ES-88-K: FINISH SPECIFICATION - SILVER

1.0 SCOPE
This specification defines the requirements for all SILVER finishes on metallic surfaces.

2.0 PURPOSE
To define the standard finish characteristics and finish codes along with their minimum and maximum layer requirements.

3.0 REFERENCE DOCUMENTS
ES-88 Molex Finish Specification

4.0 DEFINITIONS

4.1 Finish Specification Codes

4.1.1 Silver over Nickel over Copper Overall
Note: See ES-88 for specific material properties, quality, packaging, etc. details.
Conversion factor 1µm = 39.37µin

PROCESS CODE	APPEARANCE CODES	FINISH CODE	OVERALL SILVER MIN µin (µm) MAX µin (µm)	OVERALL NICKEL MIN µin (µm) MAX µin (µm)	OVERALL COPPER MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
		703	200(5.08) 300(7.62)	50(1.27) 200(5.08)	30(0.76) 200(5.08)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50µ" (1.27µm)
	Batch plating	50µ" (1.27µm)
Copper	Continuous plating	50µ" (0.27µm)
	Batch plating	100µ" (2.54µm)
Silver	Continuous plating	20µ" (0.51µm)
	Batch plating	50µ" (1.27µm)

4.1.2 Silver over Nickel Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details.
Conversion factor 1µm = 39.37µin

PROCESS CODE	APPEARANCE CODES	FINISH CODE	OVERALL SILVER MIN µin (µm) MAX µin (µm)	OVERALL NICKEL MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
		704	12(0.31)	80(2.03)	
		708	150(3.81) 200(5.08)	50(1.27)	
		709	30(0.76) 80(2.03)	50(1.27) 100(2.54)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50µ" (1.27µm)
	Batch plating	50µ" (1.27µm)
Silver	Continuous plating	20µ" (0.51µm)
	Batch plating	50µ" (1.27µm)

4.1.3 Silver Only Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details.
Conversion factor 1µm = 39.37µin

PROCESS CODE	APPEARANCE CODES	FINISH CODE	OVERALL SILVER MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
		701	120(3.05) 200(5.08)	OBSOLETE
		702	100(2.54) 150(3.81)	
		705	12(0.31)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Silver	Continuous plating	20µ" (0.51µm)

	Batch plating	50µ" (1.27µm)

4.1.4 Selective Silver with Selective Tin over Nickel Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details.
Conversion factor 1µm = 39.37µin

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT SILVER MIN µin (µm) MAX µin (µm)	SELECT TIN MIN µin (µm) MAX µin (µm)	OVERALL NICKEL MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
	B	710	75(1.91) 130(3.30)	200(5.08) 400(10.16)	50(1.27) 100(2.54)	
	M	711	75(1.91) 130(3.30)	200(5.08) 400(10.16)	50(1.27) 100(2.54)	
	S	712	75(1.91) 130(3.30)	200(5.08) 400(10.16)	50(1.27) 100(2.54)	
	M	714	100(2.54) 160(4.06)	100(2.54) 200(5.08)	50(1.27) 100(2.54)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Silver	Continuous plating	20µ" (0.51µm)
	Batch plating	50µ" (1.27µm)
Nickel	Continuous plating	50µ" (1.27µm)
	Batch plating	50µ" (1.27µm)
Tin	Continuous plating	100µ" (2.54µm)
	Batch plating	250µ" (6.35µm)

4.1.5 Selective Silver over Nickel Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details.
Conversion factor 1µm = 39.37µin

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT SILVER MIN µin (µm) MAX µin (µm)	OVERALL NICKEL MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
	M	713	80(2.03)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Silver	Continuous plating	20µ" (0.51µm)
	Batch plating	50µ" (1.27µm)
Nickel	Continuous plating	50µ" (1.27µm)
	Batch plating	50µ" (1.27µm)

5.0 TARNISH RESISTANCE

5.0.1 TARNISH RESISTANCE SOLUTION

Parts should be treated using a chromate type supplementary dip that has a low contact resistance in the order of 300 to 400 microhms per square inch (0.5 to 0.6 microhms per square mm). Lacquer, paint, clear epoxy or other organic coatings shall not be applied to the electrodeposited silver to achieve tarnish resistance.

5.0.2 TARNISH RESISTANCE VERIFICATION

Pipette one ml of 20 to 24 percent ammonium sulfide (light), reagent grade, into a one liter volumetric flask. Fill to the mark with distilled water and agitate thoroughly. Place one drop of the solution on a specimen. A sample without tarnish resistant coating will begin to show a black or brown color in one minute. Parts should be treated using a chromate type supplementary dip that has a low contact resistance in the order of 300 to 400 microhms per square inch (0.5 to 0.6 microhms per square mm). Lacquer, paint, clear epoxy or other organic coatings shall not be applied to the electrodeposited silver to achieve tarnish resistance.