BarSplice PRODUCTS INC.

ButtonHead™

GRADE 100 & 120

COLD-SWAGED STEEL HEADED DEFORMED BARS FOR GRADE 100 & GRADE 120 REINFORCEMENT

PERFORMANCE TEST DATA

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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" and ASTM A1034, " Standard Test Methods for Testing Mechanical Splices for Steel Reinforcing Bars." 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) 318-19 Chapter 25.4.5.1 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 A1035, Gr. 100.

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 318-19*, namely 100% x specified yield strength of Grade 80 reinforcement.

Tension test specimens also exceeded 100% x specified yield strength of ASTM A615 Grade 100 bar and ASTM A1035 Grades 100 & 120 bar, specifically 100,000 psi (690 MPa) and 120,000 psi (830 MPa) respectively.

Additionally, the tension test specimens exceeded the strength requirements stated in ASTM A970, Class A and Class HA, namely the specified tensile strength of ASTM A615 Grade 100 bar, specifically 115,000 psi (790 MPa), and ASTM A1035 Grade 100 & 120 bar, specifically 150,000 psi (1,030 MPa).

* In meeting the strength requirements of ACI-318 for Grade 80 reinforcement, the ButtonHead system complies with IBC 2018 Section 1901.3.

TABLE 1: BUTTONHEAD™ TENSILE TEST RESULTS

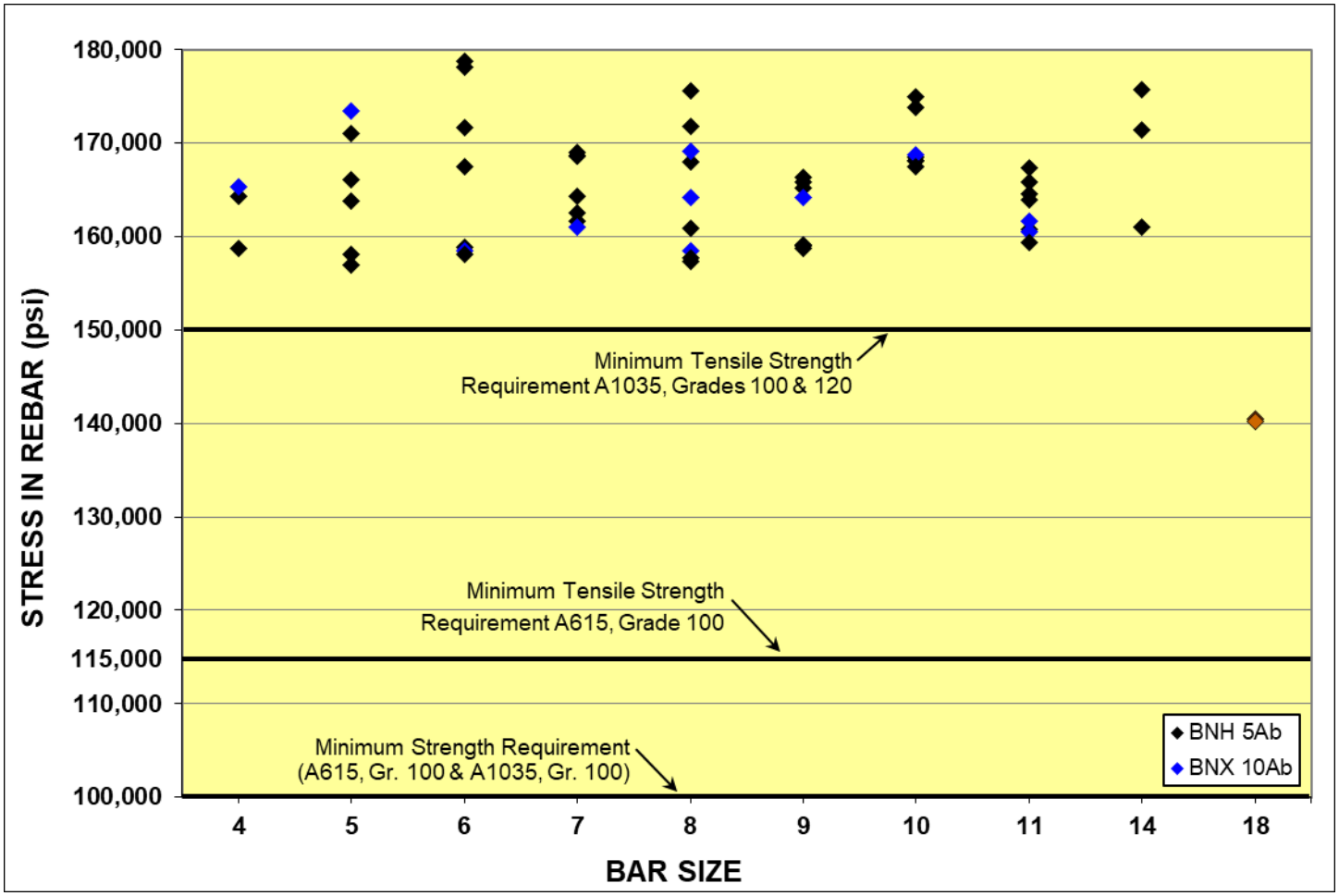
BAR SIZE	HEAD TYPE	TEST LAB ID # & REF #		PEAK STRENGTH MAX STRESS (psi)	PEAK STRENGTH % SPEC. TENSILE* GR.100/120
No. 4	BNH 5Ab	4T3644	4A	158,750	106%
			4A	164,300	110%
	BNX 10Ab	4T3702	4A	165,350	110%
No. 5	BNH 5Ab	5T4932	5A	171,032	114%
			5B	163,774	109%
		5T9560	5A	158,065	105%
			5B	156,903	105%
		5T13755	5C	166,126	111%
	BNX 10Ab	5T9716	5A	173,387	116%
No. 6	BNH 5Ab	6T4152	6A	158,091	105%
		6T6426	6A	158,864	106%
			6B	167,523	112%
		6T8864	6C	171,637	114%
		6T8980	6C	178,782	119%
		6T8990	6B	178,173	119%
	BNX 10Ab	6T4153	6A	158,500	106%
No. 7	BNH 5Ab	7T3053	7A	168,650	112%
			7B	168,983	113%
		7T3109	7A	168,583	112%
			7B	161,600	108%
		7T4400	7C	164,364	110%
		7T4415	7C	162,508	108%
	BNX 10Ab	7T1503	7A	160,950	107%
No. 8	BNH 5Ab	8T2142	8A	157,722	105%
			8B	175,646	117%
		8T3948	8A	160,873	107%
			8B	157,342	105%
		8T5465	8C	167,932	112%
		8T5528	8C	171,850	115%
	BNX 10Ab	8T2231	8A	164,165	109%
		8T2653	8A	158,468	106%
		8T5482	8C	169,063	113%

BAR SIZE	HEAD TYPE	TEST LAB ID # & REF #		PEAK STRENGTH MAX STRESS (psi)	PEAK STRENGTH % SPEC. TENSILE* GR.100/120
No. 9	BNH 5Ab	9T1333	9A	158,770	106%
		9T2514	9A	158,930	106%
			9B	159,090	106%
		9T3533	9C	165,148	110%
		9T3568	9C	165,865	111%
		9T3570	9C	166,304	111%
	BNX 10Ab	9T2557	9A	164,150	109%
No. 10	BNH 5Ab	10T2315	10A	167,512	112%
			10B	168,488	112%
		10T2332	10A	168,055	112%
			10B	168,079	112%
		10T3055	10C	173,762	116%
		10T3057	10C	174,903	117%
	BNX 10Ab	10T2333	10A	168,748	112%
No. 11	BNH 5Ab	11T3278	11A	159,391	106%
		11T4403	11A	163,955	109%
			11B	164,622	110%
		11T5636	11C	165,842	111%
		11T5683	11C	167,381	112%
		11T5684	11C	160,737	107%
	BNX 10Ab	11T3417	11A	161,673	108%
		11T5655	11C	160,506	107%
No. 14	BNH 5Ab	14T1436	14A	175,729	117%
			14B	171,382	114%
		14T1495	14C	161,009	107%
No. 18	BNH 5Ab	18T932◆	18A	140,225	93%◆
			18A	140,490	94%◆

*** % *fu* shown is for ASTM A1035. For comparison to ASTM A615, see the chart on the following page.**

◆ Test stopped at 140ksi proof load due to machine limitations.

CHART 1: BUTTONHEAD™ TENSILE TEST RESULTS



◆ 18BNH tests stopped at 140ksi proof load due to machine limitations.