ES-88-B: FINISH SPECIFICATION - TIN

1.0 SCOPE
This specification defines the requirements for all TIN 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 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	OVERALL TIN MIN µin (µm) MAX µin (µm)	OVERALL NICKEL MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
	M	116	200(5.08)	50(1.27)	
	B	118	60(1.52) 160(4.06)	50(1.27)	
	B	119	150(3.81) 400(10.16)	50(1.27) 150(3.81)	
	B	120	120(3.05)	50(1.27)	OBSOLETE
	B	121	200(5.08)	50(1.27)	
	B	122	150(3.81)	30(0.76)	NOT RECOMMENDED
E	B	123	300(7.62)	100(2.54)	
	B	124	150(3.81)	50(1.27)	
	B	126	50(1.27)	50(1.27)	
	B	128	500(12.70)	50(1.27)	
	B	129	150(3.81) 250(6.35)	50(1.27) 100(2.54)	OBSOLETE
R		197	60(1.52) 100(2.54)	50(1.27) 100(2.54)	
	B	154	100(2.54)	50(1.27)	
	M	203	40(1.02) 120(3.05)	40(1.02) 120(3.05)	
	M	222	100(2.54)	50(1.27)	
	M	223	150(3.81)	50(1.27)	
	M	224	200(5.08)	50(1.27)	
R		244	100(2.54)	50(1.27)	
R		245	35(0.89) 75(1.91)	30(0.76)	
	M	251	150(3.81) 250(6.35)	50(1.27) 150(3.81)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and batch plating:

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

Preplated, Reflowed and Hot Dipped:

Tin	100µ" (2.54µm) > Minimum Thickness	100µ" (2.54µm)

Minimum Thickness > 100µ" (2.54µm) 150µ" (3.81µm)

4.1.2 Tin 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 TIN MIN µin (µm) MAX µin (µm)	OVERALL COPPER MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
	B	101	100(2.54)	50(1.27)	NOT RECOMMENDED
	B	102	200(5.08)	100(2.54)	NOT RECOMMENDED
	B	103	200(5.08)	50(1.27)	NOT RECOMMENDED
	B	104	300(7.62)	200(5.08)	NOT RECOMMENDED
	B	105	300(7.62)	100(2.54)	NOT RECOMMENDED
	B	107	160(4.06)	80(2.03)	NOT RECOMMENDED
	B	108	35(0.89)	20(0.51)	NOT RECOMMENDED
	B	109	300(7.62)	50(1.27)	NOT RECOMMENDED
	B	110	200(5.08)	120(3.05)	NOT RECOMMENDED
	B	111	80(2.03)	80(2.03)	NOT RECOMMENDED
	B	112	120(3.05)	100(2.54)	NOT RECOMMENDED
		113	150(3.81)	50(1.27)	NOT RECOMMENDED
	B	114	80(2.03) 160(4.06)	40(1.02) 100(2.54)	NOT RECOMMENDED
	B	115	100(2.54)	100(2.54)	NOT RECOMMENDED
		127	100(2.54) 150(3.81)	50(1.27)	NOT RECOMMENDED
	B	132	200(5.08)	200(5.08)	NOT RECOMMENDED
R	B	912	35(0.89)	20(0.51)	NOT RECOMMENDED
P	B	992	100(2.54)	100(2.54)	OBSOLETE
	B	993	100(2.54)	100(2.54)	OBSOLETE
R	B	927	35(0.89) 80(2.03)	20(0.51)	
R	B	928	35(0.89) 80(2.03)	10(0.25) max	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and batch plating:

Tin	Continuous plating	100µ" (2.54µm)
	Batch plating	250µ" (6.35µm)
Copper	Continuous plating	50µ" (1.27µm)
	Batch plating	100µ" (2.54µm)

Preplated, Reflowed and Hot Dipped:

Tin	100µ" (2.54µm) > Minimum Thickness	100µ" (2.54µm)
	Minimum Thickness > 100µ" (2.54µm)	150µ" (3.81µm)

4.1.3 Tin Only

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

PROCESS CODE	APPEARANCE CODES	FINISH CODE	OVERALL TIN MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
	B	125	200(5.08)	
R	B	130	36(0.91)	
	B	131	36(0.91)	
		134	80(2.03)	
	B	135	160(4.06)	
	B, M	136	100(2.54)	
H	B	901	20(0.51) 80(2.03)	
H	B	902	40(1.02) 100(2.54)	
H	B	906	50(1.27) 150(3.81)	
H		918	40(1.02) 120(3.05)	
H		923	20(0.51) 80(2.03)	
H		924	100(2.54) 250(6.35)	
R	M	929	60(1.52) 100(2.54)	
H	B	930	60(1.52) 130(3.30)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and batch plating:

Tin	Continuous plating	100µ" (2.54µm)
	Batch plating	250µ" (6.35µm)

Preplated, Reflowed and Hot Dipped:

Tin	100µ" (2.54µm) > Minimum Thickness	100µ" (2.54µm)
	Minimum Thickness > 100µ" (2.54µm)	150µ" (3.81µm)

4.1.4 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 TIN MIN µin (µm) MAX µin (µm)	OVERALL NICKEL MIN µin (µm) MAX µin (µm	OBSOLETE/ RECOMMENDED
	M	198	150(3.81)	50(1.27)	
	S	239	200(5.08) 400(10.16)	50(1.27)	
	M	201	75(1.91)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and batch plating:

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

Preplated, Reflowed and Hot Dipped:

Tin	100µ" (2.54µm) > Minimum Thickness	100µ" (2.54µm)
	Minimum Thickness > 100µ" (2.54µm)	150µ" (3.81µm)

4.1.5 Selective Tin over Selective Nickel

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

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT TIN MIN µin (µm) MAX µin (µm)	SELECT NICKEL MIN µin (µm) MAX µin (µm	OBSOLETE/ RECOMMENDED
	M	199	100(2.54)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and batch plating:

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

Preplated, Reflowed and Hot Dipped:

Tin	100µ" (2.54µm) > Minimum Thickness	100µ" (2.54µm)
	Minimum Thickness > 100µ" (2.54µm)	150µ" (3.81µm)

4.1.6 Tin Miscellaneous

4.1.6.1 Tin 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 TIN MIN µin (µm) MAX µin (µm)	OVERALL NICKEL MIN µin (µm) MAX µin (µm)	OVERALL COPPER MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
		133	200(5.08) 400(10.16)	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" (1.27µm)
	Batch plating	100µ" (2.54µm)
Tin	Continuous plating	100µ" (2.54µm)
	Batch plating	250µ" (6.35µm)

Preplated, Reflowed and Hot Dipped:

Tin	100µ" (2.54µm) > Minimum Thickness	100µ" (2.54µm)
	Minimum Thickness > 100µ" (2.54µm)	150µ" (3.81µm)

4.1.6.2 Tin Hot-Dipped

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

PROCESS CODE	APPEARANCE CODES	FINISH CODE	OVERALL TIN HOT-DIPPED MIN µin (µm) MAX µin (µm)	OBSOLETE/ RECOMMENDED
H		905	80(2.03) 160(4.06)	
H	B	909	100(2.54) 160(4.06)	
H	B	921	140(3.56) 240(6.10)	
H	B	925	100(2.54) 177(4.50)	
H	B	926	394(10.01) 590(14.99)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Preplated, Reflowed and Hot Dipped:

Tin	100µ" (2.54µm) > Minimum Thickness	100µ" (2.54µm)
	Minimum Thickness > 100µ" (2.54µm)	150µ" (3.81µm)