

# Enameled wires

## Thermex 220<sup>®</sup> 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<sup>®</sup> 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 mm<sup>2</sup>  
- Coating class: Grade 3

### Standards

THERMEX<sup>®</sup> 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<sup>®</sup> 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      |
|--|------|---------------------|--------------------|
| <b>Mechanical properties</b>                           |      |                     |                    |
| Increase due to insulation                             | mm   | ≥ 0.18 *            | 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  |
| <b>Electrical properties</b>                           |      |                     |                    |
| Break down voltage                                     | V    | ≥ 3000              | IEC60851-5 test 13 |
| <b>Thermal properties</b>                              |      |                     |                    |
| Heat shock 30 min /240 °C mandrel Ø 1 x width          |      | no cracks           | IEC60851-6 test 9  |
| Thermal endurance                                      | TI   | 220                 | IEC60172           |

(\*) maximal increase of dimension due to enamel to be defined according to section of conductor.

### 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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