Gujarat Cables & Enamelled Products P. L.
508, Bharat Chambers, Baroda Street, Mumbai - 400009. INDIA
T:91 22 66311995 E: info@cenvar.com W: www.cenvar.com

Technical Guide: Self-Bonding Enamelled Wires

Self-bonding enamelled wires enable the creation of bobbinless, self-supporting coils, which can lead to operational cost savings and allow for unique, challenging coil configurations. These wires are coated with a thermoplastic adhesive layer on top of a standard dielectric film. This adhesive, or bondcoat, can be activated by heat, solvent, or both.

Key Advantages

- Cost Efficiency: Eliminates the need for bobbins, taping, or varnishing.
- Activation Options: Bondcoats can be activated through heat or solvents such as denatured ethyl alcohol, isopropyl alcohol, and methyl ethyl ketone (MEK).
- Applications: Particularly useful for specialized winding tasks where conventional enamelled wires fall short.

Note: Bondcoats may not withstand the higher temperatures of certain primary insulations, so check the adhesive's resoftening temperature.

Bonding Methods

1. Heat Bonding

- Principle: Heat the winding above the bondcoat's melt temperature, then cool it to set the coil shape.
- Methods: Oven bonding, hot air bonding, and resistance bonding.
- Common Use: Effective for both small and large batches of windings.
- Oven Bonding:
  - Process: Windings are placed in an oven and held in shape with a fixture. This method is time-efficient for bulk bonding but requires additional fixtures.
- Hot Air Bonding:
  - Process: Hot air is applied to the wire during winding with a hot air gun or vortex tube. This approach minimizes fixtures but may slow winding speed.
- Resistance Bonding:
  - Process: Applies voltage to heat the winding. It is quick and easily automated but requires specialized equipment to control voltage, time, and current.
  - Safety: Voltage and current must be kept below the fusion threshold to prevent conductor melting.

2. Solvent Bonding

- Process: An alcohol-based solvent or MEK activates the bondcoat, hardening as the solvent evaporates. Fixtures are required until the bond sets.
- Precaution: Solvent fumes can be hazardous, and all solvent must be removed before potting.

Gujarat Cables & Enamelled Products P. L.
508, Bharat Chambers, Baroda Street, Mumbai - 400009. INDIA
T:91 22 66311995 E: info@cenvar.com W: www.cenvar.com

3. Wet Winding Method

- **Process**: The wire passes through solvent-soaked felts during winding to ensure bonding between layers. Often messy, it requires thorough drying and is suitable for coils that will be encapsulated.

4. Solvent Application After Winding

- **Process**: Solvent is applied to completed windings by spray, brush, or dipping. It's ideal for large coils but may expose operators to solvents. Oven drying is recommended to remove residual solvent.

Application Precautions

- **Ventilation**: Ensure adequate ventilation to avoid inhaling fumes from solvents and heat bonding.
- **Post-Heating**: Use an oven cycle to thoroughly remove solvent residues, preventing insulation damage.
- **Storage**: Store bondable enamelled wires below 40°C.

Recommended Solvents, Bonding Temperatures, and Maximum Operating Temperatures

Product	Bondcoat Type	Solvent Activation	Heat Activation Temp	Max Operating Temp
SB35	Polyvinyl Butyral	Alcohol	120 – 160°C	105°C
SB37 & SB38	Epoxy	MEK	150 – 200°C	130°C
SB37PA	Aromatic Polyamide	None	180 – 230°C	175°C

Note: Activation temperatures may vary based on wire size and coil design. These values are for reference only.