

# Silver Tin Oxide



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## 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), compacting, sintering, extruding and drawing or rolling to final dimension. Profiles and tips are available with a backing layer of silver and optionally with an additional layer of a brazing alloy.

## Designation of standard compositions

The silver content is designated by the first number: e.g. Ag/SnO<sub>2</sub> 88/12 with 88 wt.-% silver, balance metal oxides. The typical gradation of the latter are 8, 10 and 12. Additives improve the switching behaviour of the different materials.

## Key Features

- best anti-welding properties on make of all silver metal oxide variants up to currents of 5000A (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 (slightly > AgNi)
- special additives keep the contact resistance stable throughout the service life
- excellent arc extinguishing properties, better than Ag/CdO for currents up to 70 A
- free of toxic and carcinogenic components

## Microstructure

The micron sized SnO<sub>2</sub> particles are oriented slightly along the direction of extrusion.



longitudinal section  
Ag/SnO<sub>2</sub> 92/8 SPW

longitudinal section  
Ag/SnO<sub>2</sub> 88/12 SPW

cross section  
Ag/SnO<sub>2</sub> 88/12 SPW

Ag/SnO<sub>2</sub>

## Physical Properties

The physical properties depend mainly on the composition. The effect of the SnO<sub>2</sub> content is shown in the following for one type of material.

Ag/SnO <sub>2</sub>	92/8 SPW	90/10 SPW	88/12 SPW
<b>Density</b> [g/cm <sup>3</sup> ]	10,1	10,0	9,9
<b>Electrical Conductivity</b> [m/Ω/mm <sup>2</sup> ]	48	47	45
<b>Hardness soft</b> [HV1]	57	62	67
<b>Tensile Strength soft</b> [MPa]	225	230	235
<b>Elongation</b> [%]	32	30	28

## 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

## Key features of standard compositions

	Designation	Content of oxides [wt-%]	Additive particles	SnO <sub>2</sub>	Application	Wires contact tips	Profiles	Remark
<b>SPW4</b>	Standard Profil Quality	8, 10, 12	WO <sub>3</sub>	medium	automotive relays; contactor esp. for devices with large tips or more complex tip design, AC and DC application		X X	best workability of all profil qualities
<b>SPW6</b>	Universal Contactor Quality	12	MoO <sub>3</sub>	fine	AC contactors for the current range from 20 A up to 400 A		X	material especially for contactors
<b>SPW7</b>	Superior Profil Quality	12	WO <sub>3</sub> Bi <sub>2</sub> O <sub>3</sub>	medium	contactors with high make capacities and long life time with AC3 load, automotive relays for high lamp loads		X	best resistance against welding of all silver-metalloxyde materials
<b>PMT1</b>	Special Wire Quality	12	Bi <sub>2</sub> O <sub>3</sub>	coarse	automotive relays (lamp, resistance and motor loads)	X		high resistance against welding on make, low erosion rate with inductive loads
<b>SP</b>	Wire Quality	8, 10, 12	none	medium	for low loads in the current range < 25 A	X		good workability, especially for demanding riveting
<b>SPW</b>	Standard Wire Quality	2, 8, 10, 12	WO <sub>3</sub>	medium	for high loads in the current range < 25 A	X		lower contact resistance, improved welding resistance

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