Westinghouse Electric Corporation
Industrial Plastics Division
Flexible Insulation
Bedford, Pa. 15522

January, 1979
Supersedes TD 64-580, page 1,
dated February, 1970

Mailed to: E, D, C/2158, 2162/PL, DB

NEMA – 8176-1, Low Cost – 8176-8
For 130°C Applications

Varnished Glass Cloth

Application for 8176-1

Westinghouse 8176-1 varnished glass cloth and tape are made from straight weave, continuous-filament glass fabric, coated with a flexible, oleoresinous varnish. This fabric complies with all NEMA specifications. The relatively high thermal conductivity of the glass cloth dissipates heat quickly and thus virtually eliminates overload damage in motors and transformers. The 8176-1 material is particularly recommended for Class B wrapper and layer applications, such as coil phase, barrier, ground, and slot-cell insulations.

Advantages

- **Excellent dielectric strength** combined with extremely good oil and moisture resistance.
- **Class B insulation.**
- **High flexibility** combined with good mechanical properties.
- **Meets all NEMA requirements.**

Specifications (Typical Values)

Thickness, Treated (inches)	0.003	0.005	0.007	0.010	0.010
Thickness (base fabric)	0.002	0.003	0.003	0.003	0.007
Width (inches)	36	36	36	36	36
Weight, Approximate (lbs./sq. yd.)	0.22	0.42	0.50	0.72	0.75
Tensile Strength, Warp (lbs./in. of width)	60	100	100	100	250
Dielectric Strength, Minimum Average, Short Time Method, ¼ in. Dia. Electrodes (volts/mil) Condition –					
24/23/50% R.H.	1200	1200	1200	1100	450
168/130°C., Bent	1100	950	950	900	....

Ordering Information

Supplied in standard tape widths on 1 inch ID cores in 36 and 72 yard rolls, and in rolls 36 inches wide in 25, 50, and 100 yard lengths on 2 inch ID cores. Also available in master rolls, approximately 350-400 yards long. Specify quantity, thickness, width and length wanted. Specify thickness of base glass wanted when .010 treated thickness ordered. Pressure sensitive backing available for cloth and tape, see TD 64-540.

Application for 8176-8

Westinghouse 8176-8 low-cost varnished glass cloth and tape consist of a straight-weave, continuous-filament, glass fabric coated with an oleoresinous varnish. It has the same properties as the NEMA grade fabric except for the fact that the weave is looser resulting in a slightly lower mechanical strength. The 8176-8 fabric is recommended for Class B use in coil, phase, barrier, ground, and slot-cell insulation.

Advantages

- **Excellent tensile strength** at an economical price.
- **Good dielectric strength.**
- **Oil and moisture resistance.**
- **Class B insulation.**

Specifications (Typical Values)

Thickness of Fabric Base – L. C. Type (inches)	0.004	0.004	0.004
Thickness, Treated (inches)	0.007	0.010	0.012
Weight, Approximate (lbs./sq. yd.)	0.44	0.58	0.80
Tensile Strength (warp, lb./in. width)	150	150	150
Dielectric Strength, ¼ in. Dia. Electrodes, Short Time Method			
(volts/mil) Condition as Received	1,630	1,630	1,400
96 hours at 96% Relative Humidity at Room Temperature	1,175	900	700
Dielectric Strength, ¼ in. Dia. Electrodes, Step-by-Step Method			
(volts/mil) Condition as Received	1,190	1,190	1,000

Ordering Information

Supplied in standard tape widths in 36 and 72 yard rolls on 1 inch ID cores, and 36 inches wide in 25, 50, and 100 yard rolls. Also furnished in master rolls approximately 350-400 yards long. Pressure sensitive backing available for cloth and tape, see TD 64-540.

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Varnished Glass Cloth Class F

NEMA – 5J04, Low Cost – 5J44,
Low Cost 5J47
For 155°C Application

January, 1979
Supersedes TD 64-580, pages 2 and 3
dated February, 1970

Mailed to: E, D, C/2158, 2162/PL, DB

Application for 5J04 Tan

Westinghouse 5J04 Class F varnished glass cloth consists of a straight-weave, continuous-filament glass fabric coated with a Class F (155°C) heat-reactive resin. It is recommended for layer and wrapper insulation in electrical apparatus when full Class F temperature rating is required.

Advantages

- **Excellent high-temperature properties** for superior Class F performance.
- **Flexibility** is combined with good dielectric and mechanical strength.
- **Imparts extra life** to apparatus in continuous use at temperatures up to 155°C.
- **Especially recommended for layer insulation** in dry type transformers.

Specifications (Typical Values)

	Tan				
Thickness (total inches)	0.003	0.007	0.010	0.012	0.015
Thickness, Glass Fabric Base (inches)	0.002	0.004	0.007	0.007	0.010
Weight, Approximate (lbs./sq. yd.)	0.22	0.50	0.72	0.90	1.12
Tensile Strength (lbs./in. of width)	60	100	300	300	300
Dielectric Strength, ¼ in. Dia. Electrodes, Short Time Method (volts/mil) Condition A (as received)	....	1400	1400	1400	....

Ordering Information

Supplied in 25, 50 and 100 yard rolls approximately 36 inches wide, on 2 inch ID cores. Also in master rolls approximately 350-400 yards long. May be slit to width as specified. Specify quantity, thickness, width and roll length required.

Application for 5J44 Tan

Westinghouse 5J44 varnished glass fabric consists of low cost glass fabric coated with a full Class F insulating varnish. It is designed for use as layer insulation at temperatures of 155°C.

Advantages

- **Combines low cost glass fabric with Class F varnish** for upgrading equipment at low cost.
- **Excellent flexibility** is combined with good mechanical strength.
- **Recommended for layer insulation** in dry type transformers.

Specifications (Typical Values)

	Tan			
Thickness, Total (inches)	0.005	0.007	0.010	0.012
Thickness, Glass Fabric Base (inches)	0.004	0.004	0.004	0.004
Weight, Approximate (lbs./sq. yd.)	0.28	0.44	0.58	0.80
Tensile Strength (lbs./in. of width) MD	150	150	150	150
Dielectric Strength, ¼ in. Dia. Electrodes, Short Time Method at room temperature (volts/mil)	1450	1450	1400	1400

Ordering Information

Supplied in 36 inch widths, trimmed, or 38 inch widths, untrimmed in 25, 50 and 100 yard roll on 2 inch ID cores. Also in master rolls approximately 350-400 yards long. May be slit to widths as specified. Specify quantity, thickness, width, and roll length required.

Application for 5J47

Westinghouse 5J47 varnished glass cloth consists of 0.007 inch L.C. glass fabric coated with a full Class F insulating varnish. It is recommended for Class F service where heavy glass fibers are required, and for temperatures to 155°C.

Advantages

- **Combines advantages of heavy and lower cost** glass fabric coated with class F insulating varnish for economical high temperature (155°C) layer insulation.
- **High mechanical strength.**
- **Heavy fibers resist breakage** and reduce loss in coil winding.

Specifications (Typical Values)

	Tan		
Total Thickness, (inches)	0.010	0.012	0.015
Thickness, Base Fabric (inches)	0.007	0.007	0.007
Weight, Approximate (lbs./sq. yd.)	0.7	0.82	1.05
Tensile Strength (lbs./in. of width) MD	270	270	270
Dielectric Strength, ¼ in. Dia. Electrodes, Short Time Method, at Room Temperature (volts/mil)	1300	1100	900
After 15 Min. in Hot Oil at 105°C (volts/mil)	1300	....	....

Ordering Information

Supplied in 36 and 48 inch widths, trimmed, or in 38 and 50 inch widths, untrimmed in 25, 50 and 100 yard rolls on 2 inch ID cores. Also in master rolls approximately 350-400 yards long. 48 and 50 inch widths on special order only. Also may be slit to widths as specified. Specify quantity, thickness, width and roll length required.

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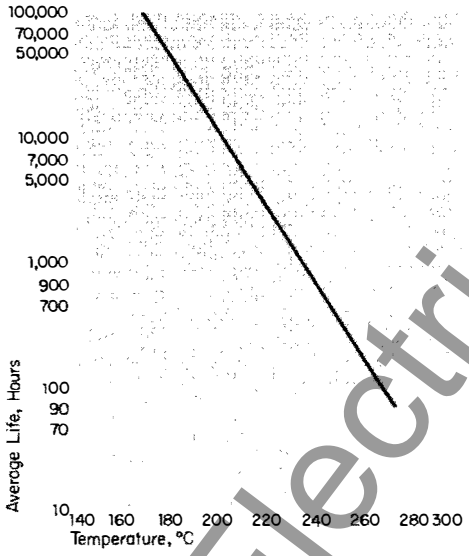
5JF04, Low Cost – 5JF44
Life Rating – 50,000 hrs at 180°C

Varnished Glass Cloth Extremely Flexible Class 180C

Application for 5JF04
Westinghouse 5JF04 consists of NEMA straight weave continuous filament glass fabric coated to specified thickness with a flexible insulating varnish. Meets requirements of MIL-I-17205, grade O.

Advantages
- **Excellent for taping, layer, wrapper and phase insulation** in electrical equipment wherever flexibility, and high dielectric strength are required.
- **Used on original equipment and repair** for armature and stator coils, transformers and other applications where a flexible and high temperature electrical barrier is needed.



Curved Electrode Test per ASTM D1932-61T 300 Vpm End Point

Application for 5JF44
Westinghouse 5JF44 is a straight weave .004 inch thick (L.C.) continuous filament glass fabric coated to specified thickness with a flexible insulating varnish. Meets requirements of MIL-I-17205, grade O.

Advantages
- **Excellent for miscellaneous electrical insulation application** where flexibility and good thermal aging properties are desired.
- **An economical flexible insulation** for taping, layer, wrapper, and phase applications.

Specifications (Typical Values) **for 5JF04**

		Tan			
Color					
Finished Thickness (inches)		0.007	0.010	0.012	0.015
Thickness Glass Fabric Base (inches)		0.003	0.007	0.007	0.007
Weight Approximate (lbs./sq. yd.)		0.41	0.69	0.84	1.02
Tensile Strength (lbs./in. of width)	WARP	100	300	300	300
	FILL	70	200	200	200
Gurley Stiffness (MG)	MD	180	500	500	500
	CMD	120	400	400	400
Dielectric Strength (V/M)	C-96/23/0	1600	1300	1250	1200
(V/M)	C-96/23/96	900	500	500	500
(Bent)	C-168/23/50	1500	1000	1000	1000
(Bent)	E-168/130	1800	700	700	700
(Bent)	E-168/180	1000	400	NA	NA
Power Factor (60 cycle)	C-96/23/0	0.05	0.05	0.05	0.05
	C-96/23/96	0.20	0.20	0.20	0.20
Dielectric Constant (60 cycle)	C-96/23/0	5.0	5.0	5.0	5.0
	C-96/23/96	8.0	8.0	8.0	8.0
Toluol Resistance (immersion)		No Effect After 3 Minutes			

Ordering Information
Supplied in 25 yard long rolls approximately 36 inches wide on 1½ inch ID cores and in master rolls approximately 350-400 yards long. Also supplied in tape slit to width as specified. Other thicknesses available on negotiation.

Specifications (Typical Values) **for 5JF44**

		Tan			
Color					
Finished Thickness (inches)		0.007	0.010	0.012	0.015©
Thickness Glass Fabric Base (inches)		0.004	0.004	0.004	0.004
Weight Approximate (lbs./sq. yd.)		0.44	0.65	0.76	0.86
Tensile Strength (lbs./in. of width)	WARP	150	150	150	150
	FILL	120	120	120	120
Gurley Stiffness (MG)	MD	170	220	400	425
	CMD	85	150	375	350
Dielectric Strength (V/M)	C-96/23/0	1400	1300	1300	1300
(V/M)	C-96/23/96	800	800	800	800
(V/M) (Bent)	C-168/23/50	1300	1200	1200	1200
(V/M) (Bent)	E-168/130	1600	1500	1500	1500
(V/M) (Bent)	E-168/180	900	800	NA	NA
Power Factor (60 Hertz)	C-96/23/0	0.05	0.05	0.05	0.05
	C-96/23/96	0.20	0.20	0.20	0.20
Dielectric Constant (60 Hertz)	C-96/23/0	5.0	5.0	5.0	5.0
	C-96/23/96	8.0	8.0	8.0	8.0
Toluol Resistance (immersion)		No Effect After 3 Minutes			

Ordering Information
Supplied in 25 yard long rolls approximately 36 inches wide on 1½ inch ID cores and in master rolls approximately 350-400 yards long. Also supplied in tape slit to width as specified. Other thicknesses available on negotiation.

© Changed or added since previous issue.

Westinghouse Electric Corporation
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Varnished Glass Cloth, Class 180C, Class F

Class 180C Extremely Flexible, Low Cost 5JF47

Class F, NEMA – 5JF67
For 155C Applications

January, 1979
Supersedes TD 64-580, pages 4 and 5 dated February, 1975

Mailed to: E, D, C/2162/DB

Application for 5JF47

Westinghouse 5JF47 is a straight weave .007 inch thick (L.C.) continuous filament glass fabric coated to specified thickness with a flexible insulating varnish. Meets requirements of MIL-I-17205, grade O.

Advantages

- **Excellent for miscellaneous electrical insulation application** where flexibility and good thermal aging properties are desired.
- **An economical flexible insulation** for taping, layer, wrapper, and phase applications.

Specifications (Typical Values) for 5JF47

			Tan	
Color				
Finished Thickness (inches)			0.010	0.015
Thickness Glass Fabric Base (inches)			0.007	0.007
Weight Approximate (lbs./sq. yd.)			0.75	1.00
Tensile Strength (lbs./in. of width)		WARP	220	220
		FILL	170	170
Gurley Stiffness (MG)		MD	500	500
		CMD	400	400
Dielectric Strength (V/M)	C-96/23/0		1200	1200
(V/M)	C-96/23/96		500	500
(V/M) (Bent)	C-196/23/50		1000	1000
(V/M) (Bent)	E-168/130		700	700
(V/M) (Bent)	E-168/180		400	NA
Power Factor (60 Hertz)	C-96/23/0		0.05	0.05
	C-96/23/96		0.20	0.20
Dielectric Constant (60 Hertz)	C-96/23/0		5.0	5.0
	C-96/23/96		8.0	8.0
Toluol Resistance (immersion)			No Effect After 3 Minutes	

Ordering Information

Supplied in 25 yard long rolls approximately 36 inches wide on 1½ inch ID cores and in master rolls approximately 350-400 yards long. Also supplied in tape slit to width as specified. Other thicknesses available on negotiation.

Application for 5JF67

Westinghouse 5JF67 epoxy-varnished glass cloth offers extreme thermal stability and high dielectric characteristics in a broad range of temperature classifications (A through F). The 5JF67 material retains its flexibility and high dielectric characteristics even after heat aging at 155°C. It is especially recommended for applications in which chemical resistance and good dielectric strength are required, such as in the cases of the separation of phase insulation coils and in interlayer insulation.

Advantages

- **Excellent resistance to oils and chemicals.**
- **Good handling characteristics** facilitate operations.
- **Good dielectric properties** even under high humidity conditions.
- **Compatible** with virtually all varnishes and encapsulating compounds.

Specifications (Typical Values)

Color	Tan				
Thickness (inches)	0.003	0.005	0.007	0.010	0.012
Base Fabric Thickness (inches)	0.002	0.002	0.003	0.007	0.007
Weight, Approximate (lbs./sq. yd.)	0.23	0.42	0.51	0.73	0.80
Tensile Strength					
MD	60	60	100	300	300
CMD	50	50	50	240	240
Dielectric Strength, ¼ in. Dia. Electrodes (volts/mil)					
in Air	1700	1700	1700	....	1375
in Oil	....	....	....	1800	1800
Power Factor, 60 Cycle at 25°C	3.35	3.35	3.35	2.32	2.32
Oil Resistance, in Transformer Oil, 15 Min. at 110°C	Unaffected				
Thermal Aging (volts/mil)	1400	1400	1400	....	....

Dielectric strength measured on sample after aging 168 hours at 180°C and bending around ⅛-inch diameter mandrel.

Ordering Information

Supplied in 25, 50 and 100 yard rolls, 36 inch wide on 2 inch ID cores. Also furnished in standard tape widths in 36 yard rolls and in widths and roll diameters specified by customer. Specify quantity, width and length required.

Printed in USA

Westinghouse Electric Corporation
Industrial Plastics Division
Flexible Insulation, Bedford, Pa. 15522

April 2, 1979
New Information
Mailed to: E, D, C/2158, 2162/PL, DB

For 200 C Applications

8929 Silicone Resin Coated Glass Cloth

Application
Westinghouse 8929 silicone-resin-coated glass cloth and tapes involve the use of a straight weave, continuous filament fabric, treated with a fully cured silicone resin. This flexible Class H insulation offers good dielectric strength at high temperatures, great cut-through, chemical and tracking resistances and hence great overload protection. These products are generally used as flexible layer, wrapper and tape insulation in high temperature applications.

Advantages
Dielectric strength is retained at elevated temperatures.

Meet the requirements of NEMA, ASTM and MIL-1-17205C, where applicable.

Meet the performance requirements for Class H thermal service.

Ordering Information
Standard tape widths are available on 1 inch ID cores in rolls 36 and 72 yards long. Also available approximately 36 inches wide in standard 25, 50 and 100 yard rolls and in master rolls approximately 350-400 yards long. Specify quantity, length and width and thickness required.

Specifications (Typical Values)

	8929-1			8929-2	8929-3	8929-4	
Thickness, Treated (Inches)	0.0035	0.004	0.005	0.007	0.010	0.010	0.013
Thickness, Base Fabric (in.)	0.002	0.002	0.002	0.003	0.004	0.007	0.007
Weight, Approximate (lbs./sq. yd.)	0.22	0.26	0.32	0.43	0.65	0.80	0.96
Tensile Strength (lbs./in. of width)							
MD	70	70	70	100	100	300	300
CMD	40	40	40	70	70	240	240
Dielectric Strength, Minimum Average, ¼ in. Dia. Electrodes, Short Time Method (volts/mil)							
as Received	1500	1500	1500	1400	1300	450	650
as Received, Bent	1060	1250	1240	1145	1050	400	465
168/250, Bent	900	1065	1055	975	900	370	400
96/23/0	....	1400	1200	1300	1200	....	....
96/23/96	....	1000	600	900	800	....	....