Supplementary Materials

Environmental effects on strength and drying shrinkage of cement-stabilized aeolian sand–aggregate bases

Tables S1–S3 provide the numerical condition-level results for the environmental program analyzed in the article. Six specimens were prepared per environmental experimental condition. Compressive strengths are reported as representative values.

Table S1. Representative compressive strengths.

Additional exposure followed 28 d of initial standard curing. The 7 and 28 d columns correspond to total ages of 35 and 56 d. Controls continued standard curing for the same periods.

Mixture	Exposure or control	7 d additional exposure (MPa)	28 d additional exposure (MPa)
P4	Control	7.99	8.78
P4	Low temperature	7.16	6.14
P4	Hot–dry	8.23	5.71
P4	Thermal cycling	7.21	5.45
P4	Sulfate freeze–thaw	6.15	5.71
P5	Control	8.37	9.32
P5	Low temperature	7.67	6.71
P5	Hot–dry	8.70	7.00
P5	Thermal cycling	7.62	6.02
P5	Sulfate freeze–thaw	6.70	6.24
P7	Control	9.02	9.75
P7	Low temperature	8.50	7.81
P7	Hot–dry	9.43	7.80
P7	Thermal cycling	8.38	6.47
P7	Sulfate freeze–thaw	7.04	6.92
P8	Control	9.17	9.89
P8	Low temperature	8.64	8.41
P8	Hot–dry	9.63	8.01
P8	Thermal cycling	8.52	6.91
P8	Sulfate freeze–thaw	7.52	7.32

Compressive strengths are reported as representative values for each mixture–exposure–age condition, with six specimens tested per condition (n = 6). Shared standard-cured controls are listed once per mixture and age.

Table S2. Water-loss measurements.

Values are expressed in %. Columns give drying time in days after 7 d of environmental pre-exposure or matched standard curing, following the initial 28 d curing period. Day 15 is the observation endpoint.

Mix	Pre-exposure	1	2	3	4	5	6	7	9	11	13	15
P4	Control	1.06	1.42	1.74	1.98	2.18	2.36	2.52	2.63	2.71	2.76	2.78
P4	Low temperature	1.25	1.65	1.99	2.31	2.49	2.66	2.79	2.98	3.05	3.12	3.16
P4	Hot–dry	1.31	1.73	2.09	2.40	2.59	2.77	2.89	3.09	3.14	3.18	3.20
P4	Thermal cycling	1.33	1.76	2.13	2.45	2.65	2.83	2.96	3.06	3.16	3.21	3.25
P4	Sulfate freeze–thaw	1.34	1.78	2.15	2.47	2.67	2.86	2.98	3.19	3.26	3.34	3.38
P5	Control	1.00	1.31	1.60	1.83	2.05	2.20	2.35	2.48	2.58	2.65	2.70
P5	Low temperature	1.23	1.62	1.93	2.19	2.40	2.55	2.71	2.89	2.99	3.08	3.11
P5	Hot–dry	1.27	1.68	2.00	2.27	2.48	2.64	2.83	2.94	3.02	3.07	3.10
P5	Thermal cycling	1.31	1.73	2.06	2.33	2.55	2.71	2.87	3.02	3.10	3.13	3.15
P5	Sulfate freeze–thaw	1.32	1.75	2.08	2.35	2.57	2.74	2.90	3.09	3.20	3.29	3.33
P7	Control	1.24	1.60	1.98	2.22	2.44	2.58	2.72	2.81	2.86	2.90	2.93
P7	Low temperature	1.35	1.75	2.13	2.48	2.68	2.88	2.98	3.11	3.16	3.24	3.28
P7	Hot–dry	1.40	1.85	2.22	2.53	2.73	2.94	3.14	3.25	3.31	3.39	3.43
P7	Thermal cycling	1.44	1.87	2.25	2.58	2.75	2.95	3.11	3.29	3.35	3.46	3.49
P7	Sulfate freeze–thaw	1.46	1.87	2.25	2.57	2.78	2.99	3.16	3.39	3.45	3.50	3.53
P8	Control	1.20	1.49	1.90	2.14	2.32	2.47	2.63	2.73	2.79	2.84	2.85
P8	Low temperature	1.32	1.70	2.05	2.38	2.59	2.75	2.84	2.99	3.13	3.20	3.24
P8	Hot–dry	1.37	1.78	2.15	2.46	2.67	2.88	3.06	3.18	3.25	3.30	3.34
P8	Thermal cycling	1.41	1.82	2.19	2.51	2.69	2.86	3.04	3.17	3.26	3.39	3.43
P8	Sulfate freeze–thaw	1.42	1.83	2.21	2.51	2.69	2.94	3.08	3.29	3.35	3.45	3.49

The control received matched additional standard curing. Each exposure represents a separate conditioning history; successive measurements describe the drying-time response.

Table S3. Drying-shrinkage measurements.

Values are expressed in με. Columns give drying time in days after 7 d of environmental pre-exposure or matched standard curing, following the initial 28 d curing period. Day 15 is the observation endpoint.

Mix	Pre-exposure	1	2	3	4	5	6	7	9	11	13	15
P4	Control	44	78	128	156	185	208	220	232	239	243	246
P4	Low temperature	62	89	127	161	185	214	237	257	273	280	287
P4	Hot–dry	65	94	133	169	194	226	250	269	288	295	303
P4	Thermal cycling	64	95	136	162	192	224	243	269	285	293	301
P4	Sulfate freeze–thaw	67	96	137	168	189	221	245	271	289	298	300
P5	Control	40	75	118	148	176	197	209	227	232	235	237
P5	Low temperature	56	87	121	142	169	198	219	242	257	271	274
P5	Hot–dry	58	91	127	149	177	208	231	254	270	285	289
P5	Thermal cycling	59	93	129	152	180	211	234	257	273	288	291
P5	Sulfate freeze–thaw	60	94	130	153	182	213	236	260	275	291	294
P7	Control	56	89	137	175	199	221	232	245	259	270	271
P7	Low temperature	66	97	135	173	203	232	259	271	286	296	300
P7	Hot–dry	69	101	141	179	206	238	260	284	301	311	316
P7	Thermal cycling	71	103	144	181	214	249	268	293	308	317	319
P7	Sulfate freeze–thaw	71	104	145	178	206	243	265	291	306	317	322
P8	Control	49	82	133	162	192	215	228	239	246	256	259
P8	Low temperature	63	92	132	168	195	221	245	267	281	290	293
P8	Hot–dry	66	96	137	172	198	232	255	276	292	305	309
P8	Thermal cycling	68	98	139	175	201	235	259	281	298	308	313
P8	Sulfate freeze–thaw	69	99	141	173	193	232	259	284	298	309	316

The control received matched additional standard curing. Each exposure represents a separate conditioning history; successive measurements describe the drying-time response.