SELF BONDING ENAMELLED WIRES

Normally enamelled copper conductors are used as coil components of various electrical products such as motors / transformers / home appliances / auto electrical components / chokes / AC compressors. Apart from AC compressors all other copper windings are under going for secondary insulation coating and curing of the same. The process is called as impregnation. The secondary insulation is used to get a firm compact winding, that can withstand the vibration and all the copper conductors are held firmly together. The voids in coil are also filled by the secondary insulation. It also prevents direct contact of moisture with the primary (enamel) insulation film. The basic property of secondary insulation (varnish) is to hold the winding together. However for certain applications (where the secondary insulation is not practical) self bonding enameled wires can be used. These wires have outer layer of bondable material which is usually thermoplastic and bonds the wires surfaces with each other once heated to the bonding temperature of the outer layer. Bondable wires, thus, benefits in reduction of cycle time and elimination of process of secondary insulation application / baking / curing cycle etc.

APPLICATIONS

Bondable wires can be used in power tools armature coils, electronics, miniature coils, TV yoke coils, continuous-transposed conductors etc. The bondable layer is applied over variety of primary insulation like polyester, polyester-imide, dual coated and solderable polyurethanes of class 130, 155 and 180.

TYPES OF BONDABLE COATS

Epoxy Resins - Mainly used along with lower temperature class base coats like PU / PVA / PVF. Used on the fine / ultra-fine solderable enamelled wires and enameled strips for CTC applications.

Polyamide - Moderate bonding temperatures and suitable over class 130, 155 and 180 enamelled insulations.

Aromatic Polyamide - Mainly used on higher temperature classes like class 180 and 200. These have higher re-softening temperatures hence can be used easily on higher thermal classes.

BONDING METHOD

Heat Bonding - The coils are heated either in oven or hot air, up to the bonding temperature of outer layers. On cooling of coil, to the room temperature, the wire turns are bonded with each other.

Solvent Bonding - The bonding is done by application of solvents on wound coils. The layers bond together due to chemical reaction with solvents.

Resistance Bonding - The entire coil is heated by circulating high current through conductor. This uniformly raises the temperature of coil up to the bonding temperature and cooling to room temperature gives rigid coil forming.

APPLICABLE STANDARDS

IEC 60317-35, Solderable Polyurethane, class 155 with a bonding layer
IEC 60317-36, Solderable Polyester-imide, class 180 with a bonding layer
IEC 60317-37, Polyester-imide, class 200 with a bonding layer
IEC 60317-38, Dual coated, class 200 with a bonding layer

BOND STRENGTHS

The bonding strength of bondable layers are usually determined by heating a helical coil of bondable wire up to the specified temperature and loading the coil with specified weights to observe that the coil turns do not separate at room temperature and also at resoftening temperature.

BONDING LAYERS THICKNESS

The thickness depends on the conductor dia as per IEC 60317 - 0 - 1 clause 4, the thickness of underlying layer can be grade 1B or grade 2B.

PRODUCT RANGE

0.20 mm to 1.00 mm grade 1B, 2B