Schlötter
Galvanotechnik

Copper Electrolytes

We fill the gaps!

technical copper processes

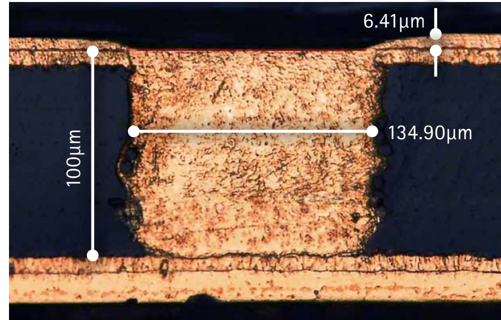
- Direct Current Plating
- Reverse Pulse Plating
- Blind Microvia Processes

www.schloetter.com

Copper SLOTOCOUP SF 30

Copper SLOTOCOUP SF 30 is used for the production of HDI printed circuit boards in order to achieve the best superfilling results of blind microvias, pattern plating and metallize through holes in one process step, but with a very thin copper layer on the surface of the printed circuit board. The achievable levelling is extraordinary, throwing power and metal distribution are excellent. Copper SLOTOCOUP SF 30 is operated with MMO anodes and can be applied in VCP-line (Vertical Continuous Plating) as well as in standard vertical plating lines. By regulation of the current density and electrolyte composition the metal distribution can be adapted to the surface geometry of the PCBs to be plated. Copper SLOTOCOUP SF 30 is made-up and replenished with three liquid additives.

Concentrations and operating conditions		Range
Copper	[g/l]	40 - 60
Sulfuric Acid	[ml/l]	16 - 43
	[g/l]	30 - 80
Chloride	[mg/l]	50 - 70
Operating temperature	[°C]	18 - 22
Cathodic current density	[A/dm²]	1,0 - 2,0



Copper SLOTOCOUP BV 110

Copper SLOTOCOUP BV 110 is used for the production of HDI printed circuit boards in order to achieve super-filling of blind microvias, pattern plating and metallize through holes in one process step. The layers deposited from Copper SLOTOCOUP BV 110 are very bright, ductile and the levelling is extraordinary. The achievable levelling is extraordinary, throwing power and metal distribution are excellent. Copper SLOTOCOUP BV 110 is operated with MMO anodes and can be applied in VCP-line (Vertical Continuous Plating) as well as in standard vertical plating lines. The electrolyte is made-up and replenished with three liquid additives. By regulation of the current density and electrolyte composition the metal distribution can be adapted to the surface geometry of the PCBs to be plated.

Concentrations and operating conditions		Range
Copper	[g/l]	50 - 65
Sulfuric Acid	[ml/l]	10 - 50
	[g/l]	20 - 90
Chloride	[mg/l]	40 - 70
Operating temperature	[°C]	18 - 22
Cathodic current density	[A/dm²]	1 - 2

Copper SLOTOCOUP BV 50

Copper SLOTOCOUP BV 50 is used for the production of HDI printed circuit boards in order to achieve super-filling of blind microvias, pattern plating and metallize through holes in one process step. With regard to the characteristics of the deposited layers as well as the performance concerning the levelling, metal distribu-tion and throwing power, Copper SLOTOCOUP BV 50 is comparable with Copper SLOTOCOUP BV 110 Copper SLOTOCOUP BV 50 was especially designed for opera-tion in vertical plating lines, equipped with copper anodes. The metal distribution can also in this process be adapted to the printed circuit boards surface geometry by regulation of the current density and electrolyte composition.

Concentrations and operating conditions		Range
Copper	[g/l]	30 - 60
Sulfuric Acid	[ml/l]	20 - 50
	[g/l]	35 - 90
Chloride	[mg/l]	50 - 70
Operating temperature	[°C]	18 - 22
Cathodic current density	[A/dm²]	1 - 2

Copper SLOTOCOUP CU 210

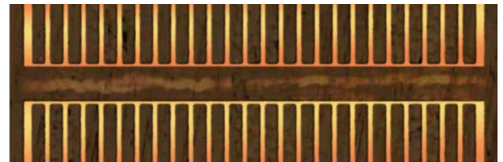
Copper SLOTOCOUP CU 210 allows in conjunction with Reverse Pulse Plating an excellent metal distribution in through holes. The copper coatings deposited are fine-grained and ductile. Since higher medium current densities are possible then with direct current deposition, a considerable reduction of plating time and excellent metal distribution can be achieved at the same time. Copper SLOTOCOUP CU 210 can also be operated with direct current and then deposits bright, fine-grained and ductile copper deposits. The electrolyte is operated with only two additives.

Concentrations and operating conditions		Range
Copper	[g/l]	12 - 23
Sulfuric Acid	[m/l]	90 - 115
Chloride	[mg/l]	70 - 100
Operating temperature	[°C]	20 - 25
Reverse Pulse Plating current densities		
forward (cathodic phase)	[A/dm²]	1 - 6
reverse (anodic phase)	[A/dm²]	2 - 12
Pulse-cycle of time		
forward (cathodic phase)	[ms]	10 - 30
reverse (anodic phase)	[ms]	0,5 - 2,0
DC-Plating (Direct Current)		
Cathodic current density	[A/dm²]	1,0 - 2,5

Copper SLOTOCOUP PRT 120

Concentrations and operating conditions		Range
Kupfer	[g/l]	18 - 30
Sulfuric Acid	[m/l]	90 - 100
Chloride	[mg/l]	50 - 100
Operating temperature	[°C]	22 - 35
Reverse Pulse Plating current densities		
forward (cathodic phase)	[A/dm²]	1,0 - 4,0
reverse (anodic phase)	[A/dm²]	2,0 - 12,0
Pulse-cycle of time		
forward (cathodic phase)	[ms]	10 - 30
reverse (anodic phase)	[ms]	0,5 - 2,0

The Copper SLOTOCOUP PRT 120 has been developed in order to optimize the benefits of Reverse Pulse Plating (periodic reverse pulse plating) in continuous vertical plating lines. With RPP (Reverse Pulse Plating), Copper SLOTOCOUP PRT 120 deposits fine-grained copper layers with excellent metal distribution at considerably reduced plating times. The electrolyte is operated with only one additive. SLOTOCOUP PRT 120 can also be operated with direct current (Direct Current Plating) and deposits then bright, fine-grained, ductile layers.



Copper SLOTOCOUP PRT 120 D

Copper SLOTOCOUP PRT 120 D has been specifically developed for copper plating of PCBs if processes of direct plating are applied. SLOTOCOUP PRT 120 D ensures a quick covering in bore holes and grants an excellent levelling metal distribution. The copper layers deposited are fine-grained, ductile and moderately bright. The electrolyte is operated with only two additives and can be used for both make-up and continuous replenishment. The concentration of the additives can be controlled by CVS (Cyclic Voltammetric Stripping). Therefore, an optimal control of the electrolyte is possible. Also over a longer operational period is no formation of disturbing decomposition products so a time-consuming active carbon treatment isn't necessary. Copper SLOTOCOUP PRT 120 D can also be operated as a RPP (Reverse Pulse Plating) electrolyte.

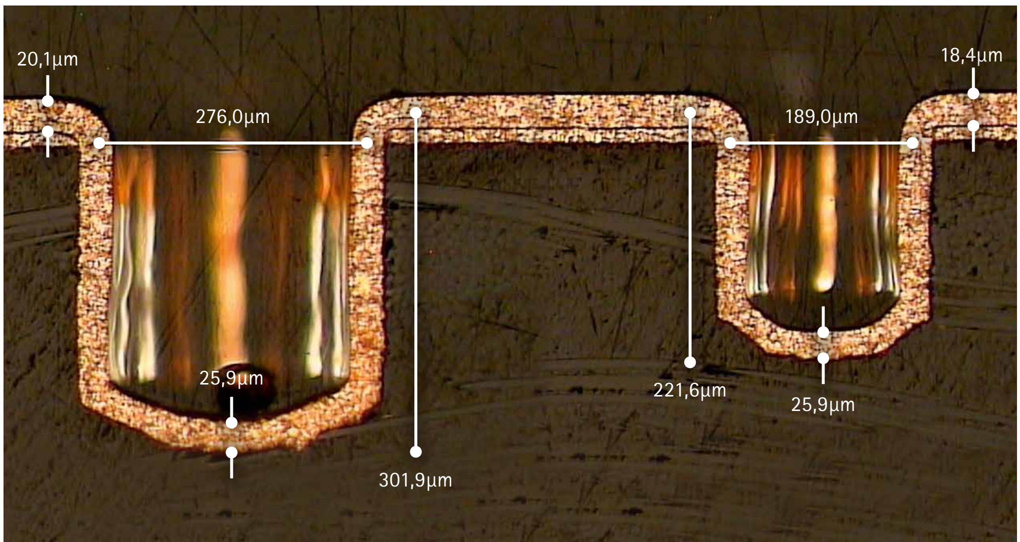
Concentrations and operating conditions		Range
Copper	[g/l]	10 - 25
Sulfuric Acid	[ml/l]	90 - 120
	[g/l]	160 - 220
Chloride	[mg/l]	50 - 80
Operating temperature	[°C]	20 - 30
Cathodic current density	[A/dm²]	1 - 4

Copper SLOTOCOUP CU 140

Schlötter Galvanotechnik

Copper SLOTOCOUP CU 140 was especially designed for plating - but not for filling - of blind microvias and is also well suited for metallization of through holes. The electrolyte deposits bright layers with low internal stress, good ductility and excellent metal distribution. The metal distribution can be adapted to the geometry of the PCB to be plated by regulation of the current density and electrolyte composition. This electrolyte is also characterized by a good compatibility to direct metallisation. Made-up and replenishment is carried out with three liquid additives.

Concentrations and operating conditions		Range
Copper	[g/l]	20 - 35
Sulfuric Acid	[ml/l]	80 - 110
	[g/l]	150 - 200
Chloride	[mg/l]	50 - 70
Operating temperature	[°C]	18 - 22
Cathodic current density	[A/dm²]	1 - 4



Copper SLOTOCOUP CU 50

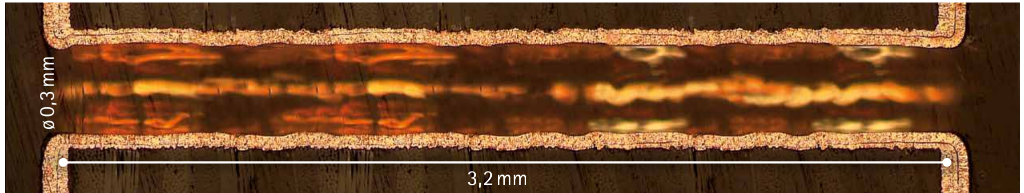
SLOTOCOUP CU 50 is a process for copper plating of printed circuit boards after direct metallization, for pre-plating or pattern plating. It ensures good metal distribution, quick coverage of the through holes and excellent covering power. The copper deposits are fine-grained, moderate bright and ductile. Since the concentrations of the additives in the electrolyte can be controlled by CVS (Cyclic Voltammetric Stripping), an optimal control of the process is possible. There's no formation of troublesome decomposition products, so active carbon treatment is not required.

Concentrations and operating conditions		Range
Copper	[g/l]	10 - 25
Sulfuric Acid	[ml/l]	90 - 120
	[g/l]	160 - 220
Chloride	[mg/l]	50 - 80
Operating temperature	[°C]	18 - 30
Cathodic current density	[A/dm²]	1 - 4

Copper SLOTOCOUP HL 10

Copper SLOTOCOUP HL 10 is used for plating of PCBs in horizontal reel-to-reel plating lines with insoluble anodes. It was especially developed for periodic current reverse plating (Reverse Pulse Plating). Copper SLOTOCOUP HL 10 deposits fine-grained, ductile coatings with excellent metal distribution. Make-up and replenishment of the electrolyte is carried out with two additives. Copper SLOTOCOUP HL 10 can also be operated with direct current (Direct Current Plating) and then provides bright, fine-grained and ductile copper deposits.

Concentrations and operating conditions		Range
Copper	[g/l]	20 - 35
Sulfuric Acid	[m/l]	90 - 115
	[g/l]	170 - 220
Chloride	[mg/l]	70 - 100
Operating temperature	[°C]	18 - 30
Reverse Pulse Plating current densities		
forward (cathodic phase)	[A/dm²]	5 - 15
reverse (anodic phase)	[A/dm²]	10 - 60
Pulse-cycle of time		
forward (cathodic phase)	[ms]	10 - 50
reverse (anodic phase)	[ms]	0,5 - 2,0
DC-Plating (Direct Current)		
cathodic current density	[A/dm²]	3 - 10



Copper Electrolytes for the Manufacturing of PCBs

Current Summary of the Processes:

Bath No.	Name	panel plating	pattern plating	RPP	DC	horicontal plating line	vertical RTR plating line	standard vert. plat. line	Blind Microvia Filling	anode technology
03019	Copper SLOTOCOUP CU 50	○	●	–	●	–	–	●	–	Cu
03026	Copper SLOTOCOUP HL 10	●	○	●	○	●	–	–	–	MMO
03033	Copper SLOTOCOUP SF 30	●	○	–	●	–	●	○	●	MMO
03105	Copper SLOTOCOUP BV 50	●	○	–	●	–	○	●	●	Cu
03311	Bright Copper SLOTOCOUP BV 110	●	●	–	●	–	●	●	●	MMO
03810	Copper SLOTOCOUP PRT 120 D	●	●	○	●	–	●	●	–	Cu
03812	Copper SLOTOCOUP PRT 120	●	●	●	○	–	●	●	–	Cu
03814	Copper SLOTOCOUP CU 140	○	●	–	●	–	●	●	–	Cu
03821	Copper SLOTOCOUP CU 210	●	●	●	○	–	○	●	–	Cu

● = standard ○ = possible Cu = copper anodes MMO = insoluble mixed metal anodes

Dr.-Ing. Max Schlötter GmbH & Co. KG

Talgraben 30
73312 Geislingen/Steige
Germany

T +49 (0) 7331 205-0
F +49 (0) 7331 205-123

info@schloetter.com
www.schloetter.com

DIN EN ISO 9001:2008
DIN EN ISO 14001:2004

06/2014