INTERTEK REPORT No.: 3068232-1

REPORT ON WITNESS TESTING

OF

ITW BUILDEX'S TEKS PIN
MODEL 2746910

BASED ON

AISI TS-4-02

STANDARD TEST METHODS FOR DETERMINING THE TENSILE AND SHEAR STRENGTH OF SCREWS

AND

AISI TS-5-02

TEST METHODS FOR MECHANICALLY FASTENED COLD-FORMED STEEL CONNECTIONS

FOR

ITW BUILDEX
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BY

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TEST DATES: MAY 23-27, 2005
REPORT DATE: MARCH 23, 2006

INTRODUCTION

Intertek Testing Services NA Inc., of Middleton, Wisconsin witnessed tests performed in the ITW Buildex Quality Assurance Laboratory in Itasca, IL. Rick Armstrong, Technical Projects Manager for Intertek witnessed and participated in the testing. This report gives the results of the evaluation of the provided sample. The test results described in this report are limited to the submitted item.

SPECIMEN DESCRIPTION

The fastener tested is described as Buildex 0.115 x 1-inch Teks Pin part number 2746910.

The material used in all the tests except 1A and 1B were standard steel studs or material cut from these studs. The studs were manufactured by Clark Steel Framing Systems and included thickness of 22, 20,18, 16, and 14 gauges. All studs were 33-ksi minimum tensile strength.
The fasteners were driven by pneumatic nailer.

PROCEDURES

Tensile Tests 1A
Ref. AISI TS-4-02 Sec. 3.1

Tensile tests were set up with the shank of the Teks Pin being held fast in a grip attached to the immovable platen of the Tinius Olsen universal testing machine (UTM). The head was held by inserting it through a hole of the fixture on the movable element of the UTM. The speed was set to 0.2 inches per minute and the UTM recorded the maximum load obtained before the fastener broke.

Loads attained per specimen tested								
1	2	3	4	5	Average	Min	Max	St. Dev
2032.5	1918.3	1932.1	1982.1	2026.9	1978.38	1918.3	2032.5	52.56

The failure mode in all cases was the shaft of the Teks Pin breaking at the UTM grip.

Single Shear Tests 1B
Ref. AISI TS-4-02 Sec. 3.2

For the single shear tests, two identical fixtures were used. The fixtures consisted of 0.1875-inch steel with a hole through which the specimens were inserted. The fixtures were attached to the UTM by means of a standard set of grips and were aligned by means of a shim of 0.1875-inch to insure that the load was transmitted in a straight line transversely through the specimen. The maximum load applied to the specimen, coincident with (or prior to) the failure was recorded by the UTM and is defined as the shear strength of the specimen. The following table shows the results of test 1B.

Loads attained per specimen tested								
1	2	3	4	5	Average	Min	Max	St. Dev
1152.8	1137.7	1210.3	1087.1	1196.7	1156.92	1087.10	1210.30	49.23

Failure mode in all cases was the shearing of the Teks Pin at the fixture.

Pullout/Pullover Tests 1C
Based on AISI TS-5-02 Sec. 7.3

For these tests the fixture was comprised of a modified U shape with a hole located at the bottom through which the fastener was driven into a section of steel stud of the appropriate gauge. This U shaped fixture (similar but not identical to figure 4 of AISI TS-5-02) was attached to the immovable member of the UTM and the steel stud was held in the movable head. The stud was supported in the fixture by a frame that left three-inches of stud exposed. The speed of separation of the UTM was 0.2-inch per minute.

	Stud gauge used				
Test run	22 gauge	20 gauge	18 gauge	16 ga.	14 ga
1	156.46	98.19	25290	352.19	712.55
2	97.59	74.06	279.25	367.90	780.63
3	80.85	138.38	156.46	344.71	723.63
4	137.10	183.01	269.84	274.88	714.90
5	62.77	34.34	261.91	381.41	742.72
6	56.99	206.93	271.92	342.22	
7	132.13	82.87	270.44	387.25	
8	62.03	52.56	282.27		
9	172.05	84.89			
10	100.81	119.02			
11		93.66			
Average	103.72	109.26	269.79	344.86	762.93
Min	62.03	74.06	156.46	274.88	712.56
Max	156.46	183.01	282.27	387.25	780.63
St. Dev	35.23	36.41	41.12	37.49	28.19

In order for the data to be more statistically accurate, the cells formatted with red borders were excluded from the computations. Either the high and low numbers were eliminated or two tests were run to eliminate one run. Further investigation seemed to indicate the U shaped fixtures were the cause of this inconsistency. Additional tests were run on 20 gauge studs using the fixture outlined below

Test run	20 gauge
1	208.61
2	205.39
3	202.43
4	209.22
5	203.03
6	192.62
7	201.02
8	201.49
9	200.28
10	216.07
Average	204.02
Min	192.62
Max	216.07
St Deviation	6.3074

RETEST USING 20 GAUGE STUDS

In the test at the left, a different U shaped member was used for each pull and the fastener was driven through the member into the stud without first making a pilot hole in the U shaped fixture. All other aspects of the test were the same as the preceding tests.

In retrospect, all of the pull-out/pull-over tests should have been performed in this manner but time constraints prevented retesting all of them. It could be argued that retesting all of the stud gauges and fasteners would come to results that are as consistent as these are.

Lapped Shear Tests 1D
Based on AISI TS-5-02 Sec. 7.2

The lapped shear tests were run without the benefit of an extensometer. Graphs were charted however but due to problems with slippage in the grips the data on the charts could only show the highest value achieved. The results that follow show the maximum load required to separate the two 2-inch x 10-inch sections of the same gauge steel studs.

22 ga			20 ga			18 ga			16 ga		
1	v	581.49	1	v	775	1	*	1175.6	1	*	1722
2	v	737.14	2	v	778.21	2	*	1301.5	2	*	1645.2
3	v	763.15	3	v	778.21	3	v	1315.6	3	*	1703.2
4	v	596.34	4	v	820.42	4	v	1349.8	4	*	1649.3
5	v	581.76	5	v	777.4	5	v	1315.1	5	*	1571.1
Average		651.98			785.85			1291.52			1658.16
Min		581.49			775			1175.6			1571.1
Max		763.15			820.42			1349.8			1722
St Dev		90.29			19.37			67.21			59.01

A failure mode for each test is listed directly to the left of the value obtained. These modes were taken from AISI TS-5-02 Section 8.2.3. Two types of failures were witnessed during these tests. Type V mode indicates that the fastener pulled over due to the forces and eventually the fastener was pulled out of the stud material. Type * indicates that the head of the fastener came off first and the metal was pulled off the head side of the stud.

All tests were performed by Mike Dill and Bert Kolodziei of ITW Buildex with the assistance of Rick Armstrong.

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