days gas test using 10ppm SO<sub>2</sub>  
Measurement of contact resistance.  
The *remaining 200 mating cycles* are subject to measurement of contact resistance and visual inspection. No abrasion of the contact finish through to the base material.  
No functional impairment.

#### HARTING, Inc. of North America

1370 Bowes Rd. Elgin, IL 60123 USA

Phone: +1 (847) 741-1500 | Email: [more.info@HARTING.com](mailto:more.info@HARTING.com)

[HARTING-usa.com](http://HARTING-usa.com)



Pushing Performance

# HARTING Contact Plating Guide

---

People | Power | Partnership

While the mating cycles and testing parameters are defined within each standard, neither of these standards define the plating chemistry for the contacts. Consequently, connector manufacturers have some freedom when defining both the plating chemistry and the material thicknesses.



Gold and nickel plating

Over time this has resulted in connector manufacturers seeking alternative plating materials for both the mating area and the contact termination area. For the latter, the RoHS initiative resulted in a move away from tin and lead plating, so that today pure tin or pure nickel are widely accepted alternatives.

Meanwhile in the mating area, the high (and volatile) cost of gold forced connector manufacturers to seek materials with a more stable cost base. One of the most common plating compositions used today is palladium and nickel (80/20) with gold flash.

For the vast majority of customers, the change in plating materials is of no concern. The connector manufacturers must test in accordance with the specification defined by the applicable standard, so the mating cycles number and associated gas test do not change. When such a change is made, supporting test data is available to confirm that the requirements of the standard are still met.

Additionally, some products are offered with a defined plating thickness, rather than to a performance level. For example, HARTING High Density D-Subs and Waterproof D-Subs have a designation of "S4 plating" specifying 30µin thickness noble metal, which can be either gold or palladium/nickel (80/20) with gold flash.

Some other products are offered with a defined plating thickness for historical reasons. The now-expired German Military (VG) specification required 70µin of gold for DIN 41 612. A limited range of connectors are still available with this plating chemistry and thickness even though the original specification is no longer maintained.

In addition to these exceptions to performance level plating, HARTING offers other special plated options based on individual customer requests. Some customers may require a specific plating due to their own internal specifications or to

---

## HARTING, Inc. of North America

1370 Bowes Rd. Elgin, IL 60123 USA

Phone: +1 (847) 741-1500 | Email: [more.info@HARTING.com](mailto:more.info@HARTING.com)

[HARTING-usa.com](http://HARTING-usa.com)



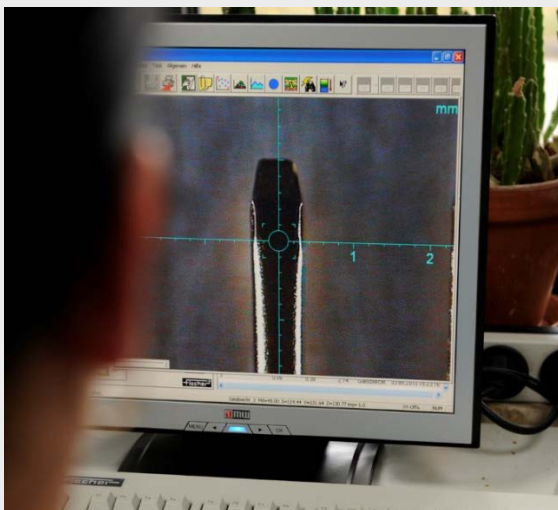
Pushing Performance

# HARTING Contact Plating Guide

People | Power | Partnership

meet requirements in their market segment where certain plating types are either preferred or demanded. In these situations plating of either 30µm or 50µm gold are typical requests. Other customers define, for example, a requirement of 30µm or 50µm thickness, but can accept palladium/nickel (80/20) with gold flash.

Returning to the example of Hard Metric 2.00mm connectors, exhibit 2 displays a typical example of standard part numbers for a type A female connector as shown in the catalog (performance levels 1 and 2) and also as shown on the drawing where an additional version with 50µm gold is offered.



Plating performance inspection

Exhibit 2: Part number options as shown in catalog and specific part number drawing

**Hard Metric 2.00mm Catalog Page**

Female connectors, angled

Ordering code	No. of positions	Part number
Type A	54	17 21 110 1001
Type A with upper shield	54	17 21 110 1002
Lower shield for Type A connectors		17 21 000 4100
Type A with upper shield and shielded contact positions	54	17 21 110 1003
Lower shield for Type A connectors (rows 1-3)		17 21 000 4100
Lower shield for Type A connectors (rows 11-21)		17 21 000 4100

Without shielding / With shielding

00 04

**Hard Metric 2.00mm Drawing (extract)**

17 21 110 1001	—	min. 0,75µm (30µin) Au Über/over
17 21 110 2102	2	min. 1,25µm (50µin) Ni
17 21 110 1102	1	Au Über/over Ni

Bestell-Nr. / part-no.	Anforderungsstufe nach IEC / performance level	Kontaktoberfläche / contact plating
17 21 110 2102	2	Au Über/over Ni
17 21 110 1102	1	Au Über/over Ni

Techn. Zeichn. / HARTING-Nr. / nach IEC / 17 21 110 1001

Nr.	Rev.	Mitteilung
Max. 29.06.99	01	
Imp. 29.06.99	01	
Zust. 29.06.99	01	

2:1 har-bus HM Federleiste Typ A, 110 pol. mit Schirmblech Reihe-F har-bus HM female connector, type A, 110 pol. with shield panel

HARTING Electronics GmbH & Co. KG  
D-32209 FREDRICHSHAGEN

TB 17 21 110 x102

HARTING, Inc. of North America  
1370 Bowes Rd. Elgin, IL 60123 USA  
Phone: +1 (847) 741-1500 | Email: more.info@HARTING.com  
HARTING-usa.com



Pushing Performance

# HARTING Contact Plating Guide

People | Power | Partnership

Other plating options beyond those shown in exhibit 2 are available for 2.00mm Hard Metric and even more are available for the DIN 41 612 connectors. For the latter, performance levels 1, 2 and 3 (acc to IEC 60603-2) are the versions shown in the catalog.

Exhibit 3 shows these and the other possible platings. These include performance level based plating without palladium/nickel and the thickness/material specific options. Together, there are 10 different ways that a connector could be plated in this exhibit.

**Exhibit 3: Performance level and specific plating options for DIN 41 612**

Performance Level Plating			Specified Thickness and/or Material Plating				
PL 3	PL 2	PL 1	PL NM30 (S4)	PL AU30	PL AU50	PL AU70	PL AU90
50 mating cycles acc. to IEC 60603-2	400 mating cycles acc. to IEC 60603-2	500 mating cycles acc. to IEC 60603-2	500 mating cycles (PL1) acc. to IEC 60603-2 with 30µinch Noble metal	500 mating cycles (PL1) acc. to IEC 60603-2 with 30µinch Au	500 mating cycles (PL1) acc. to IEC 60603-2 with 50µinch Au	500 mating cycles (PL1) acc. to IEC 60603-2 with 70µinch Au	500 mating cycles (PL1) acc. to IEC 60603-2 with 90µinch Au
	PL 2 AU 2	PL 1 AU 1					
	400 mating cycles acc. to IEC 60603-2	500 mating cycles acc. to IEC 60603-2					
			Standard Catalog Part Numbers		Available on Request		

Although this allows for the possibility that a single connector type could join 10 different part numbers, each one could differ only in the plating specification. Additional part numbers are created based on customer requests. After set up, they generally become available for purchase by other customers.

Minimum order quantities for specially plated versions vary depending on the connector type, gender and contact load. Where the appropriate special contact types are already in stock, the minimum order quantity for a specially plated connector may be as low as 500 pieces. However this number may be much higher for connectors containing a mix of different contact types.

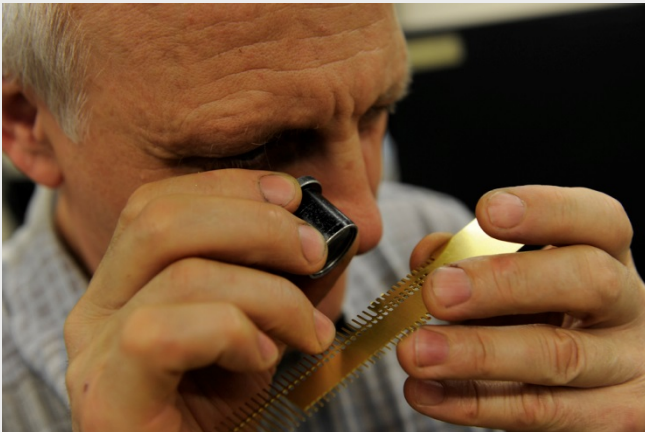


Pushing Performance

# HARTING Contact Plating Guide

---

People | Power | Partnership



Contact stamping inspection

For any customer with a requirement for a specially plated HARTING connector, our technical support department can be reached at [TechSupportUS@HARTING.com](mailto:TechSupportUS@HARTING.com). Representatives can assist in identifying what versions currently exist or can help in starting the process to set up a new part number. Such requests typically take approximately one week to calculate pricing, lead time and minimum order quantity.

In summary, the majority of HARTING PCB connectors are offered with contact plating according to a performance level defined by a standard. This makes product selection easy for most customers, with the added assurance of compatibility between different manufacturers.

For those customers requiring a defined plating thickness or a defined plating material, HARTING has the flexibility to deliver a non-standard variant in many cases. By understanding the diverse needs of customers, this approach allows us to provide connectors with a variety of contact plating options to serve those markets and applications where standard contact plating is not always acceptable.