

Evolution in electrification





Sometimes the conventional design of catenaries makes it hard to tackle complex problems such as accelerated wear or the need for mechanical improvements that do not adversely affect electrical conductivity. In these cases, designing specific materials for each situation is of great value.

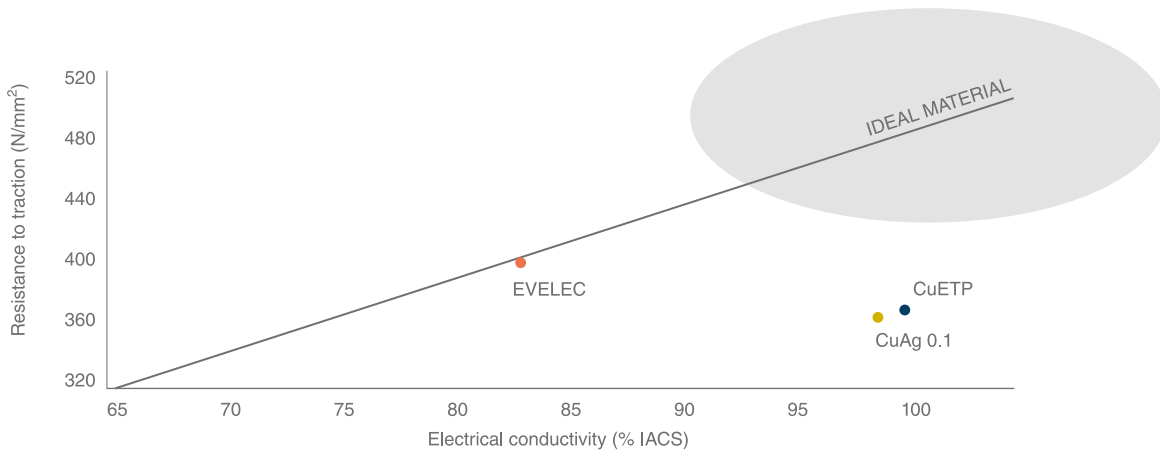
La Farga Advanced Materials has developed a new generation EVELEC™ copper, a material based on micro alloys that improves wear resistance by 30 to 50% compared to commonly used products in conventional lines.

EVELEC™ offers the right balance between resistance to traction and electrical conductivity. The micro alloys make it possible to adjust the material's technical features to the product requirements, thus creating a wide range of "à la carte" coppers.

La Farga Advanced Materials was created with the aim of offering **value to its clients**.



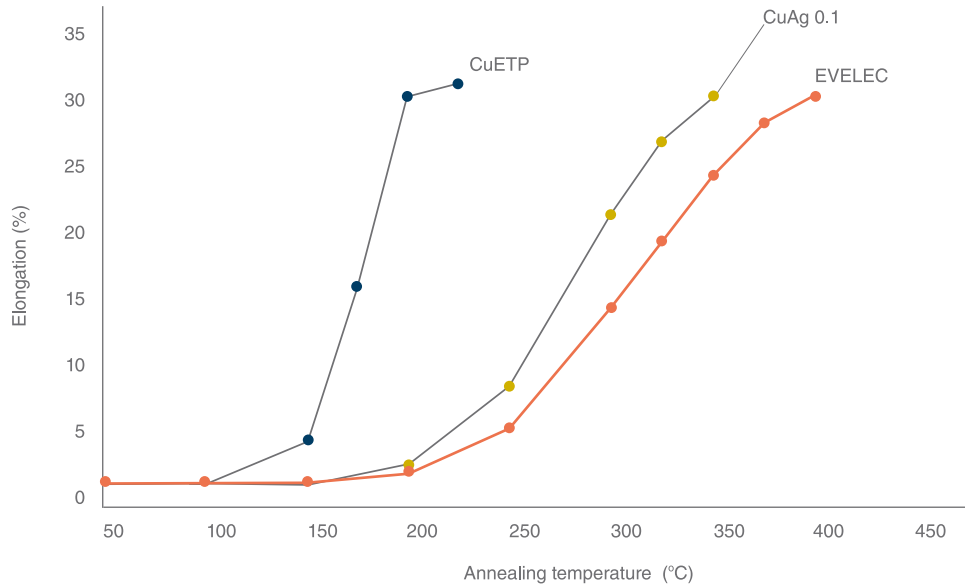
1.- Mechanical and electrical properties of the contact wire



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EVELEC™ offers a much higher annealing temperature than ETP copper and also a better temperature than CuAg 0.1:

2.- Comparative analysis of % of resistance to elongation of the different materials



In a comparison of copper silver and EVELEC™, it becomes evident that EVELEC™ is a suitable material for high speed lines.

3.- Comparative analysis of the properties of the different materials

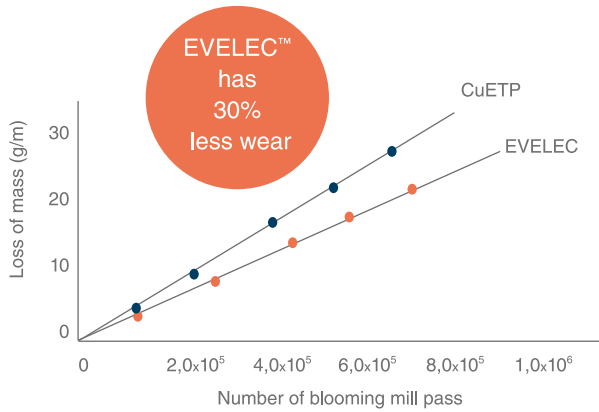
BC-150			
Properties	ETP	CuAg0,1	EVELEC
Electrical resistance (Ohm/Km)	0,122	0,1191	0,136
Weight/m (g/m)	1293 - 1374	1293-1374	1293-1374
Conductivity (% IACS)	100	98	84
Load (KN)	52,4	55,3	60,5
Resistance to traction (N/mm ²)	360	374	400
Minimum elongation (% A200)	3 - 8	5	4
Rpn 0,2 (N/mm ²)	347	352	375
Annealing temperature (°C)	200	340	380

Characteristics defined for BC-150 grooved contact wire

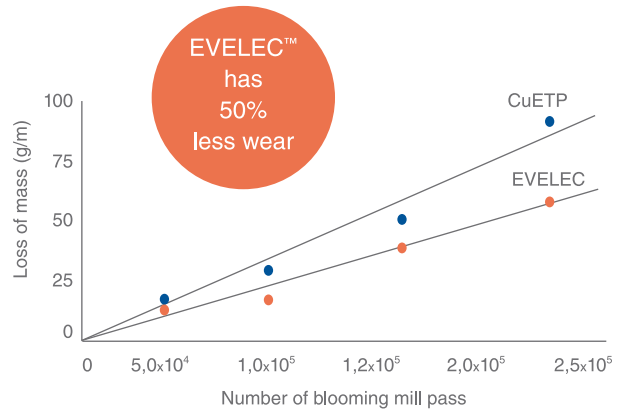
The main component of EVELEC™ is copper, with a maximum content of 99.93% so as to not affect conductivity in any severe manner and to instead increase its mechanical properties.



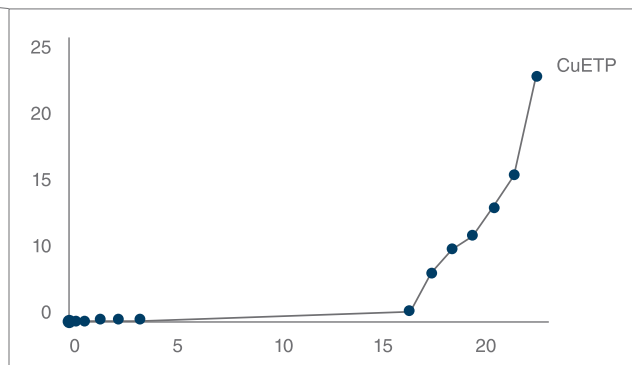
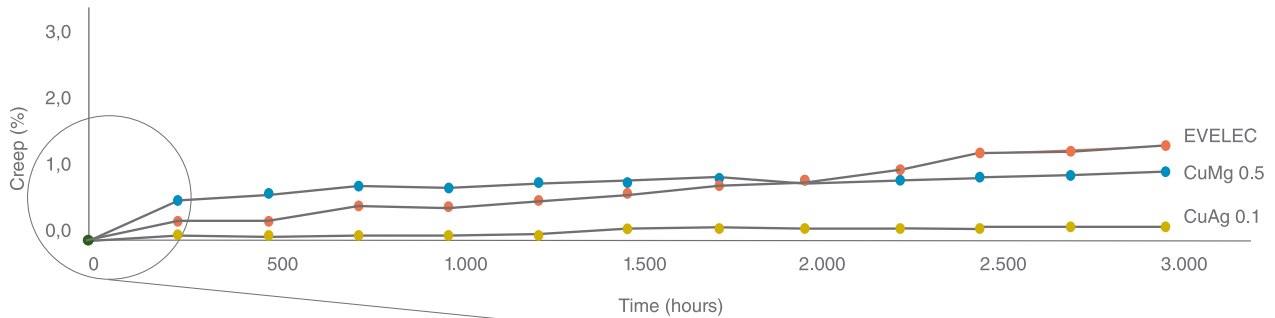
4.- Catenary wear (Accelerated wear test carried out by ETSII MADRID)



5.- Catenary wear (Industrial scale test, equivalent to 2.5 years of service)



6.- Creep test after 3,192 hours of work

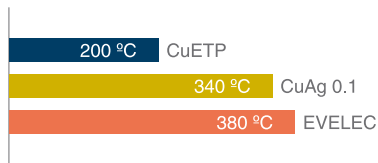


Creep test according EN10291

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The annealing temperature of EVELEC™ is above that of ETP Copper and, depending on the micro alloy, it is even substantially above that of Copper Silver, which means it provides excellent thermal stability.

7.- Resistance to annealing of contact wire



Having analysed the most relevant aspects, we can guarantee that EVELEC™ is a revolutionary product in the sector due to the following reasons:

- 1- because it has a higher annealing temperature:
 - it offers less dilation
 - it wears less
 - it lasts longer once it is installed, leading to cost savings
- 2- because it has better mechanical characteristics:
 - it offers greater resistance to traction, making it possible to exert further tension on the catenary and thus increase the speed of the wave propagation, favouring greater train speed.



Tests carried out with the collaboration of:



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