

ELECTRON PRODUCTS INC.

ENGINEERING DATA SHEET

SERIES

BW

PAPER/MYLAR, HIGH VOLTAGE CAPACITORS

ENVIRONMENTAL DATA

APPLICATIONS

Series BW Paper/Mylar High Voltage capacitors have superior electrical properties. They are oil impregnated, non-polar, wound capacitors. They contain no PCB's.

Series BW Capacitors come in several styles: Oval Wrap & Fill; Round Wrap & Fill (C Style); Axial Epoxy Case (E Style). They are available the Regular size and custom sizes to meet specific customer requirements.

Contact our Engineering Department for special sizes, configurations, capacitance values and AC applications with Anti-Corona construction at all frequencies. Custom metal enclosures are available. Custom designed Feed Through capacitors (AQ Style) are also available for filter applications to specific requirements.

OPERATING TEMPERATURE RANGE

Range: -55°C to +125°C with voltage derating, 100% of listed voltage rating from -55°C to +85°C, derate linearly to 60% of the listed voltage rating at +125°C.

LIFE TEST

Series BW capacitors shall be capable of withstanding a test of 250 hours at 125°C and 140% of the DC derated voltage. The voltage shall be applied to each capacitor through its individual current-limiting resistor as determined from the formula $R = 0.025/C$, where C is the nominal capacitance in farads and R is in ohms. The test procedures shall be in accordance with MIL-C-25, except as noted herein. Not more than one failure in twelve shall be permitted. Any one of the following shall be considered a failure.

- A change in capacitance of more than 10% from it's initial value.
- An increase in Dissipation Factor to a value greater than the initial acceptance limit.
- A decrease in Insulation Resistance to a value less than 30% of the acceptance limit for 25°C.
- A permanent short or open.

VIBRATION

Series BW capacitors shall be capable of withstanding a vibration test in accordance with MIL-STD-202, Method 201. The following details and exceptions shall apply:

a. **Mounting.** The capacitor body shall be rigidly mounted by the entire body length to the vibration test fixture. The leads shall be soldered to rigidly supported terminals and so spaced that the length of each lead from the capacitor is $1/2 \pm 1/8$ inch from the edge of the supporting terminal.

b. **Measurement during Vibration.** During the last cycle in each direction, an electrical measurement shall be made to detect intermittent contacts or open or short circuiting.

c. **Examination After Vibration.** Capacitors shall be visibly examined for evidence of mechanical damage.

MOISTURE RESISTANCE

Series BW Styles E (epoxy encased) and Style wrap & fill capacitors are not intended for exposure to high humidity conditions over extended periods of time. For stringent environmental conditions, Wrap & Fill and Epoxy Case capacitors should be used in encapsulated or hermetically sealed circuitry.

TERMINAL STRENGTH

Series BW capacitors utilize tin-plated, copper-clad steel wire terminals which shall be capable of withstanding the following test without mechanical damage to the capacitor or terminals:

a. **Pull Test.** The capacitor shall withstand a steady pull of 5 pounds axially to the leads for 1 minute.

b. **Bend Test.** The wire lead terminals shall be bent at a point of 1/4 inch from the body of the capacitor, first 90 degrees in one direction, then back to the original position, and then 90 degrees in the opposite direction.

PAPER/MYLAR AND FOIL WRAP AND FILL, OVAL AXIAL LEAD HIGH VOLTAGE CAPACITORS

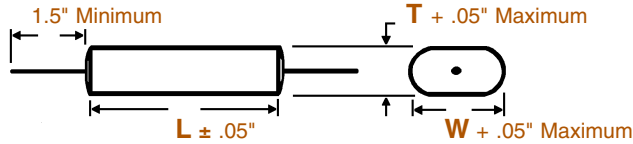


BW

PAPER/MYLAR & FOIL WRAP & FILL, OVAL REGULAR SERIES

DIMENSIONS See tables for specific T, W, L values.

WIRE SIZE (Length 1.5" Minimum)



BODY LENGTH (L)	WIRE SIZE	
	AWG No.	Diameter
< 1.00"	22	0.025"
≥ 1.00" ≤ 2.75"	20	0.032"
> 2.75"	18	0.040"

ORDERING DESCRIPTION

Capacitor, fixed: Paper/Mylar dielectric; extended foil construction; tin-plated copper-clad steel wire axial leads; encased in skin-tight plastic wrap with epoxy end fill.

APPLICATION NOTES

Wrap & Fill capacitors are not intended for exposure to high humidity conditions over extended periods of time. For stringent environmental conditions, Wrap & Fill capacitors should be used in encapsulated or hermetically sealed circuitry.

SELECTION AND ORDERING TABLES Select voltage rating, capacitance and tolerance, read Part Number to the right.

MFD	2000VDC 1000VAC				3000VDC 1500VAC				5000VDC 2500VAC				8000VDC 4000VAC				
	RATING	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #
	+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		
.001	.12	.35	1.00	BW20-102E	.12	.35	1.00	BW30-102E	.20	.40	1.30	BW50-102E	.35	.55	1.80	BW80-102E	
.002	.15	.35	1.00	BW20-202E	.23	.43	1.00	BW30-202E	.27	.50	1.30	BW50-202E	.50	.70	1.80	BW80-202E	
.003	.17	.40	1.00	BW20-302E	.25	.45	1.00	BW30-302E	.35	.55	1.30	BW50-302E	.60	.80	1.80	BW80-302E	
.005	.18	.40	1.30	BW20-502E	.25	.45	1.30	BW30-502E	.37	.57	1.50	BW50-502E	.65	.85	2.00	BW80-502E	
.01	.30	.50	1.30	BW20-103E	.36	.56	1.50	BW30-103E	.47	.67	1.80	BW50-103E	.70	.90	2.50	BW80-103E	
.02	.35	.55	1.50	BW20-203E	.45	.65	1.50	BW30-203E	.65	.85	1.80	BW50-203E	.75	.95	3.50	BW80-203E	
.03	.45	.65	1.50	BW20-303E	.58	.80	1.50	BW30-303E	.65	.85	2.30	BW50-303E	.90	1.10	3.50	BW80-303E	
.05	.45	.65	2.30	BW20-503E	.58	.78	2.30	BW30-503E	.85	1.10	2.30	BW50-503E	1.00	1.20	4.50	BW80-503E	
.10	.50	.70	3.30	BW20-104E	.65	.85	3.30	BW30-104E	.93	1.18	3.30	BW50-104E	1.45	1.65	4.50	BW80-104E	
.20	.65	.85	4.30	BW20-204E	.80	.99	4.30	BW30-204E	1.15	1.35	4.30	BW50-204E					

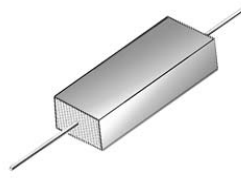
MFD	10000VDC 5000VAC				12000VDC 6000VAC				15000VDC 7500VAC				20000VDC 10000VAC				
	RATING	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #
	+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		
.001	.40	.60	1.80	BW100-102E	.50	.70	2.00	BW120-102E	.60	.80	2.00	BW150-102E	.50	.70	3.50	BW200-102E	
.002	.60	.80	1.80	BW100-202E	.70	.90	2.00	BW120-202E	.90	1.10	2.00	BW150-202E	.70	.90	3.50	BW200-202E	
.003	.60	.80	2.00	BW100-302E	.85	1.05	2.00	BW120-302E	.75	.95	2.50	BW150-302E	.90	1.10	3.50	BW200-302E	
.005	.60	.80	2.50	BW100-502E	.80	1.00	2.50	BW120-502E	1.00	1.20	2.50	BW150-502E	.90	1.10	4.50	BW200-502E	
.01	.85	1.05	2.50	BW100-103E	.80	1.00	3.50	BW120-103E	1.00	1.20	3.50	BW150-103E	1.25	1.45	4.50	BW200-103E	
.02	.90	1.10	3.50	BW100-203E	1.10	1.30	3.50	BW120-203E	1.40	1.60	3.50	BW150-203E	1.80	2.00	4.50	BW200-203E	
.03	1.05	1.25	3.50	BW100-303E	1.10	1.30	4.50	BW120-303E	1.40	1.60	4.50	BW150-303E					
.05	1.15	1.35	4.50	BW100-503E	1.40	1.60	4.50	BW120-503E	1.70	1.90	4.50	BW150-503E					
.10	1.70	1.90	4.50	BW100-104E													

MFD	25000VDC 12000VAC				30000VDC 15000VAC				
	RATING	T	W	L	PART #	T	W	L	PART #
	+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		
.001	.60	.80	3.50	BW250-102E	.75	.95	3.50	BW300-102E	
.002	.85	1.05	3.50	BW250-202E	1.10	1.30	3.50	BW300-202E	
.003	1.00	1.20	3.50	BW250-302E	1.30	1.50	3.50	BW300-302E	
.005	1.00	1.20	4.50	BW250-502E	1.30	1.50	4.50	BW300-502E	
.01	1.40	1.65	4.50	BW250-103E	1.80	2.00	4.50	BW300-103E	

TOLERANCE TABLE	
Code	Tolerance
D	± 5%
E	± 10%
None	± 20%
P	GMV
X	Special

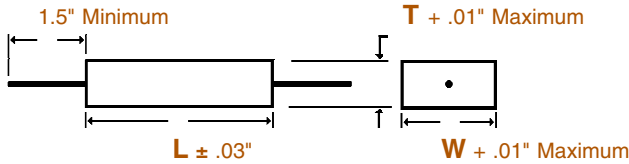
Note: Replace the last digit E with the desired tolerance code from the tolerance table. For an in-between value use the next larger value's dimensions. Custom sizes are readily available. All dimensions are in inches. All +.05" dimension tolerances are Maximum.

PAPER/MYLAR AND FOIL EPOXY CASE, RECTANGULAR AXIAL LEAD HIGH VOLTAGE CAPACITORS



BWE
PAPER/MYLAR & FOIL
EPOXY CASE, AXIAL, RECT.
REGULAR SERIES

DIMENSIONS See tables for specific T, W, L values.



WIRE SIZE (Length 1.5" Minimum)

BODY LENGTH (L)	WIRE SIZE	
	AWG No.	Diameter
< 1.00"	22	0.025"
≥ 1.00" ≤ 2.75"	20	0.032"
> 2.75"	18	0.040"

ORDERING DESCRIPTION

Capacitor, fixed: Paper/Mylar dielectric; extended foil construction; tin-plated copper-clad steel wire axial leads; encased in a molded epoxy/plastic shell with epoxy fill.

APPLICATION NOTES

Epoxy Case capacitors are not intended for exposure to high humidity conditions over extended periods of time. For stringent environmental conditions, Epoxy Case capacitors should be used in encapsulated or hermetically sealed circuitry.

SELECTION AND ORDERING TABLES Select voltage rating, capacitance and tolerance, read Part Number to the right.

MFD	2000VDC 1000VAC				3000VDC 1500VAC				5000VDC 2500VAC				8000VDC 4000VAC				
	RATING	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #
	+ .05"	+ .05"	± .05"			+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"	
.001	.32	.55	1.10	BWE20-102E	.32	.55	1.10	BWE30-102E	.45	.68	1.40	BWE50-102E	.60	.80	1.90	BWE80-102E	
.002	.32	.55	1.10	BWE20-202E	.32	.55	1.10	BWE30-202E	.45	.68	1.40	BWE50-202E	.76	.96	1.90	BWE80-202E	
.003	.32	.55	1.10	BWE20-302E	.45	.68	1.10	BWE30-302E	.60	.80	1.40	BWE50-302E	.86	1.06	2.10	BWE80-302E	
.005	.32	.55	1.40	BWE20-502E	.45	.68	1.40	BWE30-502E	.76	.96	1.40	BWE50-502E	.86	1.06	2.10	BWE80-502E	
.01	.45	.68	1.40	BWE20-103E	.45	.68	1.40	BWE30-103E	.76	.96	1.60	BWE50-103E	.95	1.15	2.60	BWE80-103E	
.02	.45	.68	1.60	BWE20-203E	.60	.80	1.60	BWE30-203E	.86	1.06	1.90	BWE50-203E	.95	1.15	3.60	BWE80-203E	
.03	.60	.80	1.60	BWE20-303E	.76	.96	1.60	BWE30-303E	.86	1.06	2.40	BWE50-303E	1.06	1.33	3.60	BWE80-303E	
.05	.60	.80	2.40	BWE20-503E	.76	.96	2.40	BWE30-503E	1.06	1.33	2.40	BWE50-503E	1.33	1.53	4.60	BWE80-503E	
.10	.76	.96	3.40	BWE20-104E	.86	1.06	3.40	BWE30-104E	1.06	1.33	3.40	BWE50-104E	1.65	1.87	4.60	BWE80-104E	
.20	.86	1.06	4.40	BWE20-204E	.95	1.15	4.40	BWE30-204E	1.06	1.53	4.40	BWE50-204E					

MFD	10000VDC 5000VAC				12000VDC 6000VAC				15000VDC 7500VAC				20000VDC 10000VAC				
	RATING	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #	T	W	L	PART #
	+ .05"	+ .05"	± .05"			+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"		+ .05"	+ .05"	± .05"	
.001	.60	.80	1.90	BWE100-102E	.76	.96	2.10	BWE120-102E	.95	1.15	2.31	BWE150-102E	.76	.96	3.75	BWE200-102E	
.002	.86	1.06	1.90	BWE100-202E	.95	1.15	2.10	BWE120-202E	1.33	1.53	2.31	BWE150-202E	.95	1.15	3.75	BWE200-202E	
.003	.86	1.06	2.10	BWE100-302E	1.06	1.33	2.10	BWE120-302E	1.06	1.33	2.81	BWE150-302E	1.33	1.53	3.75	BWE200-302E	
.005	.86	1.06	2.60	BWE100-502E	1.06	1.33	2.60	BWE120-502E	1.33	1.53	2.81	BWE150-502E	1.33	1.53	4.75	BWE200-502E	
.01	1.06	1.33	2.60	BWE100-103E	1.06	1.33	3.60	BWE120-103E	1.33	1.53	3.81	BWE150-103E	1.65	1.87	4.75	BWE200-103E	
.02	1.06	1.33	3.60	BWE100-203E	1.33	1.53	3.60	BWE120-203E	1.65	1.87	3.81	BWE150-203E	2.12	2.31	4.75	BWE200-203E	
.03	1.33	1.53	3.60	BWE100-303E	1.33	1.53	4.60	BWE120-303E	1.65	1.87	4.81	BWE150-303E					
.05	1.33	1.53	4.60	BWE100-503E	1.65	1.87	4.60	BWE120-503E	1.94	2.12	4.81	BWE150-503E					
.10	1.94	2.12	4.60	BWE100-104E													

MFD	25000VDC 12000VAC				30000VDC 15000VAC				
	RATING	T	W	L	PART #	T	W	L	PART #
	+ .05"	+ .05"	± .05"			+ .05"	+ .05"	± .05"	
.001	.95	1.15	3.75	BWE250-102E	1.06	1.33	3.75	BWE300-102E	
.002	1.06	1.33	3.75	BWE250-202E	1.65	1.87	3.75	BWE300-202E	
.003	1.33	1.53	3.75	BWE250-302E	1.65	1.87	3.75	BWE300-302E	
.005	1.33	1.53	4.75	BWE250-502E	1.65	1.87	4.75	BWE300-502E	
.01	1.94	2.12	4.60	BWE250-103E	2.12	2.31	4.75	BWE300-103E	

TOLERANCE TABLE

Code Tolerance

D = ± 5%

E = ± 10%

None = ± 20%

P = GMV

X = Special

Note: Replace the last digit E with the desired tolerance code from the tolerance table. For an in-between value use the next larger value's dimensions. Custom sizes are readily available. All dimensions are in inches. All +.05" dimension tolerances are Maximum.

PAPER/MYLAR AND FOIL HIGH VOLTAGE CAPACITORS PARAMETRIC TREND CURVES AND ACCEPTANCE CRITERIA

SERIES **BW**

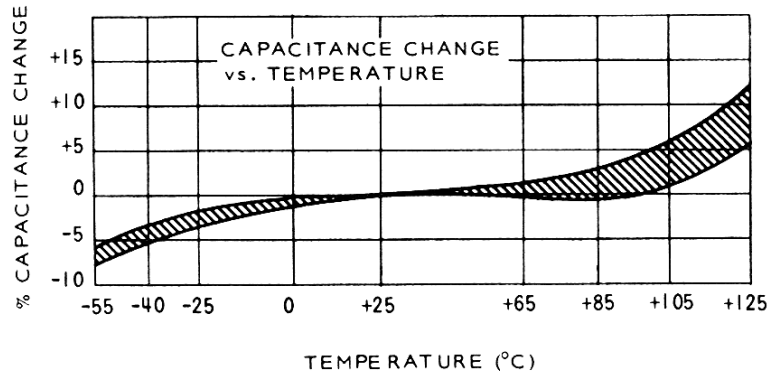
CAPACITANCE

Reference MIL-STD-202, Method 305
Test Frequency: 1000 Hz
Temperature: +25°C

Capacitance Change Over
Temperature.

Acceptance Limits:

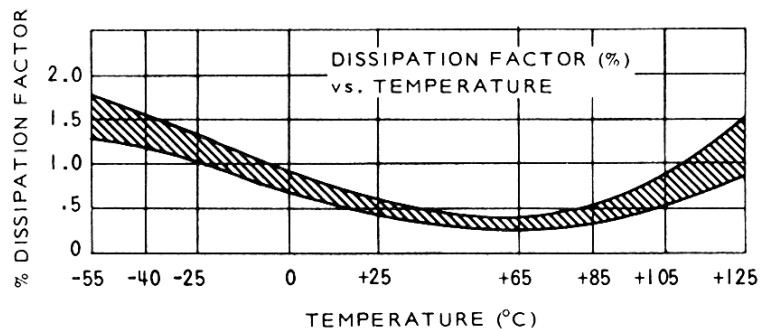
- @ -55°C = -8% Maximum Change
- @ +85°C = +5% Maximum Change
- @ +125°C = +12% Maximum Change



DISSIPATION FACTOR

Reference MIL-STD-202,
Method 306
Test Frequency: 1000 Hz
Temperature: +25°C

Acceptance Limit: 1.0% Maximum

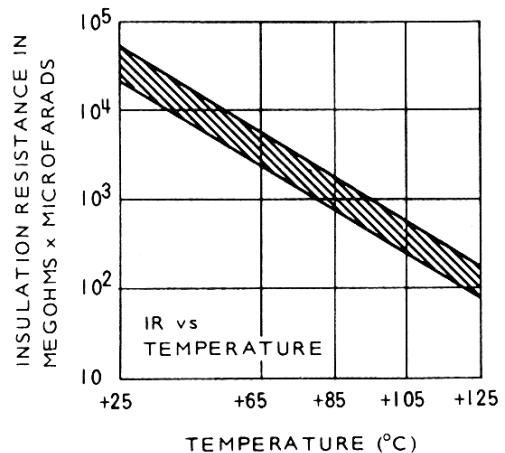


INSULATION RESISTANCE

Reference MIL-STD-202, Method 302
Electrification shall be at rated voltage
or 500 VDC, whichever is less and for
a time not greater than 2 minutes.

Acceptance Limits:

Test Temperature	Megs x μ f Minimum	Megohms Need not exceed
@ +25°C	20,000	100,000
@ +85°C	5,000	20,000
@ +125°C	50	5,000



VOLTAGE RATING

100% of listed voltage rating from -55°C to +85°C, derate linearly to 60% of the listed voltage rating at +125°C.

VOLTAGE TEST

Reference MIL-STD-202, Method 301. Surge current is limited to 1 ampere maximum. Voltage applied for 1 minute (maximum) @ +25°C. Dielectric strength test is performed terminal to terminal as follows:

- ≤ 10 KV = 200% of the DC voltage rating.
- 12 KV = 175% of the DC voltage rating.
- 15 KV = 160% of the DC voltage rating.
- ≥ 15 KV = 150% of the DC voltage rating.