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Surface finishes provided by PCBFast.

1.1 Overview

Properties	HAL	Immersion Silver	Immersion Gold [flash gold]	Immersion Gold over immersion silver	EP Gold over immersion silver	EP Gold over EP nickel
Cost	Medium	Medium	Medium	Medium-high	High	High
Lead Free	No	Yes	Yes	Yes	Yes	Yes
Planarity	No	Yes	Yes	Yes	Yes	Yes
Fine pitch application	Limited	Yes	Yes	Yes	Yes	Limited
Process effort	Medium	Medium	Medium	Medium	High	High
Operating safety	Bad	Good	Good	Good	Good	Good
Thermal Stress	High	Low	Low	Low	Low	Low
Thickness	5-25um	0.1-0.3um	0.03-0.05um	0.03-0.05um gold over 0.05-0.3um silver	0.3-0.8um gold over 0.1-0.3um silver	0.3-0.8um gold over 3-5um nickel

1.2 Hot Air Solder Level [HASL]

Pros: Excellent solderability after long term storage
Excellent bond strength – like product throughout the loading process

Cons: Prone to slight doming of surface mount pads
Not suitable for contact pads or edge connectors

Shelf Life: Minimum 12+ months with optimal storage and handling

1.3 Immersion Silver [0.05um Ag]

Pros: Excellent solderability and bond strength
Perfectly flat pads
Suitable for contact pads in controlled climates/conditions

Cons: Finish easily tarnished with inappropriate handling or storage
Not suitable for edge connectors or contact pads in aggressive climates/conditions

Shelf Life: Minimum 6 months with optimal storage and handling

1.4 Immersion Gold [0.03um Au]

Pros: Excellent solderability and bond strength
More resistant to air contamination than Immersion Silver

Cons: Will lose 'gold lustre' over time as the copper migrates into the gold
Not suitable for contact pads or edge connectors

Shelf Life: Minimum 6 months with optimal storage and handling

1.5 Immersion Gold over Immersion Silver [0.03um Au/0.05umAg]

Pros: Excellent solderability and bond strength
Perfectly flat pads
Resistant to air contamination
Suitable for contact pads in controlled climates/conditions

Cons: Not suitable for edge connectors or contact pads in aggressive climates/conditions

Shelf Life: Minimum 12 months with optimal storage and handling

1.6 Electroplated Gold over Immersion Silver [0.2um Hard Au/0.05um Ag]

Pros: Excellent solderability
Perfectly flat pads
Very resistant to air contamination
Suitable for contact pads, zebra strips and edge connectors where a low number of contact cycles are required

Cons: Not suitable for edge connectors where a high number of contact cycles are required.

Shelf Life: Minimum 12+ months with optimal storage and handling

1.7 Electroplated Gold over Electroplated Nickel [3umNi/0.2um Hard Au]

Pros: Perfectly flat pads
Very resistant to air contamination
Suitable for contact pads, zebra strips and edge connectors

Cons: Reduced bond strength may lead to solderability issues in some applications

Shelf Life: Minimum 12+ months with optimal storage and handling

1.8 Optimal Storage Conditions

PCBs should be stored in sealed dry acid free paper packs (with silica gel sachets) in a temperature range of 5 – 30°C and RH of 30 – 50%. Incorrect storage may result in the surface finish being contaminated by oxidation or air pollution and/or premature “aging” of the finish.

Despite correct storage, PCBs may retain moisture within the fiberglass over time. The risk of moisture increases with the number of layers of the PCB. The heat cycle that occurs during the soldering process can cause moisture within the PCB to expand, resulting in delamination. Potentially “damp” PCBs should be oven dried before soldering to eliminate any retained moisture that may have developed during storage, however some of the surface finishes (for example Immersion Silver) may be adversely affected with excessive or aggressive drying causing an aging effect.

1.9 Optimal Handling Conditions

Clean cotton gloves should be worn at all times to protect the surface from skin oils and acids which can contaminate and age the finish. If gloves are not available, contact should be made with the edges of the PCB only.