SynFlex Elektro GmbH Auf den Kreuzen 24 D-32825 Blomberg Germany Telefon +49-5235-968-0 E-Mail info@synflex.de



### SHTherm® 210 Flat

- Enamelled flat copper wire, thermoresistant
- Polyesterimide overcoated with
- polyamide-imide enamel
- Class 200/220

### **Attributes**

SHTherm® 210 Flat is a highly thermoresistant rectangular enamelled copper wire of heat performance class N with a wide range of excellent quality features. Its insulation film consists of 2 different coatings on top of one another. These ensure a very good permanent thermal and overload resistance, excellent resistance against mechanical stress, as well as an excellent resistance to chemical attacks of commercial washing and cleaning agents, impregnating varnishes and resins, sealing compounds, thinners, solvents and refrigerants, oils as well as their vapours. This range of excellent features make SHTherm® 210 Flat an all-round wire meeting the requirements of all applications with above average requirements to processing and operational features or operational safety in electrical systems.

The consistent further developments carried out by our R&D team allow this excellent "all-round" wire to be optimised to take into account specific customer requirements (e.g. improved adhesion after ageing, workability, electrical characteristics).

## **Application**

E-mobility, electric motors, generators, transformers, hybrid constructions

# **Standards**

IEC / DIN EN 60317-29 NEMA MW 36-C/ MW 38-C UL approved

# **Delivery forms**

Grade 1: on request

Grade 2:

Updated 05/18

width: 2.000 - 20.000 mm thickness: 0.800 - 5.000 mm







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Typical properties of enamelled flat copper wire 5.60 x 3.55 mm, with insulation film grade 2

| Mechanical   | Unit of<br>measure | Set value                       | Actual value        |
|--|--------------------|---------------------------------|---------------------|
| Bare wire width  | mm                 | as set value                    |                     |
| Width with varnish   | mm                 | 5.67 - 5.82                     | as set value        |
| Bare wire thickness  | mm                 | 3.500-3.600                     | as set value        |
| Thickness with varnish   | mm                 | 3.62 - 3.77                     | as set value        |
| Varnish increase   | μт                 | 120 - 170                       | as set value        |
| Elongation and adhesion  |                    | mandrel diameter                |                     |
| Elongation and adhesion (no cracks in varnish after winding) - bend over width     |                    | 4 x width                       | 3 x width           |
| Elongation and adhesion (no cracks in varnish after winding) - bend over thickness |                    | 4 x thickness                   | 3 x thickness       |
| Elongation and adhesion (no cracks in varnish after winding) - elongation          |                    | 15 % with cracks < 1<br>x width | 32 % without cracks |
| Pencil hardness of varnish   |                    | Н                               | 4H - 5H             |
| Elongation at break  | %                  | ≥ 32                            | ≥ 38                |
| Bare wire width  | mm                 | 5.550-5.650                     |                     |

| measure Set value Actual value |  | Thermal | Unit of<br>measure | Set value | Actual value |
|--------------------------------|--|---------|--------------------|-----------|--------------|
|--------------------------------|--|---------|--------------------|-----------|--------------|









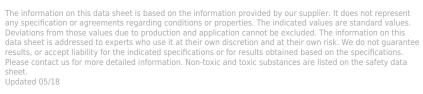
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| Thermal  | Unit of<br>measure | Set value                          | Actual value                       |
|--|--------------------|------------------------------------|------------------------------------|
| Temperature index  | °C                 | 200/220                            | 210/220                            |
| Heat shock at 220 °C (no cracks in varnish coat after winding) |                    | mandrel diameter:<br>6 x thickness | mandrel diameter: 4<br>x thickness |
| Solderability  |                    | no                                 | no                                 |

| Electrical                              | Unit of measure | Set value        | Actual value   |
|---|-----------------|------------------|----------------|
| Dielectric strength RT                  | kV              | ≥ 2.0 (ball pit) | ≥ 3 (ball pit) |
| High voltage discontiniuties 750V       |                 | 1                | ≤ 7 on 100 m   |
| Electrical conductivity of Cu conductor | MS/m            | 58 - 59          | ≥ 58.5         |

| Chemical  | Set value | Actual value |
|---|-----------|--------------|
| Pencil hardness (storage in standard solvent ½ h / 60 °C) | min. H    | 3H - 5H      |
| Pencil hardness (storage in alcohol ½ h / 60 °C)          | min. H    | 3H - 5H      |
| Resistance to commercial impregnants^(1)                  | 1         | yes          |
| Resistance to commercial refrigerants^(1)                 | 1         | yes          |
| Resistance to dry transformer oils^(1)                    | 1         | yes          |
| Resistance to hydraulic oils^(1)                          | 1         | yes          |









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(1) Due to the variety of individual applications we cannot make any generally binding commitments regarding the compatibility. We recommend testing compatibility with the materials being used.







