

Winding wires for submersible motors, type UWM insulated with special PVC.

DESCRIPTION

Winding wires for submersible motors

Driving units of **submersible pumps**, so called "**wet type motors**", have been used to a large extent for many years. Due to their simple construction, these motors can be manufactured in comparably small series. This enables end-user countries to set up their own production. This is not possible for canned, oil-filled, motors.

Application

Unlike an oil filled motor, whose insulation would fail due to contact with moisture entering from without, the water filled unit will continue to operate. There is also no danger of polluting water with oil. The advantages of **wet type motors**; in comparison to canned motors are known all over the world and production of such motors is increasing steadily. The application of this technology though, does not rest solely in the traditional field of **submersible pumps**. Nowadays, „wet type motors“ are used more and more as driving units of special pumps, dredge boats, submarines, deep-sea research instruments etc.

The winding wires of „wet type motors“ are continually in contact with liquids that are more or less aggressive. For this reason the extruded insulation of the winding wires has to be **absolutely water tight** and resistant to a number of different substances. The **dielectric properties of the insulation** (dielectric strength, insulation resistance, dielectric losses), have to meet high standards that, of course, have to be fulfilled under the influence of moisture for long periods of time.

Construction

Due to our longstanding experience and tests, NEXANS has developed its own suitable PVC compound for this special application. Our insulating materials have excellent properties to assure longlivity. Here are some of the main characteristics:

- High dielectric strength
- High insulation resistance
- Low dielectric losses ($\tan \delta$)
- Good thermal and chemical resistance

It goes without saying that our laboratory continues to test proven as well as new insulation materials in respect to the suitability for this very specific application. This will assure consistant quality and further improvement.

NEXANS has been in the market of selling water-tight winding wires for submersible pump motors since 1950. NEXANS has, due to longstanding experience, the know-how to develop and use the proper materials. We guarantee the highest standards.



STANDARDS

National DIN 53483;
DIN VDE 0472 part 502

CHARACTERISTICS

Construction characteristics

Conductor material	Copper
Insulation	PVC

Electrical characteristics

Dielectric loss factor (tand maxi =)	60E-03
Test voltage	5000 V
Breakdown voltage	55 kV

Mechanical characteristics

Tensile strength	20 N/mm2
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ADDITIONAL CHARACTERISTICS UWM PVC 380 & 600V

Tests

The following tests are carried out on 100 % of every production lot:

1. Mechanical tests:

- a) Dimension of the bare copper conductor
- b) Dimension of the insulated wire
- c) Eccentricity
- d) Surface

2. Test voltage and duration of test:



Electrical characteristics

Working voltage		50 Hz	380 V	600 V
Test voltage after 24 h in water at 20°C		15 min.	5000 V DC*	5000 V DC*
Operating temperature			70°C	70°C
Loss factor	(acc. to DIN 53483)	20°C/800 Hz 70°C/800 Hz	8 x 10 ⁻² 6 x 10 ⁻²	8 x 10 ⁻² 6 x 10 ⁻²
Relative dielectric constant	(acc. to DIN 53483)	20°C/800 Hz 70°C/800 Hz	4 8	4 8
Volume resistivity	(acc. to VDE 0472, Teil 502)	20°C/500 V DC 70°C/500 V DC	10 ¹⁵ Ω x cm 3 x 10 ¹² Ω x cm ³	10 ¹⁵ Ω x cm 3 x 10 ¹² Ω x cm ³

Breakdown voltage measured on wire	1.6/2.4 mm-Ø	20°C 70°C	≥ 55 kV/mm ≥ 30 kV/mm	≥ 55 kV/mm ≥ 30 kV/mm
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* Test voltage 2'000 V DC for wire with wall thickness under 0.4mm

Mechanical characteristics

Tensile strength on delivery		σ B	≥ 20 N/mm ²
Tensile strength after ageing	28 d/80°C	Δ σ B	≤ ± 10 %
Elongation at break on delivery		ε B	≥ 150 %
Elongation at break after ageing (VDE 0472/602)	28 d/80°C	Δ ε B	≤ ± 25 %
Hot deformation (reduction of wall thickness) (VDE 0472/609)		80°C/4 h 70°C/4 h	≤ 40 % ≤ 25 %

Marking

Each bears the following label:

K5

K390/93 & K460/105 Test label



- Dieser Draht wurde nach 48 Stunden Wasserlagerung bei einer Temperatur von 20°±5° C unter Prüfspannung elektrisch getestet.
 - Ce fil a été examiné et maintenu dans l'eau pour une période de 48 h à une température de 20°±5° C et après soumis à la tension d'essai.
 - This wire was immersed in water for 48 h at a temperature of 20°±5° C and then electrically tested at test voltage.
 - Questo filo è stato collaudato in matassa dopo immersione in acqua a 20°±5° C per 48 ore è controllato elettricamente alla tensione di prova.

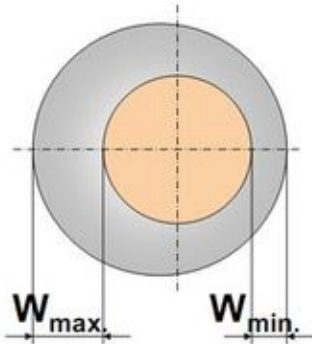
TOLERANCES / ECCENTRICITY UWM

Tolerances

Outer diameter of the insulated wire	< 2,20 mm	2,21 – 3,00 mm	3,01 – 4,30mm	4,31 – 6,00 mm
Tolerances on outer diameter of the insulated wire	± 0,05 mm	± 0,07 mm	± 0,10 mm	± 0,15 mm
Eccentricity	≤ 10 %	≤ 12 %	≤ 15 %	≤ 15 %

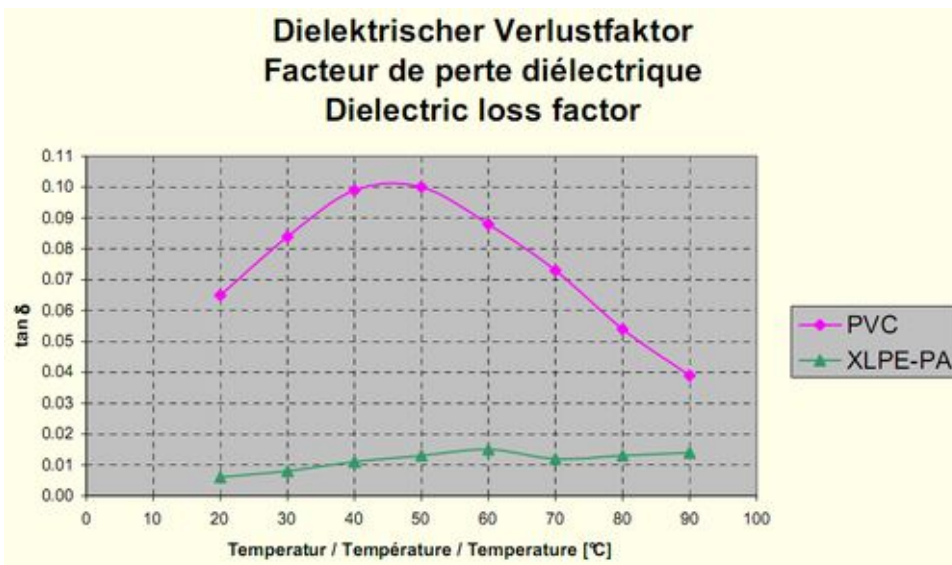
Definition Eccentricity

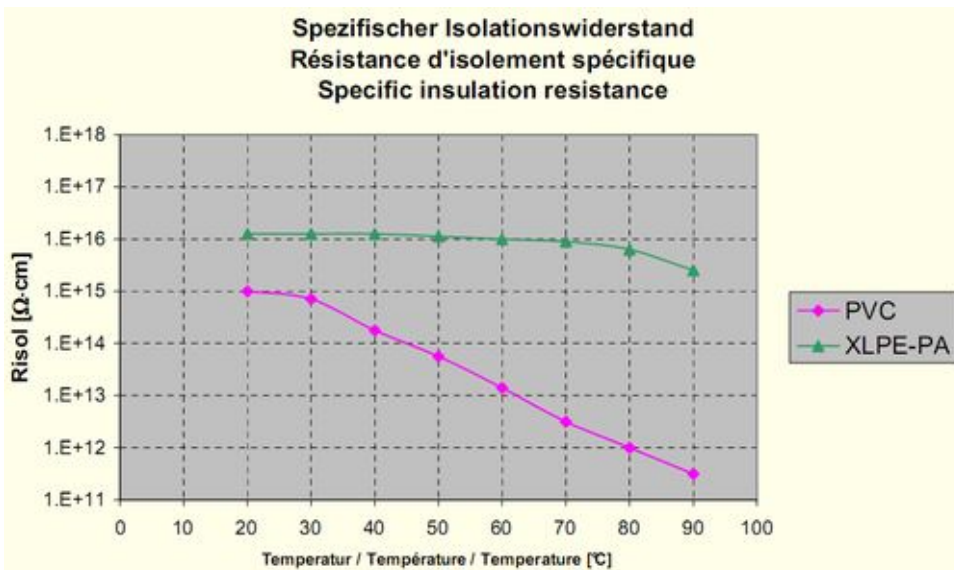
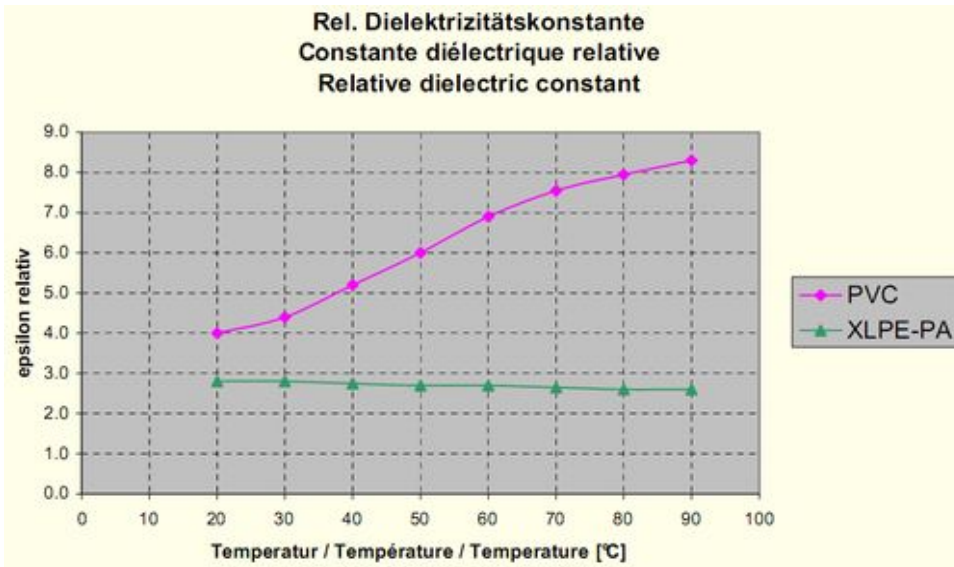
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$$E \% = \frac{W_{\max.} - W_{\min.}}{W_{\max.} + W_{\min.}} \times 100 \%$$

ELECTRICAL SPECIFICATIONS UWM





PACKING UWM

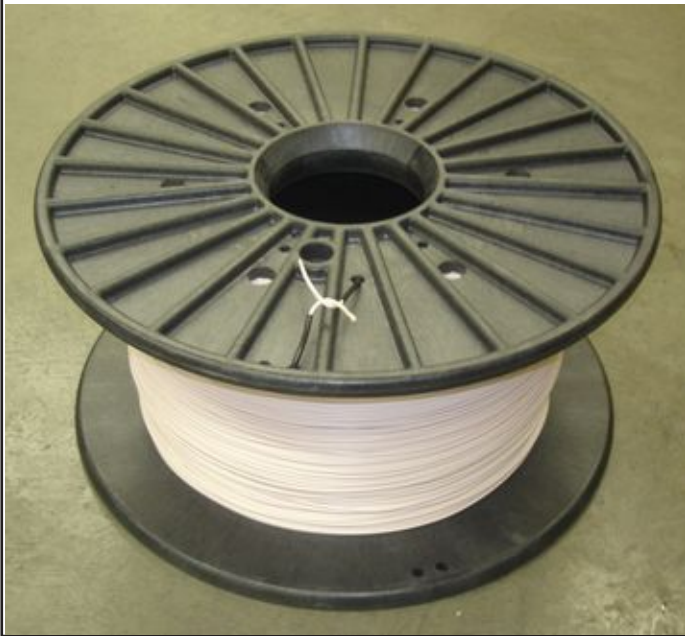
The UWM wire can be packed on 3 kinds of plastic reels.

UWM PVC 380 & 600V old

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K5



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