# Enameled wires

## Thermex 220® Grade 3 FL

- **Enameled winding wire with excellent mechanical,**
- **thermal and chemical properties**
- **Insulation based on polyamide-imide enamel**
- **Special coating class Grade 3**
- **Temperature Index 220**

**General description**
THERMEX® 220 rectangular-shaped wires are enameled with an excellent thermal base insulation based on polyamide-imide. The polyamide-imide coating ensures outstanding mechanical and chemical properties of the insulation.

**Application**
- Windings in highly stressed AC and DC motors of class H ... 200
- E-drives in automotive

**Conventional Types**
Rectangular copper wires:
- Thickness: 1.00 to 6.00 mm
- Width: 2.00 to 20 mm
- Cross-section: 2 to 80 mm2
- Coating class: Grade 3

**Standards**
THERMEX® 220 flat wires meet the requirements of IEC 60317-58. There are no standards today for coating class Grade 3. The standard dimensions of the conductors (nominal dimension) and the tolerances comply with the standard IEC 60317-0-2.

The test methods are based on IEC Publication 60851.
60851-1 General
60851-2 Definition of dimensions
60851-3 Mechanical properties
60851-4 Chemical properties
60851-5 Electrical properties
60851-6 Thermal properties

**Advantages**
Because of their high thermal stability and their good mechanical and thermal properties THERMEX® 220 rectangular wires are particularly suitable for coils subjected to constantly high temperatures and mechanical stresses.

**Order Data**
The designation shall comprise:

| | |
|---|---|
| Shape of the wire: | Flat |
| Designation of the insulation: | Thermex 220 |
| Coating class: | Grade 3 (G3) |
| Nominal dimension in mm: | 2.24 x 5.00 |
| Reel type: e.g.: | DIN 500 |

Example of complete order:
2000 kg FL TX 220 G3 2.24 x 5.00 mm D500

**Characteristics of Thermex 220 G3**

| | unit | value | Test standard |
|---|---|---|---|
| **Mechanical properties** | | | |
| Increase due to insulation | mm | 0.18 - 0.22 | IEC60851-2 |
| Elongation at break thickness up to 2.5 mm | % | ≥ 30 | IEC60851-3 test 6 |
| Elongation at break thickness above 2.5 mm | % | ≥ 32 | IEC60851-3 test 6 |
| Springiness | ° | ≤ 5.0 | IEC60851-3 test 7 |
| Adherence after elongation | 20 % | No loss of adhesion | IEC60851-3 test 8 |
| Flexibility - edgewise bent on mandrel Ø 2 x width | | no cracks | IEC60851-3 test 8 |
| Flexibility - flatwise bent on mandrel Ø 2 x thickness | | no cracks | IEC60851-3 test 8 |
| **Electrical properties** | | | |
| Break down voltage | V | ≥ 3000 | IEC60851-5 test 13 |
| **Thermal properties** | | | |
| Heat shock 30 min /240 °C mandrel Ø 1 x width | | no cracks | IEC60851-6 test 9 |
| Thermal endurance | TI | 220 | IEC60172 |

**Appearance**
Slight color variations are raw material or process-related and have no influence on the technical properties of the wire.



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