

Description

Tin is a soft, malleable, silvery grey metal, valued for its resistance to corrosion by water and dilute acids and for its ability to adhere to other metals. When molten, it is only slowly oxidised by air. These properties make it suitable for a wide range of applications, from protective coatings to glass making and as a major component of solders.

Unlike most metals, tin is amphoteric – that is it can form both bases and acids. It also has several crystalline forms stable at different temperatures, which can give rise to “tin pest” at very low temperatures. In the pure form, it shares with some other metals the ability to form very thin “whiskers” which can create “shorts” in electrical circuits, either where they are formed or when wafted around by air currents.

Applications

Hot Dip Tinning

Tinning of steel can be done by running a strip of the base metal through molten flux, followed by a bath of molten tin, covered at the exit side by a layer of oil to prevent tarnishing of the molten tin coating. Other metals in strip form can be similarly coated.

Electroplating

This process can be used to make tinned steel and other metal strips but is widely used in many industries, including electronics. In making printed circuit boards, tin is selectively plated onto copper coated laminate to act as an etch resist. This protects the copper traces and pads which act as the conductive paths and connection points between components in printed circuit assemblies. After the unwanted parts of the copper layer have been etched away, the tin is stripped, to leave bare copper, which is protected from tarnishing by further treatments.

Electroplating anodes are usually in the form of either bars suspended from hooks or pellets in anode bags.

Engineering

Tin-containing metal alloys, either tin based or lead based, are used as linings for bearings. Other engineering alloys include bronzes and gun metals, which are alloys of tin with copper and zinc, and are used for many purposes.

Tin paint, consisting of tin powder suspended in a thickened flux medium, is used to pre-tin bearing shells prior to casting white metal linings, as well as for other coating applications. On heating, the tin melts and, assisted by the action of the flux, wets and flows over the metal surface to which the paint has been applied. As the flux is corrosive, the residues need to be washed off for some applications.

Solders

Tin has always been an important component of many different kinds of solder, used to join metal parts without exposing them to high temperatures. Usually, the tin has been combined with lead, to provide a melting range tailored to the application, together with economy, improved protection from corrosion and ease of recycling. With the move to lead free solders for plumbing, for automotive use and, most recently, for electronics, the tin content of solders has increased greatly.

Other uses

There are many other uses for tin, its long liquid range between melting point and boiling point, together with its low vapour pressure and lack of toxicity, make it suited for glass making. In this, liquid tin provides a flat surface, onto which molten glass is cast to make “float glass” for windows.

Tin foil, either on its own or as a cladding on lead, is used for the capsules which cover the corks for high class wine bottles.

Tin chemicals are used in many applications – as catalysts in chemical reactions, for electro plating and as polishing agents, for example.

Technical Data

Property	Data
Melting Point	231.9 °C
Density	7.28 g/cm ³
Coefficient of Thermal Expansion (CTE)	23.8 x 10 ⁻⁶ /°C at 100°C
Thermal Conductivity	66.8 W/m/°C
Electrical Resistivity	0.155 μ cm at 100°C
Electrical Conductivity	15.6 % IACS at 20°C
Tensile Strength	14.5 MPa
Young's modulus	49.9 GPa
Hardness	3.9 HB at 20°C
Surface Tension	540 mN/m
Viscosity	1.81 mPa.sec at 260°C

Specifications

Tin products can be supplied to international, national or company standards, as specified by the customer. For electroplating, care should be given to select an appropriate grade, as most impurities do not plate across but form a sludge beneath the anode. DKL sources various grades of tin to make products suitable for each class of use.

Packaging

Tin is available as sticks, bars, ingots, extruded ovals and other sections, pellets, solid wire, powder and “Liquid Tin Sn100” paint.

Ovals are cut to the customers specified length and can be threaded ready for hooks to be fitted.

Sticks, bars and pellets are usually packed in 20kg cartons. Wire is available in various diameters on several sizes of reel. “Liquid Tin Sn100” paint is available in 1kg and 10 kg pots.

Health & Safety

Please refer to the safety Data Sheet for safety and handling instructions.