Schwering & Hasse
Pyrmonter Str. 3-5
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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:
width: 2.000 - 20.000 mm
thickness: 0.800 - 5.000 mm

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Updated 05/18

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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 measure	Set value	Actual value
Bare wire width	mm	5.550-5.650	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	µm	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 x width	32 % without cracks
Pencil hardness of varnish		H	4H - 5H
Elongation at break	%	≥ 32	≥ 38

Thermal	Unit of measure	Set value	Actual value
Temperature index	°C	200/220	210/220

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Thermal	Unit of measure	Set value	Actual value
Heat shock at 220 °C (no cracks in varnish coat after winding)		mandrel diameter: 6 x thickness	mandrel diameter: 4 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		/	≤ 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)	/	yes
Resistance to commercial refrigerants (1)	/	yes
Resistance to dry transformer oils (1)	/	yes
Resistance to hydraulic oils (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.

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