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 (equivalence from Isovolta, Cogebi, or other tape supplier can be proposed). 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 mm^2, 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.

Tape supplier:
Von Roll / Isolvolta / Cogebi

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

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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.

Order Data:
Quantity, Designation, Supply Form

The designation shall include:	Example:
Dimension in mm (width x thickness) b x s	2.00 x 8.00
Conductor material	Cu
Designation of the insulation (see table 4)	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:

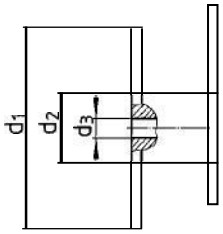

Table2

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

Characterictics of SAMICAFILM®-taped rectangular wire	
Standards	see frontpage
Type of insulation	bare or enameled with SAMICAFILM® taping (or equivalence)
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

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

Designation: WIRE Standard Products		2SA 781 not standard	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 mm²	> 8 mm²	> 8 mm²	> 8 mm²	> 8 mm²	without restriction	> 8 mm²	without restriction
Tapes used									
Polyester film as 1st 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/m²	72 +/- 11	129 +/- 9	129 +/- 9	129 +/- 9	135 +/- 10	135 +/- 10	126 +/- 7	126 +/- 7
Weight of Mica paper	g/m²	30 +/- 4	75 +/- 4	75 +/- 4	75 +/- 4	75 +/- 4	75 +/- 4 18	50 +/- 4	50 +/- 4
Resin content	g/m²	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.

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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 1st 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		315.18-01	315.18-01	315.18-11	315.18-11	315.18-01	315.18-01
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		3.5	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.

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