BarSplice PRODUCTS INC.

A SUBSIDIARY OF FC INDUSTRIES INC.

ButtonHead

GRADE 60

COLD-SWAGED HEADED DEFORMED BARS FOR GRADE 60 REINFORCEMENT

PERFORMANCE TEST DATA

SEPTEMBER 2019

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INTRODUCTION

Barsplice Products, Inc. has conducted a series of in-air tests on the ButtonHead system of headed deformed bars, sizes No. 4 through No. 18. The purpose of this testing is to ensure that they are manufactured to the quality standards of BPI's ISO 9001 Quality System and are capable of exceeding various Building Codes strength requirements.

Two head diameter designs are available, depending on application requirements, and test results for both are included. Heads with a cross-sectional area exceeding 5x the rebar area (BNH) are designated as $5A_b$ and heads with a cross-sectional area exceeding 10x the rebar area (BNX) are designated as $10A_b$.

TENSILE TEST PROCEDURE

Test specimens were loaded monotonically in tension to failure to determine the capability of the ButtonHead headed bar system. The tests were conducted in accordance with ASTM A370, "Standard Test Methods and Definitions for Mechanical Testing of Steel Products." Loads were applied through the bearing area of the head. The testing was performed to exceed the headed deformed bar strength requirements of ACI (American Concrete Institute) 318-2019 and 318-2014 Section 25.4.5.1 (ACI 318-2011 Section 12.6) and ASTM A970, Class A & Class HA.

All monotonic tension tests were carried out in a 600 kip Forney universal testing machine, located at the Barsplice manufacturing facility. Current calibration certificates for the test machine are on file.

The reinforcing steel used in these tests conforms to the requirements of ASTM A615, Grade 60 and ASTM A706, Grade 60.

TEST RESULTS

Results of the ButtonHead tension testing described above are summarized in Table 1 and represented in Chart 1.

SUMMARY

Tension test specimens exceeded the strength requirements of ACI 318*, namely 100% x specified yield strength of Grade 60 reinforcement.

Additionally, the tension test specimens exceeded the strength requirements stated in ASTM A970, Class A and Class HA, namely the specified tensile strength of Grade 60 bar which equates to 90,000 psi for ASTM A615 bar and 80,000 psi for ASTM A706 bar.

* In meeting the strength requirements of ACI-318, the ButtonHead system complies with IBC 2018 Section 1901.3.

TABLE 1: BUTTONHEAD TENSILE TEST RESULTS

BAR SIZE	TEST LAB ID # & REF #			PEAK STRENGTH MAX STRESS (psi)	PEAK STRENGTH % SPEC. TENSILE GR. 60*
No. 4	4T792	BNH 5Ab	4A	115,750	129%
			4B	116,150	129%
	4T1237	BNH 5Ab	4A	109,600	122%
			4B	110,350	123%
	4T2356	BNH 5Ab	4A	109,800	122%
			4B	105,900	118%
	4T3015 (A706)	BNX 10Ab	4A	97,950	109%
			4B	97,250	108%
No. 5	5T3060	BNH 5Ab	5A	109,710	122%
			5B	111,290	124%
	5T4573	BNH 5Ab	5A	101,484	113%
			5B	102,742	114%
	5T5994	BNH 5Ab	5A	107,871	120%
			5B	108,161	120%
	5T6151 (A706)	BNX 10Ab	5A	102,065	113%
			5B	101,387	113%
No. 6	6T1836	BNH 5Ab	6A	101,886	113%
			6B	104,886	117%
	6T2694	BNH 5Ab	6A	103,005	114%
			6B	102,766	114%
			6C	102,989	114%
	6T4744	BNH 5Ab	6A	109,682	122%
			6B	109,568	122%
	6T4873 (A706)	BNX 10Ab	6A	95,659	106%
			6B	98,295	109%
No. 7	7T1077	BNH 5Ab	7A	106,850	119%
			7B	105,317	117%
	7T1292	BNH 5Ab	7A	104,752	116%
			7B	105,305	117%
			7C	107,053	119%
	7T2016	BNH 5Ab	7A	112,467	125%
			7B	105,733	117%
	7T2308 (A706)	BNX 10Ab	7A	96,950	108%
			7B	94,300	105%
No. 8	8T1709	BNH 5Ab	8A	104,734	116%
			8B	103,101	115%
	8T2107	BNH 5Ab	8A	106,772	119%
			8B	107,304	119%
	8T2762	BNX 10Ab	8A	108,304	120%
			8B	107,025	119%
	8T3518 (A706)	BNH 5Ab	8A	98,139	109%
			8B	99,899	111%

BAR SIZE	TEST LAB ID # & REF #			PEAK STRENGTH MAX STRESS (psi)	PEAK STRENGTH % SPEC. TENSILE GR. 60*
No. 9	9T1298	BNH 5Ab	9A	101,780	113%
			9B	101,500	113%
	9T1710	BNH 5Ab	9A	108,460	121%
			9B	115,490	128%
	9T1812	BNX 10Ab	9A	106,780	119%
			9B	108,720	121%
	9T1932 (A706)	BNH 5Ab	9A	95,430	106%
			9B	96,650	107%
No. 10	10T1279	BNH 5Ab	10A	104,268	116%
			10B	105,874	118%
	10T1489	BNH 5Ab	10A	106,402	118%
			10B	103,220	115%
	10T1678	BNH 5Ab	10A	106,803	119%
			10B	109,598	122%
	10T2097 (A706)	BNX 10Ab	10A	100,220	111%
			10B	98,780	110%
No. 11	11T2213	BNH 5Ab	11A	105,853	118%
			11B	106,128	118%
	11T2639	BNH 5Ab	11A	107,449	119%
			11B	108,571	121%
	11T3323	BNX 10Ab	11A	111,436	124%
			11B	110,679	123%
	11T3455	BNH 5Ab	11A	114,167	127%
			11B	105,083	117%
	11T3939 (A706)	BNH 5Ab	11A	98,340	109%
			11B	95,558	106%
No. 14	14T658	BNH 5Ab	14A	100,742	112%
	14T757	BNH 5Ab	14A	111,484	124%
			14B	112,609	125%
	14T770	BNH 5Ab	14A	111,076	123%
			14B	109,249	121%
	14T1412 (A706)	BNH 5Ab	14A	106,244	118%
			14B	104,724	116%
No. 18	18T507 (A706)	BNH 5Ab	18A	99,344	110%
			18B	97,240	108%
	18T648	BNH 5Ab	18A	104,978	117%
			18B	103,178	115%
	18T651	BNH 5Ab	18A	102,832	114%
			18B	103,118	115%
	18T816	BNH 5Ab	18A	105,598	117%
			18B	105,955	118%

* % *fu* shown is for ASTM A615 Grade 60. For comparison to ASTM A706 Grade 60, see the chart on the following page.

CHART 1: BUTTONHEAD TENSILE TEST RESULTS