

Material overview for tubes

Grønlandsvej 197 +45 7642 8200

DK-7100, Vejle - Denmark ei@elektro-isola.dk

VAT no.: DK20429488 www.elektro-isola.com

Test method: IEC/EN 61212-2

Norm

Sample dimension

Conditioning: IEC 60212

Closest relevant standards

Material designation	IEC 61212-3-1	NEMA	Reinforcement	Resin	Colour*
Etronit IV C S	-	XXX	Paper	Phenol	●
Etronit IV C	-	XXX	Paper	Phenol	●
Etronit B 67	PF CP 23	XX	Paper	Phenol	●
Etronit B 66	PF CP 22	XX	Paper	Phenol	●
Etronit B 65	PF CP 21	XX	Paper	Phenol	●
Etronit 201 M	-	-	Paper	Phenol	●
Etronax MMMF	PF CC 24	-	Cotton fabric	Phenol	●
Etronax MMF	PF CC 21	L	Cotton fabric	Phenol	●
Etronax MFP G	-	-	Cotton/synthetic fabric	Phenol	●
Etronax MF G	-	-	Cotton fabric	Phenol	●
Etronax MF	PF CC 22	C	Cotton fabric	Phenol	●
Etronax DN	-	-	Synthetic fabric	Phenol	●
G-Etronax B	PF GC 21	G - 3	Glass fabric	Phenol	●
G-Etronax EP 10	EP GC 21	G - 10	Glass fabric	Epoxy	●
G-Etronax EP 11	EP GC 22	G - 11	Glass fabric	Epoxy	●
G-Etronax EP 22	EP GC 22	G - 11	Glass fabric	Epoxy	●
G-Etronax EP 311 HC	-	FR-5	Glass fabric	Epoxy	●
G-Etronax EP FR	EP GC 23	FR - 4	Glass fabric	Epoxy	●
G-Etronax PI	-	-	Glass fabric	Polyimide	●
G-Etronax SI	SI GC 21	G - 7	Glass fabric	Silicone	●

Conditioning

- 1: 24h/23°C/50%RH
- 2: 24h/23°C/50%RH + 1h/ in oil at 90°C
- 3: 96h/105°C +1h/23°C/20%RH
- 4: 24h/50°C + 24h in water at 23°C
- 5: 96h/105°C + 1h/ in oil at 90°C

Notes

- A: ID > 8 mm and/or OD > 10 mm
- B: Wall thickness
- C: Halogen free
- D: 230 MPa measured at 150°C
- E: Wall thickness ≥ 4,0 mm
- F: Tested on sheet material

Mechanical properties		
Bending strength	Compressive strength	Cohesion between layers
5.1	5.2	5.3
ISO 178	ISO 604	IEC 61212-2
ID > 100 mm	-	ID < 100 mm
1	1	1
MPa	MPa	MPa
120	130	145
120	130	145
120	140	160
120	130	150
130	140	160
130	140	160
120	170	150
100	170	130
120	160	150
100	180	140
90	170	130
85	140	180
300	220	250
325	200	400
325 ^(D)	200	480
325 ^(D)	200	400
300	200	400
350	230	400
380	300	460
120	65	150

The above data are average values based on the results of comprehensive tests in our laboratories. Elektro-Isola A/S does not assume responsibility for the performance of our products in applications over which we have no control. For updated technical values, we refer to our website: www.elektro-isola.com

*Note that color and surface are indicative. As this is a technical product, colour and expression may vary according to dimensions, batches and machining. If you want further information or have special decorative needs, please feel free to contact us.

Material overview for tubes

Grønlandsvej 197 +45 7642 8200
 DK-7100, Vejle - Denmark ei@elektro-isola.dk
 VAT no.: DK20429488 www.elektro-isola.com

Test method: IEC/EN 61212-2

Norm

Thickness of sample

Conditioning: IEC 60212

Closest relevant standards

Material designation	IEC 61212-3-1	NEMA	Reinforcement	Resin	Colour*
Etronit IV C S	-	XXX	Paper	Phenol	●
Etronit IV C	-	XXX	Paper	Phenol	●
Etronit B 67	PF CP 23	XX	Paper	Phenol	●
Etronit B 66	PF CP 22	XX	Paper	Phenol	●
Etronit B 65	PF CP 21	XX	Paper	Phenol	●
Etronit 201 M	-	-	Paper	Phenol	●
Etronax MMMF	PF CC 24	-	Cotton fabric	Phenol	●
Etronax MMF	PF CC 21	L	Cotton fabric	Phenol	●
Etronax MFP G	-	-	Cotton/synthetic fabric	Phenol	●
Etronax MF G	-	-	Cotton fabric	Phenol	●
Etronax MF	PF CC 22	C	Cotton fabric	Phenol	●
Etronax DN	-	-	Synthetic fabric	Phenol	●
G-Etronax B	PF GC 21	G - 3	Glass fabric	Phenol	●
G-Etronax EP 10	EP GC 21	G - 10	Glass fabric	Epoxy	●
G-Etronax EP 11	EP GC 22	G - 11	Glass fabric	Epoxy	●
G-Etronax EP 22	EP GC 22	G - 11	Glass fabric	Epoxy	●
G-Etronax EP 311 HC	-	FR-5	Glass fabric	Epoxy	●
G-Etronax EP FR	EP GC 23	FR - 4	Glass fabric	Epoxy	●
G-Etronax PI	-	-	Glass fabric	Polyimide	●
G-Etronax SI	SI GC 21	G - 7	Glass fabric	Silicone	●

Conditioning

- 1: 24h/23°C/50%RH
- 2: 24h/23°C/50%RH + 1h/ in oil at 90°C
- 3: 96h/105°C +1h/23°C/20%RH
- 4: 24h/50°C + 24h in water at 23°C
- 5: 96h/105°C + 1h/ in oil at 90°C

Notes

- A: ID > 8 mm and/or OD > 10 mm
- B: Wall thickness
- C: Halogen free
- D: 230 MPa measured at 150°C
- E: Wall thickness ≥ 4,0 mm
- F: Tested on sheet material

Electrical properties							
Electrical strength in 90°C oil		Permittivity		Dissipation factor		Insulation resistance after submersion in water	Comparative tracking index [CTI]
Perpendicular	Parallel	50HZ	1MHz	50HZ	1MHz		
6.1.2.2	6.1.2.1	6.3		6.3		6.2	6.4
IEC 61212-2		IEC 62631-2-1		IEC 62631-2-1		IEC 62631-3-3	IEC 60112
B) 3 mm	B) ≥ 3 mm	-		-		A)	-
2 kV/mm	2 kV/25 mm	3		3		4 MΩ	1 V
6.7	25	5	5	0.03	0.03	200	
6.7	25	5	5	0.03	0.03	200	
8.3	35	5	-	0.04	-	100	
10 ⁽⁵⁾	50 ⁽⁵⁾	5	-	0.04	-	10	
8.3	25	5	-	0.04	-	10	
-	1	-	-	-	-	5	
4	20	-	-	-	-	50	
3	20	-	-	-	-	200	
-	-	-	-	-	-	-	
-	-	-	-	-	-	-	
2	15	-	-	-	-	100	
3	40	4	-	0.04	-	5000	
8	50	5	5	0.03	0.04	1000	100 ^(F)
11	60	4.5	4.5	0.01	0.01	10000	200 ^(F)
11	60	4.5	4.5	0.01	0.01	10000	200 ^(F)
11	60	4.5	4.5	0.01	0.01	10000	200 ^(F)
11	60	4.5	4.5	0.01	0.01	10000	600 ^(F)
10	50	4.5	4.5	0.01	0.01	10000	200 ^(F)
10	70	4	-	0.01	-	1000	250 ^(F)
6.7	40	4	4	0.006	0.006	5000	400 ^(F)

The above data are average values based on the results of comprehensive tests in our laboratories. Elektro-Isola A/S does not assume responsibility for the performance of our products in applications over which we have no control. For updated technical values, we refer to our website: www.elektro-isola.com

*Note that color and surface are indicative. As this is a technical product, colour and expression may vary according to dimensions, batches and machining. If you want further information or have special decorative needs, please feel free to contact us.

Material overview for tubes

Grønlandsvej 197 +45 7642 8200
 DK-7100, Vejle - Denmark ei@elektro-isola.dk
 VAT no.: DK20429488 www.elektro-isola.com

Test method: IEC/EN 61212-2

Norm

Thickness of sample

Conditioning: IEC 60212

Closest relevant standards

Material designation	IEC 61212-3-1	NEMA	Reinforcement	Resin	Colour*
Etronit IV C S	-	XXX	Paper	Phenol	●
Etronit IV C	-	XXX	Paper	Phenol	●
Etronit B 67	PF CP 23	XX	Paper	Phenol	●
Etronit B 66	PF CP 22	XX	Paper	Phenol	●
Etronit B 65	PF CP 21	XX	Paper	Phenol	●
Etronit 201 M	-	-	Paper	Phenol	●
Etronax MMMF	PF CC 24	-	Cotton fabric	Phenol	●
Etronax MMF	PF CC 21	L	Cotton fabric	Phenol	●
Etronax MFP G	-	-	Cotton/synthetic fabric	Phenol	●
Etronax MF G	-	-	Cotton fabric	Phenol	●
Etronax MF	PF CC 22	C	Cotton fabric	Phenol	●
Etronax DN	-	-	Synthetic fabric	Phenol	●
G-Etronax B	PF GC 21	G - 3	Glass fabric	Phenol	●
G-Etronax EP 10	EP GC 21	G - 10	Glass fabric	Epoxy	●
G-Etronax EP 11	EP GC 22	G - 11	Glass fabric	Epoxy	●
G-Etronax EP 22	EP GC 22	G - 11	Glass fabric	Epoxy	●
G-Etronax EP 311 HC		FR-5	Glass fabric	Epoxy	●
G-Etronax EP FR	EP GC 23	FR - 4	Glass fabric	Epoxy	●
G-Etronax PI	-	-	Glass fabric	Polyimide	●
G-Etronax SI	SI GC 21	G - 7	Glass fabric	Silicone	●

Physical and thermal properties								
Temperature index 20,000 h (T.I.)	Fire class	Density	Water absorption	Smoke emission & toxicity	Oxygen Index (OI)	Smoke density (Ds max.)	Smoke density (Ds max.)	Toxicity (CIT _{NLP})
7.1	7.4	7.3	7.2	-	-	-	-	-
ISO 60216	ISO 60895-11-10	ISO 1183-A	ISO 62-1	EN 45545-2; R22, R23 & R24	EN ISO 4589-2	EN ISO 5659-2	EN ISO 5659-2	NF X 70-100-1/-2
B) ≥ 3 mm	-	All	-	-	3 mm	-	-	-
-	-	1	4	-	-	-	-	-
°C	Thickness in mm /Category	g/cm ³	mg	Thickness in mm /Classification	%	Thickness in mm /Value	Thickness in mm /Value	-
120		1.25	2					
120		1.25	2					
120		1.25	3.5					
120		1.25	4.5					
120		1.25	4.5					
120		1.25	4.5					
115		1.3	2					
115		1.3	2.5					
100		1.3	5					
100		1.3	1.8					
115		1.25	2					
130		1.15	1					
155	≥ 3 / V-0 ^(F)	1.85	2					
140		1.75	0.2					
180		1.8	0.2					
160		1.75	0.2					
180	≥ 3 / V-0 ^C	1.8	0.3	≥ 3 / HL3 ^(F)	≥ 32 ^(F)	25 / 1 ^(F)	1 / 106 ^(F)	0.06 ^(F)
145	≥ 3 / V-0 ^(F)	1.85	0.3					
190	≥ 4 / V-0 ^(F)	1.9	0.4					
220	≥ 3 / V-0 ^(F)	1.8	0.2					

Conditioning

- 1: 24h/23°C/50%RH
- 2: 24h/23°C/50%RH + 1h/ in oil at 90°C
- 3: 96h/105°C + 1h/23°C/20%RH
- 4: 24h/50°C + 24h in water at 23°C
- 5: 96h/105°C + 1h/ in oil at 90°C

Notes

- A: ID > 8 mm and/or OD > 10 mm
- B: Wall thickness
- C: Halogen free
- D: 230 MPa measured at 150°C
- E: Wall thickness ≥ 4,0 mm
- F: Tested on sheet material

The above data are average values based on the results of comprehensive tests in our laboratories. Elektro-Isola A/S does not assume responsibility for the performance of our products in applications over which we have no control. For updated technical values, we refer to our website: www.elektro-isola.com

*Note that color and surface are indicative. As this is a technical product, colour and expression may vary according to dimensions, batches and machining. If you want further information or have special decorative needs, please feel free to contact us.