

# UPCAST® in alloys

## UPCAST® is a versatile process that can be used for the production of pure metals and alloys.

**The Upward Continuous Casting Technology**, better known as the **UPCAST® process**, was originally innovated and developed in the late sixties at Outokumpu's facilities in Pori, Finland for the company's own use. However, very quickly its many advantages became so well known in the business, that a continuous string of deliveries (around 200 in 45 years) have successfully taken place to multiple companies worldwide. Although the majority of these UPGAST® units are being used for the production of oxygen free (OF) copper wire rod and Cu-DHP SGTube, the first unit sold to an outside customer was for brass rod and this was to be followed by many others.

**UPCAST® Legacy** has been carried forward under the banner of UPGAST OY with casting lines freely available for many non-ferrous applications as can be seen from the list on the opposite side of this leaflet.

### Applications for alloyed Coppers and Copper Alloys

continue to develop rapidly. The unique features of the UPGAST® system make it suitable for the production of many of them. Silver bearing coppers are used in various electrical and electronic applications. Zip fasteners are made of brasses (Cu + Zn) and nickel silvers (Cu + Ni + Zn). Tin or phosphor bronzes (Cu + Sn + P) are used for example as connectors in mobile phones – previously they were widely used in paper and pulp industries. Silicon bronze (Cu + Si) and brasses are suitable for manufacturing high-quality screws, with good resistance to stress corrosion.

### High Strengths with CuMg in elevated temperatures

and its good electrical conductivity have increased the demand of this interesting alloy. The requirements for end products change all the time and engineers seek for the best efficiency. CuMg is good material especially for grooved contact wire for high speed trains and for e.g. automotive wire harnesses, electrical and electronic connectors, conductors and connector wires.



**Wherever. Better.**

# UPCAST® in alloys

UPCAST® is used for casting a wide number of non-ferrous metals and alloys – this list gives you a general idea of the most common ones.

Designation	Composition		Electrical conductivity %IACS	Special characteristics
	Cu	Others		
<b>Coppers</b>				
Cu-OF	99.99	O2 max 0.001	≥100	High Conductivity Oxygen Free Copper, immune to hydrogen embrittlement, suitable for all electrical uses, weldable
Cu-OFE	99.99	O2 max 0.0005	≥101	High Conductivity Oxygen Free Copper, immune to hydrogen embrittlement, special copper for special electronic uses, weldable
Cu-OFC	99.99	O2 max 0.0005	≥101	High Conductivity Oxygen Free Copper, immune to hydrogen embrittlement, special copper for cryogenic applications
<b>Alloyed Coppers</b>				
CuAg0.03	99.98	O2 max 0.001	100	Silver Bearing Copper, Oxygen Free, immune to hydrogen embrittlement, higher resistance to softening than Cu-OF or Cu-OFE
CuAg0.05	99.98	O2 max 0.001	100	Silver Bearing Copper, Oxygen Free, immune to hydrogen embrittlement, higher resistance to softening than Cu-OF or Cu-OFE
CuAg0.1	99.98	O2 max 0.001	100	Silver Bearing Copper, Oxygen Free, immune to hydrogen embrittlement, higher resistance to softening than Cu-OF or Cu-OFE
CuAg0.2	99.98	O2 max 0.001	99	Silver Bearing Copper, Oxygen Free, immune to hydrogen embrittlement, higher resistance to softening than Cu-OF or Cu-OFE
Cu-DLP	99.90	P 0.005–0.012	96	Common Copper, Deep Drawing Copper, no hydrogen embrittlement, weldable
Cu-DHP	99.90	P 0.005–0.040	85	Tube Copper, no hydrogen embrittlement, most suitable for welding or brazing in reducing atmosphere/gases
CuMg0.5	99.5	Mg 0.5	≥62	Good conductivity, highest Mg content, very high tensile strengths in elevated temperatures
<b>Brasses</b>				
CuZn10	90	Zn 10	44	Commercial Brass, 90/10 Gilding Metal, resistant to dezincification and stress corrosion
CuZn15	85	Zn 15	37	Red brass, resistant to dezincification and stress corrosion
CuZn20	80	Zn 20	33	80/20 Gilding Metal, resistant to dezincification and stress corrosion
CuZn30	70	Zn 30	28	Deep-Drawing Brass, Cartridge Brass
CuZn37Pb2	61	Pb 2, Zn rest	27	Forging Brass, excellent hot working and machining properties
<b>Other alloys</b>				
CuSn4	95	Sn 5	15	Phosphor/Tin Bronzes, high strength and hardness, excellent spring properties, good resistance to corrosion, wear and fatigue
CuSn6	94	Sn 6	12	Phosphor/Tin Bronzes, high strength and hardness, excellent spring properties, good resistance to corrosion, wear and fatigue
CuSn8	92	Sn 8	12	Phosphor/Tin Bronzes, high strength and hardness, excellent spring properties, good resistance to corrosion, wear and fatigue
CuNi12Zn24	64	Ni 12, Mn 0.3 Zn rest	8	“New Silver”, Nickel-Silver, good resistance to atmospheric corrosion, good spring properties
CuNi18Zn20	62	Ni 18, Mn 0.4 Zn rest	6	“New Silver”, Nickel-Silver, good resistance to atmospheric corrosion, good spring properties
CuNi10Fe1Mn	88	Ni 10, Fe 1.5 Mn 0.7	9	Cupro Nickel, good resistance to corrosion, and bio-fouling in seawater
CuSi3Mn1	96	Si 3, Mn 1	7	Silicon Bronze, high strength at elevated temperatures, good corrosion resistance in marine atmosphere and seawater, weldable
<b>Other metals</b>				
Ag830				Working Silver, jewellery
Ag925				Sterling Silver, solid
Au				Gold, alloyed with Cu, Ag and other metals, jewelry, electronics
Zn				Zinc, alloying, corrosion protection, metal and mold spraying