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COPPER-ZINC ALLOY

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ABSTRACT OF THE DISCLOSURE

Many different copper-zinc alloys were necessary when making pipe fitting members because of the various properties required. The present copper-zinc alloy has a broad spectrum of properties and with this one alloy all the component parts for pipe fitting can be manufactured. The alloy consists of 62–65% Cu; 1–3% Pb; 0.2–0.8% Ni; 0.2–0.8% Mn; 0.1–0.6% Al; 0.3–1.0% Si; 0.2–1.0% Sn; 0.02–0.2% Sb; and the remainder is zinc.

BACKGROUND OF THE INVENTION

A great variety of different copper-zinc alloys have been known for a long time. Different requirements have been put on these alloys regarding one or more of the following properties: high strength, good resistance against corrosion, wear and loss of zinc and good cutting tool machinability.

In addition to a number of standard alloys several special alloys have been developed. The different alloys have thereby, however, each only been provided with some of the above described properties. The different copper-zinc alloys have each ones been suited for one or at most two methods of manufacture and machining. Due to this manufacturers of press alloy element of different kinds, have been compelled to store different types of alloys for die-casting, chill-casting, sand-casting, and hot pressing. From storing and manufacturing aspects this has, of course, been a complication.

SUMMARY OF THE INVENTION

The aim of the present invention is to provide an alloy which fulfills all the above desired properties and which also is suited for die-casting, chill-casting, sand-casting and hot pressing i.e. forging of blanks which are cut from a bar to members having different cross-sectional thickness. It has earlier been considered quite impossible to obtain an alloy which is suited for all those manufacturing methods, which is also proved by the large number of different copper alloys in the market. Manufacturers of brass alloy members also have presented a request for an alloy which products are pressure-proof at pressures up to 20 kg./cm.^{2}. Hitherto it has been public opinion that such an alloy may not comprise aluminum if pressure-proof properties are required. It is also known that small amounts of aluminum over 0.6% in chill-casting will lead to lathering. On one hand small amounts of aluminum in a copper alloy will lead to an improved ability for casting due to the improved flowability, but on the other hand it has authoritatively been asserted that aluminum and silicon may not be present at the same time in one alloy due to technological reasons. As silicon, however, in this connection has very

valuable properties it is desirous not to abandon this element.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The alloy according to the present invention is characterized in that consists of:

	Percent
Copper	62–65
Lead	1–3
Nickel	0.2–0.8
Manganese	0.2–0.8
Aluminum	0.1–0.6
Silicon	0.3–1.0
Tin	0.2–1.0
Antimony	0.02–0.2

and the remainder zinc.

It has been proved that this alloy in spite of its relatively high content of aluminum and the combination aluminum/silicon will fullfill the demand for being pressure-proof, is suited for all the above mentioned casting and pressing methods and additionally has very good additional properties, such as high strength and a good corrosion resistance both regarding erosion-corrosion and loss of zinc which is the same or even improved with respect to corresponding standard alloys.

Tensile tests using a 14 mm. test bar manufactured from the alloy have given the following very good results:

Yield ratio (0.2%)=19 kp./mm.^{2}
Rupture limit=37.4 kp./mm.^{2}
Ductility at a test length of 70 mm.=12.6%
Contraction=15%.

An alloy especially adapted for pressure-proof properties consists of:

	Percent
Copper	63
Lead	2
Nickel	0.5
Manganese	0.5
Aluminum	0.3
Silicon	0.7
Tin	0.5
Antimony	0.05

and remainder zinc.

This alloy has been used in chill-casting of a complicated pipe fitting member in large-scale manufacture in which earlier use of a commonly recommended chill brass alloy has produced a 50% reject due to details which were not pressure-proof. In using the above mentioned alloy the rate of rejection due to details which were not pressure-proof was reduced to below 7%. This tremendous reduction of the rate of refusal is partly believed to be a result of the very good flowability of the alloy, whereby the risk of air-inclusions and surface faults in the casting is substantially eliminated.

Due to the above described properties and the possibility of manufacturing details from the alloy by different casting and machining methods the alloy according to the invention may be used for all details of a pipe fitting system. Hereby further advantages are obtained in that the risk for galvanic corrosion between different copper-bearing components in the pipe fitting is eliminated. As it is necessary to store only one alloy it is also possible to obtain lower manufacturing costs. Furthermore, because only one alloy need be used the risk of mixing up pipe fitting details of different alloys are eliminated. Earlier this has often been a problem because for a layman it is difficult if not impossible to tell from what material and according to which method a finished pipe fitting detail has been manufactured.

The scrap which is obtained in the different manufacturing operations are collected and remelted. It is desirous that scrap of different compositions are not mixed up at the remelting as great difficulties may be involved in giving the melt the desired composition. Due to this it has earlier been necessary to use costly handling for collecting the scrap in order not to mix up the different types. Due tc the invention which provides an alloy which can be used in all manufacturing methods and which has all the different properties which may be desirous, the above described scrap problem is eliminated by the simple collecting of all scrap in one container.

Although the invention has been described in detail, it is to be understood that this does not delimit the invention. The spirit and scope of this invention is limited only by the language of the appended claims.

What is claimed is:

1. An improved copper-zinc alloy for pipe fitting members capable of being manufactured by means of different casting and pressing methods, and adapted for machining, characterized in that the alloy consists of:

	Percent
Copper	62–65
Lead	1–3
Nickel	0.2–0.8
Manganese	0.2–0.8
Aluminum	0.1–0.6
Silicon	0.3–1.0
Tin	0.2–1.0
Antimony	0.02–0.2

and the remainder zinc.

2. An improved copper-zinc alloy according to claim 1, characterized in that the alloy consists of:

	Percent
Copper	63
Lead	2
Nickel	0.5
Manganese	0.5
Aluminum	0.3
Silicon	0.7
Tin	0.5
Antimony	0.05

and the remainder zinc.

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