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Continuously Transposed Cables (CTC)

Typical Applications

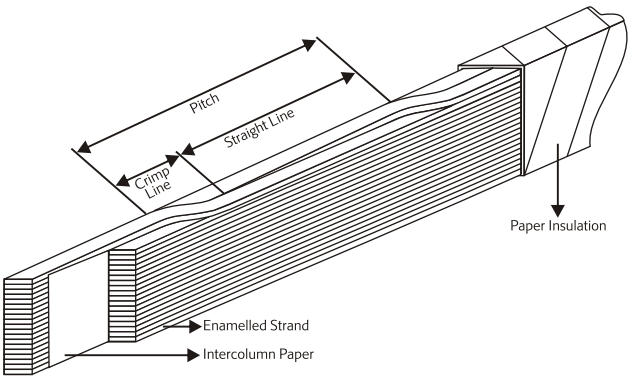
- Oil Filled Power Transformers
- HVDC Transformers
- Large Distribution Transformers
- 765 Kv EHV Transformers and Reactors
- 1200 Kv EHV Transformers

Product Description

Continuously Transposed cables (CTC) are special magnetic wires made up of multiple stranded rectangular copper conductors, which are individually enamelled, transposed continuously, and insulated by covering with electrical grade paper or netting tape.

Advantages of using CTC in Transformer Design

- Lower costs due to reduction in copper used
- Reduced winding time thereby increasing productivity for transformer manufacturers
- Deliver greater electric efficiency by minimizing load losses
- Improved cooling of the conductor due to the improved heat dissipation
- Improving mechanical strength of the windings due to the composite construction of the transposed conductors
- Transformer size becomes smaller thereby reducing the overall cost of the transformer



Production Scope (Enamelled)

Individual Enamelled Strands with Polyvinyl Acetal Enamel (PVA 120 Class) + Bondable Epoxy Resin.

Designation	Type of Enamel	Grade	Increase in Dimensions (mm)
PVA - POLY VINYL ACETAL	Polyvinyl Formal Resins	1 2	0.085 ± 0.025 0.145 ± 0.025
PVA - POLY VINYL ACETAL + Epoxy	Polyvinylformal + B Stage Epoxy Resins	1 2	0.125 ± 0.035 0.185 ± 0.035
Dual Coat 200	Polyesterimide + Polyamide Imide Resins	1 2	0.085 ± 0.025 0.145 ± 0.025

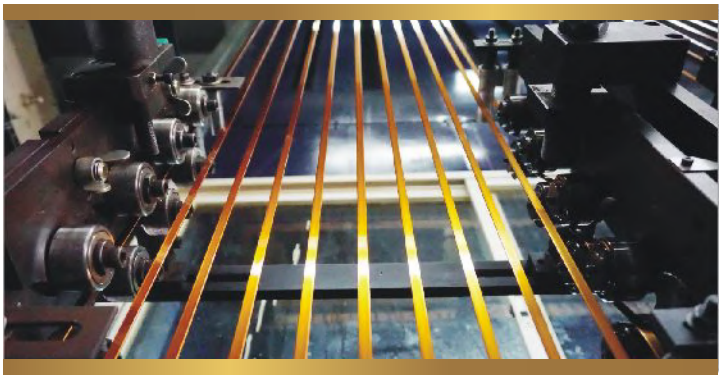
Fixed dies used to coat the strands

Benefits of Epoxy coating

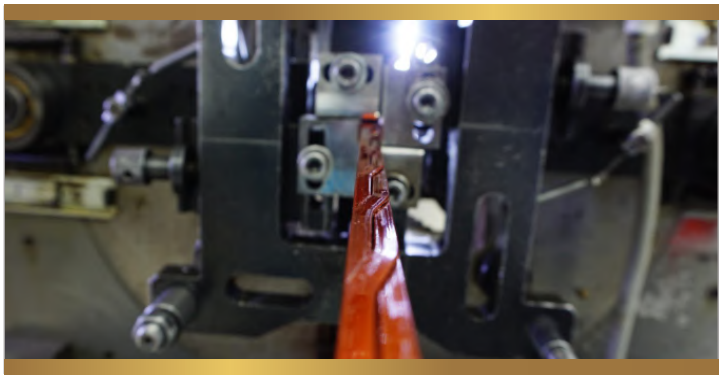
- Reduction of risks of short circuiting
- Exceptionally strong bond strength in the winding
- Epoxy resin cures in the same thermal treatment for drying paper (100-120°C)
- Better insulation of each single strip
- Conductors in the winding become like a solid beam and can withstand strong electrodynamic stresses created during short circuit testing
- Small thickness of coating needed in order to achieve very strong bonding (0.02-0.06 mm) Improves the windability of the CTC
- No-pollution, because the B-stage resin does not contain residue of harmful solvents

Epoxy is a thermosetting resin. Enamelled wires are covered by a thin layer of epoxy tack. The Epoxy system is characterized by the following properties.

- Uniform melting
- High grade curing
- Stability of B-stage (more than 6 months at 32°C)
- Suitable for the insulation system of oil transformers



Enamelling Line



Transposing Head

Production Scope (CTC)

Number of Strands	**5 - 79**
Width of Individual Strands	**3 mm - 12.5 mm**
Thickness of individual Strands	**0.9 mm - 3.2 mm**
Paper Insulation Increase	**maximum 24 layers (3.60 mm)**
Pitch	**min 36 mm - max 200 mm**

Work Hardened Copper (Controlled Proof Stress) can be produced according to BS 1432 (CPR Rp 0.1% designation or Rp 0.2%).

Controlled Proof Stress Copper	Rp (0.2%) MPa	Controlled Proof Stress Copper BS 1432	Rp (0.2%) MPa
Annealed	80-110	CPR1	140 - 200
		CPR2	170 - 220
		CPR3	220 - 260

Insulation Options of CTC

- Kraft Paper
- Thermally Upgraded Paper
- High Density Micro Crepe (Dennison / Cindus)
- Nomex®410
- Special Paper as per customer requirements
- Netting Tape

Paper Makes

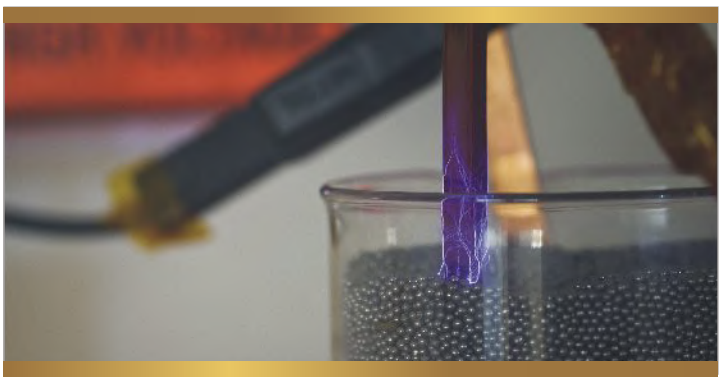
- Weidmann - USA
- Munksjo - Sweden
- Nordic / Amotfors - Sweden
- Dupont - USA
- Pucaro - Germany
- Cindus - USA
- Tervakoski - Finland

Other Options

- CTC with short pitches thereby increasing flexibility and windability of cable
- Inter-column separator can be provided
- Returnable Reels

Dust Free Manufacturing Facility

Stringent Quality Assurance



Testing

Our Quality Assurance Laboratory is equipped with testing facilities to assess:

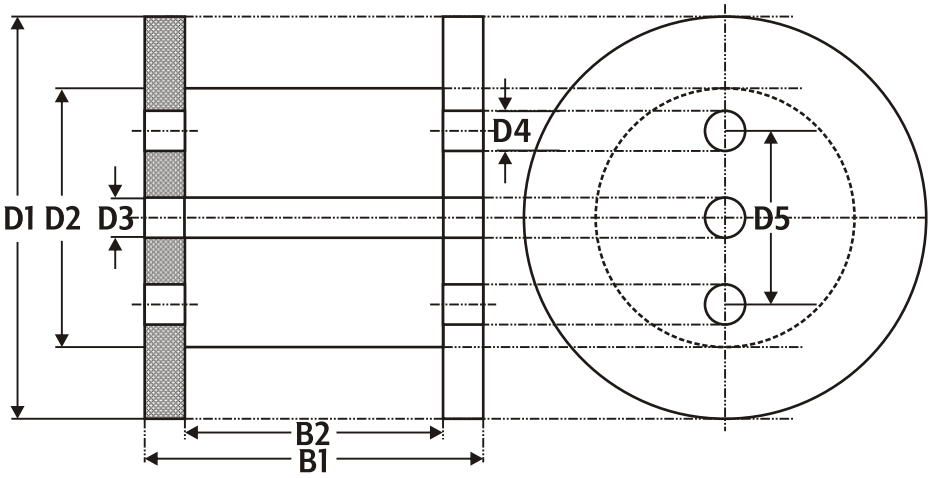
- Physical Properties
- Mechanical Properties
- Electrical Properties
- Thermal Properties
- Chemical Properties

Reference Specifications

CTC construction can be tailored to customer specifications in order to improve specific performance for winding. Standard and customised products are designed to meet international norms such as International Electrotechnical Commission (IEC), International Standards Organization (ISO), Deutsch Industries Norm (DIN) and respective national standards.

Production Scope (Packing)

KSH Standard Reel Sizes (Returnable Reels)



D1 Flange mm	D2 Barrel Diameter mm	D3 Bore mm	D4 Driving Hole mm	D5 Distance Of Driving Hole mm	B1 Total Outer Width mm	B2 Total Inner Width mm	Reel Tare Weight Apr. Kg	Fill Weight Apr. Kg
1200*	800	82	55	500	650	500	120	1000
1400*	900	82	55	500	750	600	140	1800
1600*	1000	82	55	500	850	700	180	3000
1800*	1100	82	55	500	1000	850	280	5000
2000**	1200	82	55	500	1200	1020	380	7500

***Flange Thickness 75mm & **Flange Thickness 90mm**

Drum sizes shown are as per KSH standard. Other sizes as per requirement can be provided.