RoHS-legislation
Impact on your connector needs

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FCI is a leading interconnect manufacturer with facilities around the globe to meet your needs in interconnect applications

FCI has been involved in the development and manufacturing of lead-free interconnect components since many decades

Since 1997/1998 FCI has actively been involved in the Research and Development of lead-free interconnect solutions using non lead containing tin based platings and solders

RoHS-legislation

- **Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS)**
- **Target date: July 1st 2006**
- **Substances and maximum concentration values:**

Lead	0.1% by weight
Mercury	0.1% by weight
Hexavalent Chromium	0.1% by weight
Polybrominated Biphenyls (PBB)	0.1% by weight
Polybrominated Diphenyl Ethers (PBDE)	0.1% by weight
Cadmium	0.01% by weight

- **Thresholds are defined by amendment and are valid for homogenous materials**
- **Exempt list defined by Annex and currently under review**

Impact of RoHS on connector industry

TARGETS FOR CONNECTOR INDUSTRY .....

- Find lead-free alternative for traditional tin-lead plating
- Assure no other restricted substances are present in products
- Manage transition (internally + externally)

COMPLEXITY .....

- Not everyone is on the same time schedule

AND IN THE MEANTIME .....

- Need to keep supplying traditional versions to customers with exempt

FCI solutions

FCI has developed a path forward that is flexible to customers and meets the targets of the RoHS.

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FCI solutions are easy to understand and developed to meet your requirements

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FCI solutions are throughly tested and qualified to meet the most critical demands

FCI's path to Reliable Lead-Free Components

- **Selection of best globally available bath(s)**

Whisker propensity	Bath maintainability
Cost	Technical support
Termination style performance	Deposit performance

  - FCI lead-free plating: Matte pure tin on Nickel underlayer

- **Understanding impact of plating finish change on connectors**

Increased processing temperature in solder process
Possible changes in termination style performance
Understanding forward / backward compatibility

  - FCI has tested connector housings under real-life process temperatures
  - FCI has re-qualified all termination styles on the impact of the plating change
  - FCI has tested forward / backward compatibility on all plating surfaces and with all termination styles

FCI Whiskers testing

- **Early 2003 a common whisker test method was developed by the Connector Collaboration Team (FCI, Molex, Tyco, Amphenol)**
- **Recently NEMI and IEC have developed standards for whisker testing**

FCI TERMINAL/COUPON

SAMPLE SIZE (SS)
12 total samples
9 Pb free, 3 SnPb
1 plating lot

1 SEM Examination

2 Pre-conditioning - at least 1 of:
a. 90 deg [illegible] test
b. Therm[illegible] Shock/C[illegible]ng
: -55C [illegible]
: 20 m[illegible] cycle
: 7 min[illegible] well
: 500 cycles

3 SEM Examination

4	Room Storage	Aging	Dry Heat
	SS = 4 (3/1)	SS = 4 (3/1)	SS = 4 (3/1)
	23C +-5C	52C +- 5C	50C +-5C
		90% +- 5% rh	
	6 months	6 months	6 months

5 SEM Examination

NEMI COMPONENTS/LEADS WITH Ni UNDERPLATE

SAMPLE SIZE
Components (Terminals)
3 (30) Pb free per lot, 3 plating lots, 9 (90) per group
1 (10) SnPb per lot, 1 plating lot, 1 (10) per group
30 total components/300 total leads

1 SEM EX[illegible]NA[illegible]ON

2	Roo[illegible] St[illegible]	[illegible]aging w/o[illegible] L	[illegible]m Cycle
	S[illegible]= 10[illegible]	[illegible]0C = [illegible]0	SS = 100
	20C-25C	60C +- 5C	-55C to +85C
	30%-80% rh	93% +- 2% rh	air-air
	4000 hours	4000 hours	20 min. cycle
			10 min. dwell
			1000 cycles

3 SEM EXAMINATION

IEC TERMINAL WITH Ni UNDERPLATE

SAMPLE SIZE
Terminals
< 1000 hours after plating

1 S[illegible] E[illegible]AMINATIO[illegible]

2	[illegible]a[illegible] Test	[illegible]emp Cycle
	[illegible]0	[illegible]5C
	93% +-3% rh	30 min. Cycle
	1000 hours	500 cycles
	2000 hours	1000 cycles
	4000 hours	1500 cycles
	no condensation	

3 SEM EXAMINATION

NEMI COMPLIANT PINS WITH Ni UNDERPLATE

SAMPLE SIZE
Compliant Pins
30 Pb free per lot, 3 plating lots, 90 per group
10 SnPb per lot, 1 plating lot, 10 per group
360 [illegible]al free pins [illegible]ota[illegible] Pb [illegible]s

1 SEM EXAM[illegible]ATI[illegible]

2	Room Storage	Aging w/out bias	Aging w/ bias	Temp. Cycle
	SS = 100	SS = 100	SS = 100	SS = 100
	20C-25C	60C +- 5C	60C +- 5C	-55C to +85C
	30%-80% rh	93% +- 2% rh	93% +- 2% rh	air-air
	4000 hours	4000 hours	4000 hours	20 min. cycle
				10 min. dwell
				1000 cycles

3 SEM EXAMINATION

- **FCI is now testing the variances between these different tests**
- **FCI test conditions are amongst the most severe in the industry**

FCI Qualification testing

- ***Many different elements of connector terminations have been re-qualified:***

Solderability
Solder joint reliability
Compliant pin process conditions
Compliant pin reliability
Mechanical shock and vibration
High temperature storage
Tin whisker growth after termination
Moisture sensitivity level
Compatibility (forward / backward)

- ***Overview of FCI Termination styles:***

Solder	***Press-fit***	***CTW***
- reflow	***- EON***	***IDC***
- wave	***- H-shape***	
- BGA	***- Bow-tie***	***Separable Interface***
- hand		***Wire-Wrap***

FCI has made lead-free easy

- **FCI RoHS-compatible products get new part number**

Lead-free	**Product does not contain any lead above the threshold**
RoHS-compliant	**Product does not contain any restricted substances above the threshold**
RoHS-compatible	**Product is RoHS-compliant and has been qualified to meet the lead-free termination process conditions for which it was developed**

New partnumber = Current part number + LF

- **Current part number remains available**
  - **To support customers with exempt position**
  - **To support customers with different implementation schedules**
- **Lead-free shipments are clearly labeled on the packaging**

Directive 2002/95/EC Compliant

Directive 2002/95/EC Compatible

FCI roadmap to lead-free

- The FCI-way to lead-free is making it easy for customers
  - No customers have the same requirements
  - No customers are on the same timeline
- FCI has developed a very flexible transition approach
- Almost all FCI products can be made available in a lead-free and RoHS-compatible version
  - per January 2005, depending on customer need
- To assure your product is available in time, please contact your FCI sales representative and give them your target dates and your requested volumes
- FCI product focus teams are ready to meet your schedule
  - Internal procedures are available
  - Critical issues have been qualified

FCI lead-free products

Easy to make the change

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Easy to identify in your process

Q&A

What plating is FCI recommending?

- FCI standard option for lead-free plating is matte pure tin on a nickel underlayer (thickness specified on the drawing)
- Alternative platings qualified or under test with FCI:

Bright pure tin	Qualified for shields and accessories (mainly barrel plated products)
Hot dip tin	Qualified for products w/o nickel underlayer (mainly used in Automotive)
Tin-Bismuth	Under test for special applications only
2 layer tin	Under test for special applications only
Reflowed tin	Under test for special applications only

- FCI is using only preferred and qualified baths

Q & A

What process temperature can FCI products meet?

- FCI products are developed and qualified to meet specific termination process conditions. For lead-free these conditions are specified on the customer drawing. Each condition is verified by means of standard testing procedures
- Some examples:
  - Reflow: 245C & 260C
  - Wave: 260C
  - Press-fit: various lead-free board materials & various hole diameters
- Max process temperature and applied test conditions are specified on the engineering documentation
- Customer process conditions may deviate from applied test conditions

Q & A

What is the new FCI RoHS-compatible lead-free part number?

- Lead-free part number = current part number + LF

  6801500-001 becomes 6801500-001LF

- In case a part number already has +16 characters, a new part number will be assigned, again ending with LF
- Also products that use non-tin based platings get a new part number when they are defined and documented to meet the RoHS-requirements
- The LF at the end of any FCI part number uniquely identifies this FCI product to be RoHS-compatible and lead-free
- Current part numbers remain available for customers that have continued need for tin-lead plated products

Q & A

- ***How can I get FCI lead-free products?***
  - ***Contact your FCI sales representative and inform them of your need for FCI lead-free products***
  - ***In case you have a specific date for availability of the products, assure your contact person is aware of that***
  - ***Your contact will communicate your need and verify availability of the requested product with the FCI product focus teams***

NO ORDERS = NO BUSINESS

this old rule has not changed with lead-free

The FCI-way

RoHS made easy