

PROVISIONAL SPECIFICATION.

IMPROVEMENTS IN OR RELATING TO SOLDERING OF ALUMINIUM CABLES.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH, RAFI MARG, NEW DELHI-1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860).

The following specification describes the nature of this invention.

This is an invention by Balkunje Anantha Shenoi, Ramachandra Subramanian, both of the Central Electrochemical Research Institute, Karaikudi, Madras, India, and Azariah, Indian Railways, Simla, India, all Indian citizens. This invention relates to improvements in or relating to the technique of soldering of aluminium and aluminium alloys used in the cable manufacture.

Hitherto has been proposed to use special solder compositions with special fluxes for soldering aluminium.

This is open to the objection that 1. not easy for adaptation for field applications, 2. require special types of soldering irons and 3. require fluxes and special soldering alloys.

The object of this invention is to obviate these disadvantages by giving a coating of copper on the surface to be soldered and then solder by conventional Copper solders which is adaptable for all types of aluminium alloys.

To these ends, the invention broadly consists in giving a layer of Zinc over which copper is deposited by immersion and then the common solders used for soldering copper wires by using simple soldering irons or by gas flames. The following typical examples are given to illustrate the invention:

EXAMPLE 1.

After cleaning the wires in nitric acid and rinsing, a layer of zinc is deposited by applying a paste containing

zinc oxide. (10-30 g.) Sodium hydroxide 100-200 gms. Sodium fluoride 2-38 Zinc chloride 2-3 gms. made into a paste with water. The paste is brushed on for 1 minute, washed and then the zincated portion is dipped in a solution of copper containing: Copper salt 20-40 g- Sodium Carbonate 20-40 g. Sodium hydroxide 30-60 g- Sodium tartrate 100 gm. and 300 ml. formalin as reducing agent with a stabilizer. The dipping is carried out at 32° C. for 3-7 minutes. Then rinsed well with water and then soldered by using conventional solders for copper with 100 Watts soldering iron.

The following are among the main advantages of the invention:

1. Easy to adopt in the field also;
2. Takes less time;
3. Solder is cheap;
4. Does not affect the conductivity;
5. A good bond strength;
6. No special equipments are needed.

R. BHASKAR PAI,

Patent Officer,

Council of Scientific & Industrial Research.

Dated this 19th day of August, 1964.

COMPLETE SPECIFICATION.

IMPROVEMENTS IN OR RELATING TO SOLDERING OF ALUMINIUM CABLES.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH, RAFI MARG, NEW DELHI-1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860).

The following specification particularly describes and ascertains the nature of this invention and the manner in which it is to be performed.

This is an invention by Balkunje Anantha Shenoi and Ramachandra Subramanian, both of the Central Electrochemical Research Institute, Karaikudi, Madras, India, and Azariah, Indian Railways, Simla, India, all Indian citizens.

This invention relates to improvements in or relating to the soldering of aluminium cables and has particular reference to the technique of soldering of aluminium and aluminium alloys used in the cable manufacture.

Hitherto it has been proposed to make soldered joints on aluminium cables by use of fluxes and solders specifically used for aluminium jointing alone and common solders or fluxes used in the jointing of copper cables could not be used for such purposes.

This is open to the objection that (i) common solders could not be used for jointing aluminium cables and hence require special formulation of solder compositions, and (ii) common fluxes as are used for copper cable jointing could not be used and hence require special formulations of fluxes.

The object of this invention is to obviate these disadvantages by giving a coating of copper on the surface to be soldered and then make the jointing by using conventional copper solders and fluxes. Thus jointing of cables made of aluminium or aluminium alloys could be easily and effectively carried out in the same manner as for copper cable jointing.

The invented process for soldering aluminium cables consists in forming a layer of zinc on the cable surface to be soldered, and then depositing copper by immersion in a solution containing copper salt and then soldering, using common solders for soldering copper wires by using simple soldering irons or by gas flames.

Thus, a layer of zinc is formed by immersion in aqueous bath containing zinc oxide dissolved in sodium hydroxide, or by applying a thin paste of the following composition: zinc oxide=10-30 gms; sodium hydroxide=100-200 gms; sodium fluoride=2-38 gms; zinc fluoride crystals=2-3 gms made into a thick paste with water on the cable surface to be soldered, and then copper is deposited by immersion in an aqueous solution containing copper salt and other ingredients in the range indicated below:

Copper sulphate	...	20-40 gms/lit
sodium carbonate	...	20-40 gms/lit
sodium hydroxide	...	30-60 gms/lit
sodium tartarate	...	100 gms/lit
formalin	...	30 ml/lit
stabilizer methyl alcohol	...	30 ml/lit
pH	...	11-12
Temperature	...	30-40° C.

A good adherent layer of copper is now formed which is solderable with conventional copper solders and fluxes. The following typical example is given to illustrate the invention.

Price : TWO RUPEES.

**EXAMPLE.**

After cleaning the wire ends in 1:1 nitric acid, and rinsing, a layer of zinc is deposited by applying a thin layer of a paste made by mixing the following:

Zinc oxide	...	20 gms
sodium hydroxide	...	150 gms
sodium fluoride	...	4 gms
zinc chloride crystals	...	2 gms

water to make a paste.

The paste is brushed on for a minute, washed. Then the zincated portion is dipped in a solution containing:

copper sulphate	...	30 gms/lit
sodium carbonate	...	30 gms/lit
sodium potassium-tartrate	...	100 gms/lit
sodium hydroxide	...	50 gms/lit
formalin	...	30 ml/lit
methyl alcohol	...	30 ml/lit
pH	...	11-12
Temperature	...	32° C.

The dipping is carried out at 32° C. for 3-7 minutes then rinsed well with water and then soldered by using conventional copper solders and fluxes with a soldering iron or gas flame.

The following are among the main advantages of the invention:

1. No specialized formulation for fluxes and solders are required as the jointing can now be made with conventional copper solders and fluxes.

2. The jointing can now be made in the same way as copper cable jointing requiring no special precautions.

3. Since low melting conventional lead-tin solders are used, the temperature of soldering is low resulting in good joint without danger of damage to cable sheaths.

**We claim:**

1. A process for soldering aluminium cables which consists in forming a layer of zinc on the cable surface to be soldered, and then depositing copper by immersion in a solution containing copper salt and then soldering, using common solders for soldering copper wires by using simple soldering irons or by gas flames.

2. A process for soldering aluminium cables substantially as described in the example.

3. A process for the soldering of cables of aluminium and aluminium alloys substantially as hereinbefore described.

4. Aluminium cables whenever soldered according to the process substantially as hereinbefore described.

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Scientist,

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*Dated this 18th day of May 1965.*