

## 27% Nickel-Plated Copper (NPC)

Nickel plating is applied to wire products due to its excellent corrosion resistance properties and in particular, its durability and stability at extremes of temperatures. Of significant importance, and a speciality product of TEMCO Wire Products Ltd in the UK, is 27% nickel-plated copper (NPC) - which provides unsurpassed levels of performance. The plating thickness of 27% (by product weight) gives temperature protection of up to 750°C, as well as providing superb corrosion resistance at negative temperatures such as those prevailing in the Stratosphere which can be as low as -60°C. 27% NPC is increasingly used in a wide range of applications and is included in aerospace, military and industrial/heating products.

## Technical properties of nickel

- Chemical element with symbol "Ni"
- Specific weight 8.90 g/cm<sup>3</sup> (at 20°C)
- Melting point is 1726K (1453°C)
- Electrical resistivity 0.096 ohm mm<sup>2</sup>/m
- Corrosion protection due to high resistance to environmental influences from alkalis, salt spray and reducing chemicals
- High temperature resistance
- Low hardness and good ductility in annealed condition

Commencing in the early 1950's, TEMCO Wire Products Ltd has a long and pioneering history in nickel-plating and in the processing of nickel-plated copper-based wire products. The technology has continually evolved in order to ensure the supply of top-grade nickel-plated products to satisfy market demands for consistent quality and high product reliability.

With the installation of Europe's first nickel-plating line (2007) conceived and designed specifically for 27% NPC wire, TEMCO Wire Products Ltd has the unique capability of mass production of this technologically challenging material. Of course, the plating line is only the first part of the story; since its installation in 2007 a highly dedicated team of engineers has continually strived to keep improving the process. The plating chemistry has been carefully optimised before standardisation, thus guaranteeing a nickel plating structure which is completely uniform and concentric. Process control through inline monitoring is of paramount importance in ensuring the best nickel-plating quality for subsequent wire drawing. Due to the differences in hardness between the nickel plate and the copper substrate, ductility is a particularly critical aspect and is precisely managed - whilst simultaneously maximising the production capacity of this key machine.

In house testing techniques ensure that the plating chemistry and process controls are always maintained, thereby depositing precisely the required quality and quantity of nickel - without variance - at any time throughout the lifespan of the electroplating solutions. Such monitoring also allows effective control of plating thickness within tight tolerances, which is an ever-present challenge for the conservation of resources and waste minimisation.

All of these efforts have proven successful in improving quality, capability and capacity well beyond the OEM's design parameters of the equipment.

Once plated, the wire is readily drawn to fine diameters of as little as Ø0.050mm. The development work on plating has naturally also progressed to enhancing the wire drawing techniques. Drawing dies are strictly controlled and profiled with the very best of die measurement equipment to optimise the drawability of 27% NPC. Improvements in both the technologies and management systems for lubrication and filtration have also played a major role in effecting continual productivity improvements, notably with drawing speeds far in excess of OEM parameters.

Annealing controls also provide the opportunity to adjust the temper of the finished wire, from fully annealed with excellent elongation, to customised intermediate tempers which maintain both flexibility and elongation, whilst retaining some additional tensile strength if needed for improved flex-life performance. This process capability has been particularly beneficial for producing braiding wire for applications ranging from traditional screening in external and non-pressurised sections of aircraft, to bonding leads for the Aerospace, Military and various Industrial markets.

At the opposite end of the scale to the fine-wire and its opportunities for miniaturisation, the core competency of stranding 27% NPC wire is also continually developing. Multi-wire drawing is successfully employed as the basis for maximising capacity of higher-volume production of 27% NPC wire and its subsequent stranding. The technology enables very consistent tension settings across all wires during drawing and at pay-off into the stranding machines.

Only valid at the time of printing!



Exceptionally uniform stranded conductors - whether true concentric or unilay construction – is the result. Highly flexible bunches are similarly available, and for the more industrial applications, rope-strand constructions are manufactured as well. In addition to being a primary source within the European markets, TEMCO Wire Products Ltd successfully exports the 27% NPC products to international markets.

## Standard Range\*

Applicable Specification ASTM B355

Wire diameter	Ø1,65mm – Ø0,050mm	
Wires for braiding	2 to 12 wires	
Stranded conductor	0,05 mm <sup>2</sup> to 2,6 mm <sup>2</sup> 7, 19, 37 ends unilay or true concentric	
Flexible bunch	$0,20 \text{ mm}^2 - 2,5 \text{ mm}^2$	
Rope Strands	up to $25 \text{ mm}^2$	

\*special sizes/constructions available on request.

Due to the superior corrosion and temperature resistance characteristics, demand for 27% NPC continues to grow in a variety of industries. Within the Aerospace industry, 27% NPC has particular importance – from traditional screening, to the currently evolving weight-reducing technologies for next-generation aircraft and power-plants.

If you have not yet sourced 27% NPC wires and strands from us, merely send us your product details and request a product qualification/quotation.

## Records of Revision

Version	Date of revision	Contents of revision	Reason for revision
1	05/2025	New issue refresh from 2013	Website update