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# Copper-Based Casting Alloys and Process for Producing the Same

**Low-cost, lead-free copper-manganese alloys with high castability and machinability offer a superior alternative for plumbing component manufacturing.**

Copper-based alloys used for casting plumbing components typically contain lead, which is insoluble in copper (Cu). Lead is considered necessary to "plug" microporosity formed during solidification as well as improve machinability. Indeed, leaded versions of brass and bronze alloys are preferred for virtually all components requiring significant machining. Plumbing component manufacturers are under increased pressure to remove lead from valves and fittings, whether cast or wrought.

Researchers at Purdue University have developed copper-manganese alloys based on compositions near the congruent (minimum) melting point at 870 degrees Celsius and 32 weight percent manganese. The low melting temperature and narrow freezing range of these alloys compared to other copper alloys make them especially well-suited for complex shape casting, e.g., plumbing valves and fittings, due to their high castability. The high concentration and low cost of manganese relative to copper and other alloying elements commonly used in copper alloys also make these alloys intrinsically low-cost.

**Advantages**:

-Removes lead

-Lower cost compared to lead-based alloy

-Increased castability and machinability for many applications

Potential Applications:

-Machining

-Manufacturing

**Technology ID**

65836

**Category**

GreenTech/Water & Resource Management
Materials Science & Nanotechnology/Advanced Functional Materials
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

**Authors**

Kevin Trumble

**Further information**

Parag Vasekar
psvasekar@prf.org

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