CONTROLLED-EXPANSION ALLOYS

Alloy 50

Iron–nickel sealing alloy / Nominal 50% nickel by mass

Alloy 50 is used for sleeves and capillaries sealed to selected soft glasses in electronic packages. Match the alloy and glass over the temperature interval specified for the seal.

01 Chemical composition

Mass fraction (%)

ELEMENT	CONTENT	ELEMENT	CONTENT
Nickel (Ni)	**49.5–50.5**	Aluminum (Al)	**0.10 max.**
Iron (Fe)	**Balance**	Carbon (C)	**0.05 max.**
Manganese (Mn)	**0.80 max.**	Phosphorus (P)	**0.020 max.**
Silicon (Si)	**0.30 max.**	Sulfur (S)	**0.020 max.**

A variation in nickel content is acceptable only if the agreed material specification permits it and the specified mean expansion requirements are met.

02 Typical physical properties

PROPERTY	VALUE	UNIT
Density	**8.21**	**g/cm³**
Thermal conductivity	**16.7**	**W/(m·K)**
Specific heat capacity	**502**	**J/(kg·K)**
Electrical resistivity	**0.44**	**μΩ·m**

These are reference values. Measurement temperatures are not stated in the source data.

CONTROLLED-EXPANSION ALLOYS

THERMAL EXPANSION

Alloy 50 / Mean coefficient of linear thermal expansion

03 Expansion by temperature interval

Each value is an average from 20 °C to the upper temperature shown, not the instantaneous coefficient at that temperature. Units: micrometres per metre per kelvin, µm/(m·K).

INTERVAL (°C)	TYPICAL MEAN	SPECIFIED RANGE
20 to 100	**9.8**	—
20 to 200	**9.8**	—
20 to 300	**9.5**	**9.2–10.0**
20 to 400	**9.4**	**9.2–9.9**
20 to 500	**9.7**	—
20 to 600	**10.6**	—

A dash means no range is listed for that interval. Typical means are reference values, not acceptance limits for individual lots.

Expansion test specimen

For the specified ranges, the test specimen is held at 900 ± 20 °C for one hour in vacuum or hydrogen, then cooled at no more than 5 °C/min to below 200 °C before removal.

For a tube order, specify the mating glass, temperature interval and any required expansion test report. The specimen treatment above does not define the delivery condition of the tube.