SAXONIA®
TECHNICAL MATERIALS

Ag/SnO_2 Powder Metallurgical

SILVER TIN OXIDE

/ SILVER TIN OXIDE (Ag/SnO_2 Powder Metallurgical)

Scope: This information refers to silver tin oxide wires, profiles and contact tips manufactured by blending of silver and metal oxide powder without (SP) or with additives (SPW / PMT), compacting, sintering, extruding and drawing or rolling to the final dimension. Profiles and tips are available with a backing layer of silver and optionally with an additional layer of brazing alloy.

Designation of standard compositions

The silver content is designated by the first number: e. g. Ag/SnO_2 88/12 with 88 wt.-% silver, balance metal oxides. The typical gradation of the latter are 8, 10, 12 and 14. Additives improve the switching behaviour of the different materials.

Applications

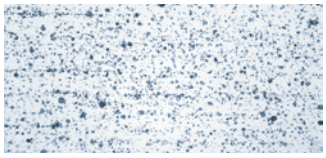
- contactors
- automotive relays
- power line relays
- earth leakage breakers, miniature circuit breakers
- switches for domestic applications, main switches
- circuit breakers up to switching currents of 5000 A

Characteristics

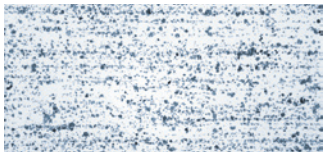
- best anti-welding properties on make of all silver metal oxide variants up to currents of 5000 A (increasing with higher oxide content)
- lowest erosion rate of all silver metal oxide materials for currents exceeding 100 A
- significantly less material migration compared to Ag/CdO and Ag/ZnO
- low contact resistance comparable to other silver metal oxides
- special additives keep the contact resistance stable throughout the service life
- excellent arc extinguishing properties
- RoHS + ELV conform

Microstructure

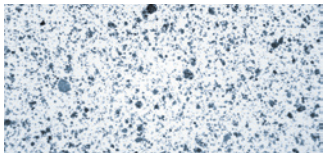
The micron sized SnO_2 particles are oriented slightly along the direction of extrusion.



Ag/SnO_2 92/8 SPW
longitudinal section



Ag/SnO_2 88/12 SPW
longitudinal section



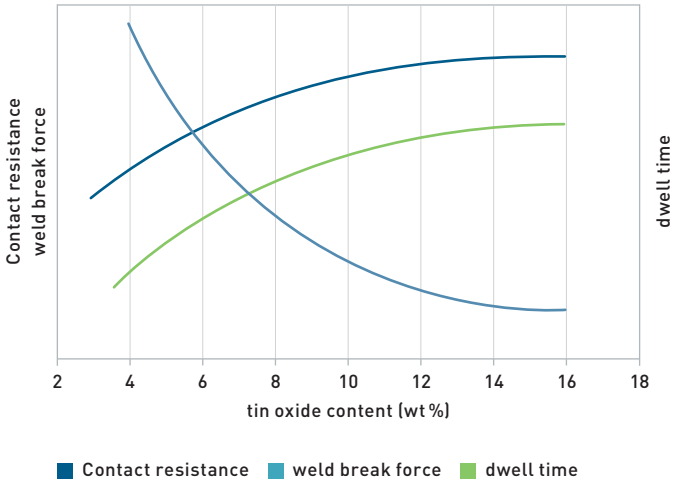
Ag/SnO_2 88/12 SPW
cross section

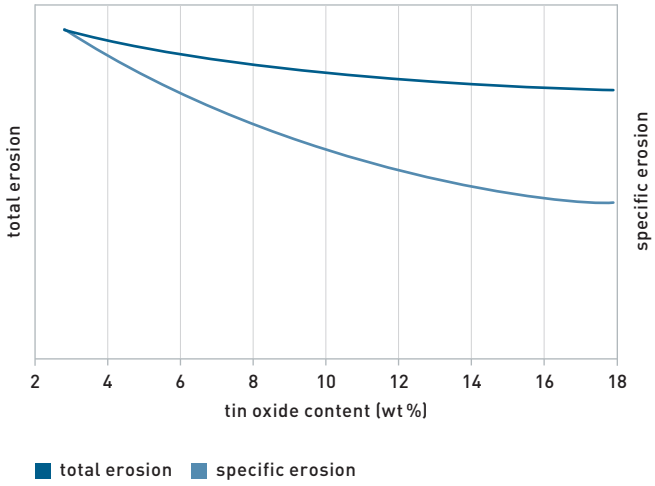
Physical Properties

The physical properties depend mainly on the composition. The effect of the SnO_2 content is shown in the following for one type of material.

Ag/SnO_2	Density	Electrical Conductivity	Hardness Soft	Tensile Strength Soft	Elongation
	[g/cm³]	[m/(Ω·mm²)]	[HV1]	[MPa]	[%]
92/8 SPW	10.1	48	57	200 – 260	> 28
90/10 SPW	10.0	47	62	210 – 270	> 26
88/12 SPW	9.9	45	67	220 – 280	> 24

Impact of Metal Oxide Content on switching properties





Key features of standard compositions

(other upon request, details see Technical Data Sheet)

Ag/SnO_2	Content of Oxides [wt.-%]	Additive	Remark	Wires	Profiles Contact Tips
SP	8 10 12	none	not of practical relevance	•	
SPW	2 8 10 12	WO_3	standard wire material grade lower contact resistance, improved welding resistance	•	
SPW4	8 10 12	WO_3	automotive relays; contactor esp. for devices with large tips or more complex tip design, AC and DC application best workability of all profile qualities	•	•
SPW6	12	MoO_3	AC contactors		•
SPW7	10 12	WO_3 Bi_2O_3	AC contactors		•
PMT1	4 6 8 10 12	Bi_2O_3 CuO	AC contactors (small and medium power rating) automotive relays (lamp, resistance and motor loads) high resistance against welding on make, low erosion rate with inductive loads	•	•*
PMT2	12	CuO	AC contactors (small and medium power rating)	•	•
PMT3	14	Bi_2O_3 CuO	AC contactors (high power rating) lowest erosion rate with inductive loads, high resistance against welding		•*

* PMT1 & PMT3 as profiles and tips with silver backing in PLUS quality, improved bonding quality level.

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