

## ES-88-F: FINISH SPECIFICATION – SELECTIVE GOLD WITH SELECTIVE TIN LEAD ALLOY

### 1.0 SCOPE

This specification defines the requirements for all SELECTIVE GOLD WITH SELECTIVE TIN-LEAD ALLOY 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

REVISION: <b>P1</b>	EC INFORMATION: EC No: <b>663282</b> DATE: <b>2021/05/08</b>	TITLE: <b>FINISH SPECIFICATION SELECTIVE GOLD WITH SELECTIVE TIN LEAD ALLOY</b>	SHEET No. <b>1 of 10</b>
DOCUMENT NUMBER: <b>ES-88-F</b>	CREATED / REVISED BY: <b>MANOHARA HV</b>	CHECKED BY: <b>SHIVA B ARALI</b>	APPROVED BY: <b>SHIVA B ARALI</b>

## 4.0 DEFINITIONS

### 4.1 Finish Specification Codes

#### 4.1.1 Selective Hard Gold with Selective 60/40 Tin Lead Alloy over Nickel Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details

Conversion Factor 1 $\mu$ m = 39.37 $\mu$ in

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	SELECT 60/40 TIN LEAD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OVERALL NICKEL MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OBSOLETE/ RECOMMENDED
		566	10(0.25)	100(2.54)	50(1.27)	OBSOLETE
	M	580	15(0.38)	100(2.54)	50(1.27)	
	M	582	15(0.38)	50(1.27)	50(1.27)	
	M	587	15(0.38)	75(1.91)	50(1.27)	
	M	592	15(0.38)	80(2.03)	50(1.27)	
	M	608	5(0.13)	75(1.91)	50(1.27)	
		635	15(0.38) 25(0.64)	120(3.05) 200(5.08)	50(1.27) 70(1.78)	
		645	15(0.38)	75(1.91)	100(2.54)	
		646	15(0.38)	40(1.02)	40(1.02)	NOT RECOMMENDED
		650	2(0.05) 10(0.25)	150(3.81)	50(1.27)	
		661	10(0.25)	150(3.81)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

#### Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu$ m)
	Batch plating	50 $\mu$ " (1.27 $\mu$ m)
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu$ m)
	Batch plating	250 $\mu$ " (6.35 $\mu$ m)
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu$ m)
	Batch plating	20 $\mu$ " (0.51 $\mu$ m)

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DOCUMENT NUMBER: <b>ES-88-F</b>	CREATED / REVISED BY: <b>MANOHARA HV</b>	CHECKED BY: <b>SHIVA B ARALI</b>	APPROVED BY: <b>SHIVA B ARALI</b>

### 4.1.1 Selective Hard Gold with Selective 60/40 Tin Lead Alloy over Nickel Overall (Continued.....)

Note: See ES-88 for specific material properties, quality, packaging, etc. details  
Conversion Factor 1 $\mu$ m = 39.37 $\mu$ in

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	SELECT 60/40 TIN LEAD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OVERALL NICKEL MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OBSOLETE/ RECOMMENDED
		526	15(0.38)	150(3.81)	50(1.27)	OBSOLETE
		541	30(0.76)	75(1.91)	50(1.27)	OBSOLETE
	M	564	30(0.76)	15(0.38) 50(1.27)	50(1.27)	
	M	568	20(0.51)	200(5.08)	30(0.76)	NOT RECOMMENDED
	M	572	20(0.51)	75(1.91)	50(1.27)	
	M	573	20(0.51)	100(2.54)	50(1.27)	
	M	581	30(0.76)	50(1.27)	50(1.27)	
	M	583	15(0.38)	200(5.08)	50(1.27)	
	M	599	30(0.76)	75(1.91)	50(1.27)	
		642	30(0.76)	75(1.91)	100(2.54)	
		651	15(0.38)	150(3.81)	50(1.27)	
	M	593	100(2.54)	100(2.54)	50(1.27)	
	M	589	30(0.76)	80(2.03)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu$ m)
	Batch plating	50 $\mu$ " (1.27 $\mu$ m)
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu$ m)
	Batch plating	250 $\mu$ " (6.35 $\mu$ m)
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu$ m)
	Batch plating	20 $\mu$ " (0.51 $\mu$ m)

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DOCUMENT NUMBER: <b>ES-88-F</b>	CREATED / REVISED BY: <b>MANOHARA HV</b>	CHECKED BY: <b>SHIVA B ARALI</b>	APPROVED BY: <b>SHIVA B ARALI</b>

### 4.1.1 Selective Hard Gold with Selective 60/40 Tin Lead Alloy over Nickel Overall (Continued....)

Note: See ES-88 for specific material properties, quality, packaging, etc. details  
Conversion Factor 1 $\mu$ m = 39.37 $\mu$ in

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	SELECT 60/40 TIN LEAD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OVERALL NICKEL MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OBSOLETE/ RECOMMENDED
	M	563	30(0.76)	100(2.54)	50(1.27)	
	M	575	50(1.27)	50(1.27)	50(1.27)	
	M	576	30(0.76)	200(5.08)	75(1.91)	
	M	577	50(1.27)	100(2.54)	50(1.27)	
		579	8(0.20)	118(3.00)	79(2.01)	OBSOLETE
		584	15(0.38)	75(1.91)	30(0.76)	OBSOLETE
		585	15(0.38)	50(1.27)	30(0.76)	OBSOLETE
		586	100(2.54)	75(1.91)	50(1.27)	OBSOLETE
		598	3(0.08)	75(1.91)	79(2.01)	OBSOLETE
		636	30(0.76) 40(1.02)	160(4.06) 200(5.08)	50(1.27) 70(1.78)	
		637	30(0.76) 100(2.54)	160(4.06) 260(6.60)	50(1.27) 70(1.78)	
		643	50(1.27) 60(1.52)	75(1.91)	100(2.54)	
		644	50(1.27)	75(1.91)	100(2.54)	
		652	30(0.76)	150(3.81)	50(1.27)	
		669	30(0.76)	200(5.08)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu$ m)
	Batch plating	50 $\mu$ " (1.27 $\mu$ m)
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu$ m)
	Batch plating	250 $\mu$ " (6.35 $\mu$ m)
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu$ m)
	Batch plating	20 $\mu$ " (0.51 $\mu$ m)

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### 4.1.2 Selective Hard Gold with Selective 90/10 Tin Lead Alloy over Nickel Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details

Conversion Factor 1 $\mu$ m = 39.37 $\mu$ in

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	SELECT 90/10 TIN LEAD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OVERALL NICKEL MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OBSOLETE/ RECOMMENDED
		525	10(0.25) 20(0.51)	40(1.02) 116(2.95)	40(1.02) 100(2.54)	NOT RECOMMENDED
		536	2(0.05) 5(0.13)	75(1.91)	50(1.27)	
		543	30(0.76)	150(3.81)	75(1.91)	OBSOLETE
	M	544	5(0.13)	75(1.91)	50(1.27)	
	M	546	2(0.05)	40(1.02) 140(3.56)	40(1.02) 90(2.29)	NOT RECOMMENDED
		549	10(0.25)	40(1.02)	40(1.02)	NOT RECOMMENDED
		597	2(0.05) 10(0.25)	75(1.91)	50(1.27)	OBSOLETE
		653	2(0.05) 10(0.25)	150(3.81)	50(1.27)	
		658	2(0.05)	120(3.05)	40(1.02)	NOT RECOMMENDED
	M	542	15(0.38)	50(1.27)	50(1.27)	
	M	547	14(0.36)	40(1.02)	40(1.02)	NOT RECOMMENDED
	M	588	10(0.25)	75(1.91)	50(1.27)	
		605	15(0.38)	50(1.27)	30(0.76)	NOT RECOMMENDED
		631	15(0.38)	20(0.51) 70(1.78)	50(1.27)	OBSOLETE
	M	634	10(0.25)	40(1.02)	80(2.03)	
		640	15(0.38) 25(0.64)	60(1.52) 100(2.54)	50(1.27) 70(1.78)	
		659	10(0.25)	120(3.05)	40(1.02)	NOT RECOMMENDED
		700	10(0.25)	150(3.81)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu$ m)
	Batch plating	50 $\mu$ " (1.27 $\mu$ m)
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu$ m)
	Batch plating	250 $\mu$ " (6.35 $\mu$ m)
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu$ m)
	Batch plating	20 $\mu$ " (0.51 $\mu$ m)

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## 4.1.2 Selective Hard Gold with Selective 90/10 Tin Lead Alloy over Nickel Overall (Continued....)

Note: See ES-88 for specific material properties, quality, packaging, etc. details  
Conversion Factor 1 $\mu$ m = 39.37 $\mu$ in

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	SELECT 90/10 TIN LEAD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OVERALL NICKEL MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OBSOLETE/ RECOMMENDED
		528	15(0.38)	75(1.91)	50(1.27)	
		529	30(0.76)	35(0.89) 70(1.78)	50(1.27)	
		535	30(0.76)	15(0.38) 50(1.27)	50(1.27)	
	M	538	20(0.51)	100(2.54)	50(1.27)	
	M	567	15(0.38)	100(2.54)	50(1.27)	
	M	571	15(0.38)	75(1.91)	50(1.27)	
		578	15(0.38)	150(3.81)	50(1.27)	
	M	594	30(0.76)	50(1.27)	50(1.27)	
		606	30(0.76)	50(1.27)	30(0.76)	NOT RECOMMENDED
		632	30(0.76)	20(0.51) 70(1.78)	50(1.27)	OBSOLETE
		638	15(0.38) 25(0.64)	120(3.05) 200(5.08)	50(1.27) 70(1.78)	
		641	30(0.76) 40(1.02)	60(1.52) 100(2.54)	50(1.27) 70(1.78)	
	B	657	30(0.76)	40(1.02)	40(1.02)	NOT RECOMMENDED

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

### Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu$ m)
	Batch plating	50 $\mu$ " (1.27 $\mu$ m)
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu$ m)
	Batch plating	250 $\mu$ " (6.35 $\mu$ m)
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu$ m)
	Batch plating	20 $\mu$ " (0.51 $\mu$ m)

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### 4.1.2 Selective Hard Gold with Selective 90/10 Tin Lead Alloy over Nickel Overall (Continued....)

Note: See ES-88 for specific material properties, quality, packaging, etc. details  
Conversion Factor 1 $\mu$ m = 39.37 $\mu$ in

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	SELECT 90/10 TIN LEAD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OVERALL NICKEL MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OBSOLETE/ RECOMMENDED
		534	30(0.76)	100(2.54)	50(1.27)	
	M	537	30(0.76)	100(2.54) 300(7.62)	50(1.27)	
		540	30(0.76)	150(3.81)	75(1.91)	
		548	30(0.76)	150(3.81)	50(1.27)	
	M	574	30(0.76)	75(1.91)	50(1.27)	
		639	30(0.76) 40(1.02)	120(3.05) 200(5.08)	50(1.27) 70(1.78)	
		660	30(0.76)	120(3.05)	40(1.02)	NOT RECOMMENDED
		663	30(0.76) 40(1.02)	160(4.06) 200(5.08)	50(1.27) 70(1.78)	
		664	30(0.76) 100(2.54)	160(4.06) 260(6.60)	50(1.27) 70(1.78)	
		665	30(0.76) 40(1.02)	75(1.91)	100(2.54)	
		666	30(0.76)	75(1.91)	100(2.54)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu$ m)
	Batch plating	50 $\mu$ " (1.27 $\mu$ m)
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu$ m)
	Batch plating	250 $\mu$ " (6.35 $\mu$ m)
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu$ m)
	Batch plating	20 $\mu$ " (0.51 $\mu$ m)

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## 4.1.2 Selective Hard Gold with Selective 90/10 Tin Lead Alloy over Nickel Overall (Continued....)

Note: See ES-88 for specific material properties, quality, packaging, etc. details  
 Conversion Factor 1 $\mu$ m = 39.37 $\mu$ in

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	SELECT 90/10 TIN LEAD MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OVERALL NICKEL MIN $\mu$ in ( $\mu$ m) MAX $\mu$ in ( $\mu$ m)	OBSOLETE/ RECOMMENDED
	M	539	30(0.76)	200(5.08)	75(1.91)	
	M	570	50(1.27)	100(2.54)	50(1.27)	
		586	100(2.54)	75(1.91)	50(1.27)	OBSOLETE
	M	595	50(1.27)	50(1.27)	50(1.27)	
		633	50(1.27)	20(0.51) 70(1.78)	50(1.27)	OBSOLETE
		649	50(1.27)	75(1.91)	50(1.27)	
		662	30(0.76)	200(5.08)	50(1.27)	
		667	50(1.27) 60(1.52)	75(1.91)	100(2.54)	
		668	50(1.27)	75(1.91)	100(2.54)	
	M	899	20(0.51) 40(1.02)	100(2.54) 400(10.16)	50(1.27)	
		907	50(1.27)	50(1.27)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu$ m)
	Batch plating	50 $\mu$ " (1.27 $\mu$ m)
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu$ m)
	Batch plating	250 $\mu$ " (6.35 $\mu$ m)
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu$ m)
	Batch plating	20 $\mu$ " (0.51 $\mu$ m)

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### 4.1.3 Selective Hard Gold with Selective 95/05 Tin Lead Alloy over Nickel Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details

Conversion Factor  $1\mu\text{m} = 39.37\mu\text{in}$

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HARD GOLD MIN $\mu\text{in}$ ( $\mu\text{m}$ ) MAX $\mu\text{in}$ ( $\mu\text{m}$ )	SELECT 95/05 TIN LEAD MIN $\mu\text{in}$ ( $\mu\text{m}$ ) MAX $\mu\text{in}$ ( $\mu\text{m}$ )	OVERALL NICKEL MIN $\mu\text{in}$ ( $\mu\text{m}$ ) MAX $\mu\text{in}$ ( $\mu\text{m}$ )	OBSOLETE/ RECOMMENDED
	M	545	20(0.51)	100(2.54)	50(1.27)	
	M	569	30(0.76)	100(2.54)	50(1.27)	
	M	596	50(1.27)	75(1.91)	50(1.27)	
		630	15(0.38)	200(5.08)	100(2.54)	
		647	15(0.38)	75(1.91)	50(1.27)	
		648	30(0.76)	75(1.91)	50(1.27)	
		654	2(0.05) 10(0.25)	150(3.81)	50(1.27)	
		655	15(0.38)	150(3.81)	50(1.27)	
		656	30(0.76)	150(3.81)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu\text{m}$ )
	Batch plating	50 $\mu$ " (1.27 $\mu\text{m}$ )
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu\text{m}$ )
	Batch plating	250 $\mu$ " (6.35 $\mu\text{m}$ )
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu\text{m}$ )
	Batch plating	20 $\mu$ " (0.51 $\mu\text{m}$ )

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#### 4.1.4 Selective Hard Gold with Selective Hard Gold Flash with Selective 60/40 Tin Lead Alloy over Nickel Overall

Note: See ES-88 for specific material properties, quality, packaging, etc. details Conversion Factor  $1\mu\text{m} = 39.37\mu\text{in}$

PROCESS CODE	APPEARANCE CODES	FINISH CODE	SELECT HD GOLD FLASH MIN $\mu\text{in}$ ( $\mu\text{m}$ ) MAX $\mu\text{in}$ ( $\mu\text{m}$ )	SELECT HARD GOLD MIN $\mu\text{in}$ ( $\mu\text{m}$ ) MAX $\mu\text{in}$ ( $\mu\text{m}$ )	SELECT 60/40 TIN LEAD MIN $\mu\text{in}$ ( $\mu\text{m}$ ) MAX $\mu\text{in}$ ( $\mu\text{m}$ )	OVERALL NICKEL MIN $\mu\text{in}$ ( $\mu\text{m}$ ) MAX $\mu\text{in}$ ( $\mu\text{m}$ )	OBSOLETE /RECOMME NDED
	M	602	2(0.05) 10(0.25)	50(1.27)	100(2.54)	50(1.27)	OBSOLETE
	M	603	2(0.05) 10(0.25)	30(0.76)	100(2.54)	50(1.27)	
	M	604	2(0.05) 10(0.25)	30(0.76)	75(1.91)	50(1.27)	

UNLESS OTHERWISE SPECIFIED MAXIMUM FINISH THICKNESS ALLOWED ABOVE MINIMUMS:

Continuous and Batch Plating:

Nickel	Continuous plating	50 $\mu$ " (1.27 $\mu\text{m}$ )
	Batch plating	50 $\mu$ " (1.27 $\mu\text{m}$ )
Tin-Lead Alloy	Continuous plating	75 $\mu$ " (1.91 $\mu\text{m}$ )
	Batch plating	250 $\mu$ " (6.35 $\mu\text{m}$ )
Gold	Continuous plating	10 $\mu$ " (0.25 $\mu\text{m}$ )
	Batch plating	20 $\mu$ " (0.51 $\mu\text{m}$ )

REVISION: <b>P1</b>	EC INFORMATION: EC No: <b>663282</b> DATE: <b>2021/05/08</b>	TITLE: <b>FINISH SPECIFICATION SELECTIVE GOLD WITH SELECTIVE TIN LEAD ALLOY</b>	SHEET No. <b>10 of 10</b>
DOCUMENT NUMBER: <b>ES-88-F</b>	CREATED / REVISED BY: <b>MANOHARA HV</b>	CHECKED BY: <b>SHIVA B ARALI</b>	APPROVED BY: <b>SHIVA B ARALI</b>