

## ACCT Tests of New Staple Placements, Texas, March 2-3, 1996

Loblolly Pine, 6" Staples (US made), Horizontal Orientation, No Pilot Hole		
Test #	Strength (lbs)	Notes
1	2350	
2	2689	
3	5891	
4	4655	
<b>Average: 3896</b> <b>Range: 3541 (59%)</b> <b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

Loblolly Pine, 6" Staples (US made), Horizontal Orientation, 3/8" x 3" Pilot Hole		
Test #	Strength (lbs)	Notes
1	2860	
2	2647	
3	3581	
<b>Average: 3029</b> <b>Range: 934 (31%)</b> <b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

Loblolly Pine, 6" Staples (US made), Vertical Orientation, No Pilot Hole		
Test #	Strength (lbs)	Notes
1	2350	
2		Bad Data
3	3950	
4		Bad Data
5	4514	
6	5102	
<b>Average: 3183</b> <b>Range: 2752 (86%)</b> <b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

Loblolly Pine, 6" Staples (US made), Vertical Orientation, 3/8" x 3" Pilot Hole		
Test #	Strength (lbs)	Notes
1	4064	
2	1971	
3	2416	
<b>Average: 2817</b>		
<b>Range: 2093 (74%)</b>		
<b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

Live Oak, 6" Staples (US made), Vertical Orientation, 3/8" x 3" Pilot Hole		
Test #	Strength (lbs)	Notes
1	8503	
2	7825	
3		Bad Data
4	5397	
<b>Average: 7242</b>		
<b>Range: 3106 (43%)</b>		
<b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

Live Oak, 6" Staples (US made), Horizontal Orientation, 3/8" x 3" Pilot Hole		
Test #	Strength (lbs)	Notes
1	6307	
2	5536	
3	6129	
<b>Average: 5991</b>		
<b>Range: 771 (13%)</b>		
<b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

Southern Yellow Pine Pole, 6" Staples (US made), Horizontal Orientation, 3/8" Pilot Hole		
Test #	Strength (lbs)	Notes
1	7900	1 1/2" deep pilot hole
2	10130	3" deep pilot hole
3	7800	3" deep pilot hole
4	8050	3" deep pilot hole
5	8100	3" deep pilot hole
<b>Average: 8396</b>		
<b>Range: 2330 (28%)</b>		
<b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

Southern Yellow Pine Pole, 6" Staples (US made), Vertical Orientation, 3/8" x 3" Pilot Hole		
Test #	Strength (lbs)	Notes
1	9460	1 1/2" deep pilot hole
2	9860	3" deep pilot hole
3	8094	3" deep pilot hole
4	8065	3" deep pilot hole
5	12000	3" deep pilot hole
<b>Average: 9496</b>		
<b>Range: 3935 (41%)</b>		
<b>General Notes:</b> 1. Staples were driven to a depth of approximately 3".		

### ACCT Tests of Old Staple Placements, Colorado, 1997

Southern Yellow Pine Pole, 6" Staples, Horizontal Orientation, 3/8" Pilot Hole		
Test #	Strength (lbs)	Notes
1	6930	
2	7128	
3	6072	
<b>Average:                    6710</b> <b>Range:                        1056 (16%)</b> <b>General Notes:</b> 1. Staples were driven to a depth of approximately 3". 2. One staple that was not predrilled pulled out at 9372 lb. - not recorded above. 3. Staple placements were 7 years old.		

Ponderosa Pine Tree, 6" Staples, Horizontal Orientation, No Pilot Hole		
Test #	Strength (lbs)	Notes
1	3454	3" of staple exposed
2	2618	3" of staple exposed
3	3278	3" of staple exposed
<b>Average:                    3117</b> <b>Range:                        836 (27%)</b> <b>General Notes:</b> 1. Staples were driven to a depth of approximately 3". 2. Staple placements were 7 years old.		

## ACCT Tests of Old Staple Placements in Trees, Massachusetts, November 1997

White Pine, 6" Staples, Horizontal Orientation, No Pilot Hole		
Test #	Strength (lbs)	Notes - amount of staple exposed (in)
1	3220	1 3/8
2	2140	1 1/2
3	2160	1 1/2
4	2310	1 3/4
<b>General Notes:</b> <ol style="list-style-type: none"> <li>1. Staple placements were 5 years old.</li> <li>2. Bark depth = 1/2"</li> <li>3. Averages not recorded because of variation in staple penetration.</li> </ol>		

White Pine, 6" Staples, Horizontal Orientation, No Pilot Hole		
Test #	Strength (lbs)	Notes - amount of staple exposed (in)
1	2440	1 3/4
2	2590	1 1/4
3	3490	1 5/8 - pulled off angle
4	1970	2 - pulled slightly off angle
<b>General Notes:</b> <ol style="list-style-type: none"> <li>1. Staple placements were 10 years old.</li> <li>2. Bark depth = 1/2" to 3/4"</li> <li>3. Averages not recorded because of variation in staple penetration.</li> </ol>		

Hemlock, 6" Staples, Horizontal Orientation, 3/8" Pilot Hole		
Test #	Strength (lbs)	Notes - amount of staple exposed (in)
1	2110	2 1/4
2	1905	2 1/8
3	1800	2 1/2
<b>General Notes:</b> <ol style="list-style-type: none"> <li>1. Staple placements were 5 months old.</li> <li>2. Bark depth = 3/8" to 1/2"</li> <li>3. Averages not recorded because of variation in staple penetration.</li> </ol>		

**White Oak, 6" Staples, Horizontal Orientation, 3/8" Pilot Hole**

Test #	Strength (lbs)	Notes - amount of staple exposed (in)
1	2410	1 3/8
2	2240	1 7/8
3	3480	2 1/8

- General Notes:**
1. Staple placements were 6 to 8 years old.
  2. Bark depth = 1/2" to 3/4"
  3. Bark condition around staples was poor.
  4. Averages not recorded because of variation in staple penetration.

**White Oak, 6" Staples, Horizontal Orientation, 3/8" Pilot Hole**

Test #	Strength (lbs)	Notes - amount of staple exposed (in)
1	5800	1 1/4 - truck slipped
2	4640	1 1/2
3	5160	1 5/8 - truck slipped

- General Notes:**
1. Staple placements were 6 to 8 years old.
  2. Bark depth = 1/2" to 3/4"
  3. Bark condition around staples was good.
  4. Averages not recorded because of variation in staple penetration.

### ACCT Tests of New Placements, Single White Pine Tree, Massachusetts, Oct. 31, 2002

US made 8" Barbed Staple, Inserted 5"		
Test #	Strength (lbs)	Notes
1a	2560	Bottom holding strap slipped up the trunk. Staple was not completely removed.
1b	2390	Same staple as in trial 1a pulled to failure.
2	2490	
3	3360	
4	2470	
5	2380	
6	2200	
7	3130	
<b>Average:</b> <span style="float: right;"><b>2672</b></span>		
<b>Range:</b> <span style="float: right;"><b>1160 (43%)</b></span>		
<b>General Notes:</b> 1. The average only takes into account tests 2 through 7. Test 1 was omitted. 2. Staple driven until depth mark was even with the tree bark. 3. Pilot holes drilled with 3/8" bit to 4 1/2" depth.		

US made 8" Staple, Inserted 5"		
Test #	Strength (lbs)	Notes
1	2710	
2	3600	
3	3120	
4	4030	
5	3730	
6	3690	
<b>Average:</b> <span style="float: right;"><b>3480</b></span>		
<b>Range:</b> <span style="float: right;"><b>1320 (38%)</b></span>		
<b>General Notes:</b> 1. Staple driven until depth mark was even with the tree bark. 2. Pilot holes drilled with 3/8" bit to 4 1/2" depth.		

**Canadian 8" Staple, Inserted 5"**

Test #	Strength (lbs)	Notes
1	2980	
2	2470	
3	3270	
4	2870	

**Average: 2898****Range: 800 (28%)****General Notes:** 1. Staple driven until depth mark was even with the tree bark.  
2. Pilot holes drilled with 3/8" bit to 4 1/2" depth.**Australian 8" Staple, Inserted 5"**

Test #	Strength (lbs)	Notes
1	4020	
2	4100	
3	3580	
4	4460	

**Average: 4040****Range: 880 (22%)****General Notes:** 1. Staple driven until depth mark was even with the tree bark.  
2. Pilot holes drilled with 3/8" bit to 4 1/2" depth.**US made 8" Staple, Inserted 4"**

Test #	Strength (lbs)	Notes
1	3170	
2	2570	
3	2740	
4	3060	
5	2530	
6	2390	

**Average: 2743****Range: 780 (28%)****General Notes:** 1. Staple driven until depth mark was even with the tree bark.  
2. Pilot holes drilled with 3/8" bit to 3 1/2" depth.

**Canadian 8" Staple, Inserted 4"**

Test #	Strength (lbs)	Notes
1	3460	
2	1790	
3	1730	
4		Inconclusive - faulty gauge reading
5	1780	
6	1810	
7	1690	

**Average: 2043****Range: 1770 (87%)****General Notes:** 1. Staple driven until depth mark was even with the tree bark.  
2. Pilot holes drilled with 3/8" bit to 3 1/2" depth.

Australian 8" Staple, Inserted 4"		
Test #	Strength (lbs)	Notes
1	2770	
2	3160	
3	3550	
4	2590	
<b>Average: 3018</b>		
<b>Range: 960 (32%)</b>		
<b>General Notes:</b> 1. Staple driven until depth mark was even with the tree bark. 2. Pilot holes drilled with 3/8" bit to 3 1/2" depth.		

British 8" Staple, Inserted 5"		
Test #	Strength (lbs)	Notes
1	2800	
2	2940	
3	3440	
<b>Average: 3060</b>		
<b>Range: 640 (21%)</b>		
<b>General Notes:</b> 1. Staple driven until depth mark was even with the tree bark. 2. Pilot holes drilled with 3/8" bit to 4 1/2" depth.		

US made 8" Staple, Inserted 5" - 5/16" Pilot Hole		
Test #	Strength (lbs)	Notes
42	4860	
43	3610	
44	no readout	
45	3790	
46	2850	
47	3230	
<b>Average: 3668</b>		
<b>Range: 2010 (55%)</b>		
<b>General Notes:</b> 1. Staple driven until depth mark was even with the tree bark. 2. Pilot holes drilled with 5/16" bit to 4 1/2" depth.		

### Tests Conducted by Project Adventure on Loblolly Pine Trees, Georgia, Oct. 27, 2003

8" (US made), Loblolly Pine, 2 Year Old Placement		
Test #	Strength (lbs)	Amount of Staple Protruding From Bark (in)
1	5553	2 7/8
2	5800	2 1/2
3	5672	2 3/4
4	6025	2 5/8
5	5912	2 7/8
6	5441	2 7/8
7	5687	2 3/8
8	5454	2 7/8
9	5650	3 1/4
10	4989	3
<b>General Notes:</b> 1. These staples were normal placements in a healthy tree. 2. Predrilled with a 3/8" bit to 4 1/2" depth. 3. All test results were greater than 5,000 lb. 4. Average and range not calculated as depths varied.		

**8" (US made), Loblolly Pine, New Placements**

Test #	Strength (lbs)	Amount of Staple Protruding From Bark (in)
1	6519	3
2	5672	3
3	4858	3
4	5249	3
5	5200	3
6	5694	3
7	5112	3
8	5081	3
9	5079	3
10	5308	3

**Average: 5377****Range: 1768 (71%)**

- General Notes:**
1. These staples were normal placements in a healthy tree.
  2. Predrilled with a 3/8" bit to 4 1/2" depth.
  3. All test results except #3 were greater than 5,000 lb.

**6", Loblolly Pine, 5+ Year Old Placements**

Test #	Strength (lbs)	Amount of Staple Protruding From Bark (in)
1	3613	1 7/8
2	3392	2 1/4
3	3220	2 1/4
4	2712	2 3/8
5	3655	2
6	3833	2 1/4
7	3295	2
8	2477	2 1/2
9	2859	2 1/2
10	3128	1 3/4

- General Notes:**
1. These staples were normal placements in a healthy tree.
  2. Predrilled with a 3/8" bit, depth unknown.
  3. Average and range not calculated as depths varied.

6", Loblolly Pine, 8-10 Year Old Placements		
Test #	Strength (lbs)	Amount of Staple Protruding From Bark (in)
1	4043	1 3/4
2	3481	1 7/8
3	4717	1 5/8
4	5222	1 3/4
5	4735	1 7/8
6	4140	2
7	4515	1 7/8
8	3657	1 3/4
9	4521	1 7/8
10	3381	2

**General Notes:**

1. These staples were normal placements in a healthy tree.
2. Predrilled with a 3/8" bit, depth unknown.
3. Average and range not calculated as depths varied.

6" (US made), Loblolly Pine, New Placements		
Test #	Strength (lbs)	Distance from Bark Surface to End of Staple (in)
1	3602	3
2	2317	3
3	3117	3
4	2286	3
5	2899	3
6	2506	3
7	1834	3
8	2160	3
9	2191	3
10	1869	3

**Average:** 2478

**Range:** 1768 (71%)

**General Notes:**

1. These staples were normal placements in a healthy tree.
2. Predrilled with a 3/8" bit, 2" depth.