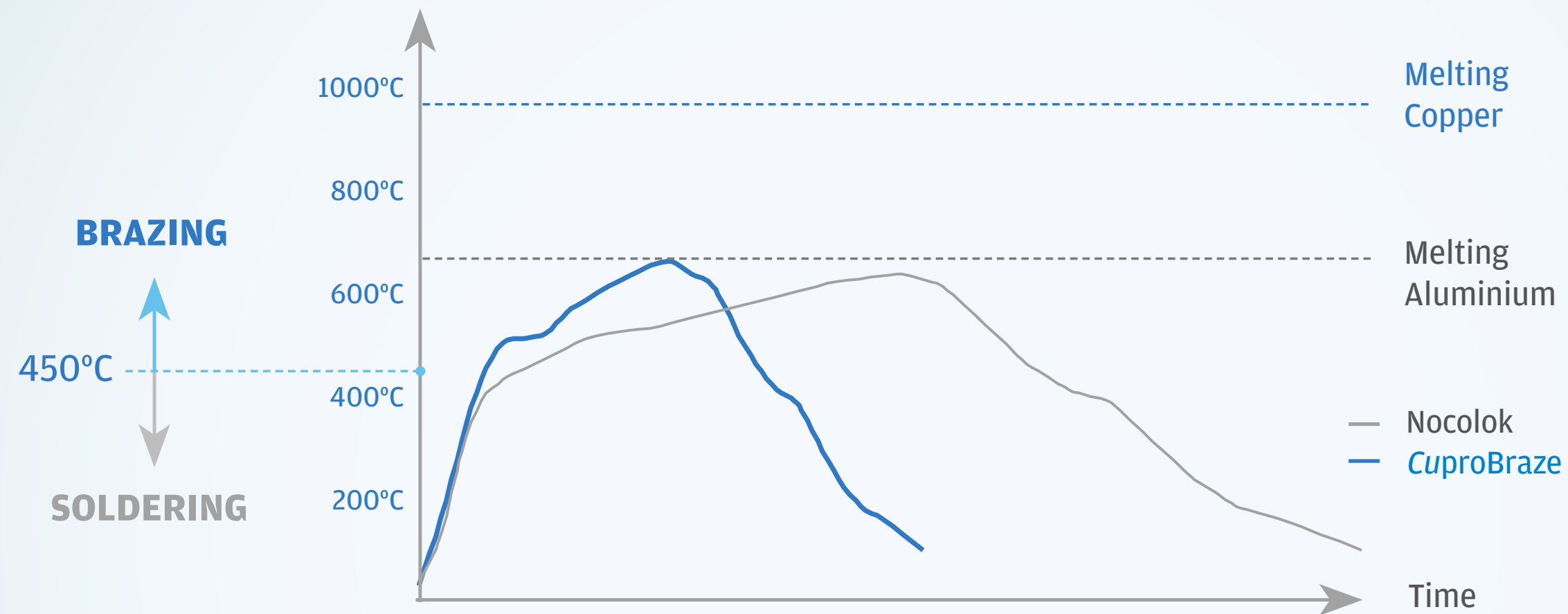


CuproBraze **specialist** **in the radiator** **industry**

 **Finnradiator**

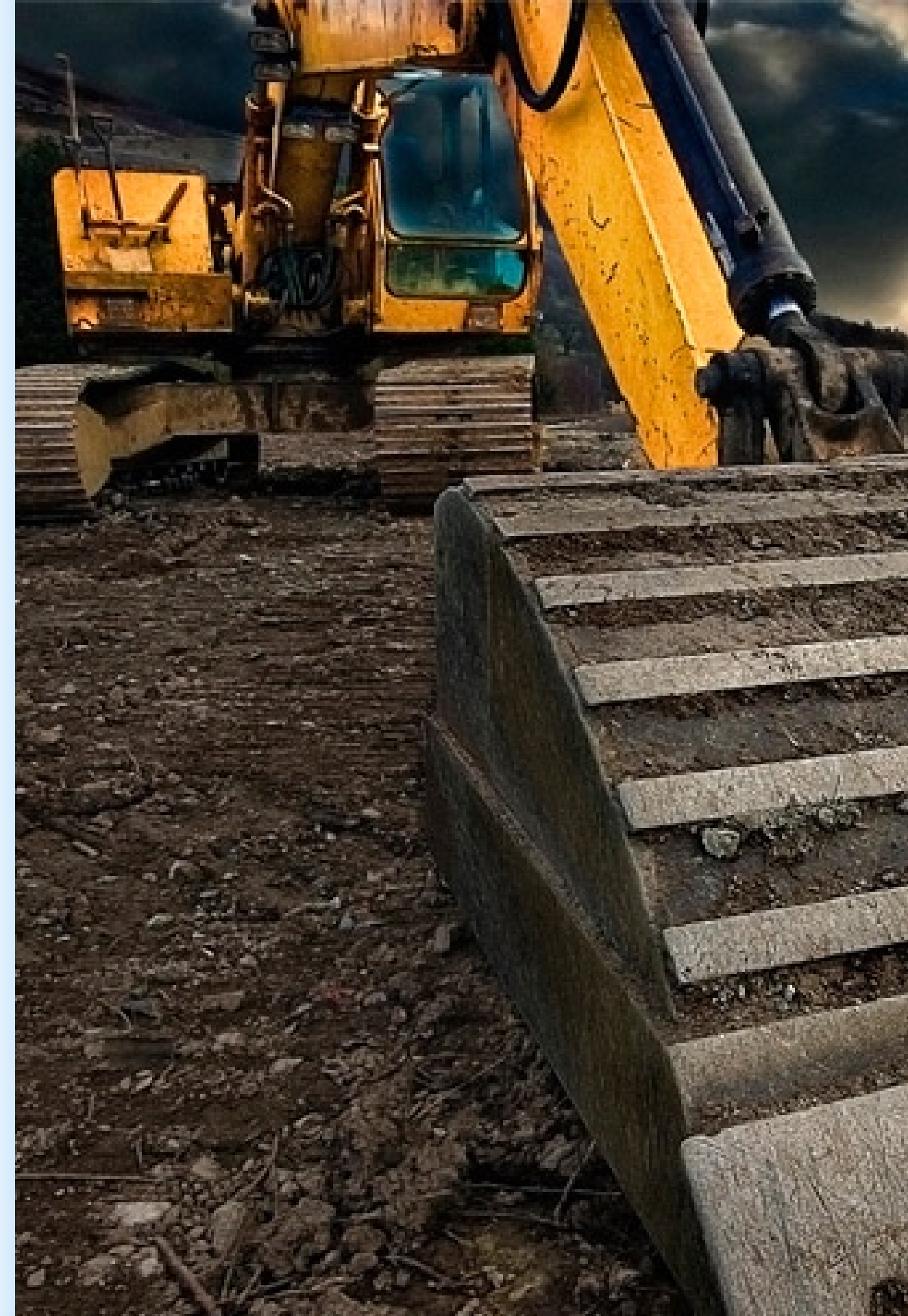
**Why is *CuproBraze*
technology an
excellent choice?**



CuproBraze technology is an advanced method to produce highly efficient heat exchangers.

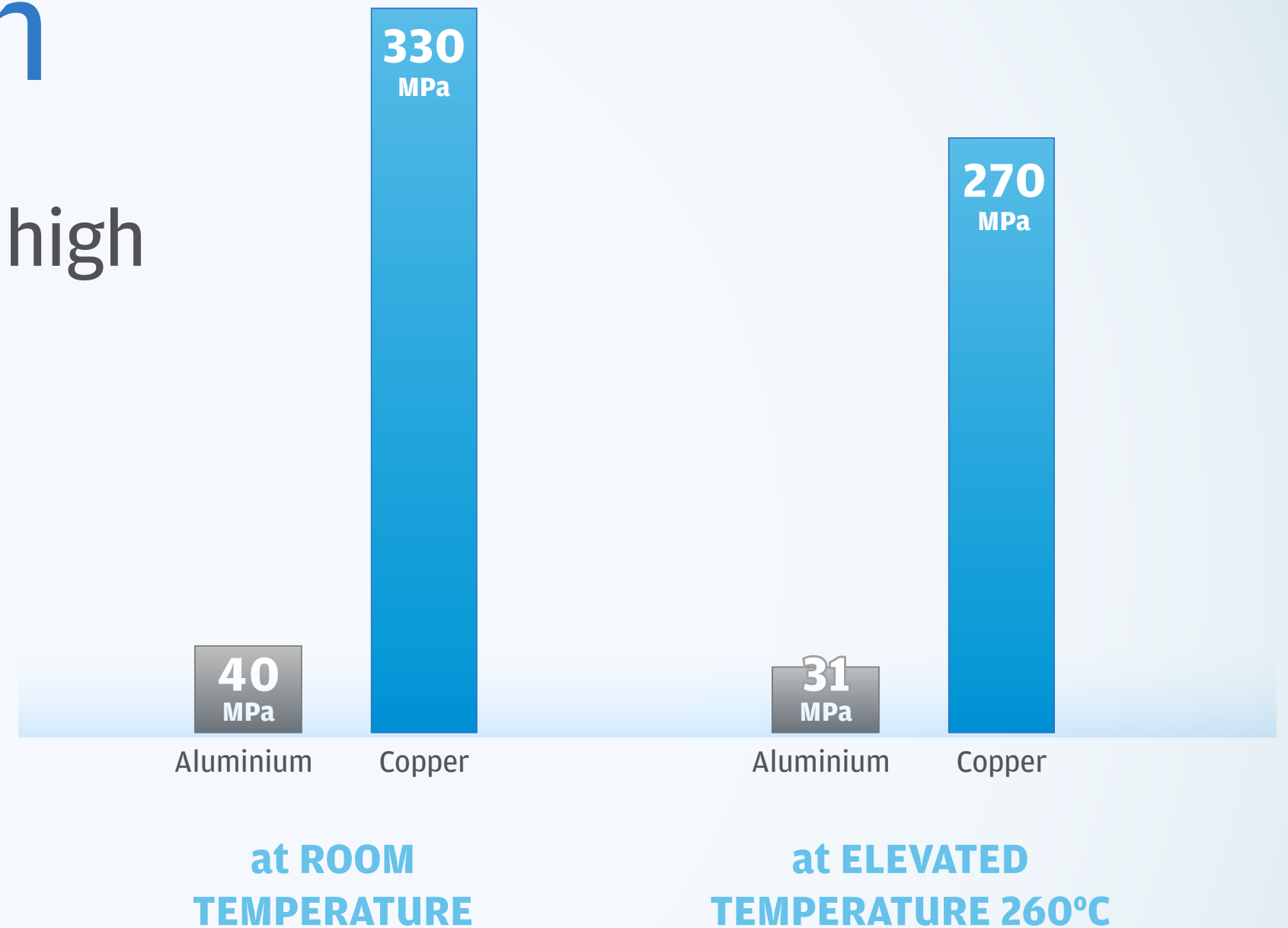
What benefits do *CuproBraze* products offer?

- Durability
- Efficiency
- Reliability



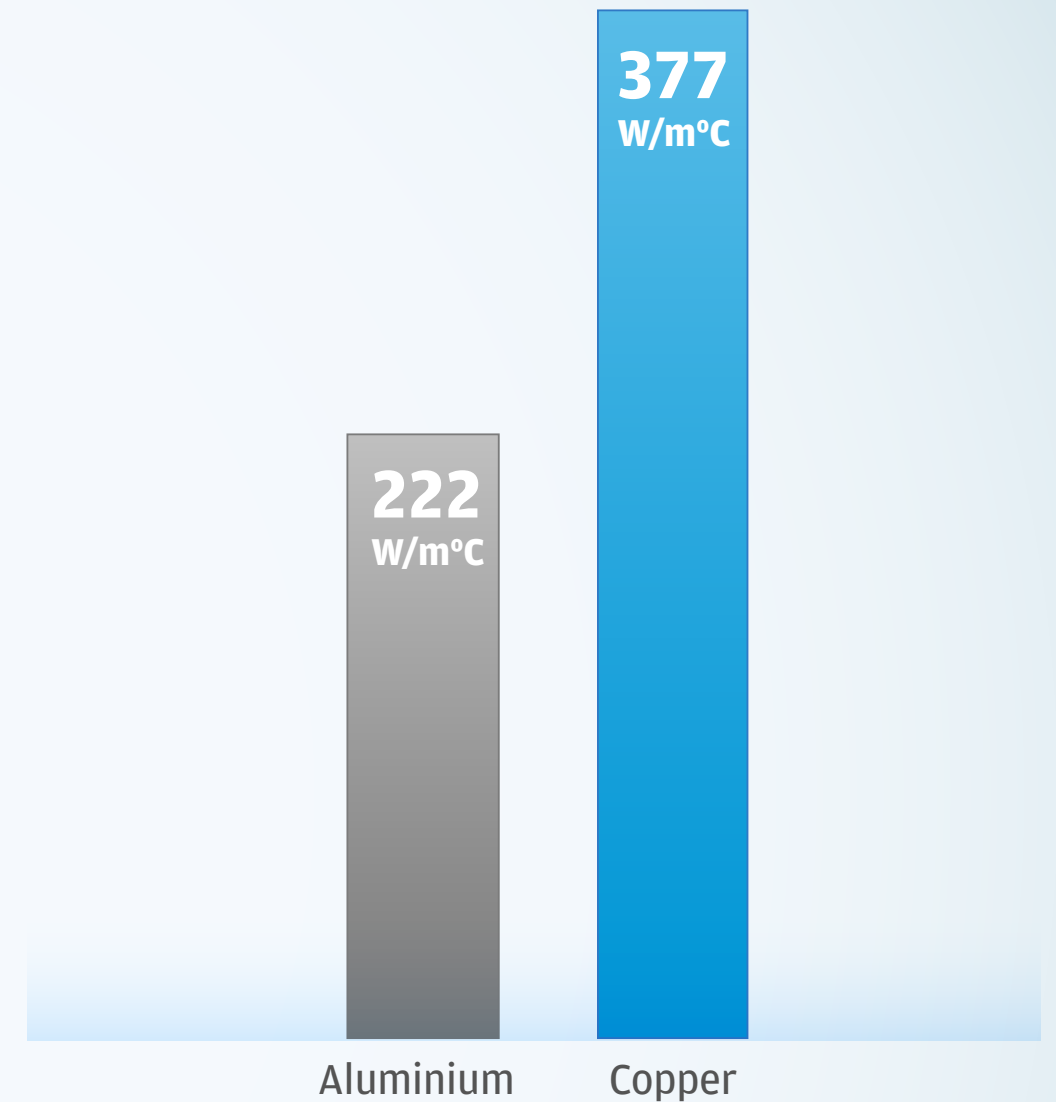
Tensile strength

CuproBrazed products have high tolerance for load stress.



Thermal conductivity

Copper fins have excellent thermal conductivity.



THERMAL CONDUCTIVITY

Heat and pressure tolerance

CuproBraze products are extremely well suited for harsh and hot conditions.



Corrosion resistance

✓ **SWAAT**

✓ **Marine
atmosphere**

✓ **Salt spray**

TESTS

Smaller size

*CuproBraz*e enables smaller product size and higher performance.



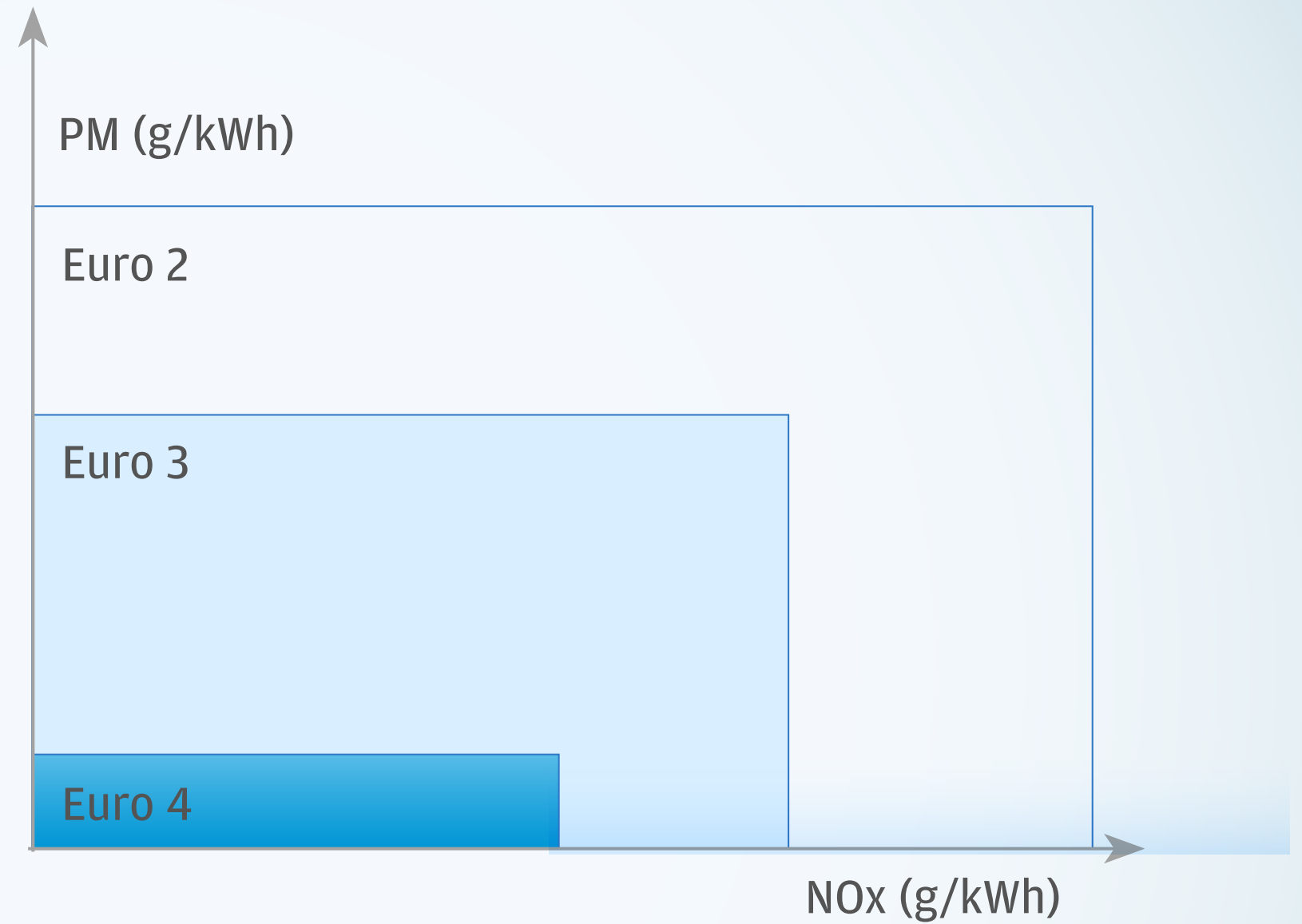
Shock and vibration resistance

CuproBraze works extremely well in conditions where radiators are subject to strong vibration and shocks.



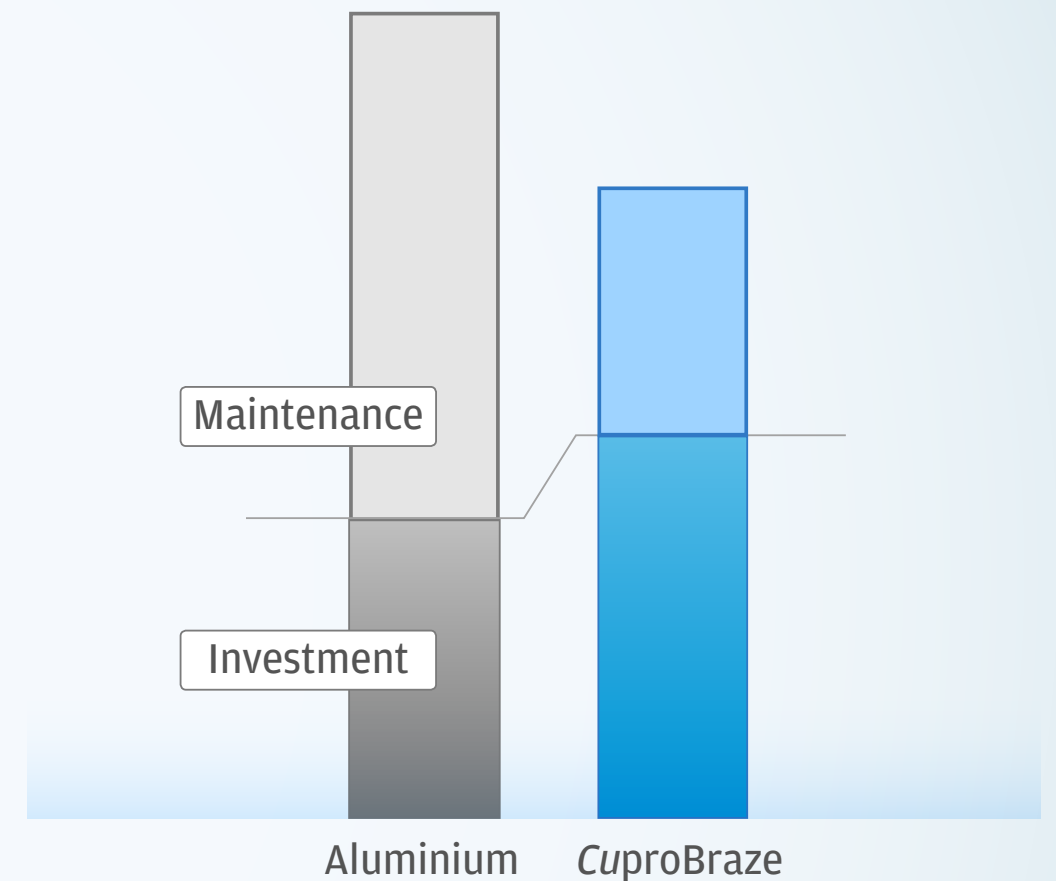
Emission standards

CuproBraze enables you to meet the Euro 4 and Tier 4 Final emission standards.



Maintainability and reparability

- Less downtime
- Less spare parts
- Easier cleaning



LIFE CYCLE COSTS

Heavy Duty Applications
Premium Segment

Sustainable development

- The *CuproBraze* process is free of lead and other toxic chemicals
- Copper and Brass are virtually 100 % recyclable
- *CuproBraze* production uses over 50 % less energy than aluminium production
- *CuproBraze* heat exchangers are reparable both in production and operation



Applications

- Radiators
- Heaters
- Charge air coolers (CACs)
- Oil coolers
- CPU coolers Inverter coolers in hybrid vehicles
- Climate control systems
Copper is classified as antimicrobial material, meaning less odor in passenger compartment.
- Other heat transfer cores



CuproBraze technology is ideal for vehicles and equipment such as

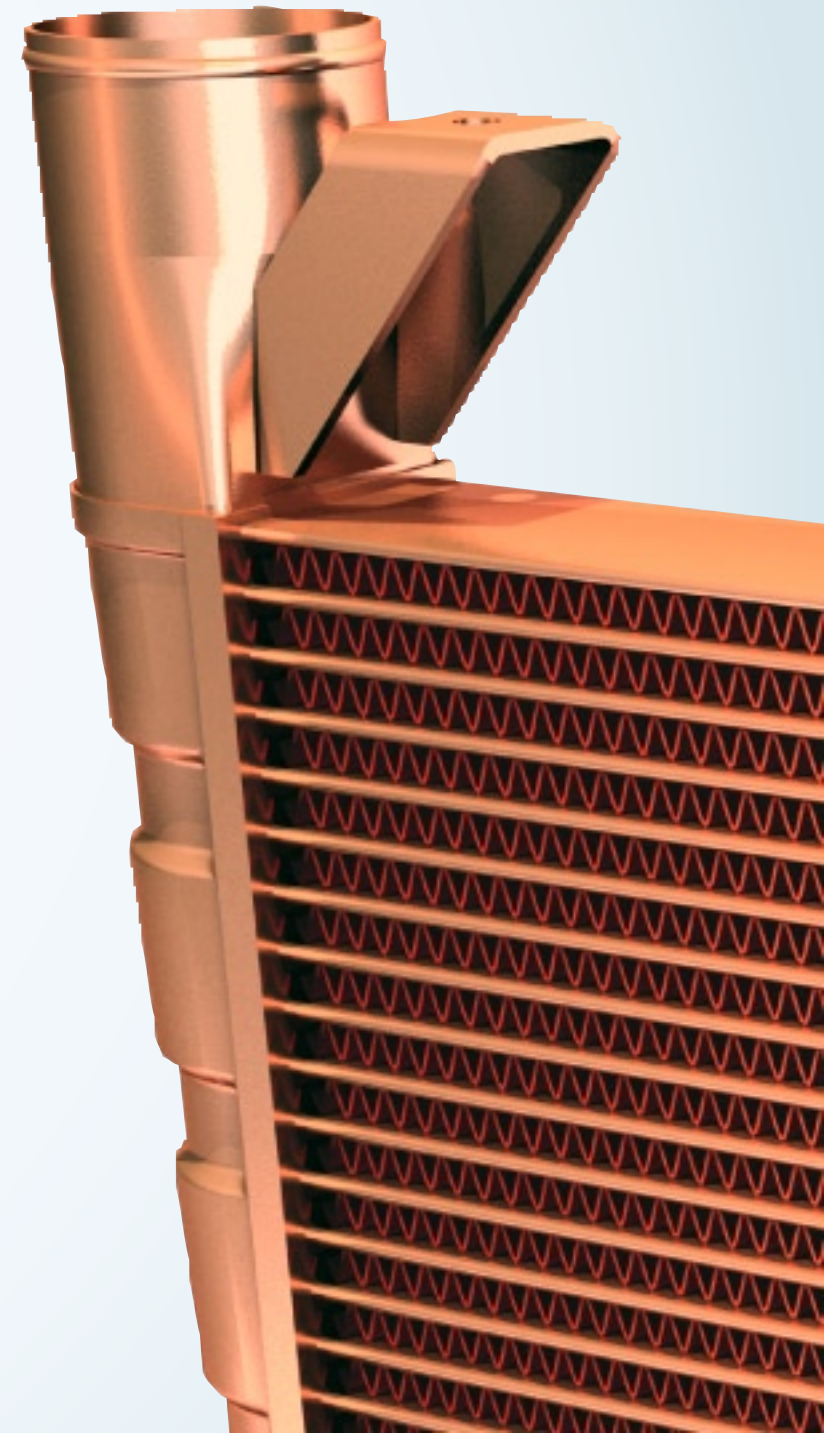
- Heavy-duty highway trucks
- Construction and agricultural equipment
- Stationary power generators
- Other off-road diesel engines



**What makes *CuproBraze*
products so superior?**

Material properties

*CuproBraz*e production uses high temperature resistant copper and brass alloys.



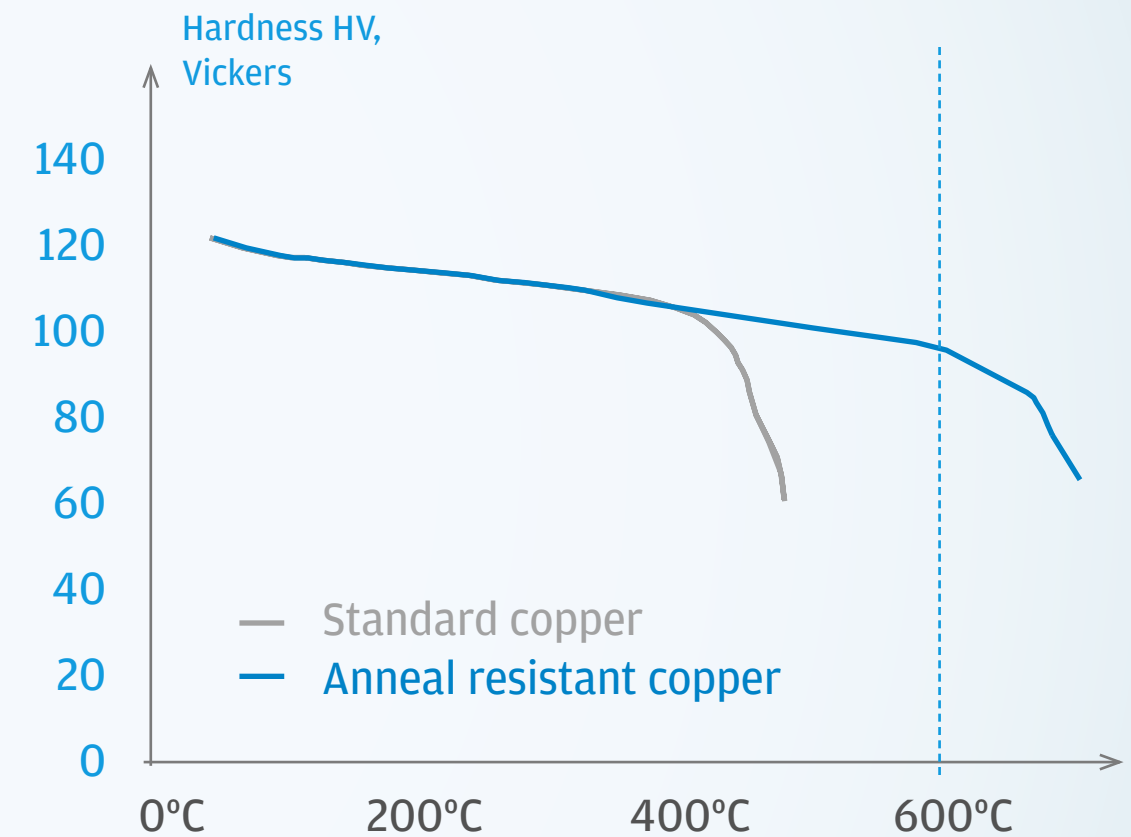
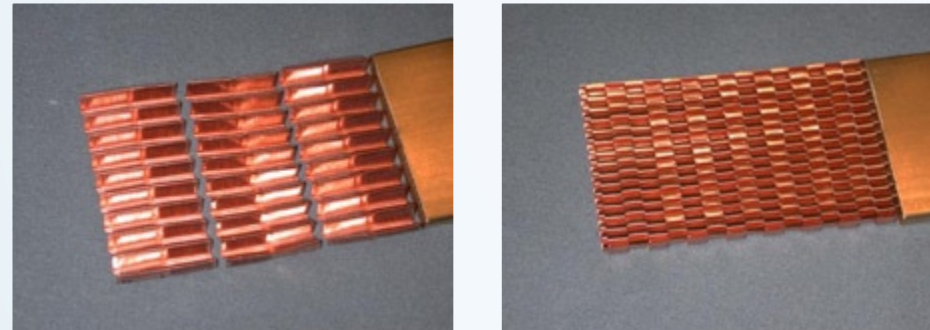
Fin copper for brazing

Copper alloyed with 0.2% chromium.

Precipitation hardening.

Finely dispersed Copper Chromium particles prevent softening (recrystallization).

Particle size 2 nanometers.



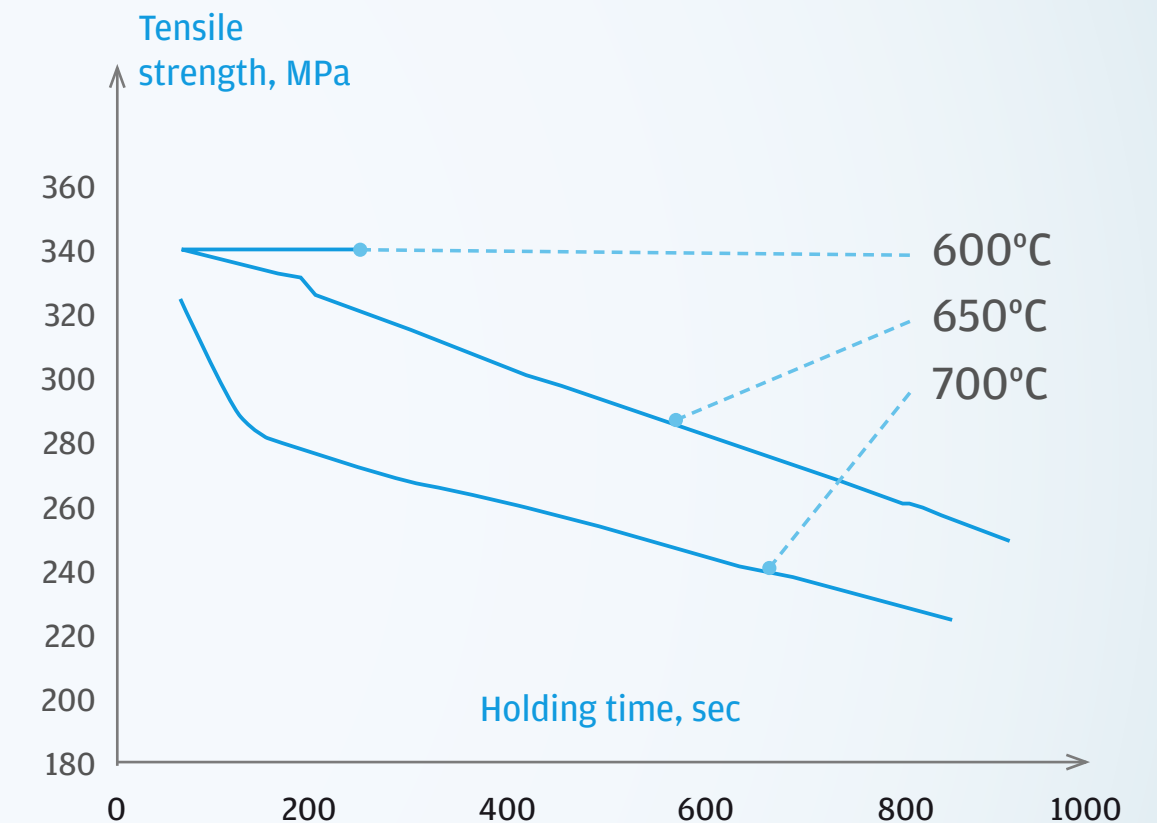
Hardness HV
Copper after 2 min annealing

Mechanical properties of copper - standard temper

Property

Anneal Resistant Copper

	Before	After brazing
Conduct. %IACS	60	min90 (364 W/m°C)
Yield N/mm ²	340	260
Tensile N/mm ²	400	330
Hardness HV	120	100
Elong. A50 %	1	10



Mech. Prop. of Copper

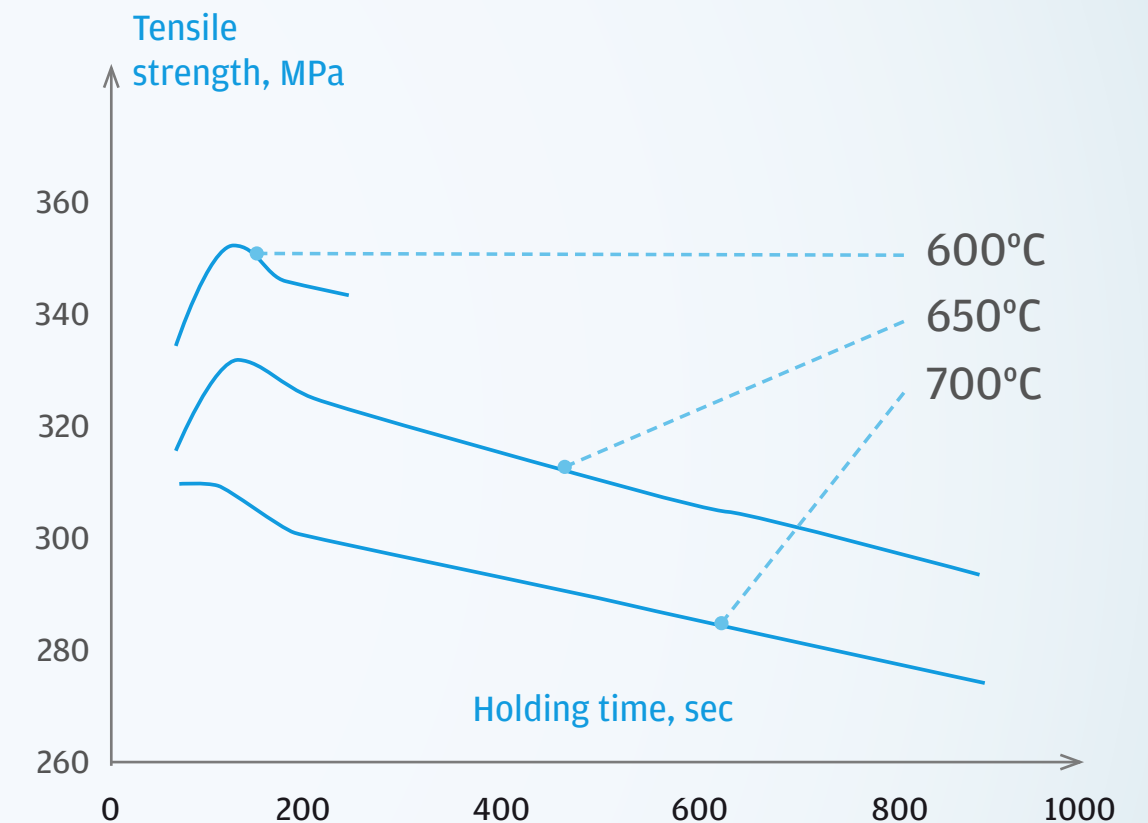
Standard Temper

Mechanical properties of copper - soft temper

Property

Anneal Resistant Copper

	Before	After brazing
Conduct. %IACS	60	min90 (364 W/m°C)
Yield N/mm ²	122	160
Tensile N/mm ²	264	297
Hardness HV	69	77
Elong. A50 %	35	28



Mech. Prop. of Copper

Soft Temper

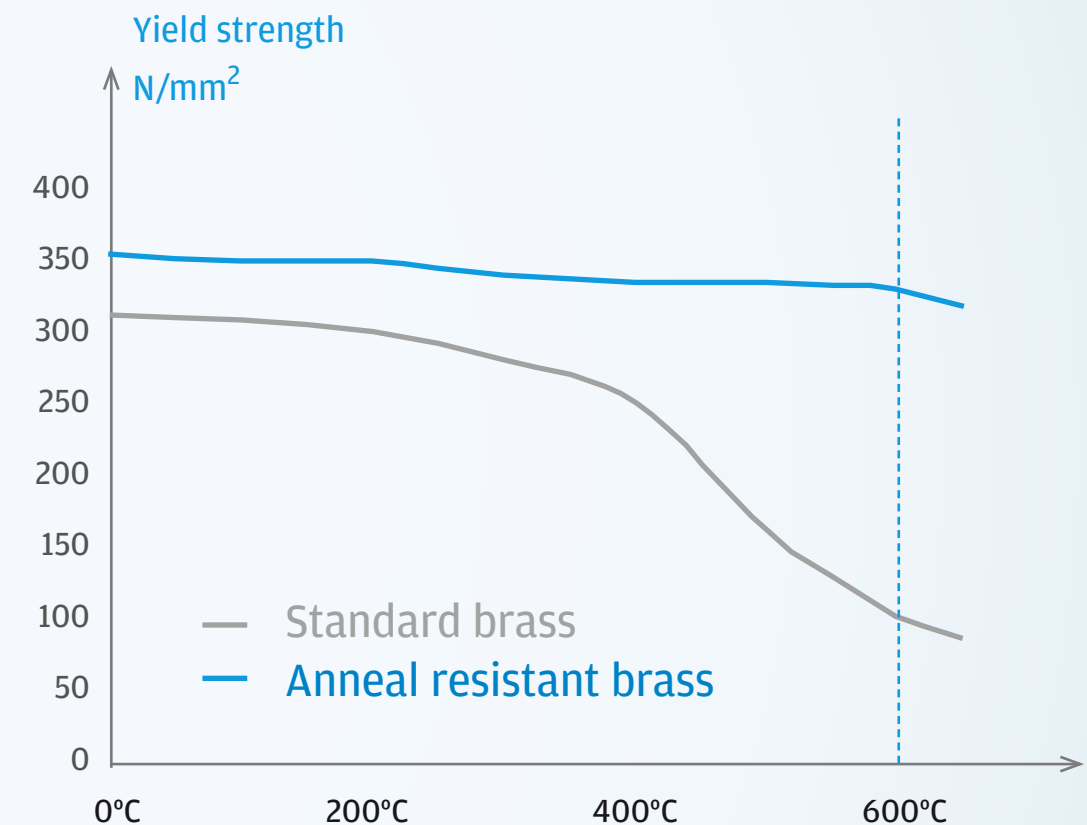
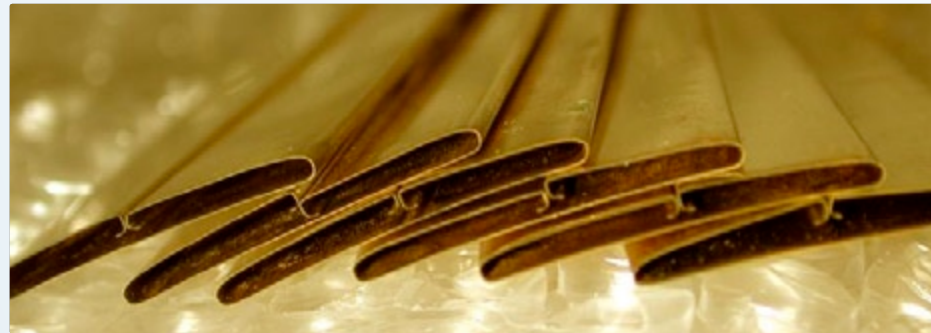
Tube brass for brazing

Cu Zn15 alloyed with iron.

Precipitation hardening.

Finely dispersed iron particles prevent softening (recrystallization).

Particle size 0.2 micrometers.



Yield Strength Brass

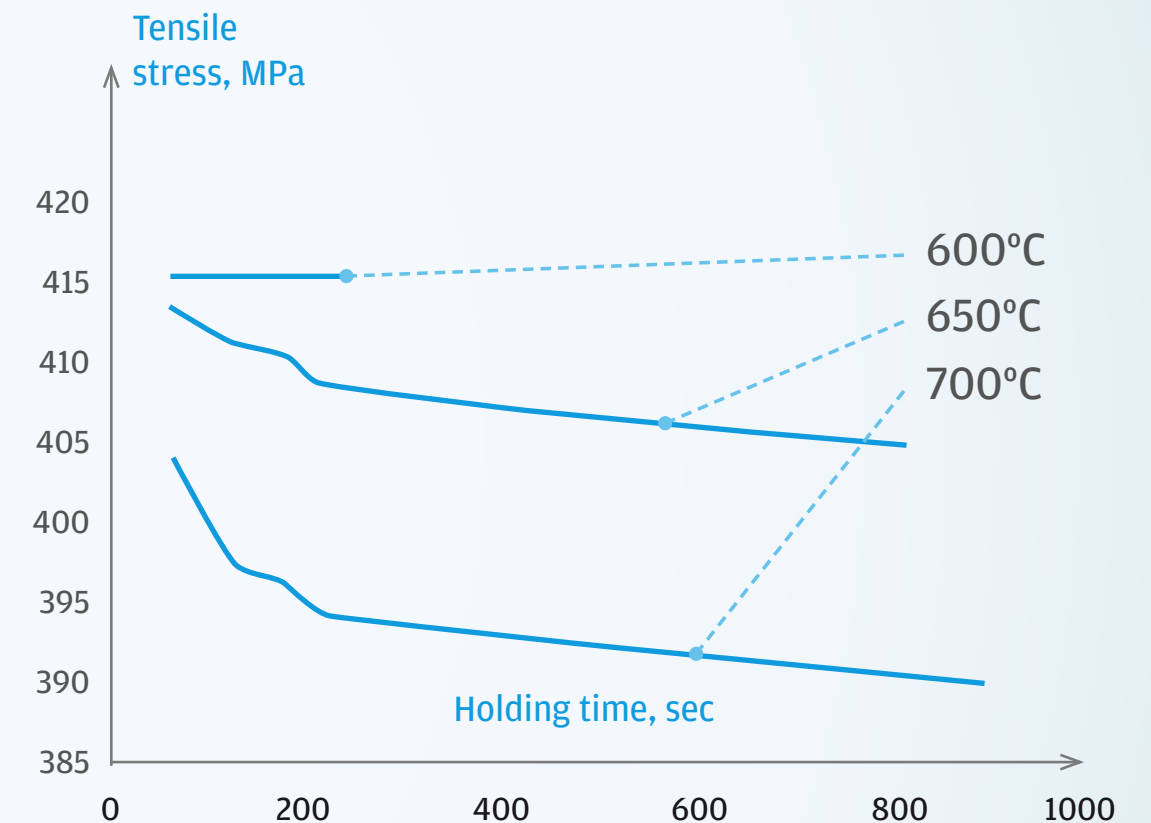
After 2 min annealing

Mechanical properties of tube brass for brazing

Property

Anneal Resistant Brass

	Before	After brazing
Conduct. %IACS	35	30
Conduct. W/m°C	150	129
Yield N/mm ²	340	270
Tensile N/mm ²	420	400
Hardness HV	130	110
Elong. A50 %	25	30

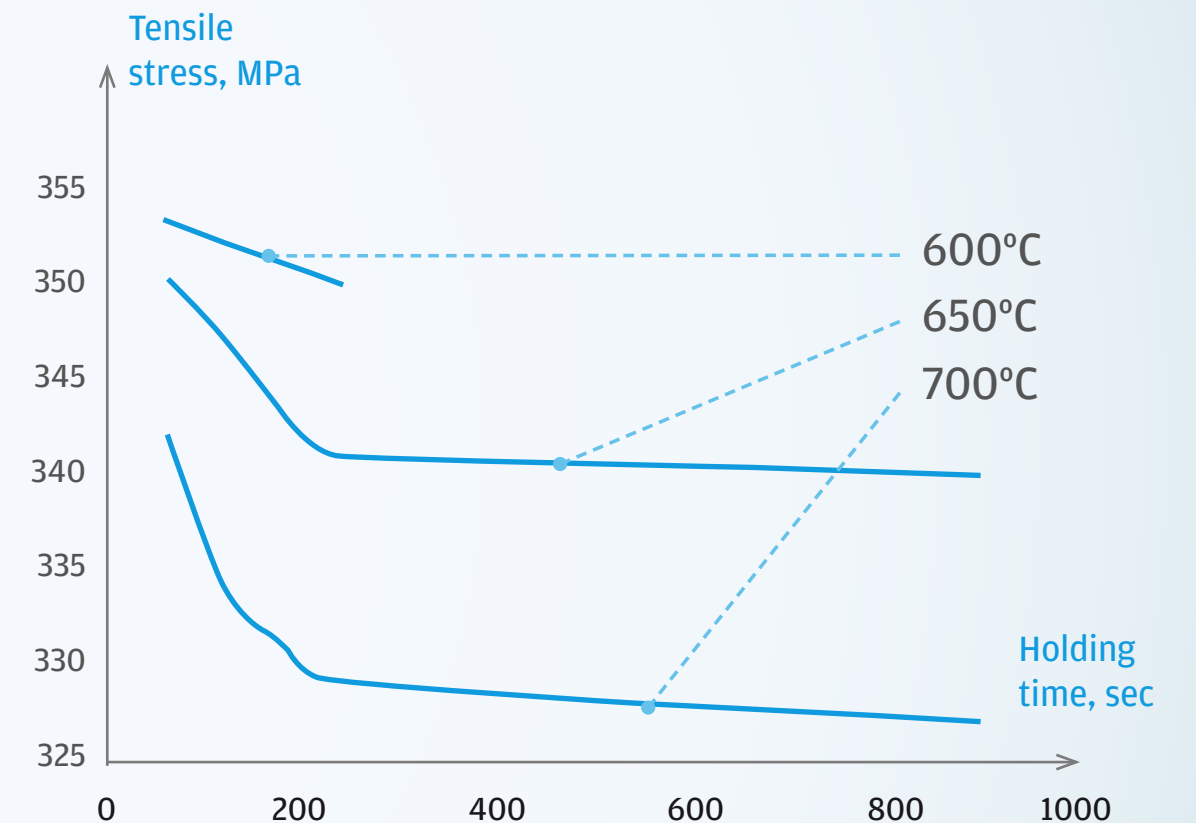
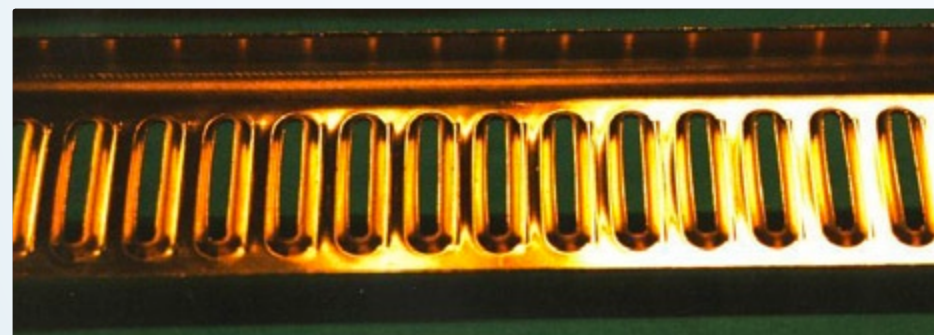


Mech. Prop. of Tube Brass

Mechanical properties of header brass and side support brass

Property **Anneal Resistant Brass**

Property	Before	After brazing
Yield N/mm ²	115	105
Tensile N/mm ²	350	340
Hardness HV	70	67
Elong. A50 %	70	75



Mech. Prop. of Header Brass

Brazing paste

OKC 600 characteristics

Gas atomized to a spherical powder

Particle size < 90 μm

Average particle size 15 to 30 μm
depending on source

Melting temperature 600°C

Melting range 10°C



Tin (Sn)	15%
Nickel (Ni)	4%
Phosphorous (P)	5%
Copper (Cu)	Balance

Brazing filler alloy foil

VZ-2250 characteristics

Foil gauge > 20 µm

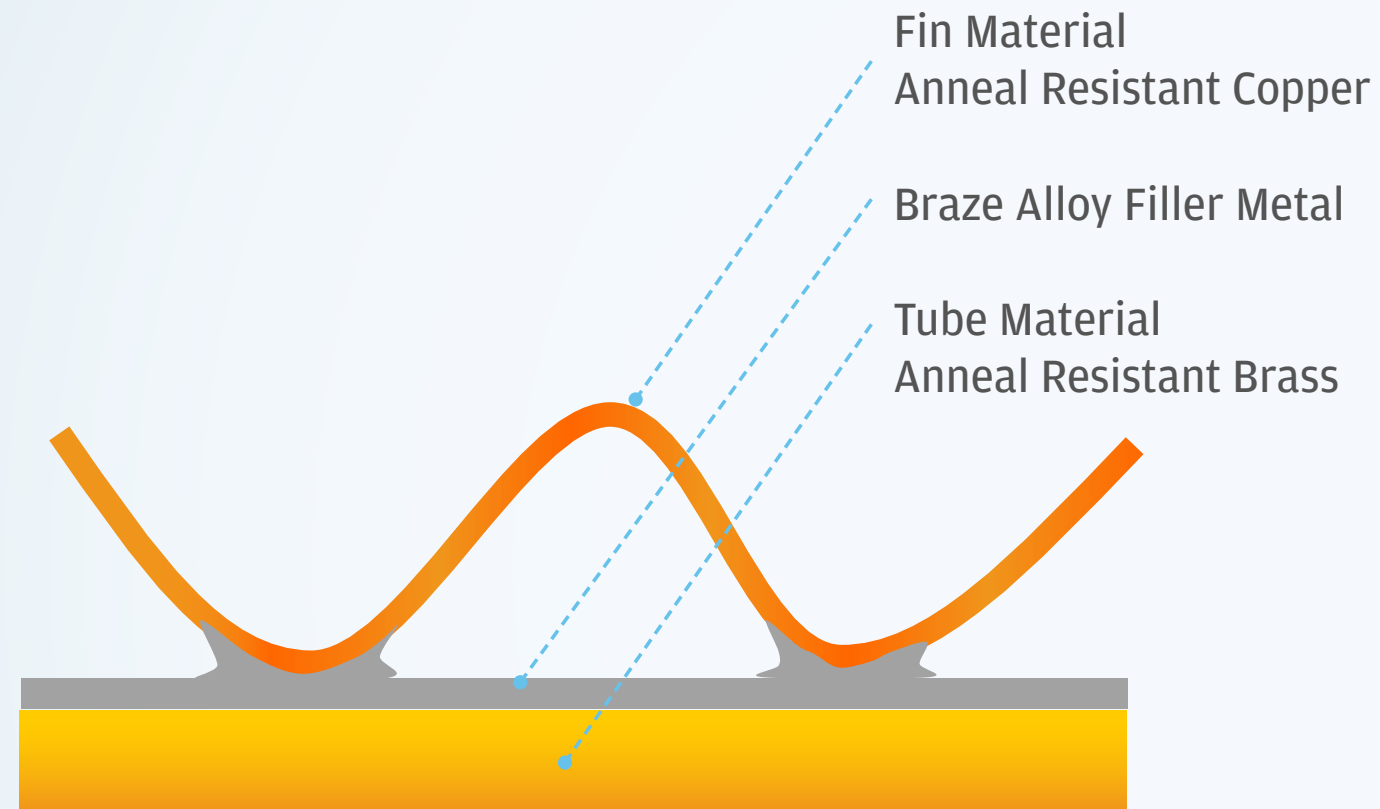
Melting point 595°C

Melting range 55°C

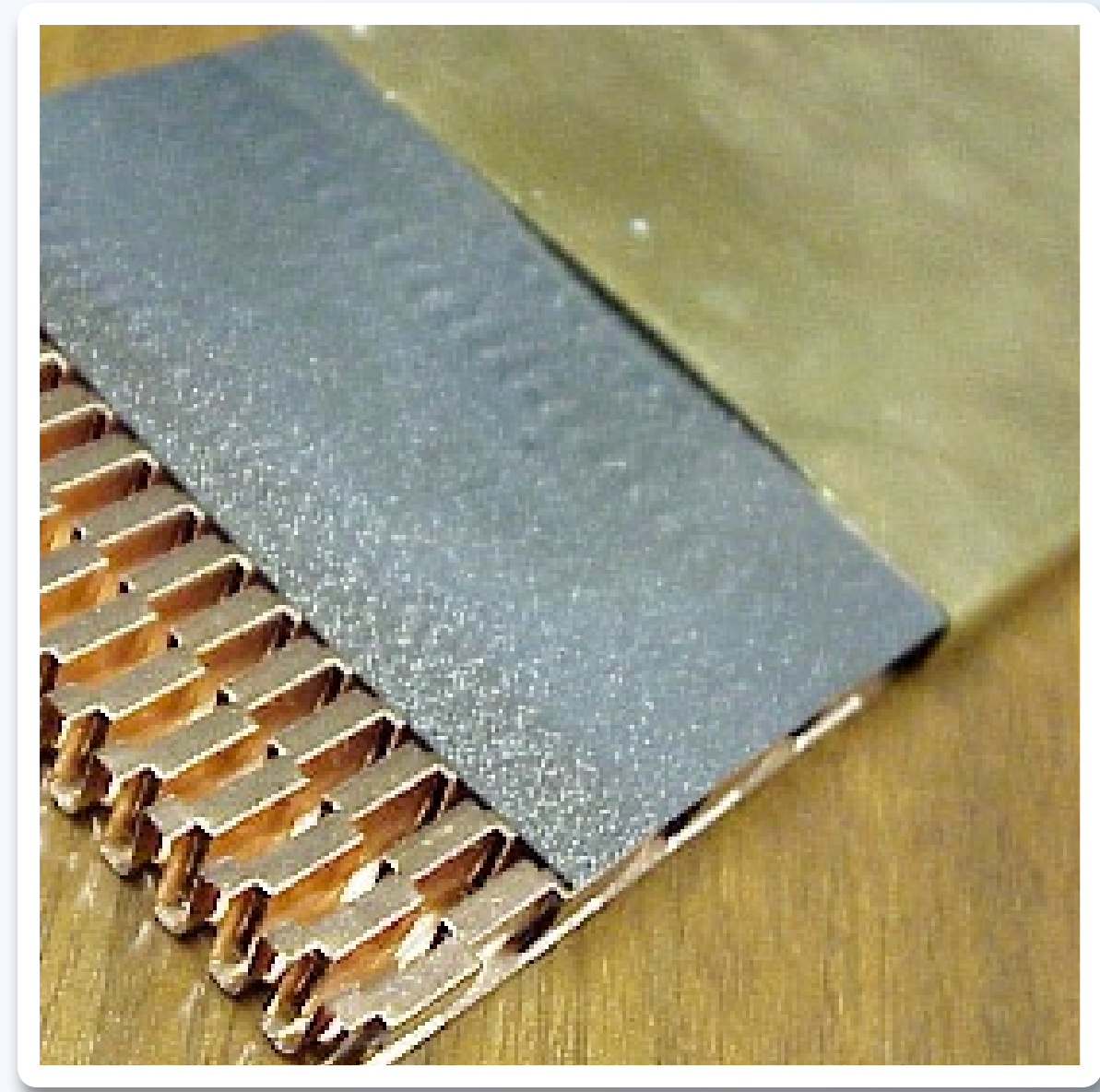


Tin (Sn)	9,3%
Nickel (Ni)	5,7%
Phosphorous (P)	6,5%
Copper (Cu)	Balance

Bonding tube and fin materials

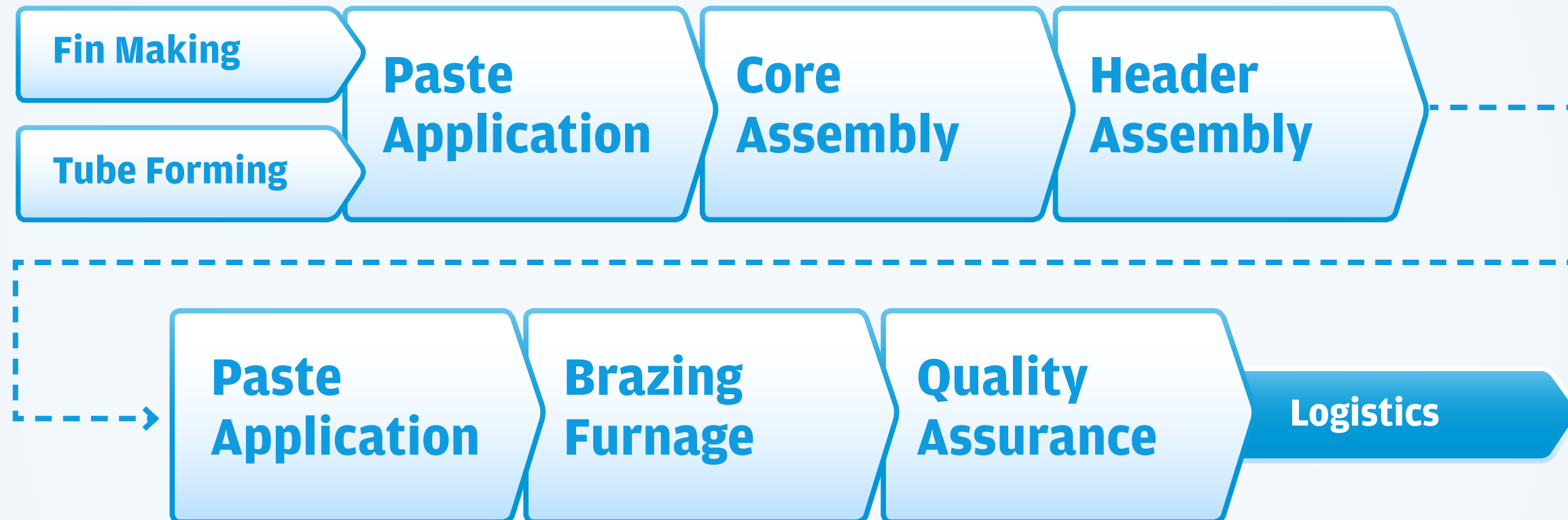


Foil in oil cooler or CAC



**How are
CuproBraze products
manufactured?**

The *CuproBraze* process



Brazing cycle control

Paste

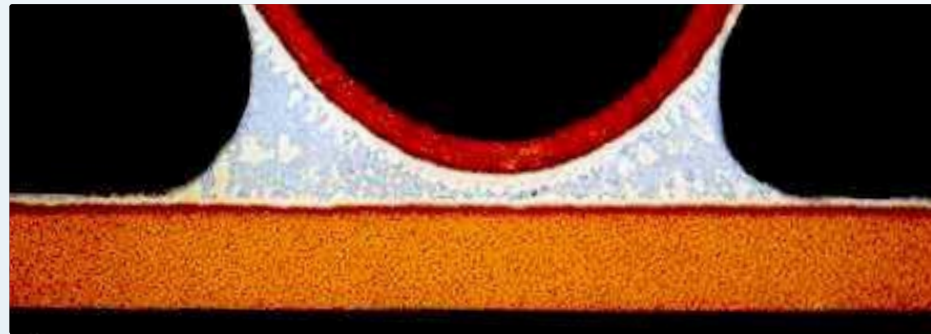
Time above 630°C typical 3 minutes

Max temperature typical 650°C

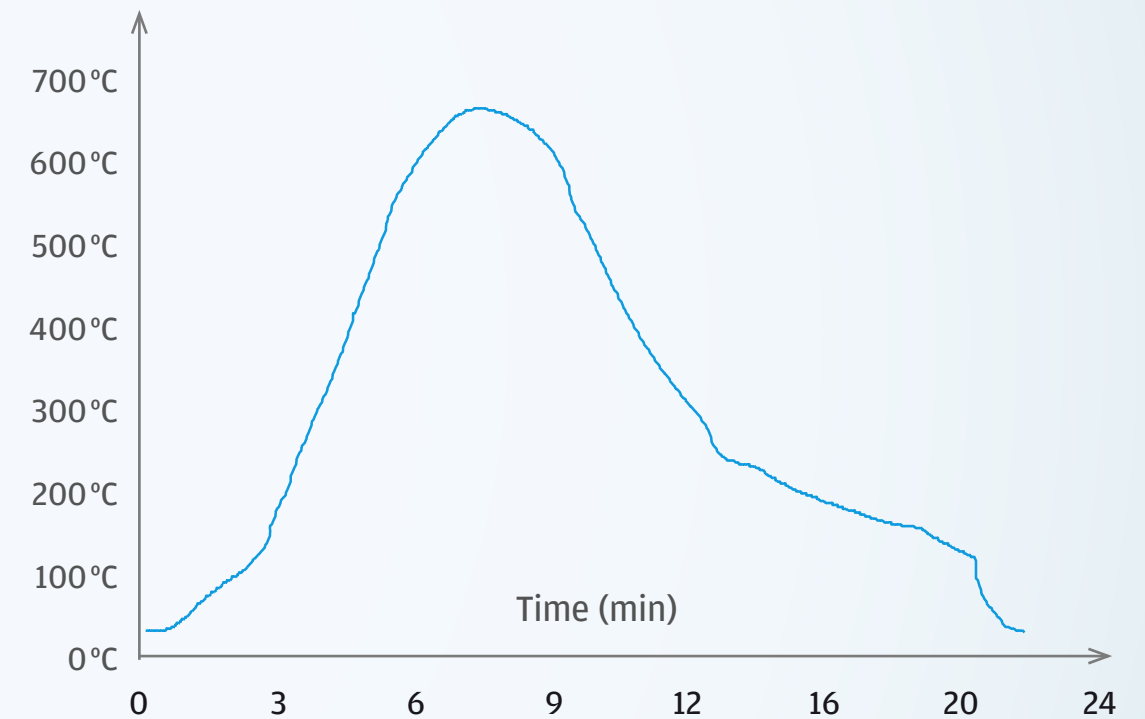
Foil

Time above 650°C typical 3 minutes

Max temperature typical 670°C



Tube to fin joint



Brazing Cycle



**Finnradiator is
a forerunner in
implementing
CuproBraze
technology.**