

# Fibre-insulated wires

## VS 220 flat

- Fibre-insulated wire for windings in rotating machines
- Temperature Index 220

### General description

VS 220 is an enameled flat copper wire insulated with a polyamide-imide impregnated glass and polyester fibre blend covering.

### Application

Stator and rotor windings.

### Conventional types

VS 220 covered enameled wires are available in standard version:  
VS 220 P or VS 220 V, which are covered with a different type of mixed fibres.

Cross section: 2 to 80 mm<sup>2</sup>  
Width: 2 to 22 mm  
Thickness: 1 to 6 mm

The standard dimensions of the conductors (nominal dimensions), the tolerance and the overall dimension of the enameled wire, complies with the IEC standard 60317-0-2.

### Standards

There are no existing IEC standards for VS 220 wires today.  
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

- Very high thermal resistance
- Very good dielectric properties
- Covering with high mechanical strength

### Order data

The designation shall comprise:  
For rectangular shape: FL  
Description of the insulation: VS 220 V  
Reel type: e.g.: DIN 500

Complete order:  
2000 kg FL VS220 V 2.24x5.00mm D500

### Characteristics of VS 220 flat

	unit	value	Test standard
<b>Increase due the insulation</b>			
For width above 2.00 mm	mm	0.20 to 0.25	
<b>Mechanical properties</b>			
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	°	≤ 5.5	IEC60851-3 test 7
Adherence after elongation	20 %	No loss of adhesion	IEC60851-3 test 8
Flexibility - if width up to 10 mm - edgewise bent on mandrel Ø 3 x width	visual	no cracks	IEC60851-3 test 8
Flexibility - if width above 10 mm - edgewise bent on mandrel Ø 4 x width	visual	no cracks	IEC60851-3 test 8
Flexibility - flatwise bent on mandrel Ø 3 x thickness	visual	no cracks	IEC60851-3 test 8
<b>Electrical properties</b>			
Break down voltage after bending	V	≥ 2400	IEC60851-5 test 13
<b>Thermal properties</b>			
Heat shock 30 min / 240 °C if width up to 10 mm - edgewise mandrel Ø 5 x width	visual	no cracks	IEC60851-6 test 9
Heat shock 30 min / 240 °C if width above 10 mm - edgewise mandrel Ø 6 x width	visual	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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