

TECHNICAL DATA SHEET



CIC (Copper - Invar™ - Copper)

material	description:	CIC is a composite material of Invar sandwiched between two layers of copper. Foils supplied by Schlenk Metallfolien have been produced by roll-cladding.
	composition of material:	
	copper layer	oxygen free copper, SE-Cu acc. to EN1652; 99.95% Cu incl. Ag; approx. 0.003% P
	core layer:	FeNi36; Nickel / Iron Alloy (Invar); 36.5% Ni; 63.07% Fe; 0.004% C; 0.01% Si; 0.002% P; 0.0009% S; (typical analysis)
	layer ratio	standard: 12.5/75/12.5 in volume percentage; others on request
	application	CIC is used for printed circuit boards with ground and power planes and/or metal cores. The low CTE (coefficient of thermal expansion) over a broad temperature range (-55° to 125°C) is crucial for aviaional and special applications.
	material designation	IPC-CF-152/2 CIC W 6 D (as described in IPC-CF-152B)
		/2: specification sheet number, current standard: #2 (12.5/75/12.5) , others on request standard temper: annealed; hard as rolled available on special request
		CIC: composite material
		W: type of manufacturing; only wrought available
	6: thickness in increments of 0.025mm; standard 0.15mm , other thicknesses on request	
	D: bond enhancement treatment; N: no treatment, no stain-proofing; P: no treatment, stain proofing both sides; S: single sided treatment with stain proofing both sides; D: double sided treatment with stain proofing both sides standard: D with zink-treatment and chromate passivation	

physical properties (design values only, will not be certified)	metric units		American units	
	density	8.33 g/cm ³		.301 lbs/in
thermal conductivity	1.10 (xy plane); 0.19 (z plane) W cm/cm ² °C		64 (xy); 11 (z) Btu ft/ft ² hr °F	
electrical conductivity	14.5 m/Ω mm ²	at 20°C soft annealed	25 % IACS	at 68 °F soft annealed
electrical resisitivity	0.069 Ω mm ² /m	at 20 °C soft annealed	41.48 Ω/cir.mil.ft	at 68 °F soft annealed
modulus of elasticity	140000 N/mm ²		20.3·10 ⁻⁶ lb./in. ²	
CTE (coefficient of thermal expansion)	2.4 to 5.6 ppm/°C	annealed condition Longitudinal	values for CTE can be certified	

Qualification procedure for treated product	Our product is laminated to a standard Epoxy-based substrate (exact type is defined in internal procedures)
	Acceptance level: min. 1,5 N/mm
	Test parameters: 10 bar pressure 180 °C press-plate temperature 1 h hold-time
	Peel strength is tested after 3 press-cycles
	This test procedure has been developed jointly with different customers. Due to the wide variety of substrates being used, we strongly recommend to implement incoming test procedures for this product. A transfer of our test results to other materials and/or press parameters is not recommended.

Applicable specifications	We consider the IPC-CF-152B to be applicable for this material. There are some points which we cannot confirm to:
	Surface finish treat (unclear definition of value to be measured, Ra or Rz.)
	CTE (results are strongly influenced by measurement system, to be agreed upon individually)
	Elongation (we test on a length of 100 mm)
	Temper Invar (test method is not defined properly)

manufacturing program of strip	thickness of strip [mm]	0.035/0,05/0,075 to 0.3 mm; standard thickness: 0.15 mm; other thicknesses on request		
	width of strip [mm]	1 to 610 mm		
	thickness tolerance	±10 % on total thickness; thickness of each layer as determined by volume ratio shall not deviate by more than +/-10% from nominal		
	width tolerance	<25.4 mm: +/- 0.2 mm	25.4 to 254mm. +/- 0.25 mm	>254 mm: +/- 0.4 mm
	ID of coil [mm]	preferably 150mm; plastic cores; other core sizes and materials available on request		

manufacturing program for sheets cut to length; not leveled	width [mm]	300 to 610 mm;* tolerance +/- 2 mm
	length [mm]	300 to 1000 mm; tolerance on length: +/- 2 mm
		*maximum available roll width is 610 mm; for widths > 610 mm, the width of the sheet will be in rolling direction thus limiting the length to 610 mm.

All values have been obtained with great care, and to the best of our knowledge, but we accept no liability in respect thereof.

This data is subject to change without notice

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