



# ButtonHead

**COLD-SWAGED MECHANICAL  
END ANCHORAGES FOR  
GRADE 60 REINFORCING BARS**



## PERFORMANCE TEST DATA

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## INTRODUCTION

Barsplice Products, Inc. has conducted a series of in-air tests on the ButtonHead system of reinforcing bar mechanical end anchorages, 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<sub>b</sub> and heads with a cross-sectional area exceeding 10x the rebar area (BNX) are designated as 10A<sub>b</sub>.

## TENSILE TEST PROCEDURE

Test specimens were loaded monotonically in tension to failure to determine the capability of the ButtonHead end anchorage 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 mechanical anchorage strength requirements of ACI (American Concrete Institute) 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 318-2014\*, namely 100% x specified yield strength of Grade 60 rebar.

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 rebar which equates to 90,000 psi or 150% x specified yield for A615 rebar and 80,000 psi or 133% x specified yield for A706 rebar.

\* In meeting the strength requirements of ACI-318, the ButtonHead system complies with IBC 2015 Section 1901.2.

**TABLE 1: BUTTONHEAD TENSILE TEST RESULTS**

BAR SIZE	TEST LAB ID # & REF #			PEAK STRENGTH	
				MAX STRESS (psi)	% GR. 60 SPEC. YIELD
No. 4	4T792	BNH 5Ab	4A	115,750	193%
			4B	116,150	194%
	4T1237	BNH 5Ab	4A	109,600	183%
			4B	110,350	184%
	4T2356	BNH 5Ab	4A	109,800	183%
			4B	105,900	177%
	4T3015 (A706)	BNX 10Ab	4A	97,950	163%
			4B	97,250	162%
No. 5	5T3060	BNH 5Ab	5A	109,710	183%
			5B	111,290	185%
	5T4573	BNH 5Ab	5A	101,484	169%
			5B	102,742	171%
	5T5994	BNH 5Ab	5A	107,871	180%
			5B	108,161	180%
	5T6151 (A706)	BNX 10Ab	5A	102,065	170%
			5B	101,387	169%
No. 6	6T1836	BNH 5Ab	6A	101,886	170%
			6B	104,886	175%
	6T2694	BNH 5Ab	6A	103,005	172%
			6B	102,766	171%
			6C	102,989	172%
	6T4744	BNH 5Ab	6A	109,682	183%
			6B	109,568	183%
	6T4873 (A706)	BNX 10Ab	6A	95,659	159%
6B			98,295	164%	
No. 7	7T1077	BNH 5Ab	7A	106,850	178%
			7B	105,317	176%
	7T1292	BNH 5Ab	7A	104,752	175%
			7B	105,305	176%
			7C	107,053	178%
	7T2016	BNH 5Ab	7A	112,467	187%
			7B	105,733	176%
	7T2308 (A706)	BNX 10Ab	7A	96,950	162%
7B			94,300	157%	
No. 8	8T1709	BNH 5Ab	8A	104,734	175%
			8B	103,101	172%
	8T2107	BNH 5Ab	8A	106,772	178%
			8B	107,304	179%
	8T2762	BNX 10Ab	8A	108,304	181%
			8B	107,025	178%
	8T3518 (A706)	BNH 5Ab	8A	98,139	164%
			8B	99,899	166%

BAR SIZE	TEST LAB ID # & REF #			PEAK STRENGTH	
				MAX STRESS (psi)	% GR. 60 SPEC. YIELD
No. 9	9T1298	BNH 5Ab	9A	101,780	170%
			9B	101,500	169%
	9T1710	BNH 5Ab	9A	108,460	181%
			9B	115,490	192%
	9T1812	BNX 10Ab	9A	106,780	178%
			9B	108,720	181%
	9T1932 (A706)	BNH 5Ab	9A	95,430	159%
			9B	96,650	161%
No. 10	10T1279	BNH 5Ab	10A	104,268	174%
			10B	105,874	176%
			10C	105,976	177%
	10T1489	BNH 5Ab	10A	106,402	177%
			10B	103,220	172%
	10T1678	BNH 5Ab	10A	106,803	178%
			10B	109,598	183%
	10T2097 (A706)	BNX 10Ab	10A	100,220	167%
10B			98,780	165%	
No. 11	11T2213	BNH 5Ab	11A	105,853	176%
			11B	106,128	177%
	11T2639	BNH 5Ab	11A	107,449	179%
			11B	108,571	181%
	11T3323	BNX 10Ab	11A	111,436	186%
			11B	110,679	184%
	11T3455	BNH 5Ab	11A	114,167	190%
			11B	105,083	175%
11T3939 (A706)	BNH 5Ab	11A	98,340	164%	
		11B	95,558	159%	
No. 14	14T658	BNH 5Ab	14A	100,742	168%
			14B	111,484	186%
	14T757	BNH 5Ab	14A	112,609	188%
			14B	111,076	185%
	14T770	BNH 5Ab	14A	111,076	185%
			14B	109,249	182%
	14T1412 (A706)	BNH 5Ab	14A	106,244	177%
			14B	104,724	175%
No. 18	18T507 (A706)	BNH 5Ab	18A	99,344	166%
			18B	97,240	162%
	18T648	BNH 5Ab	18A	104,978	175%
			18B	103,178	172%
	18T651	BNH 5Ab	18A	102,832	171%
			18B	103,118	172%
	18T816	BNH 5Ab	18A	105,598	176%
			18B	105,955	177%

# CHART 1: BUTTONHEAD TENSILE TEST RESULTS

