

The present Patent application relates to coating resins of the thermoplastic or thermosetting type destined to receive an inscription by thermal action. This thermal action can be induced by radiation, for example with the aid of a laser beam, or by another hot marking system.

Thermoplastic or thermosetting resins are often used in the electronics industry to coat electrical components in order to ensure their mechanical protection and their electrical insulation. As these components have to be marked in a reliable and effective manner, it is advantageous to engrave the resin in order to indicate the electrical value of the component in the same way as the mark of the manufacturer. The engraving of the resin can be effected in different ways. The thermal marking process has the advantage of rapidity of implementation. It can be obtained by a laser beam. It is also known to mark a resin through the change of colour of an additive through thermal action. Such a marking process is described in EP 36680. The only disadvantage of the thermal marking is the lack of contrast between the inscription and the support made of resin.

In order to obviate these disadvantages, the invention proposes to add to the resin coating the components appropriate additives the colour of which, under the action of heat, stands out clearly from that of the coating resin. This distinction between the support resin and the additive or additives can be obtained by changes of colour induced by thermal action. Such inscribable resins can serve not only for coating components, but also assemblies of components constituting circuits.

The invention therefore has as its object a coating resin for thermal marking, comprising a thermoplastic or thermosetting base resin and at least one marking additive, characterized in that the base resin is a polyepoxide resin, a polyurethane resin, a polyester resin, of polypropylene, of

polybutylene terephthalate or of polvinyl chloride, and that the additive is a yellow iron oxide or a lead poxide (PbO).

The thermal action will advantageously be obtained by the impact of a laser beam.

The additives constituted by carbonates, oxides or chlorides of metals, for example yellow iron oxides or lead oxide PbO , turn out to be particularly effective.

The invention therefore proposes to introduce, into a thermoplastic or thermosetting matrix, one or more organic or mineral additivies which, under the thermal action induced for example by a laser beam, are able to change colour and cause a contrast between the heated and non-heated portions.

In the case of mineral additives, one can use, inter alia, carbonates, oxides and chlorides of metals such as iron, zinc, manganese, lead. The choice of the additive, mineral or organic, is determined by the colour of the coating resin. It is necessary, for a resin of a specific colour, to choose an additive which stands out sufficiently in order to obtain a rapid reading.

By way of example, yellow iron oxides (ferrous oxides) introduced at a rate of 5% by weight into a BADGE resin (bisphenol A diglycidyl ether) obtain resins which are inscribable by laser beam. These iron oxides are marketed under the mark DEANOX. They are introduced into a liquid BADGE resin into which an anhydride is added as hardener. MTHPA (methyiltetrahydrophthalic anhydride) can be used as anhydride. This supplies a liquid casting (or potting) resin which, when it is hardened, can be marked under the action of a laser beam. The marking is then red-violet in colour on a yellow background.

Another example is supplied by lead oxide PbO which, introduced at a rate of the order of 10% by weight into an

organic matrix such as BADGE, gives under the action of a laser beam a black marking on a yellow background.

The aforesaid additives can be introduced into epoxy resins, polyurethanes, polyesters, etc. or into thermoplastics PP (polypropylene), PBT (polybutylene terephthalate), PVC (polyvinyl chloride), etc. This, of course, to the extent of good compatibility or of good dispersion of the additives in the resin. It is also advisable for the temperature of implementation of the resin (that is to say allowing the coating of the components) to be lower than the temperature of revelation of the additive or of the additives as the case may be.

The additives can be introduced by simple mixing at the instant of the preparation of the coating resin. One can proceed to a removal of gas after the malaxage of the mixture constituted in this way. The proportion of additive in the resin is a function of the products constituting the mixture. In practice, the additives represent a few percent by weight of the resin.

Thanks to the invention, conventional thermosetting resins of the fluidised bed type, casting, LIM (liquid injection moulding), powder transfer, type can be marked by laser beam. The same holds true for any thermoplastic.

The beam serving for the inscription can without discrimination be generated by a YAG, CO₂ or infra-red laser. The laser beam can be pulsed or continuous. The energy necessary to obtain a correct marking depends mainly on the aptitude to changing of colour of the additive introduced into the resin. By way of example, an energy of 1.2 Joules supplied by a CO₂ laser is sufficient to inscribe a conventional epoxy resin containing a rate of 1 to 5% of iron oxide.

The main but not restrictive application of these inscribable resins is the coating of electronic components.

CLAIMS

1. A coating resin for thermal marking, comprising a thermoplastic or thermosetting base resin and at least one marking additive, characterized in that the base resin is a polyepoxide resin, a polyurethane resin, a polyester resin, of polypropylene, of polybutylene terephthalate or of polyvinyl chloride, and that the additive is a yellow iron oxide or a lead oxide (PbO).
2. A coating resin according to claim 1, characterized in that the base resin is bisphenol A diglycidyl ether (BADGE).

