

Article

Mechanical Property Characterization of Architectural Coated Woven Fabrics Subjected to Freeze–Thaw Cycles

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Supplementary material

Results of all freeze-thaw experiments for glass-PTFE materials are listed in Table S1 and Table S2.

Table S1. k_{hum} , freeze-thaw cycles, glass-PTFE fabrics, warp direction

$f_{u,ave}$: mean tensile strength, $f_{u,5\%}$: 5 % fractile of tensile strength, $k_{hum,mean}$: strength modification factor based on $f_{u,ave}$, $k_{hum,5\%}$: strength modification factor based on $f_{u,5\%}$

Fabric	Material	Standard	Test method	f _u [kN/m]						f _{u,ave} [kN/m]	f _{u,δ} % [kN/m]	SD	COV	k _{hum,δ} %	k _{hum,mean}
				Specimen number											
				1	2	3	4	5	6						
Glass-PTFE type III	Virgin	-	-	140.83	138.56	141.77	141.14	137.16		139.89	135.35	1.95	0.01		
	Artificially weathered	ASTM D7792/ D7792M-15	0 cycle=In-out of plane watering, 720 h	131.25	124.65	125.33	129.37	128.77		127.87	121.36	2.80	0.02	1.12	1.09
			Freeze-thaw, 26 cycle	126.06	126.49	126.59	125.36	124.63		125.83	123.90	0.83	0.01	1.09	1.11
			Freeze-thaw, 50 cycle	125.99	124.89	126.24	125.44	127.29		125.97	123.87	0.90	0.01	1.09	1.11
			Freeze-thaw, 76 cycle	126.64	123.43	127.23	125.63			125.73	121.33	1.67	0.01	1.12	1.11
			Freeze-thaw, 100 cycle	124.26	126.97	124.21	125.05	125.81	124.88	125.20	122.91	1.05	0.01	1.10	1.12
Glass-PTFE type IV first batch	Virgin	-	-	167.96	171.65	165.81	167.36	169.67		168.49	163.27	2.24	0.01		
	Artificially weathered	ASTM D7792/ D7792M-15	Freeze-thaw, 100 cycle	138.38	141.63	142.02	136.36	137.54		139.19	133.32	2.52	0.02	1.22	1.21
Glass-PTFE type IV second batch	Virgin	-	-	168.41	165.51	165.33				166.42	160.59	1.73	0.01		
		ASTM D7792/ D7792M-15	Freeze-thaw, 26 cycle	162.06	163.33	157.65	157.28	157.27		159.52	152.67	2.94	0.02	1.05	1.04
			Freeze-thaw, 50 cycle	163.99	165.68	167.37	162.97	167.22		165.45	160.92	1.94	0.01	1.00	1.01
			Freeze-thaw, 76 cycle	167.29	162.76	167.66	162.47	157.87		163.61	154.22	4.03	0.02	1.04	1.02
Glass-PTFE type IV third batch		ASTM D7792/ D7792M-15	Freeze-thaw, 100 cycle	157.68	167.13	162.95	165.15	166.70		163.92	154.94	3.85	0.02	1.04	1.02
			-	167.23	168.14	165.74	168.56	168.80		167.69	164.80	1.24	0.01		
Glass-PTFE type IV fourth batch	Artificially weathered	ASTM D7792/ D7792M-15	Freeze-thaw, 100 cycle	121.51	132.87	133.14	136.97	136.43		132.18	117.63	6.25	0.05	1.40	1.27
	Virgin	-	-	179.69	180.37	180.66	181.15	179.17		180.21	178.38	0.78	0.00		
	Artificially weathered	ASTM D7792/ D7792M-15	Freeze-thaw, 100 cycle	142.47	143.22	137.88	141.77	147.83		142.63	134.34	3.56	0.02	1.33	1.26

Table S2. k_{hum} , freeze-thaw cycles, glass-PTFE fabrics, weft direction

$f_{u,ave}$: mean tensile strength, $f_{u,5\%}$: 5 % fractile of tensile strength, $k_{hum,mean}$: strength modification factor based on $f_{u,ave}$, $k_{hum,5\%}$: strength modification factor based on $f_{u,5\%}$

Fabric	Material	Standard	Test method	f _u [kNm]						f _{u,ave} [kNm]	f _{u,5%} [kNm]	SD	COV	k _{hum,5%}	k _{hum,mean}
				Specimen number											
				1	2	3	4	5	6						
Glass-PTFE type III	Virgin	-	-	134,2654	135,08871	135,33412	137,01651	138,26948		135.99	132.23	1.62	0.01		
	Artificially weathered	ASTM D7792/ D792M-15	Freeze-thaw, 0 cycle=thaw of plane	124,29513	118,46074	123,87256	128,80973	127,4899		124.59	115.24	4.01	0.03	1.15	1.09
			Freeze-thaw, 26 cycle	124,75412	123,73676	127,07027	127,03921	123,84352		125.25	121.28	1.71	0.01	1.09	1.09
			Freeze-thaw, 50 cycle	124,41801	124,46666	126,1419	124,45151	126,34023		125.16	122.87	0.99	0.01	1.08	1.09
			Freeze-thaw, 76 cycle	126,14604	123,95098	123,71038	126,14684	124,04279		124.80	121.92	1.24	0.01	1.08	1.09
Glass-PTFE type IV first batch	Virgin	-	-	127,75981	125,2907	124,97019	127,21128	127,18071		126.48	123.55	1.26	0.01	1.07	1.08
	Artificially weathered	ASTM D7792/ D792M-15	Freeze-thaw, 100 cycle	198,29758	184,88274	202,13484	191,06542	187,93363		192.86	176.11	7.19	0.04		
			Freeze-thaw, 100 cycle	171,42268	169,9486	171,15252	166,63064	163,7927		168.59	160.92	3.29	0.02	1.09	1.14
			Freeze-thaw, 26 cycle	183,35066	187,59545	190,24192				190.40	180.69	2.88	0.02		
			Freeze-thaw, 50 cycle	136,36824	138,64676	137,03968	135,94631	137,4014		137.08	134.65	1.04	0.01	1.34	1.39
Glass-PTFE type IV second batch	Artificially weathered	ASTM D7792/ D792M-15	Freeze-thaw, 50 cycle	137,56282	138,95308	137,26715	128,0181	137,86569		135.93	125.52	4.47	0.03	1.44	1.40
			Freeze-thaw, 76 cycle	136,24095	130,64437	136,7725	135,30907			134.74	128.22	2.80	0.02	1.41	1.41
			Freeze-thaw, 100 cycle	136,68225	135,91068	134,80923	137,13846	136,96637		136.30	134.07	0.96	0.01	1.35	1.40
			Freeze-thaw, 26 cycle	183,21365	197,05786	199,12007	191,63471	184,99754		193.20	180.46	5.47	0.03		
	Glass-PTFE type IV third batch	Artificially weathered	ASTM D7792/ D792M-15	Freeze-thaw, 100 cycle	159,06762	163,08501	155,67228	149,46371		156.82	141.66	5.77	0.04	1.27	1.23
Glass-PTFE type IV fourth batch	Virgin	-	-	192,0845	183,29061	191,87029	189,08266	194,12117		190.09	179.75	4.20	0.02		
	Artificially weathered	ASTM D7792/ D792M-15	Freeze-thaw, 100 cycle	153,51207	167,23265	157,40566	161,92464	162,31998		160.48	147.63	5.22	0.03	1.22	1.18