SUMMARY TEST REPORT

ButtTaper Drywall Joint Construction for Fords Drywall

Report number: P02-192-01

Prepared for

Mr. Steve Henits
Fords Drywall, Inc.
153 Howell Ave.
Fords, NJ 08863

by

NAHB Research Center, Inc.
400 Prince George's Blvd.
Upper Marlboro, MD 20774-8731

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BACKGROUND

Fords Drywall developed a new technique for making flatter/better butt joints in conventional drywall construction. Drywall is manufactured with tapered edges along the length of the sheet. This taper allows the joint to be finished flush with the sheet surface using conventional tape/joint compound. The ends (butts) of the sheet are not tapered. Conventional finishing with tape and joint compound results in a slight thickness increase at the butt joint and inherently resulting in a surface that is not flat. In order to minimize the visual impact of the butt joint, the joint compound is tapered flush with the sheet surface over a wide (typically 12") section. Making a visually acceptable wide joint requires considerable skill as well as time and materials. The Fords Drywall Butttaper tool and procedure were developed to allow butt joints to be taped flush (flat) and in less time than conventional butt joints.

The procedure requires that the drywall at the butt joint be wetted with water from a squirt bottle to "soften" the gypsum material. The Butttaper tool is then used to deform the softened gypsum to yield a rounded tapered edge on both edges of the butt joint. The joint is then filled with joint compound and a ½" wide paper tape similar to conventional practice. A second and third coat of joint compound is typically applied just as in standard drywall joints.

The purpose of this testing was to evaluate the comparative performance in tension and compression of butt joints constructed via a conventional technique and butt joints constructed with the Butttaper tool according to it's manufacturer's recommendations.

Test Samples

Eighteen samples of butt joints were prepared from US Gypsum ½" 4x8 sheets of drywall. 21" wide sections were cut from the sheets and the butt joints were made factory edge to factory edge. Six joints were made with conventional attachment to a 2x4 stud using 1-1/4" coarse drywall screws 4" on center held 3/8" back from the edge. Six joints were made using the same procedure with the drywall glued as well as screwed to the 2x4 stud. Six joints were made using a 4" wide 7/16" OSB backer board with adhesive and 1-1/4" coarse drywall screws as shown in figure 1. All joints had a 3/32" gap between the edges of the drywall sheets. The first group of joints was finished using conventional taping technique with 2" wide tape. The last two groups were made using the ButtTaper tool and procedure. For all joints the first coat of joint compound was US Gypsum Ready Mix Heavyweight. The second and third coats used US Gypsum Plus 3 lightweight joint compound. The drywall adhesive used was Liquid Nails Heavy Duty Construction Adhesive.

Plywood headers were attached with glue and screws to each sample to reinforce and distribute the load during testing. Temporary braces were attached to hold the joint rigid during taping and set up in the test rig. These braces were removed for testing.

The sample joints were prepared by the Research Center staff according to the instructions provided by Fords Drywall. The joints were taped by Fords Drywall under supervision of the Research Center following the procedure described in the ButtTaper literature (see figure 2). The joints were cured for 60 hours and tested in an un-sanded and un-painted condition.

TEST PROCEDURE

Half of the samples were to be tested in tension and half in compression. The testing was done in the Research Center's Universal Test Machine (UTM). A deflectometer was attached to measure the displacement across the joint (in the center of the panel) versus load (see figure 3). The load was applied at a constant displacement of 0.03"/min. The measurement instruments were calibrated to NIST traceable standards. During the loading the joint was observed to determine when a visible crack or other joint deformity began to form. Loading increased at constant displacement until a complete failure occurred. Photos were taken at intervals of approximately 1000 pounds during the test and at failure. The photos were also used to aid in estimating the load at initial cracking.

For the samples tested in compression, a fixture was provided to prevent buckling failure of the joint or the drywall. The fixture is show in Figure 4. The samples tested in tension did not require a test fixture other than the reinforcing headers where the load was applied. The tension set up is shown in figure 5.

Three replicates of each geometry were tested.

Results

The table below summarizes the load and displacement at initial sign of cracking.

Joint Type	Load at Initial Crack (pounds)		Displacement at Initial Crack(inches)	
	Average	Std. Deviation	Average	Std. Deviation
Compression				
Standard on stud (no adhesive)	1900	849	0.001	0.000
ButtTapper with backer board & adhesive	4533	153	0.005	0.001
ButtTaper on stud with adhesive	6500	500	0.008	.002
Tension				
Standard on stud (no adhesive)	1150	229	0.003	0.003
ButtTapper with backer board & adhesive	1467	252	0.006	0.002
ButtTaper on stud with adhesive	1100	0	0.004	0.001

Table 1 in the appendix summarizes all the test results. Figures 6-11 show typical cracking at failure (load drops to 80% of max) for each type of joint tested. Also noted is the load at failure.

Uncertainty

Due to the uncertainty of visually identifying the initial cracking (or deformation) the uncertainty of the load at cracking is estimated to be +/- 300 pounds. Using displacement versus load data the estimate of the uncertainty of the displacement at cracking in compression is +/- 0.001" and +/- 0.006" in tension.

Conclusions

The data shows that the ButtTaper joints (as tested) tolerated greater displacement and higher loads in compression prior to cracking than the conventionally taped joints. The ButtTaper joints tolerated equivalent loads and displacements when compared to the conventional joint in tension. The ButtTaper

joint with the backer board tested in tension showed slightly higher loads and displacements than the standard joint but the data scatter and uncertainty means the difference is not statistically significant. It must be noted that all the ButtTaper joints included the use of adhesive and the comparative standard joints did not. It is not possible to differentiate the extent of the higher loads and displacements attributable to the joint style versus the use of adhesive.

In actual use butt joints may also be stressed in a shear and flexural condition. No conclusion can be drawn from this testing about performance of the joints in shear or flexure.

DECLARATIONS AND DISCLAIMERS

This is a factual report of the results obtained from laboratory tests of the samples tested. The report may be reproduced and distributed at the client's discretion provided it is reproduced in its entirety. Any partial reproduction must receive prior written permission of the NAHB Research Center.

This test report does not constitute a product endorsement by the NAHB Research Center or any of its accrediting agencies.

Signed _____ Date _____

Robert L. Hill
Director, Laboratory Services.

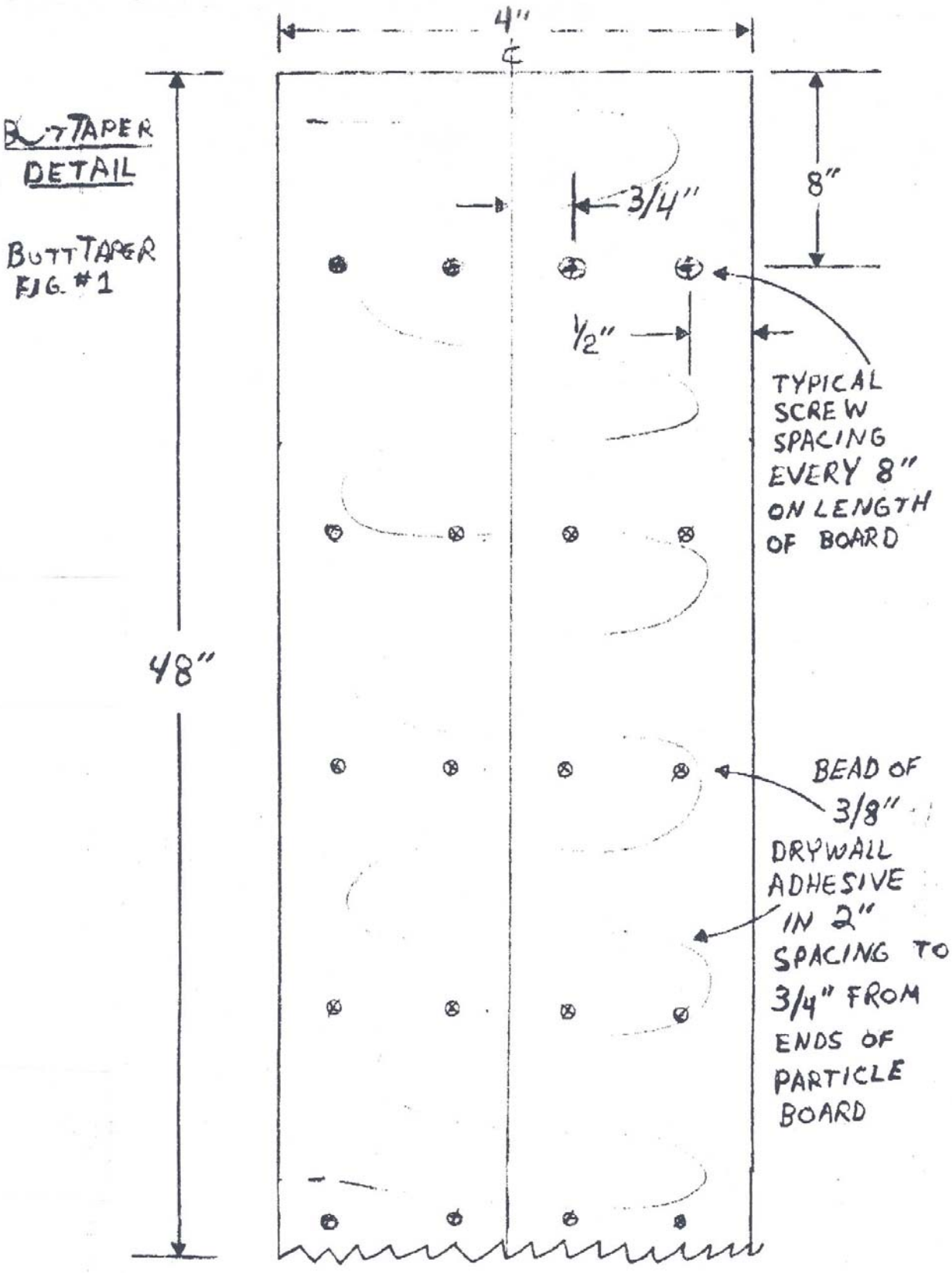

Figure 1 – ButtTaper joint detail using backer board.

Figure 2 – Fords Drywall literature describing ButtTaper instructions.

Figure 3 – Test Specimen mounted in UTM with deflectometer to measure displacement across the joint in the center of the panel.

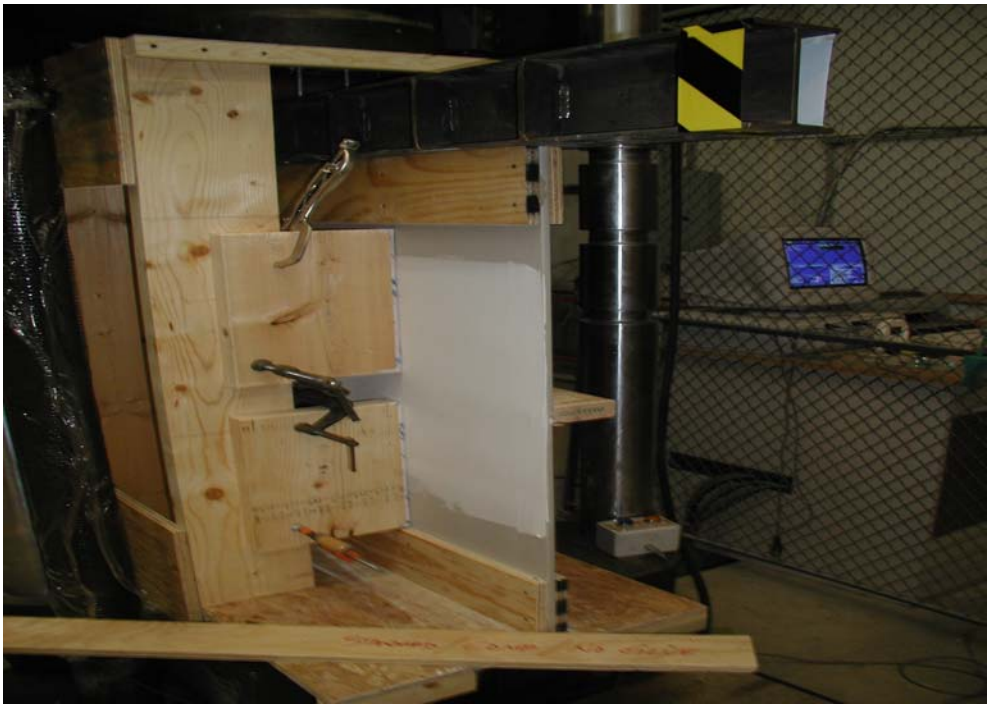

Figure 4 – Compression test set up with fixture.

Figure 5 – Tension test set up.

Figure 6 – Compression Failure –
Standard joint on 2x4 failure load = 6627 lbs

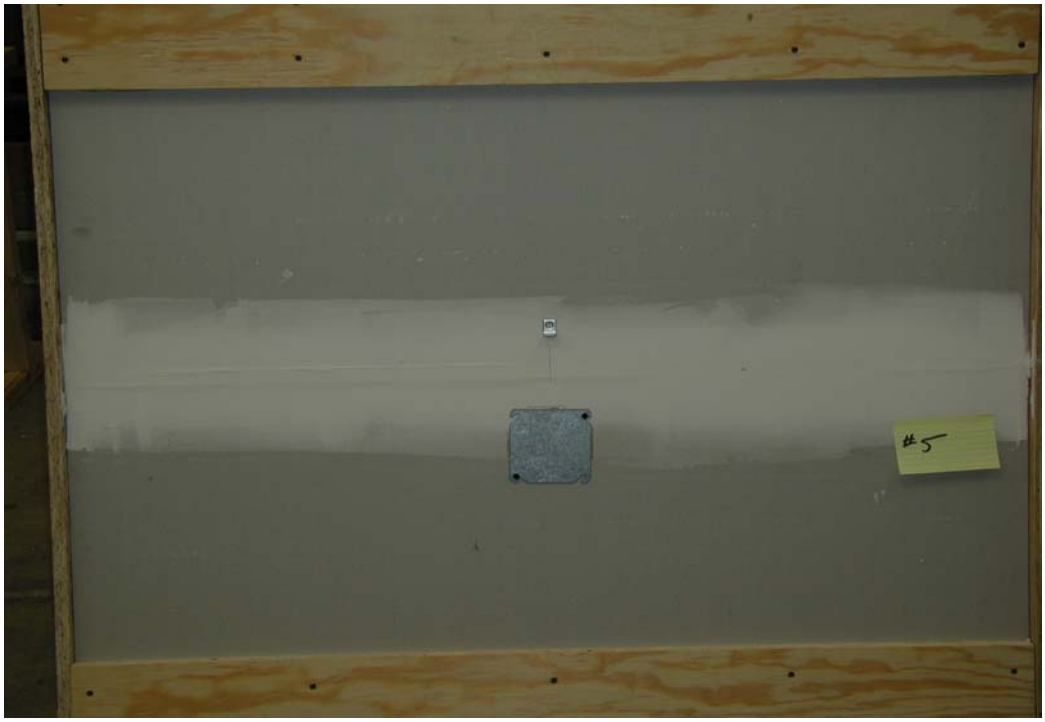

Figure 7 – Compression Failure –
ButtTaper joint w/backer failure load = 9470 lbs

Figure 8 – Compression Failure –
ButtTaper joint on 2x4 failure load = 8145 lbs

Figure 9 – Tension Failure –
Standard joint on 2x4 failure load = 1547

Figure 10 – Tension Failure –
ButtTaper joint w/backer failure load = 3028

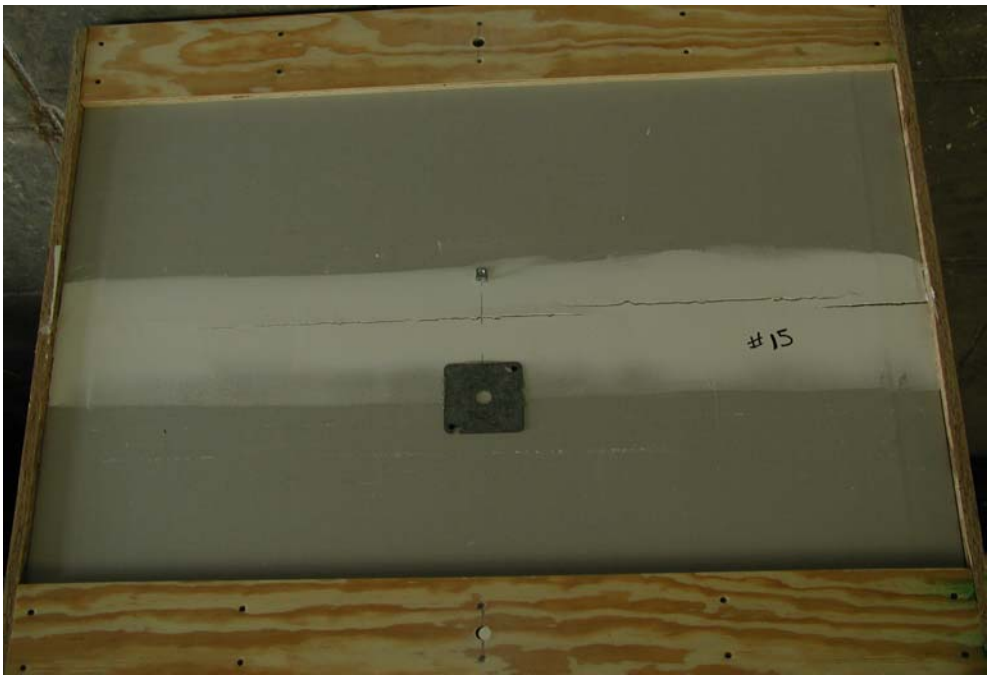

Figure 11 – Tension Failure –
ButtTaper joint on 2x4 failure load = 1741

Table 1
Fords Drywall Test Results

Sample #	Joint Type	Load at 1st Crack	Displacement at 1st Crack	Load at failure	Displacement at Failure	Notes
COMPRESSION						
1	std	2500	0.001	6627	0.18	
4	std	1300	0.001	5397	0.182	
7	std	n/a	n/a	6071	0.035	1
	avg	1900	0.001	6032	0.132	
	std dev	849	0.000	616	0.084	
2	BT w/ backer	4500	0.005	8475	0.121	
5	BT w/ backer	4400	0.004	9470	0.028	
8	BT w/ backer	4700	0.006	9224	0.025	
	avg	4533	0.005	9056	0.058	
	std dev	153	0.001	518	0.055	
3	BT	6000	0.006	6753	0.099	2
6	BT	7000	0.008	8145	0.013	
9	BT	6500	0.010	8591	0.016	2
	avg	6500	0.008	7830	0.043	
	std dev	500	0.002	959	0.049	
TENSION						
10	std	1200	0.005	1547	0.014	
13	std	1350	0.003	1545	0.011	
16	std	900	0.000	1741	0.041	
	avg	1150	0.003	1611	0.022	
	std dev	229	0.003	113	0.017	
11	BT w/ backer	1500	0.007	3028	0.045	2
14	BT w/ backer	1200	0.004	3690	0.069	
17	BT w/ backer	1700	0.007	3140	0.039	3
	avg	1467	0.006	3286	0.051	
	std dev	252	0.002	354	0.016	
12	BT	n/a	n/a	2889	0.057	4
15	BT	1100	0.004	1741	0.041	
18	BT	1100	0.003	2928	0.071	
	avg	1100	0.004	2519	0.056	
	std dev	0	0.001	674	0.015	

Notes:
1) Specimen was cracked by excessive preload.
2) Initial crack load estimated from photos.
3) Failure was in drywall sheet; not the butt joint.
4) Specimen was cracked while loading into UTM.