

Dura-Systems

TEST PROCEDURES AND RESULTS

Weatherometer Tests:

Procedure:

(ASTM G23) 2000 hour exposure - Atlas Twin Arc Weatherometer

Exposure Procedure:

Device: Atlas Twin Arc Weatherometer, Type DH

Light Source: Twin Carbon Arcs 1/2" Diameter Electrodes

Spectral Transmission: 91% @ 2750 to 3700 Angstroms

Operating Black Panel Temperature: 145 deg. F. +/- 9 deg F.

Water Spray: 4.4 to 5.2 pints/min. @ 15 psi

Cycling Cam: 51 min. - 9 min.

Operating Relative Humidity: 50 +/- 5%

Light only 145 deg. F. +/- 9 deg. F. Black Panel Temperature

Light with Water Spray at 55 deg. F. +/- 9 deg. F.

Total: 22 Periods of

Comment:

So that some relationship to natural weathering can be made, it is generally accepted that 2000 hours of accelerated weathering in the Atlas Weatherometer is approximately equivalent to 6 years of natural weathering or 350 hours/year.

Results of Visual Examination After 2000 Hours of Accelerated Weathering:

After 2000 hours of exposure the specimens showed no signs of chalking, crazing, cracking, blistering, delamination, or any other deleterious affects.

Tensile and Elongation Tests Before and After Weathering Exposure

Condition of Specimen	Average Results of Five Specimens	
	Tensile Strength PSI	Percentage Elongation
A. Before Weathering (Control Samples)	2,440.0	350.0
B. After 2000 Hours of Weathering	2,850.0	300.0

Aging Tests of "A" Deck Surfacing System

Procedure

ASTM A756 - Procedure D and E, (25) consecutive cycles.

Each cycle consists of:

12 hours in Freezer at -40 deg. C.

12 hours in Oven at 80 deg. C.

12 hours in Freezer at -40 deg. C.

12 hours in Oven at 80 deg. C. and 75% R.H.

2 Days

Visual Examination After Aging Tests:

After (25) consecutive cycles the test specimens showed no signs of chalking, crazing, cracking, blistering, delamination, or any other deleterious affects.

Tensile and Elongation Tests Before and After Aging Exposure

Condition of Specimen	Average Results of Five Specimens	
	Tensile Strength PSI	Percentage Elongation
A. Before Aging (Control Samples)	2,440.0	350.0
B. After Aging	2,880.0	270.0

Bond Strength Tests Before and After Aging Exposure

Procedures:

The Decking Material was Tested on Plywood Substrate

ASTM C297 Tension Tests in Flatwise Plane. Specimen size 2" x 2".

A total of five specimens were tested. The high strength epoxy was used to prepare the sandwich. The specimens were ambient cured for five days before tension testing. The test consisted of subjecting the sandwich construction to tensile load normal to the plane of the sandwich. Following are the test results:

Condition of Specimen	Average Results of Five Specimens	
	Bond Strength PSI	Type of Failure
A. Before Aging (Control Samples)	230.0	Failure of Plywood
B. After Aging	238.0	Failure of Plywood

Percolation Tests: (After 1,000 cycle abrasion test)

Procedure:

2" diameter tube, 48" water column, 48 hours

Room Temperature = 70 +/- 2 deg. F.

Relative humidity = 50 +/- 5%

Results:

Sample Number	Total Drop of 48" Water Column in 48 hours	Drop of Water Column Due to Evaporation in 48 hours	Loss Due to Percolation	
			Overhead of Water Inches	Percent of Original Head
A	0.10	0.10	0.00	0.00
B	0.10	0.10	0.00	0.00
C	0.10	0.10	0.00	0.00
			Average:	0.00

NOTE: The specification allows a maximum percolation of 1.0 percent of original head (48 inches).

Absorption Tests:

ASTM D570 Water Absorption of Plastics (24 hours immersion in distilled water)

Results:

Sample Number	Dry Weight	Weight After 24 hours Immersion	Weight Percent of Water Absorption
1	7.30	7.50	2.74
2	7.10	7.30	2.80
3	7.20	7.40	2.78
4	7.90	8.10	2.53
5	7.30	7.50	<u>2.74</u>
		Average:	2.72

NOTE: The specification allows a maximum of 15.0 percent absorption by weight.

Water Vapor Transmission: ASTM E96 (Desiccant Method A)

Test Condition = 75 deg. F. - 50% R.H.

Sample Mark	WVT Grams/Hour/Meter ²	WVT Grains/Hour/Foot ²
1	0.98	1.41
2	0.87	1.25
3	<u>0.93</u>	<u>1.33</u>
	Average:	1.33

Abrasion Test (ASTM D1242):

Procedure:

ASTM D1242 - Resistance to abrasion of plastic materials, Method A

1000 revolutions

1000 gram load

No. 80 TP Aluminum Oxide Grit

Three specimens were measured for thickness before and after the abrasion cycle.

Results:

Sample Number	Original Thickness Inches	Thickness After Abrasion 1000 Cycles Inches	Thickness Loss Inches	Percentage Thickness Loss Inches
1	0.150	0.146	0.004	2.7
2	0.153	0.148	0.005	3.3
3	0.149	0.143	<u>0.006</u>	<u>4.0</u>
		Average:	0.005	3.3

NOTE: The maximum allowable abrasion loss is 5%.

Concentrated Load Test:

The "A" decking material was subjected to a concentrated load test of 300 pounds on a one inch diameter steel indenter. The load was applied in increments of 100 pounds and corresponding deflection was measured.

<u>Test Load in Pounds</u>	<u>Deflection in Inches</u>	<u>Remarks</u>
30	0.000	Preload
100	0.016	
200	0.027	
300	0.035	
30	0.014	Upon Load Removal
30	0.004	After 15 min. Recovery

Impact Resistance: (2 pound steel ball drop test from 8')

The "A" material was subjected to three impacts of a falling two pound steel ball dropped from an eight foot height.

<u>Drop Number</u>	<u>Depth of Indentation, Inches</u>	<u>Remarks</u>
1	0.033	No chipping, spalling or bond loss. Some slight hairline cracks on the outside edges of the crater.
2	0.022	Same as No. 1
3	<u>0.027</u>	Same as No. 1
Average:	0.036	

Cracking Resistance: (Crack Bridging)

Five specimens 2"x8" were cut from the membrane covered plywood substrate. The specimens were cut across the horizontal joints of the plywood so that tension load could be applied across the deck joints to determine the extent of decking membrane elongation before failure occurred.

<u>Specimen Mark</u>	<u>Elongation in Inches At Separation Failure</u>	<u>Mode of Failure</u>
1	0.190	Tension Failure of Reinforcement Mesh
2	0.180	Tension Failure of Reinforcement Mesh
3	0.180	Tension Failure of Reinforcement Mesh
4	0.190	Tension Failure of Reinforcement Mesh
5	<u>0.190</u>	Tension Failure of Reinforcement Mesh
Average:		0.186

Agriculture Chemical Resistance Tests

Dura-System surfaces of **Dura-Flex , Dura-Seal 27 & Dura-Lastic** were exposed to pooled, undiluted, chemicals at a thickness of 1/8". Chemicals were allowed to stand upon surfaces @ 75° F. for an average of from 60-90 days until complete desiccation took place for each individual chemical. Some chemicals dehydrated at different rates until final desiccation. The Dura-System surfaces were then re-hydrated with distilled water and allowed to stand an additional 60 days, @ 75° F, until completely desiccated a second time.

<u>Ag Chemical</u>	<u>RESULT</u>	<u>Ag Chemical</u>	<u>RESULT</u>
Bicep II	no effect	Bullet	no effect
Dual	no effect	Lasso Microtec	no effect
Round-up	no effect	28-0-0 & 10-34-0	no effect

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