

Taped wires

Samicafilm® taped rectangular wire

- Taped winding wire for high voltage motors
- Wire with a high resistance to corona discharges

Description:

SAMICAFILM® covered winding wires are bare or enameled rectangular copper conductors, wrapped with a SAMICA® tape. SAMICA® is the trade name for the Mica paper, developed and manufactured by Von Roll. In the case of SAMICAFILM®, this Mica paper is laminated with a Polyester PET or Polyimide film, before being cut into the required tapes. Because of their outstanding electrical insulating properties, Mica tapes have been used successfully over many years already for electro-technical applications. Especially in high voltage machines, the insulation of single conductors has to be resistant to the destructive action of corona discharge. Mica and Mica paper have proved themselves under such extremely severe conditions of application.

The wires can be wrapped with one or more layers of SAMICAFILM® tape, either butt-lapped or overlapped.

They can also be delivered in a B-stage condition. In this case, the insulating film(s) is/are coated with a hot-melt adhesive. This grade allows the consolidation of the straight sections of the coils by hot-pressing before applying the main insulation.

Dimensions:

Rectangular wires according to IEC 60317-0-2, and every dimension up to 100 mm², with width between 2 and 20 mm and thickness from 0,8 to 6 mm.

A width/thickness ratio of max. 10:1. is recommended.

Bare wire tolerances		Table 1
Width or thickness in mm		Tolerance in mm
From	to	±
-	3.15	0.030
3.15	6.30	0.050
6.30	12.50	0.070
12.50	20.00	0.100

Standard types:

Bare or enameled rectangular winding wires, taped according to the types described in Table 4.

Standards:

Special IEC Standards are not yet existing for this product.

The tests mentioned in the following table are based on IEC test methods: 60851 (1985)

60851 - 1	General
60851 - 2	Determination of the dimensions
60851 - 3	Mechanical properties
60851 - 4	Chemical properties
60851 - 5	Electrical properties
60851 - 6	Thermal properties

Advantages:

- ▶ High dielectric strength
- ▶ Very good resistance to corona discharges
- ▶ Short pressing time for the consolidation of the straight sections with the hot-melt-adhesive-coated grades
- ▶ Taped bare wire recommended for repairs because any dimension can be chosen.

Applications:

- ▶ High voltage motors
- ▶ Wind turbine generators
- ▶ Windings with high resistance to corona discharges

Processing instructions:

- ▶ Avoid tearing the insulating tapes (use non-metallic materials for guides, wheels, tools).
- ▶ When forming coils, avoid the use of hard and sharp-edged tools.
- ▶ Heavy localized impacts have to be avoided (hammer blows).
- ▶ The minimum radius for bending is:
3 x width edgewise
2 x thickness flatwise
- ▶ For the adhesive coated grades, consolidation of the straight sections of the coils has to be done in a press preheated up to 160 °C and pressing at 2,5 MPa for about 5 minutes. The coil should then be cooled in the press below 80°C for about 5 minutes. We recommend to not form the coils after the pressing operation.
- ▶ For impregnating varnishes and resins, consult our customer service.

Storage conditions:

The taped wires with SAMICAFILM® should be stored in clean, dry, cool conditions without exposure to light. The shelf life of SAMICAFILM® taped wires is 6 months at 20°C or 12 months at 5° C.

Order Data:

Quantity, Designation, Supply Form

The designation shall include:

Dimension in mm
(width x thickness) b x s
Conductor material
Designation of the insulation (see table 4)

Example:

2.00 x 8.00
Cu
2SA 581

The supply form shall indicate the type of reels required:

Cylindrical reels according to IEC 60264-2, equal to DIN 46399 (see Table 2)

Example :

2000 kg FL 2SA581 2.00 x 8.00 D500

Form of delivery:

Type, dimensions and wire capacity of the reels:

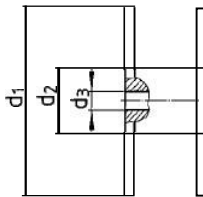


Table2

Type	Reel dimensions in mm					Wire capacity	
	d ₁	d ₂	d ₃	l ₁	l ₂	kg	
D500	500	315	36	250	180	80	
VM 630	630	320	51	250	180	130	
VM710	710	400	51	250	180	165	
VM800	800	500	41	270	200	350	

Other reels available on request

Characteristics of SAMICAFILM®-taped rectangular wire

Standards	see frontpage
Type of insulation	bare or enameled with SAMICAFILM® taping
Dimensions	Publications IEC 60317-0-2

Properties	Test Method	Unit	Value
Mechanical:			
Elongation at break	IEC 60851-3, Test 6		
Thickness t < 2,5 mm	Elongation	%	min. 30
Thickness t > 2,5 mm	Elongation	%	min. 32
Springiness	IEC 60851-3, Test 7		
Thickness t < 1,5 mm	Spring-back angle	°(Degrees)	max. 5,0
Thickness 1,5 < t < 3,0 mm	Spring-back angle	°(Degrees)	max. 4,5
Thickness t > 3,0 mm	Spring-back angle	°(Degrees)	max. 4,0
Flexibility and Adherence	IEC 60851-3, Test 8		
Width ≤ 8 mm bent edgewise 4 x width		visual	no cracks
Width > 8 mm bent edgewise 6 x width			
Width ≤ 8 mm bent flatwise 4 x thickness		visual	no cracks
Width > 8 mm bent flatwise 6 x thickness			
Electrical:			
Specific Resistance at 20°C	IEC 60851-5, Test 5	Ohm.mm ² /m	max. 0,01724
Breakdown Voltage on straight or bent samples	IEC 60851-5, Test 13	kV	see Table 4
	straight sample		
	bent edgewise 6 x width		
	bent flatwise 4 x thickness (also with Heat shock)		
Thermal:			
Heat shock at 180°C, 30 min. on bent samples flatwise 4 x thickness	IEC 60851-6, Test 9	visual	no cracks
Thermal endurance	IEC 60172	Temperature Index ¹⁾	155 (Samica with PET) 180 (Samica with PI)

¹⁾ The temperature Index is derived from the test carried out according to IEC 60172. It gives an indication of the behavior of the wires when exposed to heat, but it does not necessarily equal the service temperature at which the wires can be used

Characteristics of SAMICAFILM®-taped rectangular wire - Class F grades

Designation: WIRE Standard Products	2SA 781	2SA 841	3SA 841	4SA 841	2SA 851	SA 640	3SA 571	TX220 G2 SA 570
Wires used								
Machine Voltage Range in kV	< 3,3	< 6,6	< 11	< 13.8	< 6,6	< 11	< 13,8	< 15
Bare or Thermex 220 Grad 2 enamelled	bare	bare	bare	bare	bare	bare	bare	TX 220 G2
Dimension range 2)	> 8 mm ²	> 8 mm ²	> 8 mm ²	> 8 mm ²	> 8 mm ²	without restriction	> 8 mm ²	without restriction
Tapes used								
Polyester film as 1 st wrapped layer						PET film 23µm		
Number of tapes	-	-	-	-	-	1	-	-
Overlapping in %	-	-	-	-	-	50 +0 - 5	-	-
Butt lapping, layers displaced in %	-	-	-	-	-	-	-	-
SAMICAFILM® lapping								
	315.11-01	315.15-01	315.15-01	315.15-01	315.15-11	315.15-11	315.23-11	315.23-11
Number of tapes	2	2	3	4	2	1	3	1
Overlapping in %	0 +0 - 5	0 +0 - 5	0 +0 - 5	0 +0 - 5	0 +0 - 5	50 +0 - 5	0 +0 - 5	50 +0 - 5
Butt lapping, layers displaced in %	50 +/- 10	50 +/- 10	33 +/- 10	25 +/- 10	50 +/- 10	-	33 +/- 10	-
SAMICAFILM® tape composition								
Hot-melt coating outside					x	x	x	x
Polyester PET film µm	23	30	30	30	30	30	23	23
SAMICA® paper	x	x	x	x	x	x	x	x
Epoxy resin	x	x	x	x	x	x	x	x
Polyester PET film µm							13	13
Hot-melt coating towards copper							x	x
Properties of SAMICAFILM® tape								
	315.11-01	315.15-01	315.15-01	315.15-01	315.15-11	315.15-11	315.23-11	315.23-11
Thickness mm	0,05 +/-0,01	0,09 +/- 0,02	0,09 +/- 0,02	0,09 +/- 0,02	0,09 +/- 0,02	0,09 +/- 0,02	0,09 +/- 0,02	0,09 +/- 0,02
Total weight g/m ²	72 +/- 11	129 +/- 9	129 +/- 9	129 +/- 9	135 +/- 10	135 +/- 10	126 +/- 7	126 +/- 7
Weight of Mica paper g/m ²	30 +/- 4	75 +/- 4	75 +/- 4	75 +/- 4	75 +/- 4	75 +/- 4 18	50 +/- 4	50 +/- 4
Resin content g/m ²	10 +/- 5	12 +/- 3	12 +/- 3	12 +/- 3	18 +/- 4	+/- 4	27 +/- 5	27 +/- 5
Dimensions								
Unpressed insulation thickness	0.20	0.36	0.54	0.72	0.36	0.46	0.54	0.51
	+/- 0.06	+/- 0.08	+/- 0.10	+/- 0.12	+/- 0.08	+/- 0.08	+/- 0.10	+/- 0.10
Pressed insulation thickness	0.18	0.30	0.45	0.60	0.30	0.40	0.45	0.45
	+/- 0.04	+/- 0.04	+/- 0.06	+/- 0.08	+/- 0.04	+/- 0.04	+/- 0.06	+/- 0.06
Electrical Properties								
on straight sample	3.0	3.5	4.5	5.5	3.5	3.5	6.5	7.0
between wires	6.0	7.0	9.0	11.0	7.0	7.0	12.0	14.0
edgewise bent 6 x width	1.5	2.0	3.0	4.0	2.0	2.0	5.0	6.0
flatwise bent 4 x thickness	1.5	2.0	3.0	4.0	2.0	2.0	5.0	6.0
+ Heat shock 180 °C, 30 min.								

2) In the dimension range below 8 mm², only half overlapped wires can be manufactured. Instead of 2 or 3 butt-lapped layers, it is also possible to wrap 1 layer of tape with a 50 or 66 % overlapping value

Appearance

Slight color variations are raw material or process-related and have no influence on the technical properties of the wire.

Characteristics of SAMICAFILM®- Characteristics of SAMICAFILM®-

Designation: WIRE Standard Products	2SA 681	3SA 681	2SA 691	3SA 691	TX220 G2 2SA 681	TX220 G2 SA 680
Wires used						
Machine Voltage Range in kV	< 6,6	< 11	< 6.6	< 11	< 15	< 15
Bare or Thermex 220 Grad 2 enameled	bare	bare	bare	bare	TX 220 G2	TX 220 G2
Dimension range 2)	> 8 mm ²	> 8 mm ²	> 8 mm ²	> 8 mm ²	> 8 mm ²	without restrictions
Tapes used						
Polyester film as 1 st wrapped layer						
Number of tapes	-	-	-	-	-	-
Overlapping in %	-	-	-	-	-	-
Butt lapping, layers displaced in %	-	-	-	-	-	-
SAMICAFILM® lapping	315.18-01	315.18-01	315.18-11	315.18-11	315.18-01	315.18-01
Number of tapes	2	3	2	3	2	1
Overlapping in %	0 +0 - 5	0 +0 - 5	0 +0 - 5	0 +0 - 5	0 +0 - 5	50 +0 - 5
Butt lapping, layers displaced in %	50 +/- 10	33 +/- 10	50 +/- 10	33 +/- 10	50 +/- 10	-
SAMICAFILM® tape composition						
Hot-melt coating outside			x	x		
Polyimide film µm	25	25	25	25	25	25
SAMICA® paper	x	x	x	x	x	x
Epoxy resin	x	x	x	x	x	x
Properties of SAMICAFILM® tape						
Thickness mm	0,09 +/-0,02	0,09 +/-0,02	0,09 +/-0,02	0,09 +/-0,02	0,09 +/- 0,02	0,09 +/- 0,02
Total weight g/m ²	122 +/- 12	122 +/- 12	126 +/- 10	126 +/- 10	122 +/- 12	122 +/- 12
Weight of Mica paper g/m ²	75 +/- 6	75 +/- 6	75 +/- 5	75 +/- 5	75 +/- 6	75 +/- 6
Resin content g/m ²	10 +/- 2	10 +/- 2	14 +/- 3	14 +/- 3	10 +/- 2	10 +/- 2
Dimensions in mm						
Unpressed insulation thickness	0.36	0.54	0.36	0.54	0.51	0.51
	+/- 0.08	+/- 0.10	+/- 0.08	+/- 0.10	+/- 0.10	+/- 0.10
Pressed insulation thickness	0.30	0.45	0.30	0.45	0.45	0.45
	+/- 0.04	+/- 0.06	+/- 0.04	+/- 0.06	+/- 0.06	+/- 0.06
Electrical Properties in kV						
on straight sample	35	4.5	3.5	4.5	7.0	7.0
between wires	7.0	9.0	7.0	9.0	14.0	14.0
edgewise bent 6 x width	2.0	3.0	2.0	3.0	5.5	5.5
flatwise bent 4 x thickness	2.0	3.0	2.0	3.0	5.5	5.5
+ Heat shock 180 °C, 30 min.						

2) In the dimension range below 8 mm², only half overlapped wires can be manufactured. Instead of 2 or 3 butt-lapped layers, it is also possible to wrap 1 layer of tape with a 50 or 66 % overlapping value

Appearance

Slight color variations are raw material or process-related and have no influence on the technical properties of the wire.

The product properties set forth in this data sheet are based on the results of testing of typical material produced by the affiliated companies of Delle Fil SAS. Some variation in product properties is typical. Comments or suggestions relating to any subject other than product properties are offered only to call the end-user's or other person's attention to considerations which may be relevant in the independent determination of the use and/or manner of use of product. Delle Fil SAS does not claim or warrant that the use of its product will have the results described in this data sheet or that the information provided is complete, accurate or useful. The user should test the product to determine its properties and its suitability for the intended use. Delle Fil SAS expressly disclaims any liability for any damage, harm, injury, cost or expense to any person resulting directly or indirectly from that person's reliance on any information contained in this data sheet. Nothing contained in this data sheet constitutes representation or warranty as to any matter whatsoever. Delle Fil SAS makes no warranties whatsoever in this data sheet, expressed or implied, including any implied warranty or fitness for a particular use or purpose. Delle Fil SAS shall in no event be liable for incidental, exemplary, punitive or consequential damages.

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