# Appendix B

# Data and Figures from the Analysis of the Static and Dynamic Tests

## B.1 Hysteresis Loops from the Static Tests

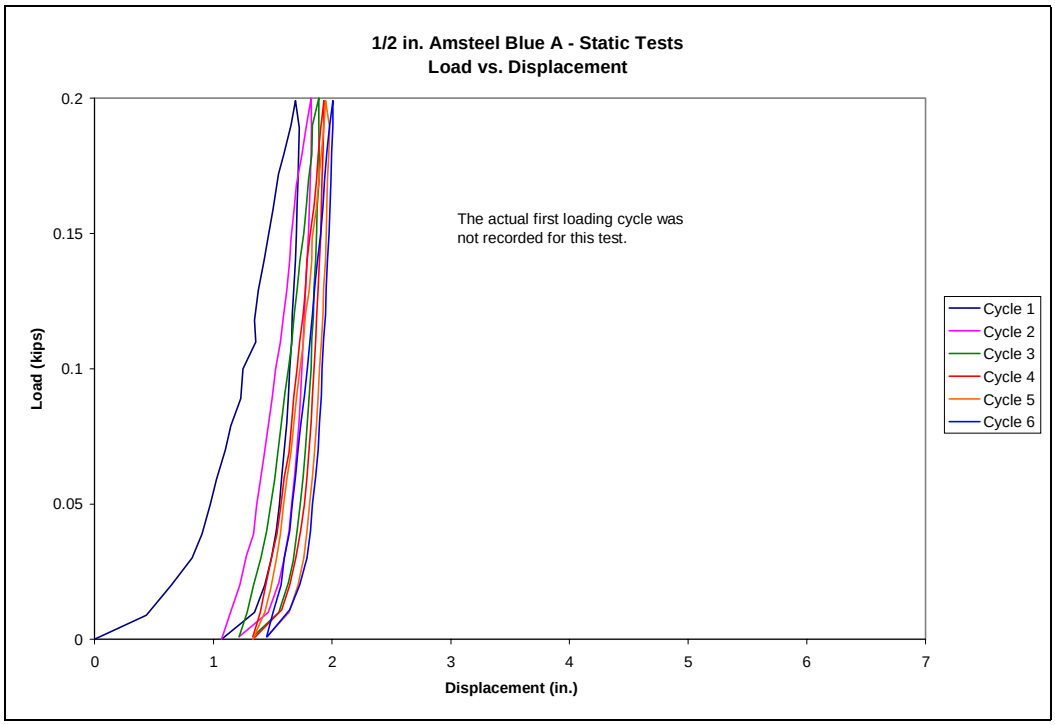


Figure B.1.1: Amsteel Blue A – Static Hysteresis Loops

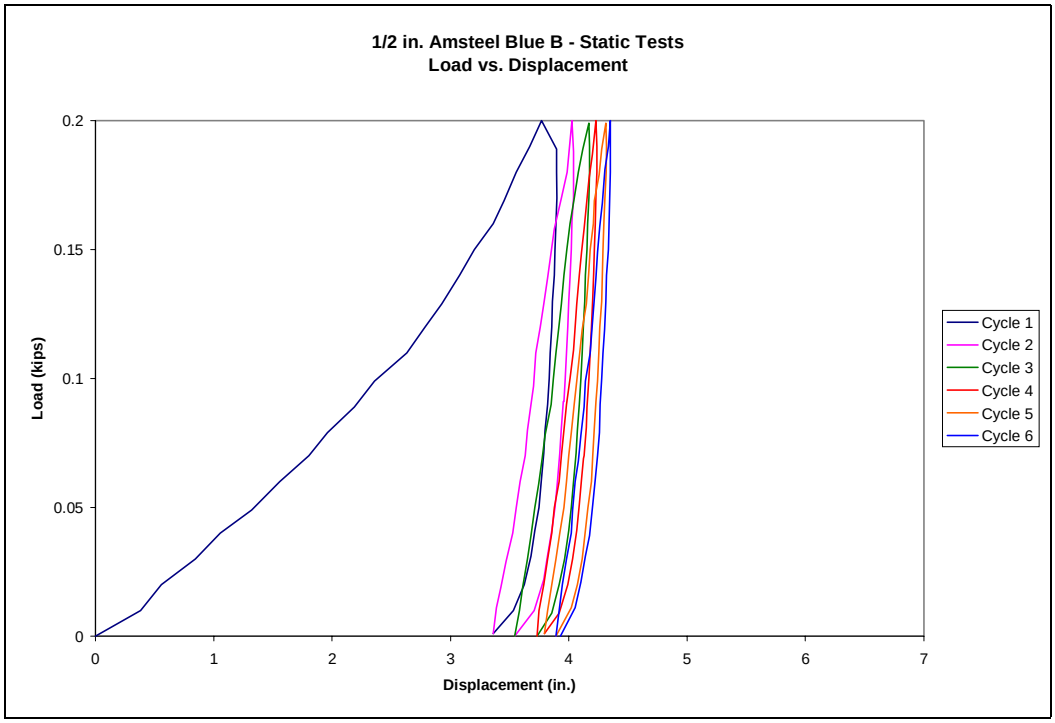


Figure B.1.2: Amsteel Blue B – Static Hysteresis Loops

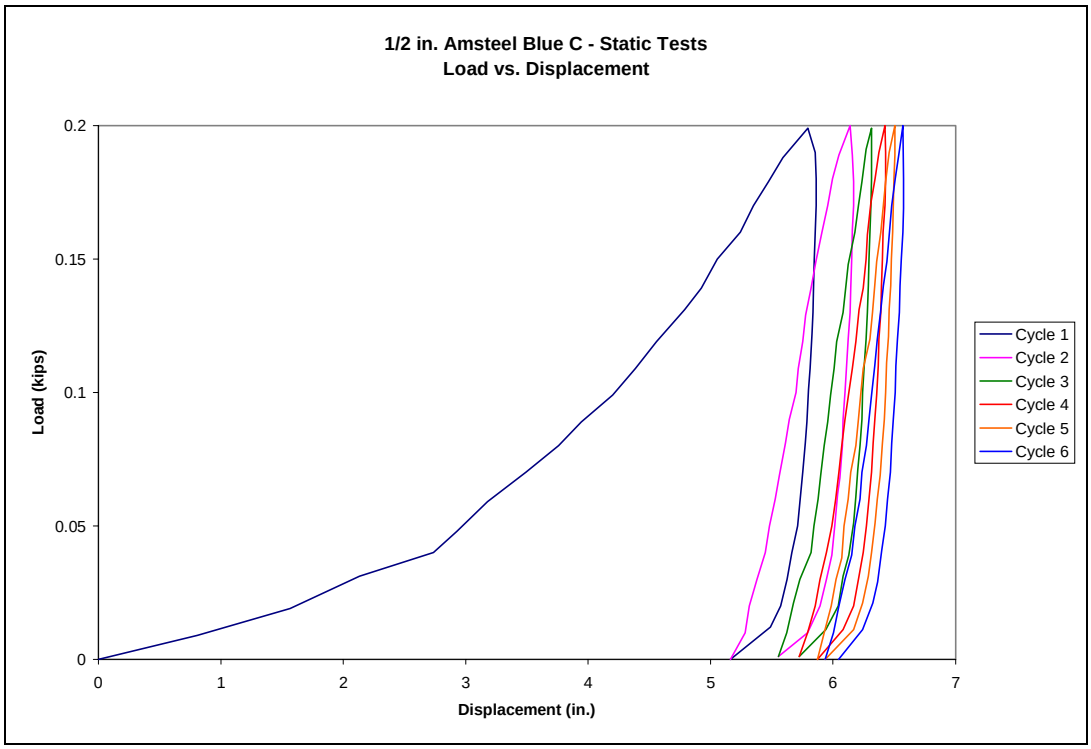


Figure B.1.3: Amsteel Blue C – Static Hysteresis Loops

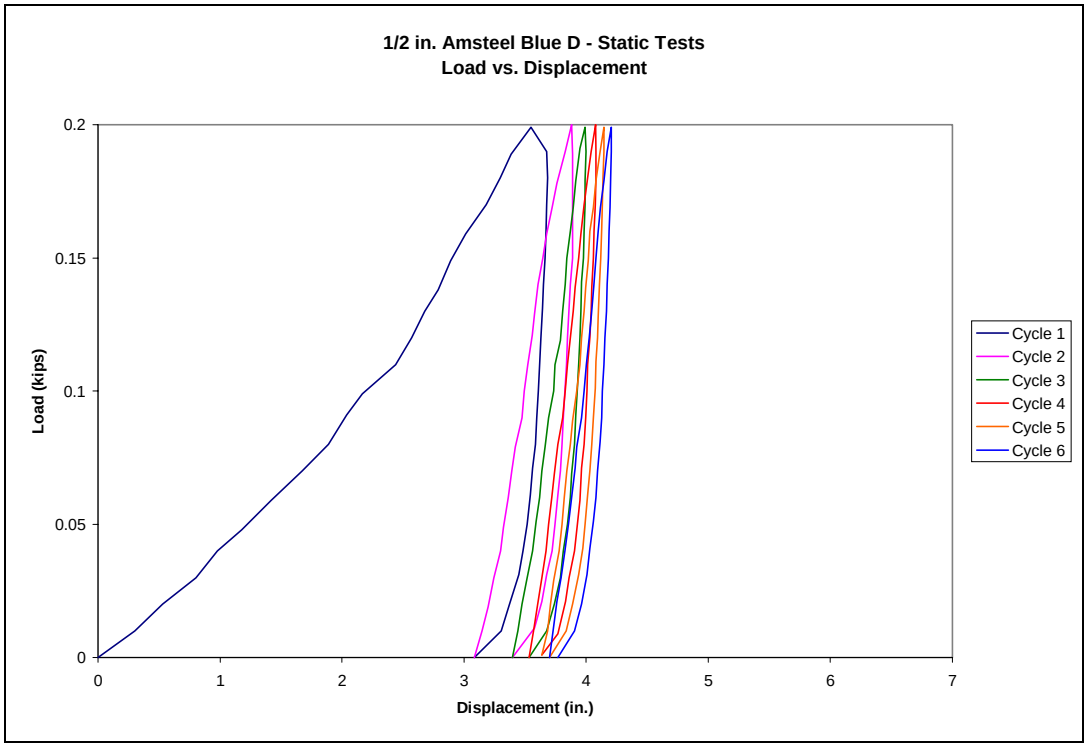


Figure B.1.4: Amsteel Blue D – Static Hysteresis Loops

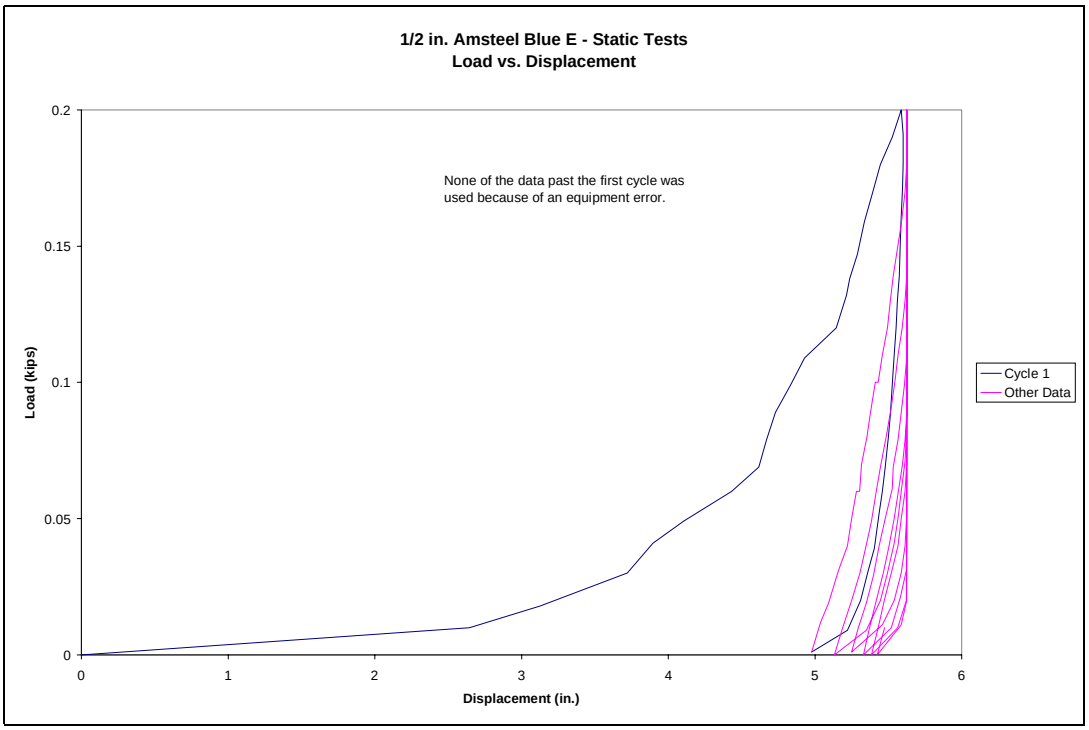


Figure B.1.5: Amsteel Blue E – Static Hysteresis Loops

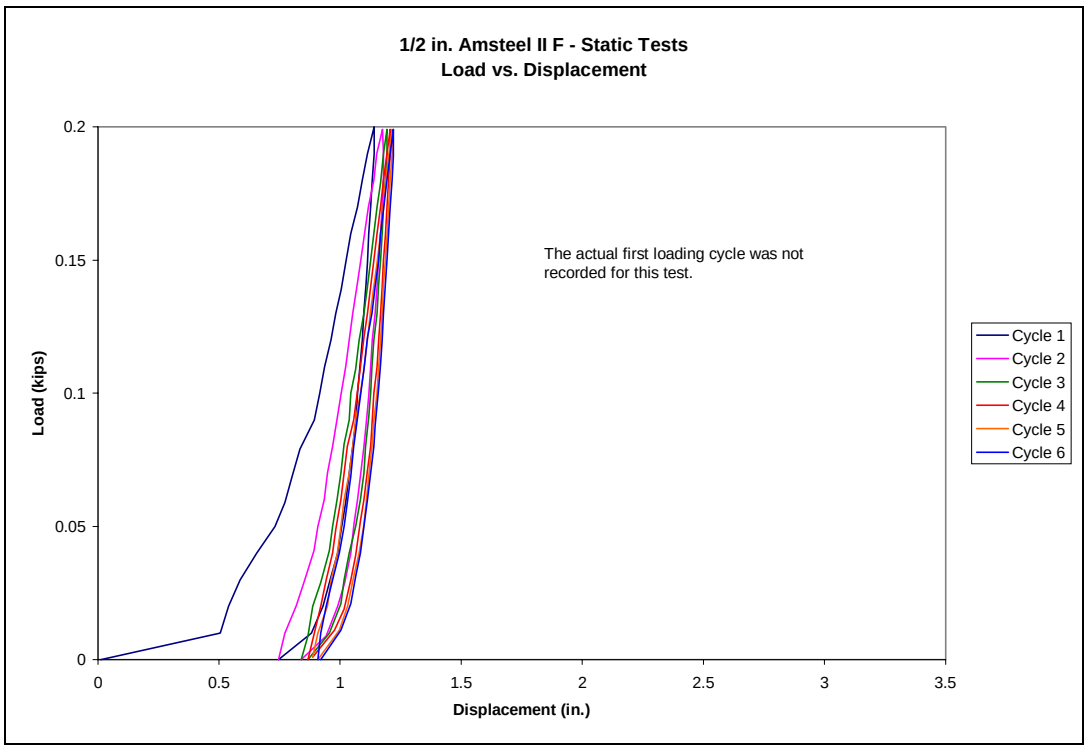


Figure B.1.6: Amsteel II F – Static Hysteresis Loops

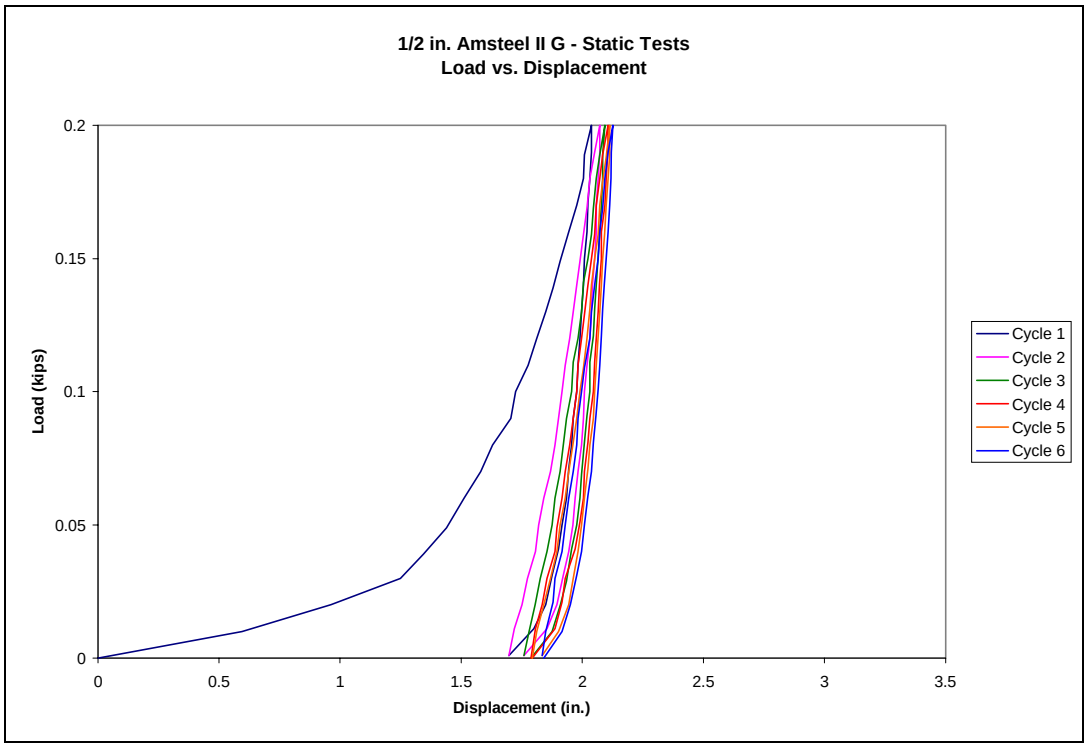


Figure B.1.7: Amsteel II G – Static Hysteresis Loops

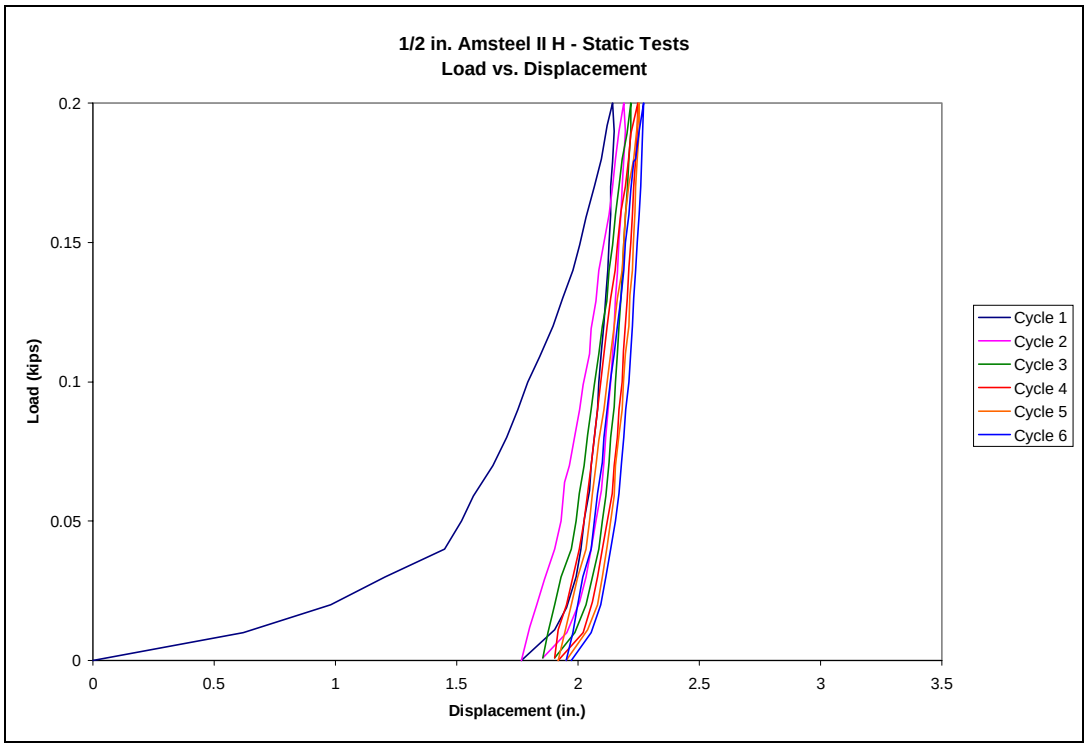


Figure B.1.8: Amsteel II H – Static Hysteresis Loops

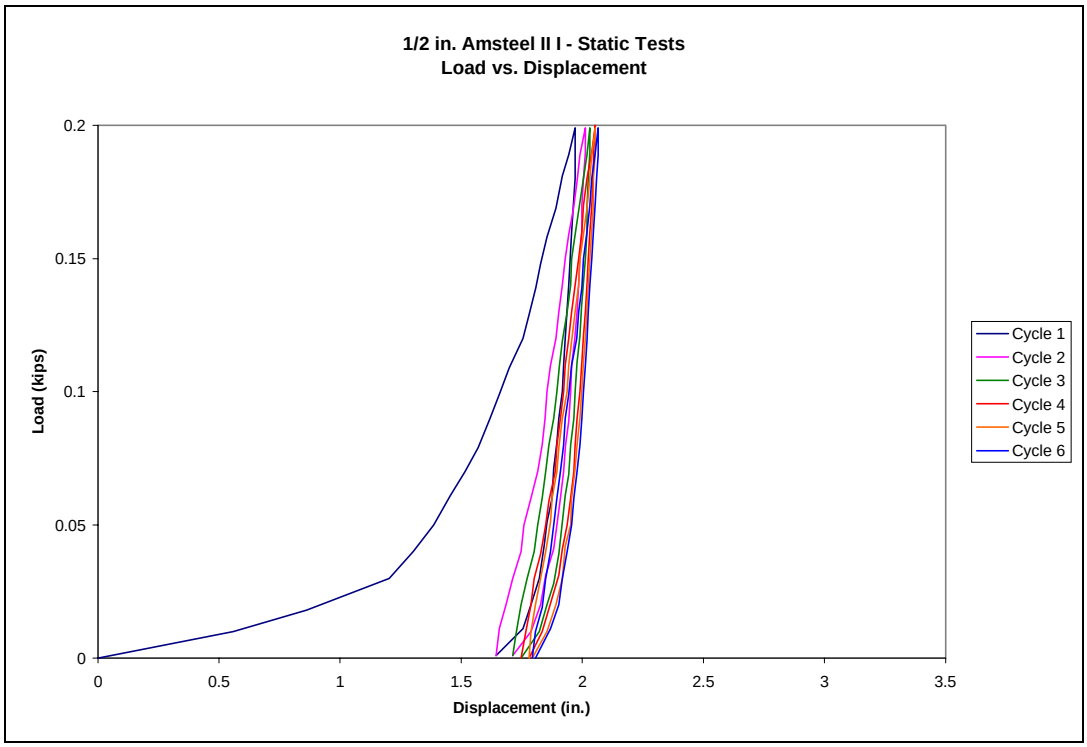


Figure B.1.9: Amsteel II I – Static Hysteresis Loops

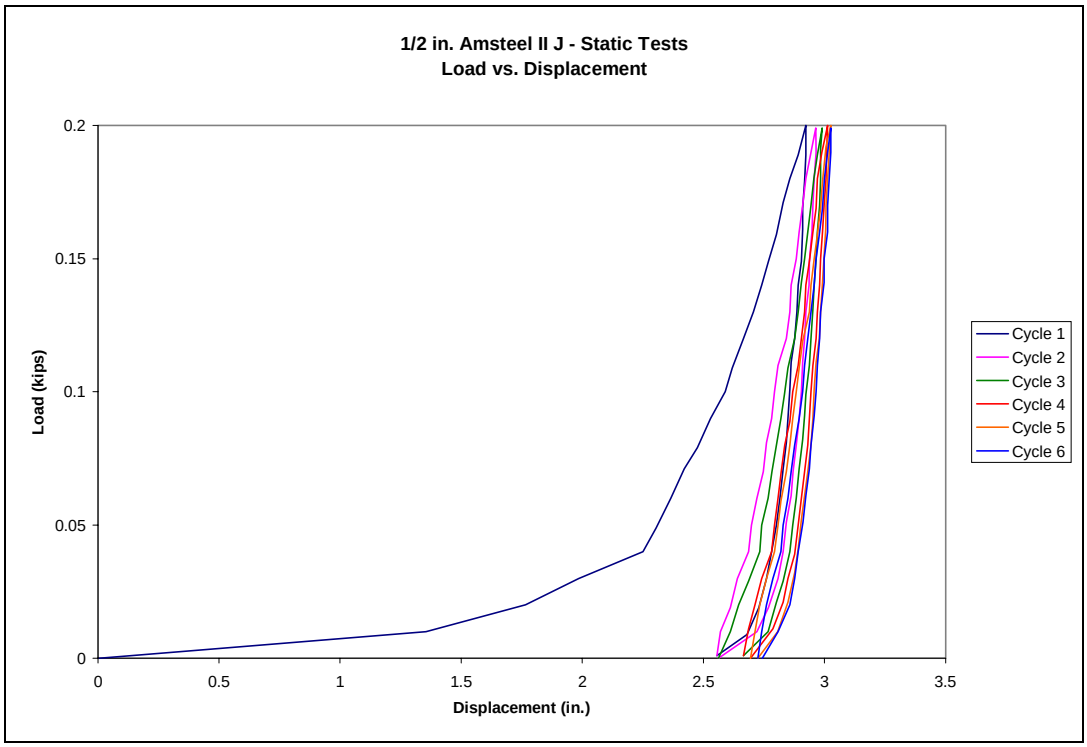


Figure B.1.10: Amsteel II J – Static Hysteresis Loops

## B.2 Elongation of the Ropes from the Static Tests

| Elongation of Ropes During the StaticTest Cycles (in.) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rope | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Cycle 5 | Cycle 6 | Total |
| Amsteel Blue - A | 5.161 | 0.392 | 0.170 | 0.149 | 0.061 | 0.111 | 6.044 |
| Amsteel Blue - B | 3.359 | 0.185 | 0.190 | 0.061 | 0.095 | 0.041 | 3.931 |
| Amsteel Blue - C | 1.068 | 0.149 | 0.116 | 0.001 | 0.117 | 0.006 | 1.457 |
| Amsteel Blue - D | 3.086 | 0.308 | 0.137 | 0.106 | 0.061 | 0.068 | 3.766 |
| Amsteel Blue - E | 5.078 | - | - | - | - | - | 5.078 |
| Amsteel II - F | 0.745 | 0.094 | 0.028 | 0.020 | 0.021 | 0.013 | 0.921 |
| Amsteel II - G | 1.697 | 0.062 | 0.028 | 0.006 | 0.041 | 0.007 | 1.841 |
| Amsteel II - H | 1.766 | 0.089 | 0.048 | 0.014 | 0.034 | 0.021 | 1.972 |
| Amsteel II - I | 1.644 | 0.069 | 0.034 | 0.033 | 0.014 | 0.013 | 1.807 |
| Amsteel II - J | 2.557 | 0.006 | 0.103 | 0.027 | 0.032 | 0.018 | 2.743 |

Table B.2.1: Static Rope Elongation Values

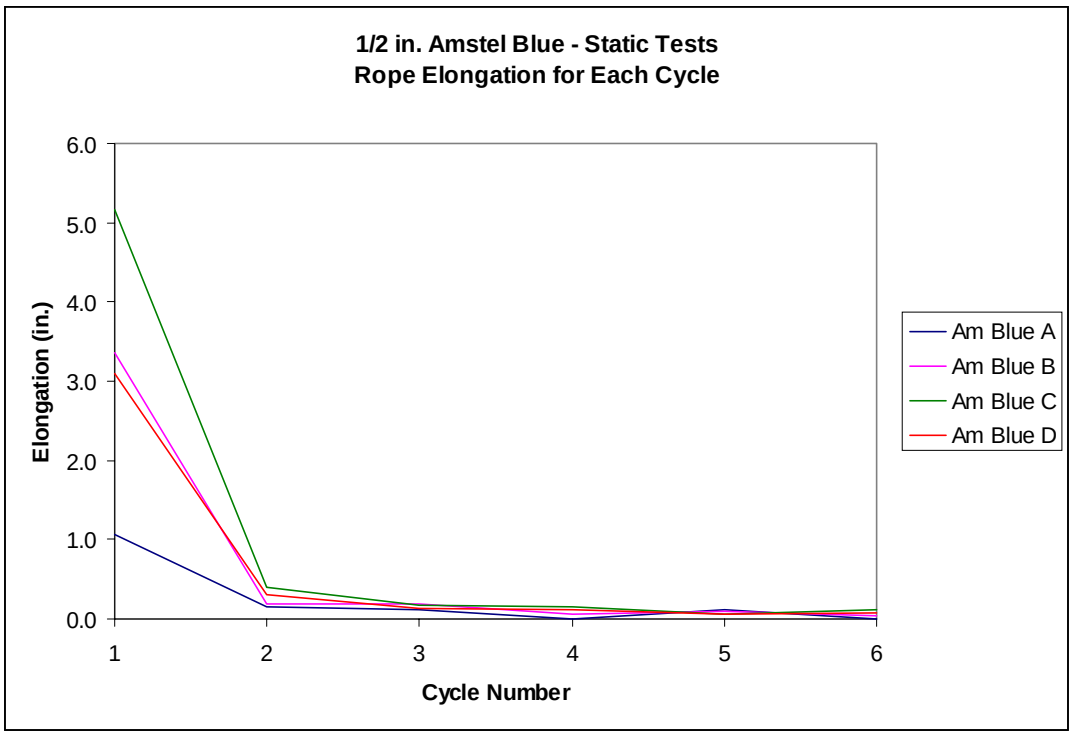


Figure B.2.1: Amsteel Blue – Static Rope Elongation

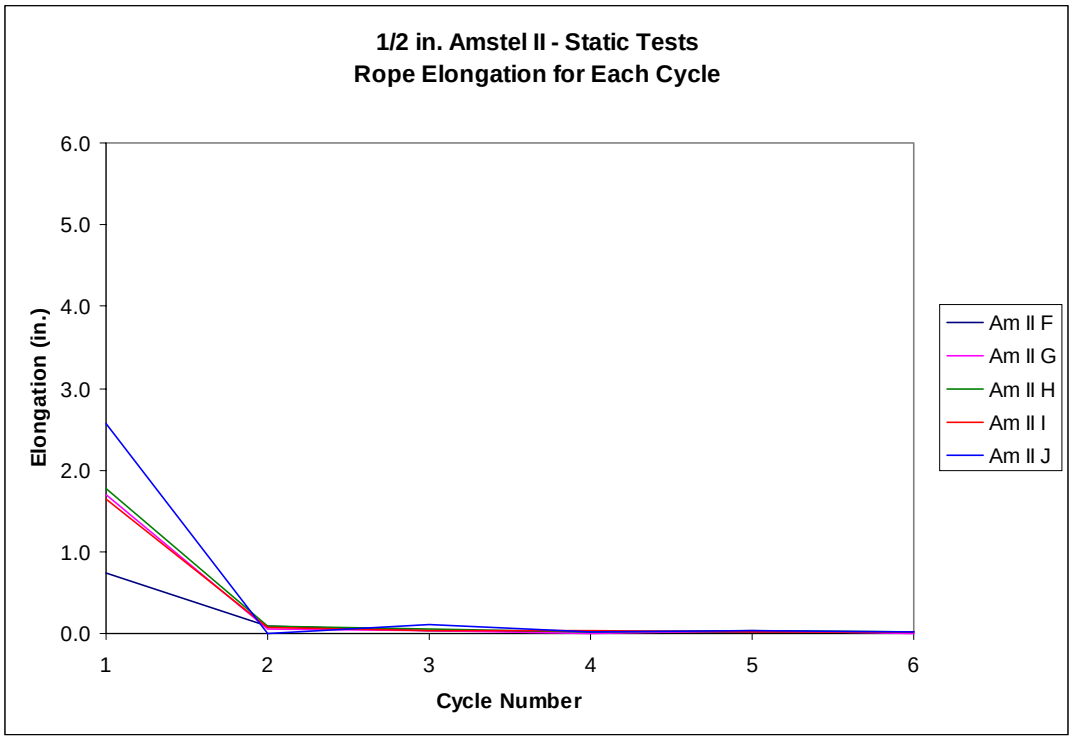


Figure B.2.2: Amsteel II – Static Rope Elongation

## B.3 Maximum Displacements from the Static Tests

| Rope Type | Maximum Displacements (in) | | | | | |
|---|---|---|---|---|---|---|
| | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Cycle 5 | Cycle 6 |
| Amsteel Blue - 1/2" - A | 5.861 | 6.165 | 6.314 | 6.429 | 6.504 | 6.575 |
| Amsteel Blue - 1/2" - B | 3.899 | 4.040 | 4.176 | 4.237 | 4.318 | 4.353 |
| Amsteel Blue - 1/2" - C | 1.726 | 1.828 | 1.890 | 1.932 | 1.980 | 2.005 |
| Amsteel Blue - 1/2" - D | 3.684 | 3.889 | 3.998 | 4.079 | 4.146 | 4.208 |
| Amsteel Blue - 1/2" - E | 5.674 | - | - | - | - | - |
| Amsteel II - 1/2" - F | 1.141 | 1.180 | 1.194 | 1.207 | 1.214 | 1.221 |
| Amsteel II - 1/2" - G | 2.038 | 2.072 | 2.093 | 2.106 | 2.113 | 2.126 |
| Amsteel II - 1/2" - H | 2.149 | 2.196 | 2.217 | 2.247 | 2.251 | 2.271 |
| Amsteel II - 1/2" - I | 1.971 | 2.012 | 2.032 | 2.053 | 2.053 | 2.066 |
| Amsteel II - 1/2" - J | 2.924 | 2.965 | 2.991 | 3.012 | 3.026 | 3.026 |

Table B.3.1: Static Maximum Displacement Values

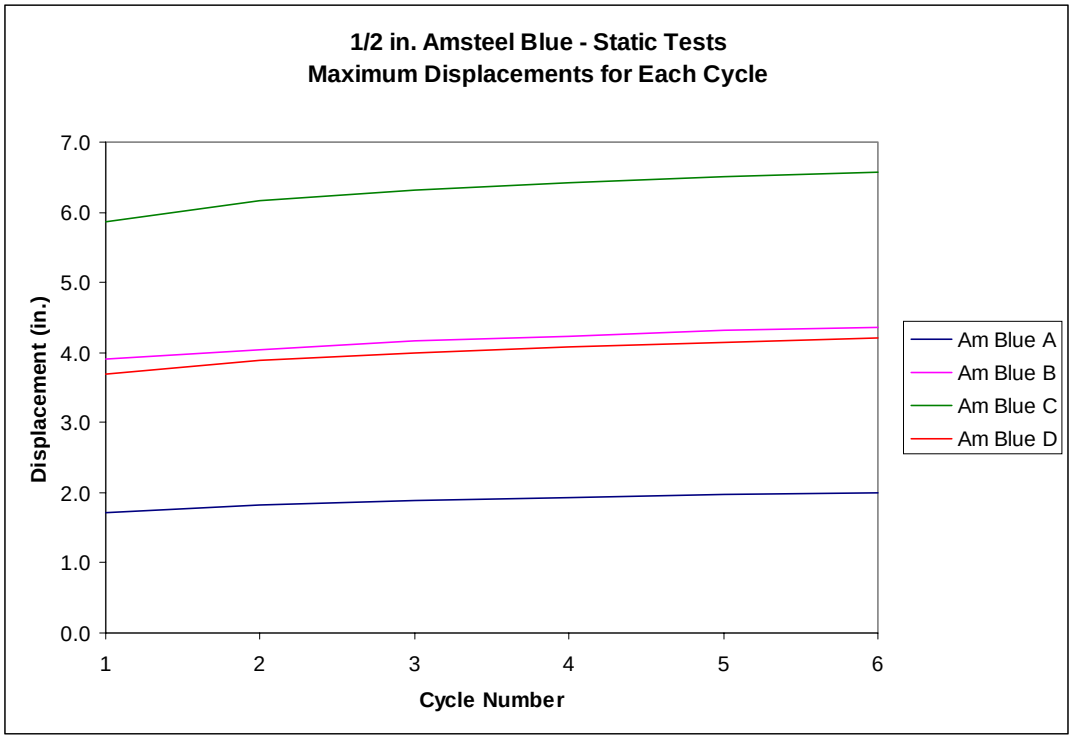


Figure B.3.1: Amsteel Blue – Static Maximum Displacements

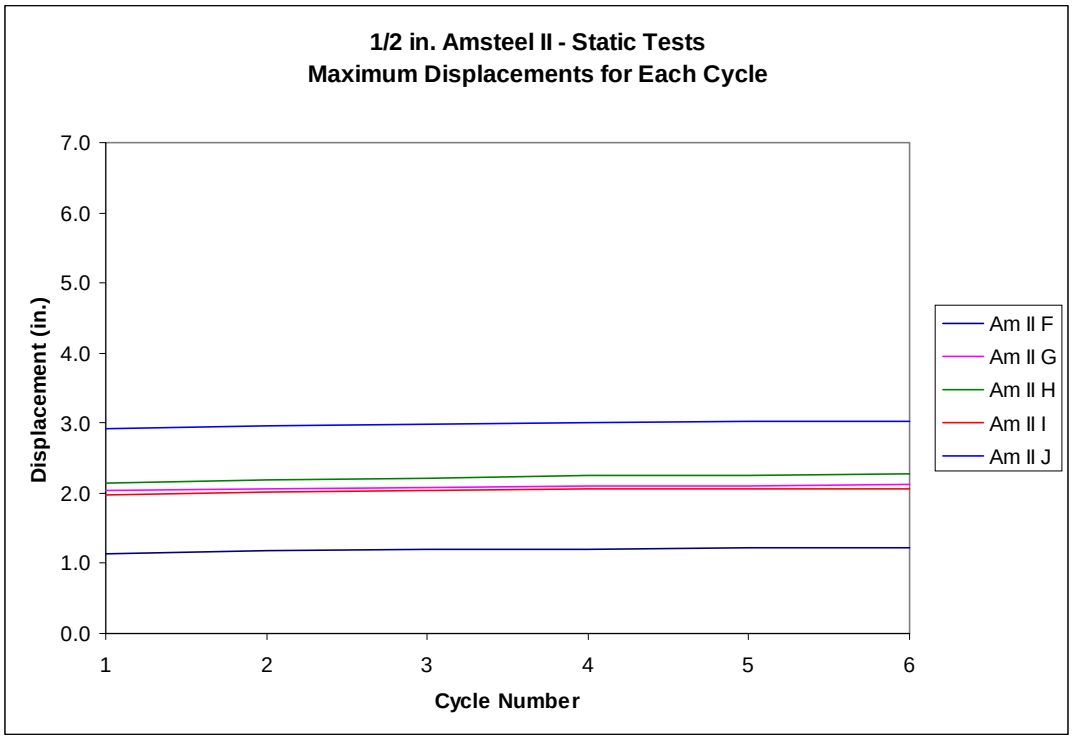


Figure B.3.2: Amsteel II – Static Maximum Displacements

## B.4 Rope Stiffnesses from the Static Tests

| Rope Type | Slope of Load vs. Displacement Curve (k/in.) | | | | | | Rope Stiffness k |
|---|---|---|---|---|---|---|---|
| | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Cycle 5 | Cycle 6 | |
| Amsteel Blue - 1/2" - A | 0.052 | 0.246 | 0.327 | 0.357 | 0.378 | 0.399 | 0.341 |
| Amsteel Blue - 1/2" - B | 0.050 | 0.301 | 0.340 | 0.407 | 0.401 | 0.441 | 0.378 |
| Amsteel Blue - 1/2" - C | 0.210 | 0.342 | 0.379 | 0.416 | 0.416 | 0.444 | 0.399 |
| Amsteel Blue - 1/2" - D | 0.071 | 0.307 | 0.387 | 0.413 | 0.459 | 0.446 | 0.402 |
| Amsteel Blue - 1/2" - E | 0.076 | - | - | - | - | - | - |
| Amsteel II - 1/2" - F | 0.455 | 0.581 | 0.657 | 0.665 | 0.693 | 0.719 | 0.663 |
| Amsteel II - 1/2" - G | 0.273 | 0.621 | 0.692 | 0.753 | 0.736 | 0.781 | 0.717 |
| Amsteel II - 1/2" - H | 0.228 | 0.566 | 0.667 | 0.698 | 0.724 | 0.766 | 0.684 |
| Amsteel II - 1/2" - I | 0.366 | 0.621 | 0.699 | 0.752 | 0.785 | 0.816 | 0.735 |
| Amsteel II - 1/2" - J | 0.237 | 0.578 | 0.613 | 0.706 | 0.694 | 0.775 | 0.673 |

| Rope Type | Average k | Std. Dev. |
|---|---|---|
| Amsteel Blue | 0.380 | 0.028 |
| Amsteel II | 0.694 | 0.030 |

Table B.4.1: Static Rope Stiffness Values

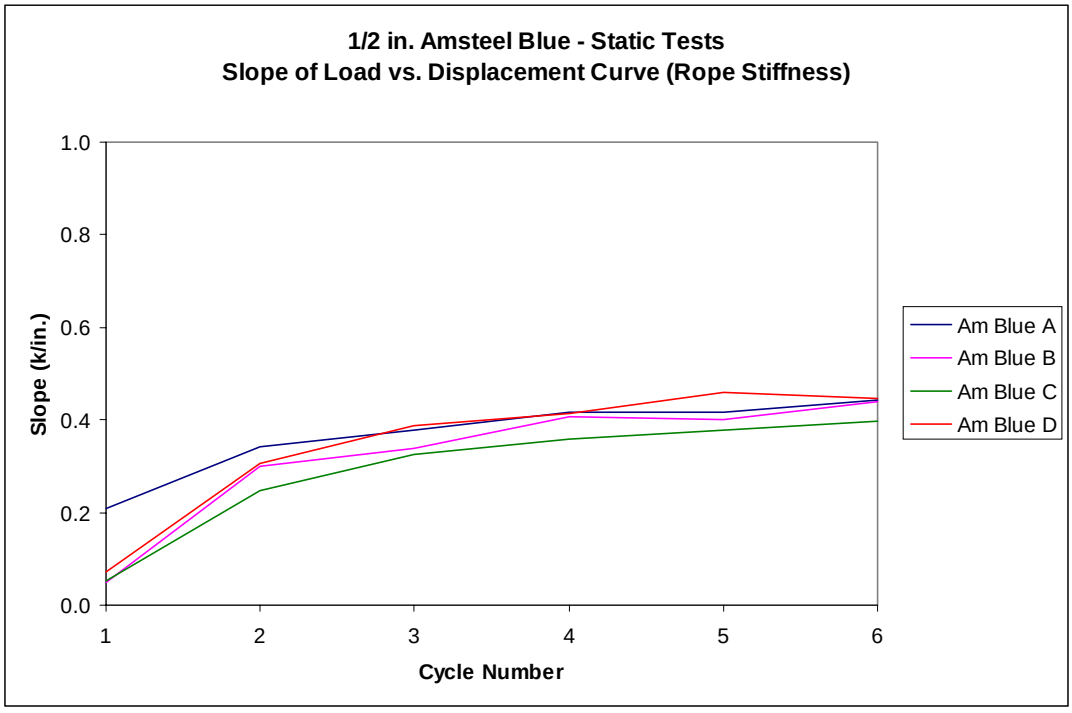


Figure B.4.1: Amsteel Blue – Static Rope Stiffnesses

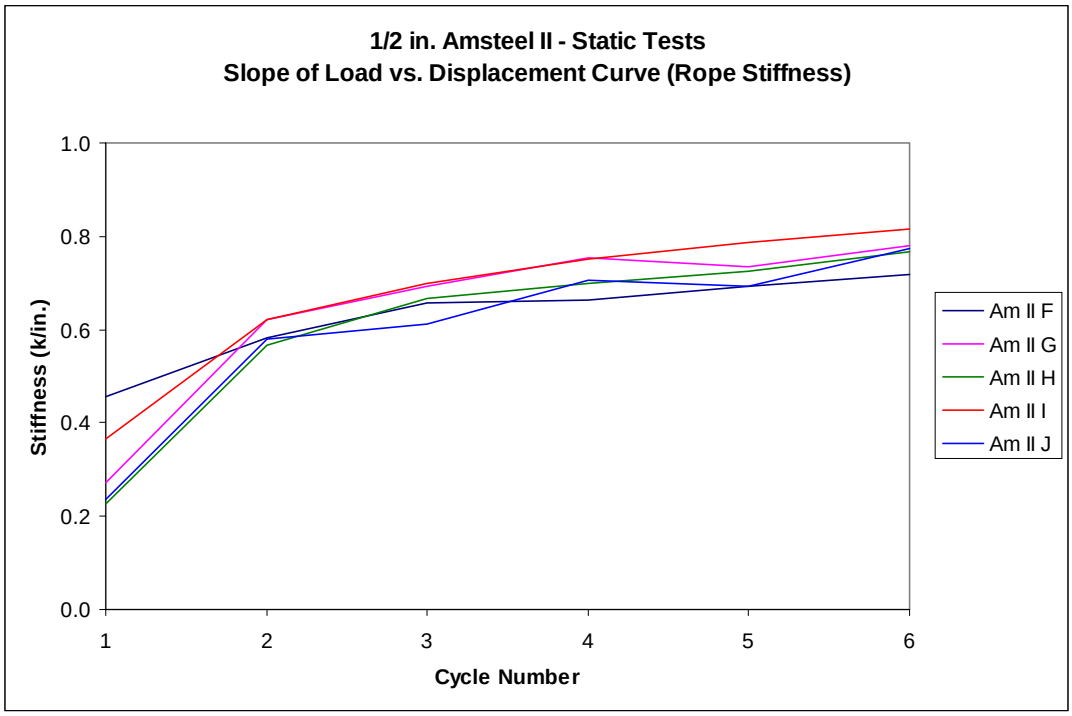


Figure B.4.2: Amsteel II – Static Rope Stiffnesses

## B.5 Area Inside the Static Hysteresis Loops

| Rope Type | Area Under Load vs. Displacement Hysteresis (k-in.) | | | | | | Total Area |
|---|---|---|---|---|---|---|---|
| | Cycle 1 | Cycle 2 | Cycle 3 | Cycle 4 | Cycle 5 | Cycle 6 | |
| Amsteel Blue - 1/2" - A | 0.376 | 0.077 | 0.045 | 0.041 | 0.034 | 0.034 | 0.607 |
| Amsteel Blue - 1/2" - B | 0.311 | 0.046 | 0.043 | 0.028 | 0.030 | 0.022 | 0.481 |
| Amsteel Blue - 1/2" - C | 0.083 | 0.041 | 0.035 | 0.025 | 0.030 | 0.022 | 0.236 |
| Amsteel Blue - 1/2" - D | 0.301 | 0.062 | 0.036 | 0.032 | 0.027 | 0.028 | 0.485 |
| Amsteel Blue - 1/2" - E | 0.323 | - | - | - | - | - | - |
| Amsteel II - 1/2" - F | 0.039 | 0.022 | 0.013 | 0.013 | 0.012 | 0.012 | 0.110 |
| Amsteel II - 1/2" - G | 0.071 | 0.019 | 0.013 | 0.012 | 0.011 | 0.011 | 0.137 |
| Amsteel II - 1/2" - H | 0.080 | 0.021 | 0.015 | 0.014 | 0.012 | 0.013 | 0.155 |
| Amsteel II - 1/2" - I | 0.072 | 0.018 | 0.014 | 0.012 | 0.011 | 0.010 | 0.136 |
| Amsteel II - 1/2" - J | 0.084 | 0.019 | 0.017 | 0.014 | 0.013 | 0.010 | 0.157 |

| Rope Type | Average Area (k-in.) | Std. Dev. |
|---|---|---|
| Amsteel Blue | 0.452 | 0.155 |
| Amsteel II | 0.139 | 0.019 |

Table B.5.1: Areas Inside the Static Hysteresis Loop

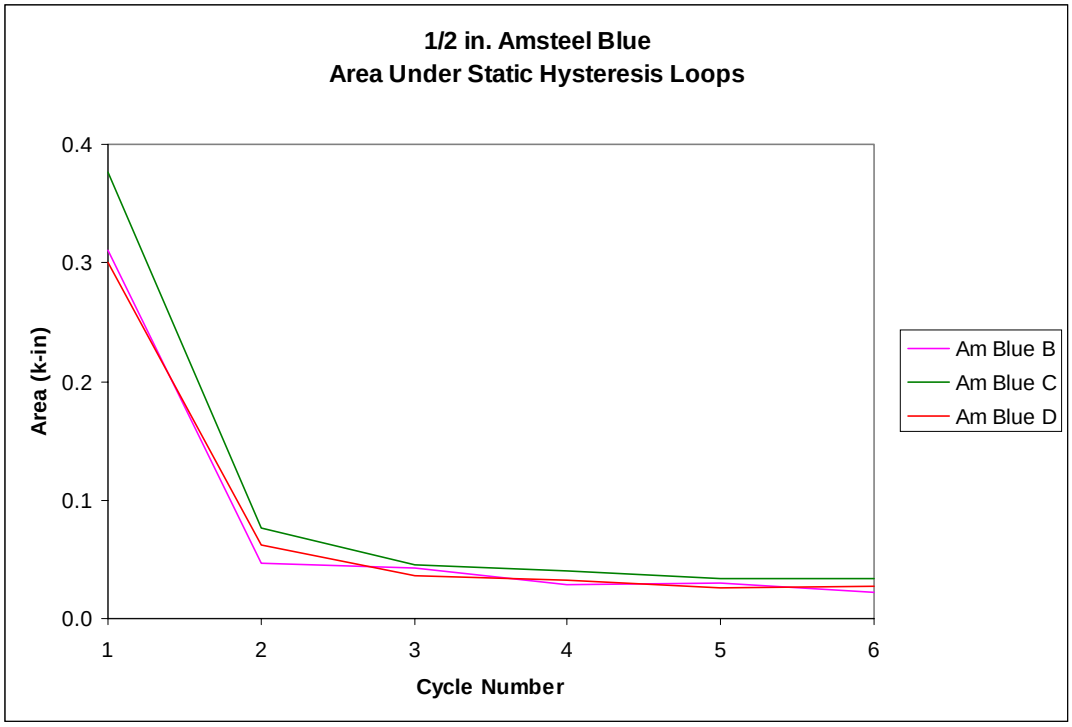


Figure B.5.1: Amsteel Blue – Static Area Trends

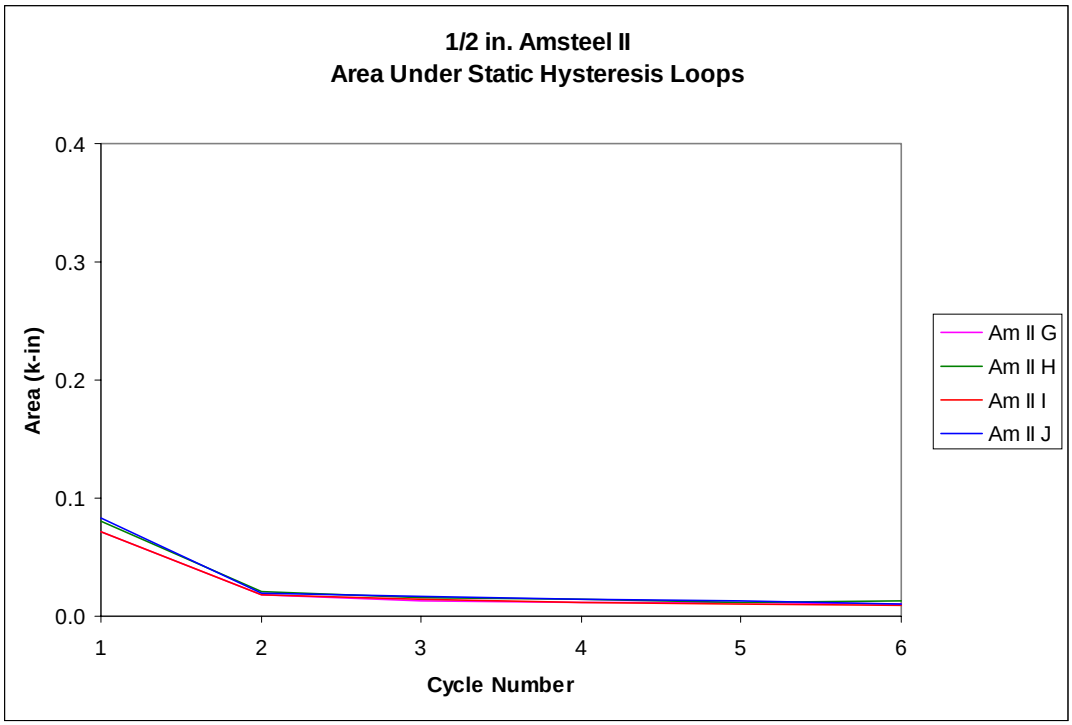


Figure B.5.2: Amsteel II – Static Area Trends

## B.6 Dynamic Rope Elongation

| Dynamic Rope Elongation Comparison | | | |
|---|---|---|---|
| Rope | Computed Dyn. (in.) | Measured Dyn. (in.) | Difference (in.) |
| Am Bl - A | 4.75 | 4.0 | 0.75 |
| Am Bl - B | 4.76 | 5.0 | 0.24 |
| Am Bl - C | error | 4.0 | error |
| Am Bl - D | 4.94 | 4.5 | 0.44 |
| Am Bl - E | 4.40 | 4.5 | 0.10 |
| Am Bl - AA | 7.54 | 8.0 | 0.46 |
| Am Bl - BB | 7.41 | 7.5 | 0.09 |
| Am Bl - CC | error | 8.0 | error |
| Am Bl - DD | 8.02 | 8.5 | 0.48 |
| Am Bl - EE | 7.99 | 8.0 | 0.01 |

| Dynamic Rope Elongation Comparison | | | |
|---|---|---|---|
| Rope | Computed Dyn. (in.) | Measured Dyn. (in.) | Difference (in.) |
| Am II - F | 0.52 | 1.0 | 0.48 |
| Am II - G | 1.69 | 1.5 | 0.19 |
| Am II - H | 1.50 | 1.5 | 0.00 |
| Am II - I | 1.64 | 1.5 | 0.14 |
| Am II - J | 1.49 | 1.0 | 0.49 |
| Am II - FF | 1.33 | 2.0 | error |
| Am II - GG | 1.83 | 2.0 | 0.17 |
| Am II - HH | 2.46 | 2.5 | 0.04 |
| Am II - II | 2.90 | 2.5 | 0.40 |
| Am II - JJ | 3.50 | 3.0 | 0.50 |

Table B.6.1: Dynamic Rope Elongation Comparison

| Amsteel Blue - Static Tests | | | | |
|---|---|---|---|---|
| Rope | Length (in.) | | Δ Length (in.) | % Change |
| | Before | After | | |
| A | 107.0 | 111.5 | 4.5 | 4.2 |
| B | 108.0 | 112.0 | 4.0 | 3.7 |
| C | 107.0 | 112.5 | 5.5 | 5.1 |
| D | 108.5 | 112.0 | 3.5 | 3.2 |
| E | 109.0 | 114.0 | 5.0 | 4.6 |

| Amsteel II - Static Tests | | | | |
|---|---|---|---|---|
| Rope | Length (in.) | | Δ Length (in.) | % Change |
| | Before | After | | |
| F | 108.5 | 110.5 | 2.0 | 1.8 |
| G | 108.5 | 110.5 | 2.0 | 1.8 |
| H | 107.5 | 109.5 | 2.0 | 1.9 |
| I | 108.0 | 110.0 | 2.0 | 1.9 |
| J | 107.5 | 110.0 | 2.5 | 2.3 |

| Amsteel Blue - Dynamic Tests | | | | |
|---|---|---|---|---|
| Rope | Length (in.) | | Δ Length (in.) | % Change |
| | Before | After | | |
| A | 111.5 | 116.5 | 5.0 | 4.5 |
| B | 112.0 | 117.0 | 5.0 | 4.5 |
| C | 112.5 | 116.5 | 4.0 | 3.6 |
| D | 112.0 | 116.5 | 4.5 | 4.0 |
| E | 114.0 | 118.5 | 4.5 | 3.9 |
| AA | 108.0 | 116.0 | 8.0 | 7.4 |
| BB | 108.5 | 116.0 | 7.5 | 6.9 |
| CC | 107.5 | 116.5 | 9.0 | 8.4 |
| DD | 108.0 | 116.5 | 8.5 | 7.9 |
| EE | 108.5 | 116.5 | 8.0 | 7.4 |

| Amsteel II - Dynamic Tests | | | | |
|---|---|---|---|---|
| Rope | Length (in.) | | Δ Length (in.) | % Change |
| | Before | After | | |
| F | 110.5 | 111.5 | 1.0 | 0.9 |
| G | 110.5 | 112.0 | 1.5 | 1.4 |
| H | 109.5 | 111.0 | 1.5 | 1.4 |
| I | 110.0 | 111.5 | 1.5 | 1.4 |
| J | 110.0 | 111.0 | 1.0 | 0.9 |
| FF | 109.5 | 111.5 | 2.0 | 1.8 |
| GG | 109.0 | 111.0 | 2.0 | 1.8 |
| HH | 108.5 | 111.0 | 2.5 | 2.3 |
| II | 108.0 | 110.5 | 2.5 | 2.3 |
| JJ | 108.5 | 111.5 | 3.0 | 2.8 |

| Amsteel Blue - All Tests | | | | |
|---|---|---|---|---|
| Rope | Length (in.) | | Δ Length (in.) | % Change |
| | Before | After | | |
| A | 107.0 | 116.5 | 9.5 | 8.9 |
| B | 108.0 | 117 | 9.0 | 8.3 |
| C | 107.0 | 116.5 | 9.5 | 8.9 |
| D | 108.5 | 116.5 | 8.0 | 7.4 |
| E | 109.0 | 118.5 | 9.5 | 8.7 |
| AA | 108.0 | 116.0 | 8.0 | 7.4 |
| BB | 108.5 | 116 | 7.5 | 6.9 |
| CC | 107.5 | 116.5 | 9.0 | 8.4 |
| DD | 108.0 | 116.5 | 8.5 | 7.9 |
| EE | 108.5 | 116.5 | 8.0 | 7.4 |

| Amsteel II - All Tests | | | | |
|---|---|---|---|---|
| Rope | Length (in.) | | Δ Length (in.) | % Change |
| | Before | After | | |
| F | 108.5 | 111.5 | 3.0 | 2.8 |
| G | 108.5 | 112.0 | 3.5 | 3.2 |
| H | 107.5 | 111.0 | 3.5 | 3.3 |
| I | 108.0 | 111.5 | 3.5 | 3.2 |
| J | 107.5 | 111.0 | 3.5 | 3.3 |
| FF | 109.5 | 111.5 | 2.0 | 1.8 |
| GG | 109.0 | 111.0 | 2.0 | 1.8 |
| HH | 108.5 | 111.0 | 2.5 | 2.3 |
| II | 108.0 | 110.5 | 2.5 | 2.3 |
| JJ | 108.5 | 111.5 | 3.0 | 2.8 |

Table B.6.2: Change in Rope Length throughout Testing

## B.7 Rope Stiffnesses from the Dynamic Tests

| Dynamic Rope Stiffness Values (k/in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 0.237 | 0.359 | - | 0.254 | 0.190 | 0.212 | 0.202 | - | 0.115 | 0.092 |
| 2 | 0.533 | 0.811 | - | 0.463 | 0.728 | 0.585 | 0.545 | - | 0.365 | 0.215 |
| 3 | 0.945 | 1.410 | - | 0.565 | 0.962 | 1.327 | 1.122 | - | 1.129 | 0.405 |
| 4 | 1.313 | 1.877 | - | 1.081 | 1.634 | 1.834 | 1.772 | - | 1.814 | 0.529 |
| 5 | 1.438 | 2.294 | - | 1.033 | 1.709 | 2.227 | 1.774 | - | 1.736 | 0.996 |
| 6 | 1.839 | 2.374 | - | 1.330 | 1.734 | 2.175 | 1.841 | - | 2.218 | 1.003 |
| 7 | 1.942 | 2.490 | - | 1.498 | 1.959 | 2.229 | 2.306 | - | 2.333 | 1.311 |
| 8 | 2.274 | 3.735 | - | 1.951 | 1.944 | 2.503 | 2.475 | - | 2.694 | 1.433 |
| 9 | 2.467 | 5.652 | - | 1.953 | 1.918 | 2.914 | 2.619 | - | 2.578 | 1.435 |
| 10 | 2.565 | 2.585 | - | 0.923 | 1.929 | 2.963 | 2.581 | - | 3.129 | 1.217 |
| 11 | 2.645 | 3.266 | - | 2.466 | 1.966 | 2.689 | 2.748 | - | 3.117 | 1.288 |
| 12 | 2.714 | 2.260 | - | 2.550 | 1.999 | 2.874 | 2.649 | - | 3.149 | 1.670 |
| 13 | 2.815 | 2.815 | - | 2.510 | 2.166 | 2.987 | 2.786 | - | 5.066 | 1.640 |
| 14 | 2.934 | 2.767 | - | 2.771 | 2.402 | 3.073 | 2.921 | - | 3.005 | 1.308 |
| 15 | 2.418 | 2.962 | - | 2.780 | 2.372 | 3.205 | 2.912 | - | 3.360 | 1.601 |
| 16 | 2.342 | 2.997 | - | 2.625 | 2.424 | 2.921 | 2.978 | - | 2.952 | 1.674 |
| 17 | 2.518 | 3.043 | - | 2.661 | 2.409 | 3.167 | 3.056 | - | 2.924 | 1.641 |
| 18 | 2.726 | 3.052 | - | 3.001 | 2.451 | 3.030 | 3.102 | - | 3.055 | 1.612 |
| 19 | 2.445 | 3.052 | - | 3.022 | 2.536 | 3.223 | 3.174 | - | 3.161 | 1.808 |
| 20 | 2.914 | 3.132 | - | 2.342 | 2.615 | 3.342 | 3.023 | - | 3.301 | 1.519 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 1.061 | 1.423 | 1.211 | 1.032 | 0.718 | - | 0.856 | 2.029 | 0.731 | 0.720 |
| 2 | 2.126 | 2.386 | 2.180 | 1.751 | 1.662 | 1.584 | 2.559 | 2.494 | 1.741 | 1.746 |
| 3 | 2.281 | 2.807 | 2.541 | 1.983 | 2.068 | 2.422 | 3.105 | 2.856 | 2.018 | 2.730 |
| 4 | 2.837 | 2.732 | 2.096 | 1.999 | 2.052 | 3.129 | 2.971 | 2.821 | 2.185 | 2.892 |
| 5 | 3.015 | 2.940 | 2.868 | 2.252 | 2.226 | 3.259 | 3.255 | 2.927 | 2.368 | 2.353 |
| 6 | 2.860 | 3.023 | 2.885 | 2.175 | 1.930 | 3.039 | 3.295 | 3.042 | 2.430 | 2.890 |
| 7 | 2.778 | 2.905 | 2.975 | 2.299 | 2.253 | 3.186 | 3.341 | 3.052 | 2.629 | 2.810 |
| 8 | 2.857 | 2.989 | 3.006 | 2.240 | 2.237 | 3.279 | 3.301 | 3.292 | 2.581 | 2.545 |
| 9 | 2.999 | 2.892 | 3.167 | 2.331 | 2.395 | 3.280 | 3.388 | 3.222 | 2.529 | 2.762 |
| 10 | 2.981 | 3.089 | 3.269 | 2.606 | 2.490 | 3.354 | 3.583 | 3.198 | 2.604 | 2.596 |
| 11 | 2.863 | 2.957 | 3.342 | 2.567 | 2.415 | 3.189 | 3.469 | 3.153 | 2.615 | 2.899 |
| 12 | 2.802 | 3.101 | 3.224 | 2.522 | 2.412 | 3.484 | 3.498 | 2.894 | 2.619 | 2.591 |
| 13 | 2.944 | 3.163 | 3.225 | 2.509 | 2.403 | 3.352 | 3.563 | 3.166 | 2.596 | 2.663 |
| 14 | 2.942 | 3.114 | 3.247 | 2.640 | 2.410 | 3.308 | 3.513 | 3.170 | 2.638 | 2.854 |
| 15 | 2.845 | 2.964 | 3.484 | 2.543 | 2.427 | 3.294 | 3.459 | 3.239 | 2.683 | 2.861 |
| 16 | 2.442 | 3.055 | 3.473 | 2.604 | 2.391 | 3.343 | 3.580 | 3.090 | 2.722 | 2.722 |
| 17 | 2.753 | 3.073 | 3.428 | 2.721 | 2.392 | 3.363 | 3.531 | 3.129 | 2.780 | 2.501 |
| 18 | 2.790 | 3.019 | 3.446 | 2.573 | 2.363 | 3.119 | 3.549 | 3.163 | 2.667 | 2.882 |
| 19 | 2.915 | 3.156 | 3.536 | 2.709 | 2.433 | 3.417 | 3.523 | 3.273 | 2.699 | 2.740 |
| 20 | 2.920 | 3.115 | 3.501 | 2.708 | 2.473 | 3.444 | 3.536 | 3.176 | 2.753 | 2.749 |

Table B.7.1: Dynamic Rope Stiffness Values

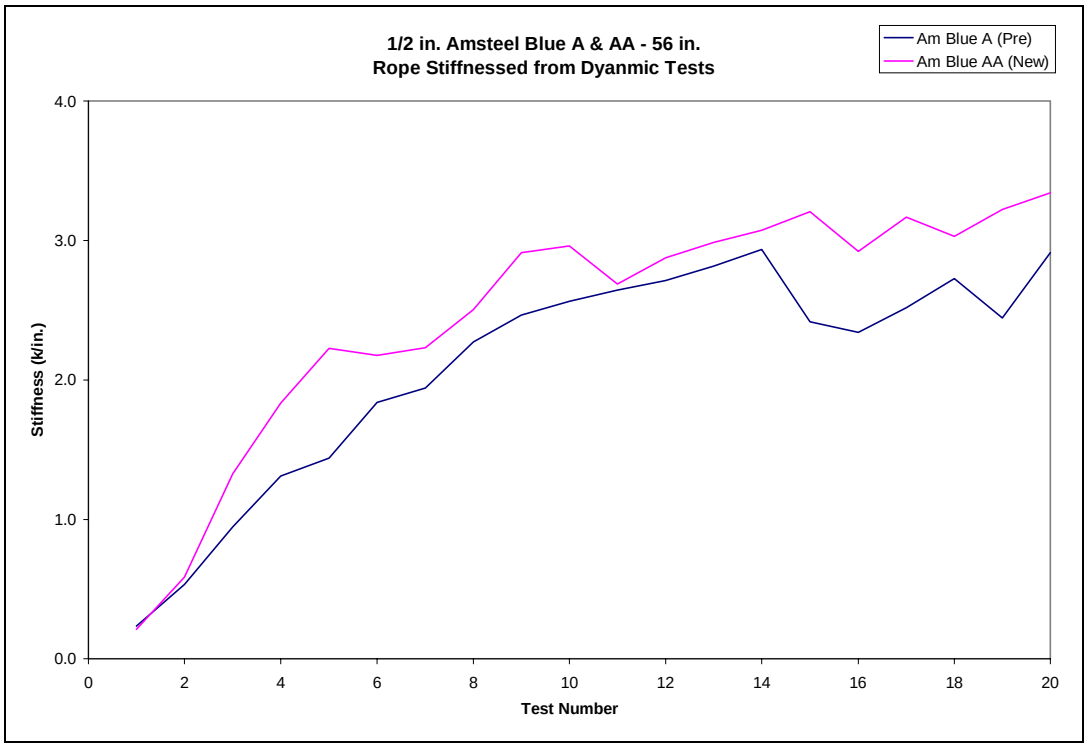


Figure B.7.1: Amsteel Blue A and AA – Dynamic Rope Stiffnesses

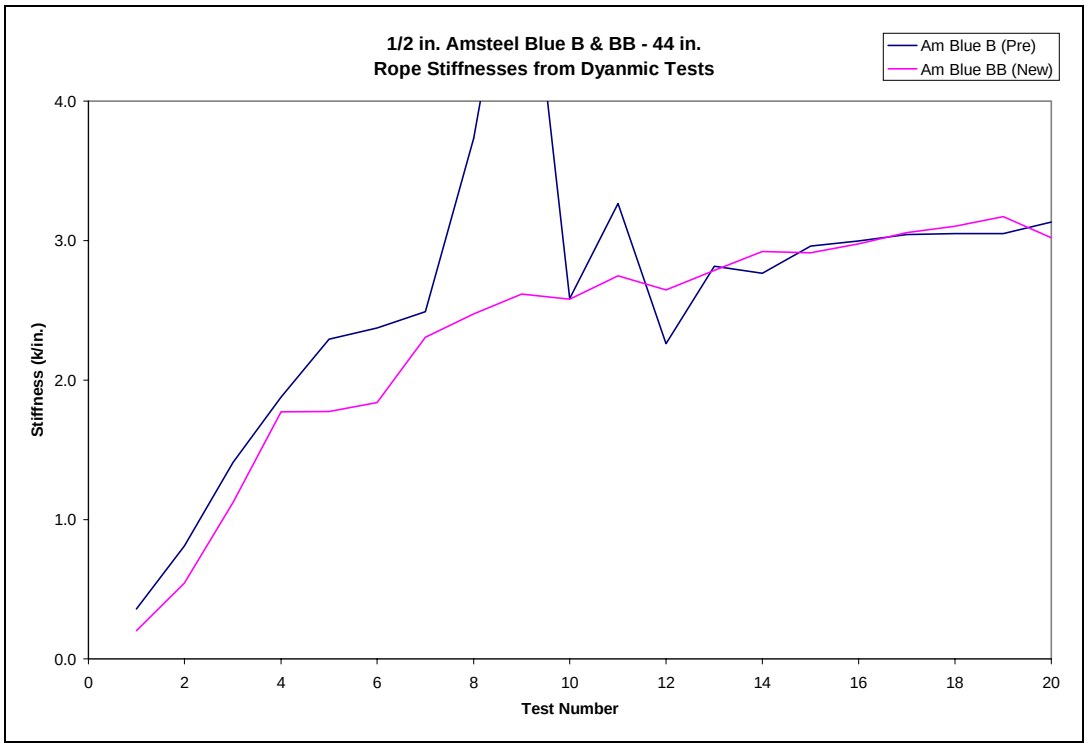


Figure B.7.2: Amsteel Blue B and BB – Dynamic Rope Stiffnesses

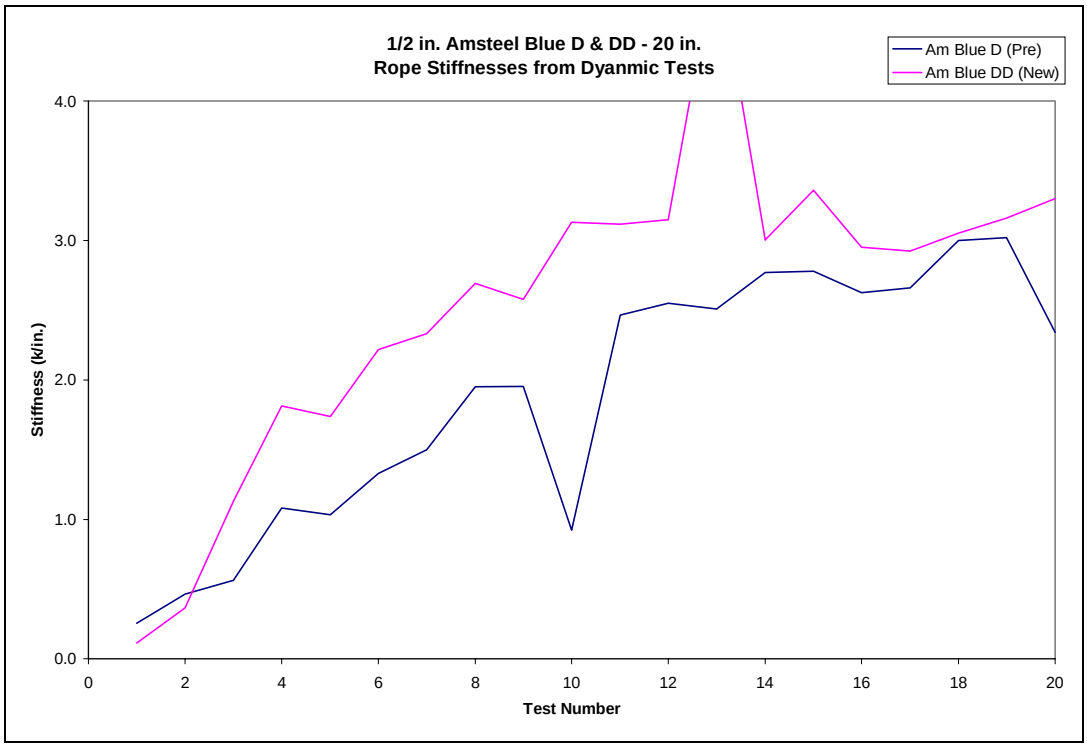


Figure B.7.3: Amsteel Blue D and DD – Dynamic Rope Stiffnesses

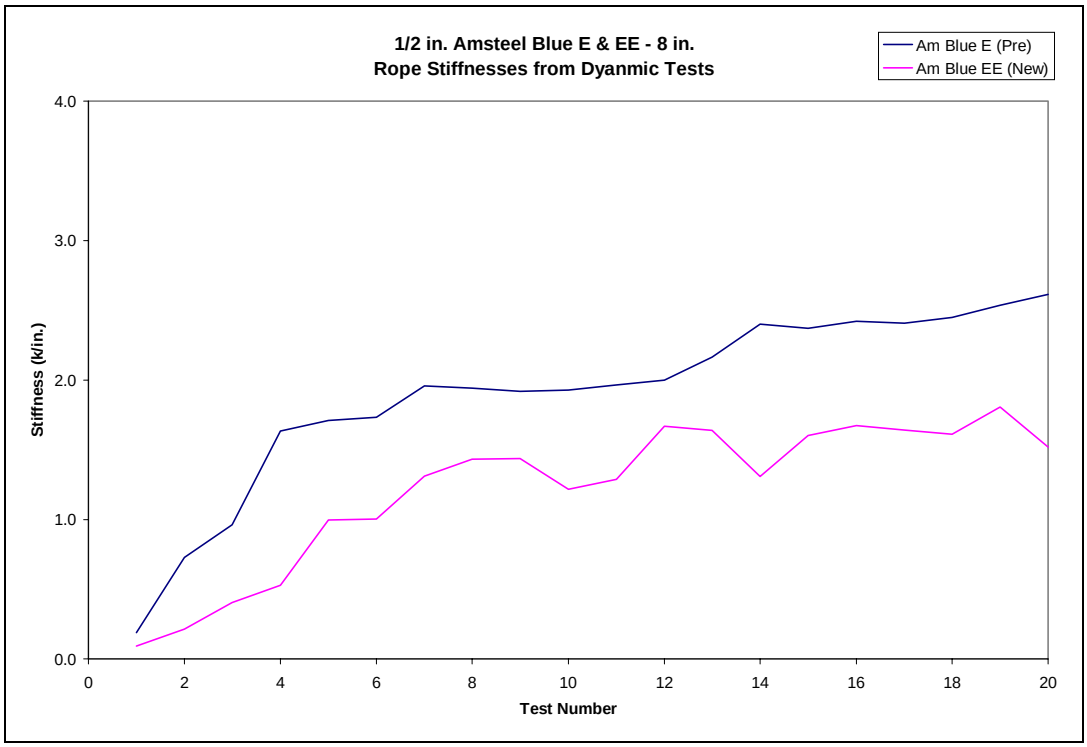


Figure B.7.4: Amsteel Blue E and EE – Dynamic Rope Stiffnesses

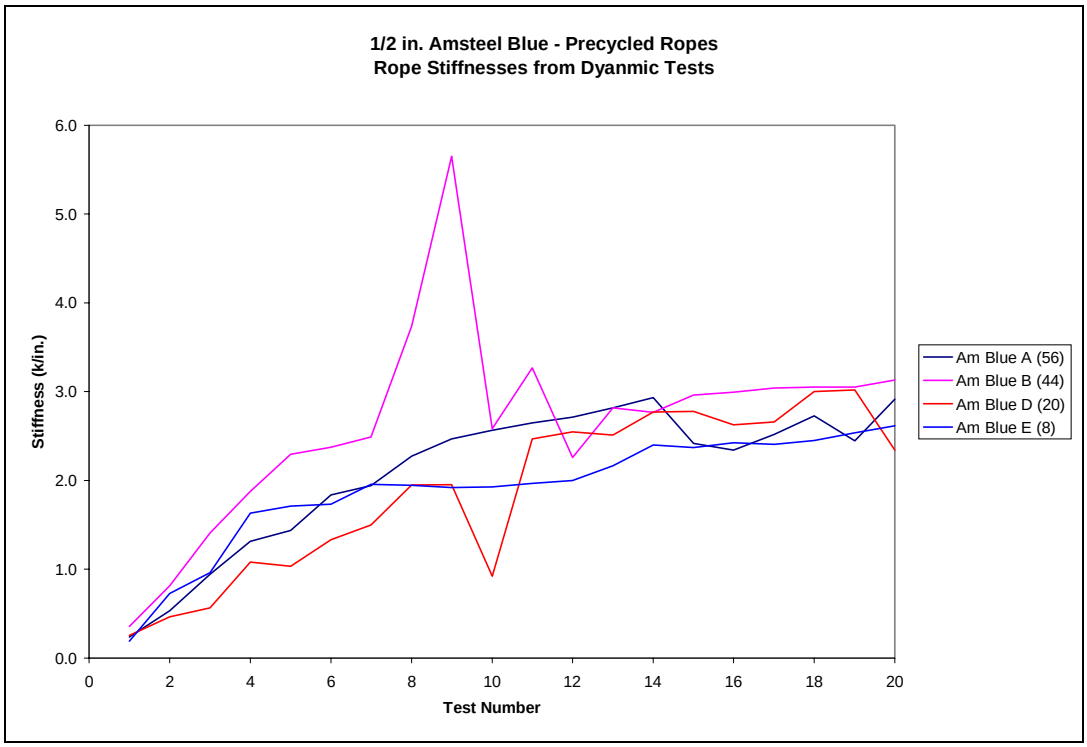


Figure B.7.5: Amsteel Blue – Precycled Ropes – Dynamic Rope Stiffnesses

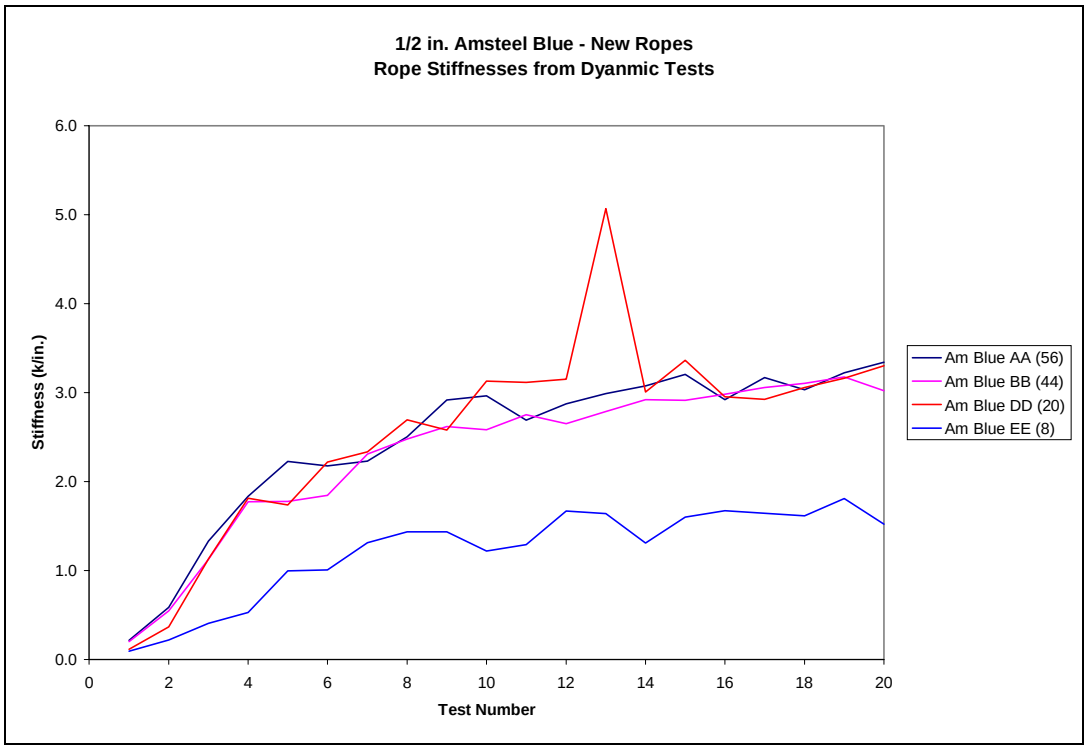


Figure B.7.6: Amsteel Blue – New Ropes – Dynamic Rope Stiffnesses

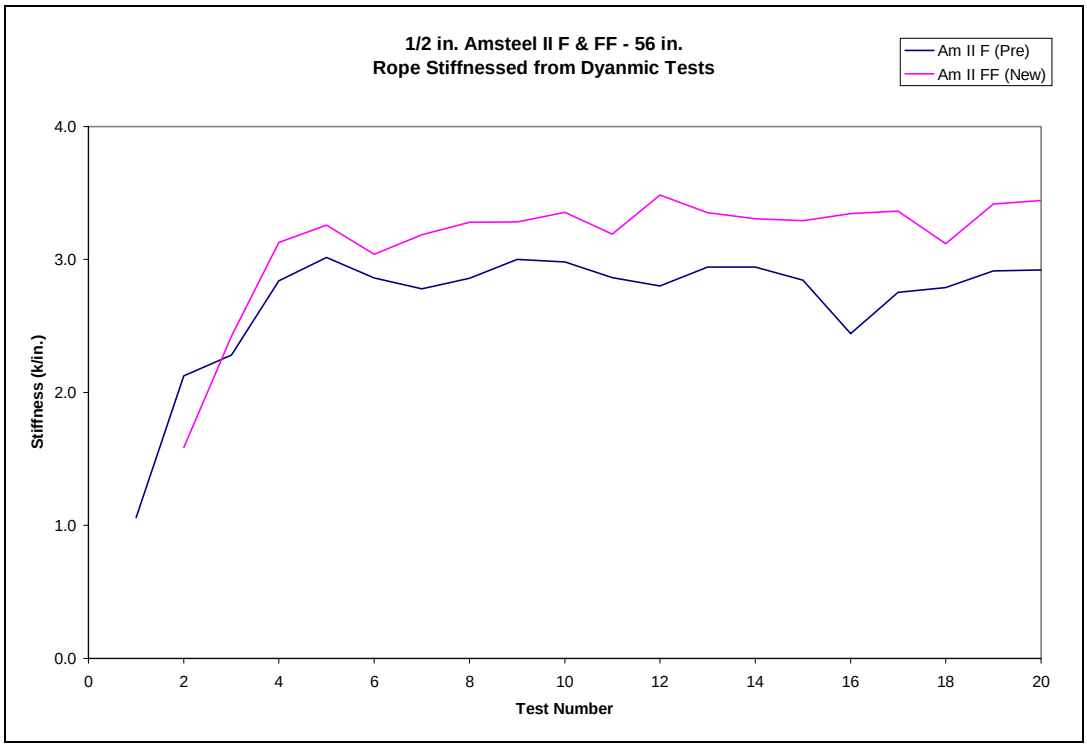


Figure B.7.7: Amsteel II F and FF – Dynamic Rope Stiffnesses

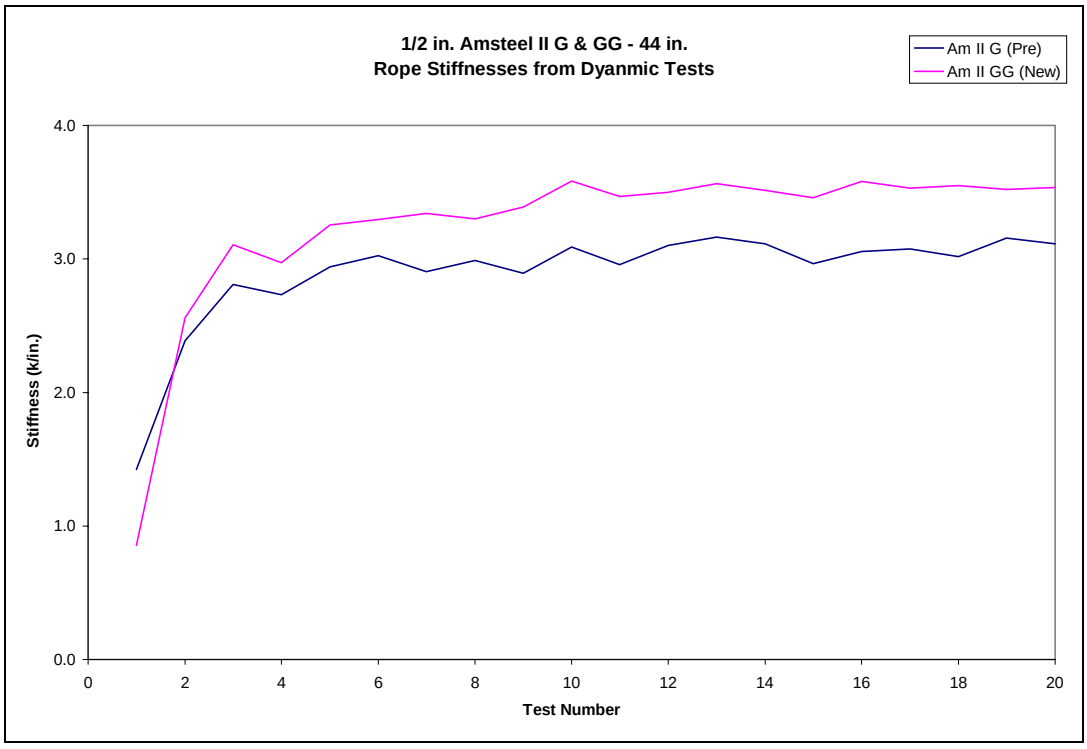


Figure B.7.8: Amsteel II G and GG – Dynamic Rope Stiffnesses

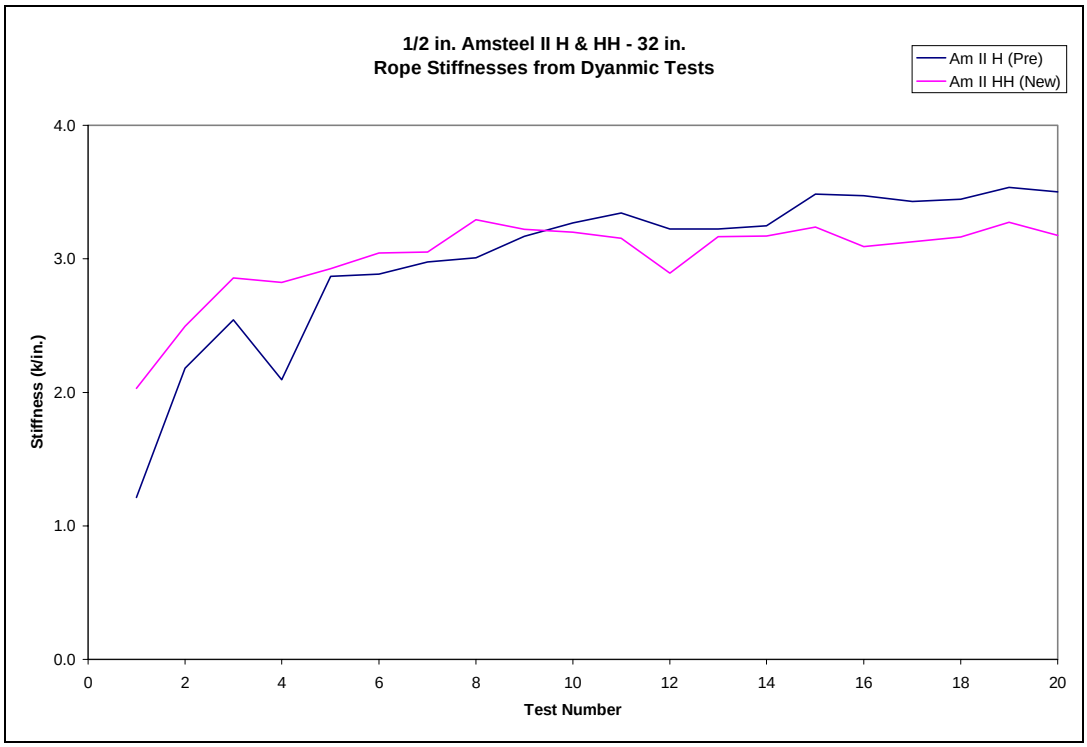


Figure B.7.9: Amsteel II H and HH – Dynamic Rope Stiffnesses

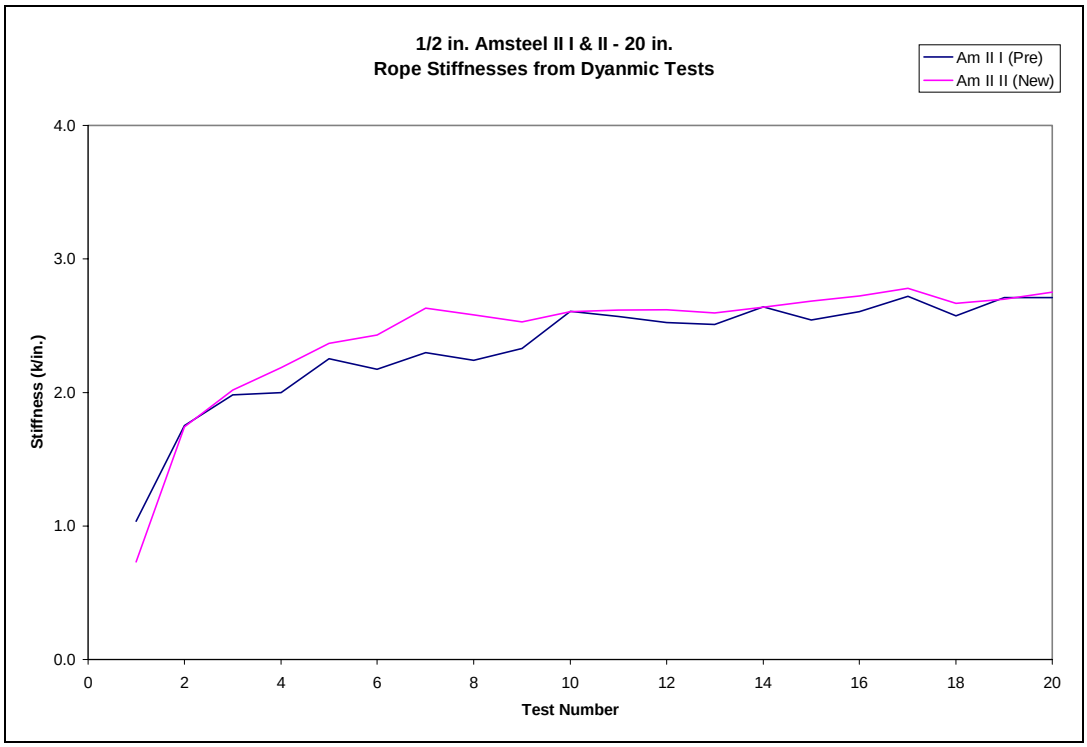


Figure B.7.10: Amsteel II I and II – Dynamic Rope Stiffnesses

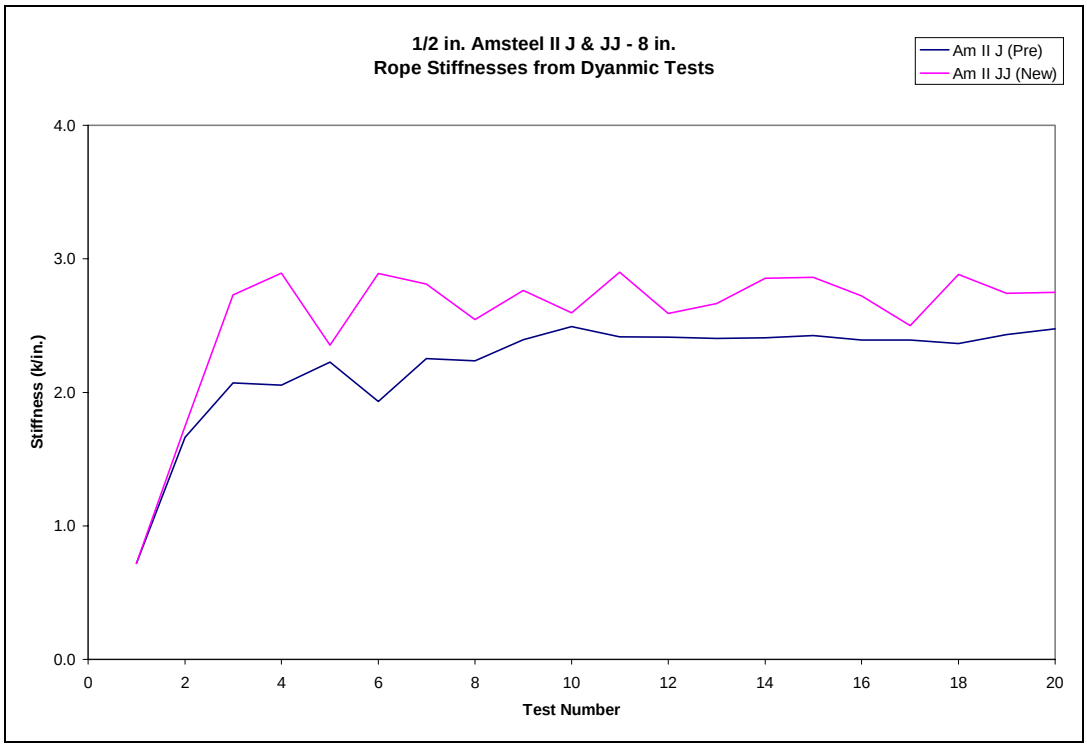


Figure B.7.11: Amsteel II J and JJ – Dynamic Rope Stiffnesses

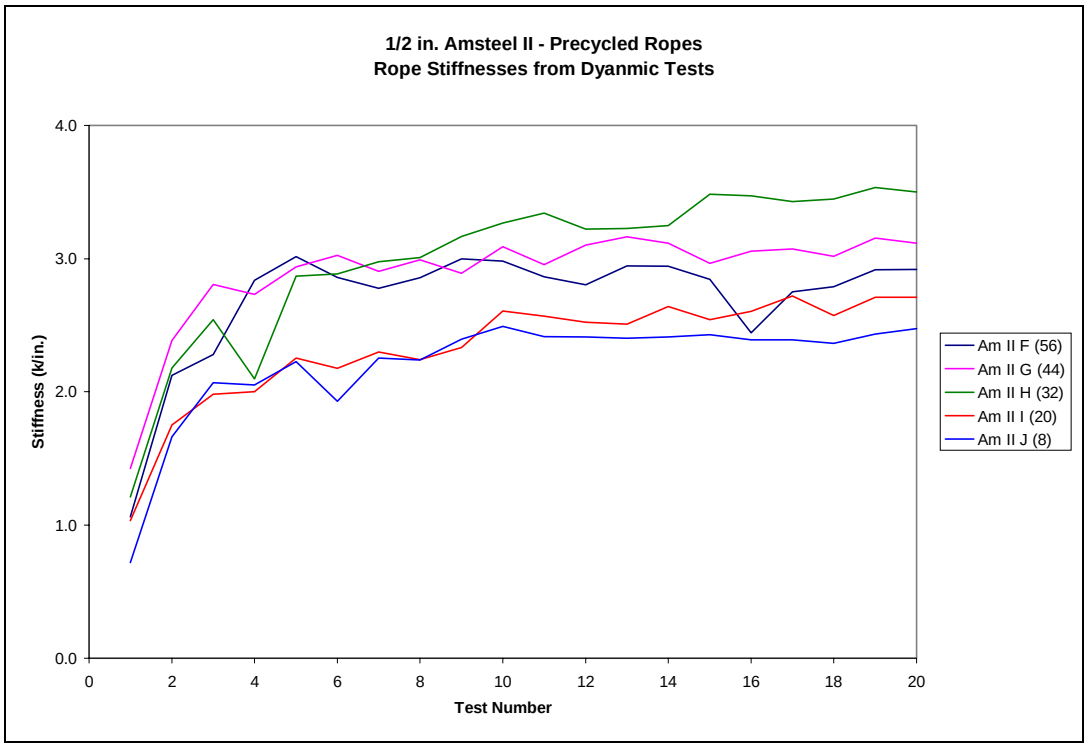


Figure B.7.12: Amsteel II – Precycled Ropes – Dynamic Rope Stiffnesses

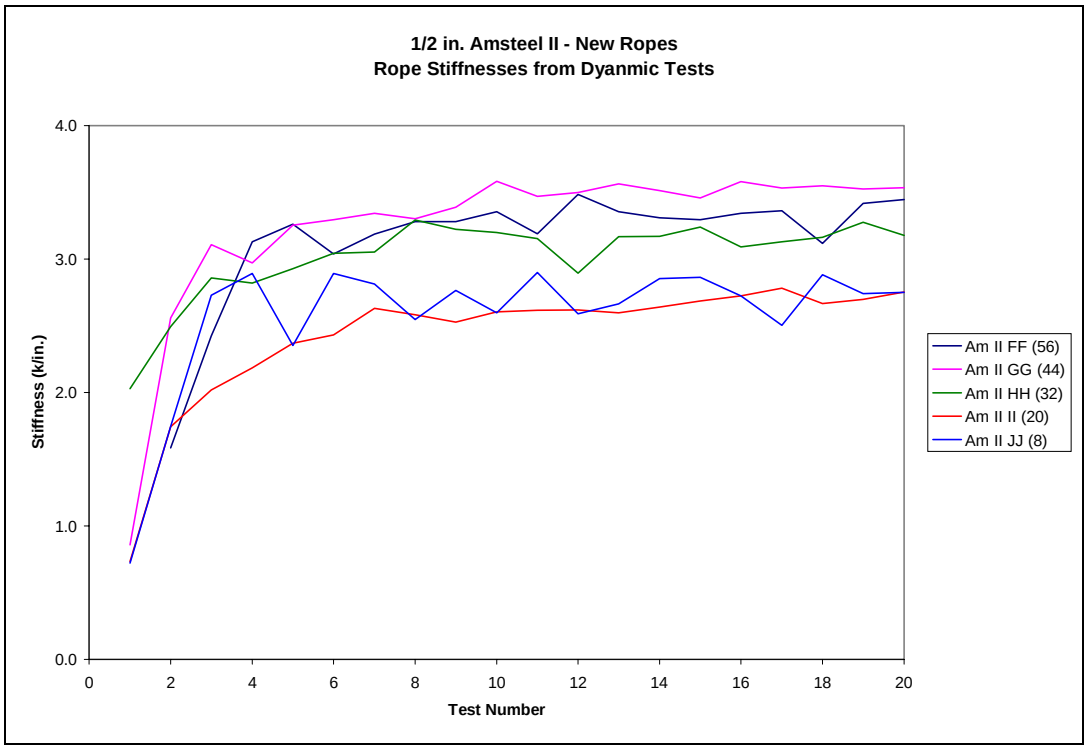


Figure B.7.13: Amsteel II – New Ropes – Dynamic Rope Stiffnesses

## B.8 Pulse Durations from the Dynamic Tests

| Pulse Duration Values (sec) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 0.0880 | 0.0735 | - | 0.0935 | 0.0935 | 0.1090 | 0.1025 | - | 0.1190 | 0.1575 |
| 2 | 0.0685 | 0.0645 | - | 0.0750 | 0.0980 | 0.0695 | 0.0770 | - | 0.0740 | 0.1045 |
| 3 | 0.0650 | 0.0585 | - | 0.0645 | 0.0675 | 0.0620 | 0.0610 | - | 0.0730 | 0.0830 |
| 4 | 0.0650 | 0.0605 | - | 0.0575 | 0.0855 | 0.0650 | 0.0680 | - | 0.0665 | 0.0795 |
| 5 | 0.0605 | 0.0585 | - | 0.0655 | 0.0705 | 0.0490 | 0.0590 | - | 0.0640 | 0.0845 |
| 6 | 0.0535 | 0.0645 | - | 0.0510 | 0.0700 | 0.0645 | 0.0620 | - | 0.0645 | 0.0835 |
| 7 | 0.0555 | 0.0585 | - | 0.0485 | 0.0705 | 0.0640 | 0.0610 | - | 0.0645 | 0.0815 |
| 8 | 0.0520 | 0.0565 | - | 0.0665 | 0.0705 | 0.0515 | 0.0590 | - | 0.0640 | 0.0850 |
| 9 | 0.0555 | 0.0565 | - | 0.0670 | 0.0710 | 0.0540 | 0.0585 | - | 0.0635 | 0.0815 |
| 10 | 0.0610 | 0.0540 | - | 0.0680 | 0.0695 | 0.0470 | 0.0615 | - | 0.0630 | 0.0950 |
| 11 | 0.0585 | 0.0565 | - | 0.0650 | 0.0650 | 0.0605 | 0.0555 | - | 0.0575 | 0.0800 |
| 12 | 0.0505 | 0.0705 | - | 0.0660 | 0.0670 | 0.0560 | 0.0570 | - | 0.0635 | 0.0810 |
| 13 | 0.0515 | 0.0545 | - | 0.0630 | 0.0680 | 0.0505 | 0.0595 | - | 0.0605 | 0.0870 |
| 14 | 0.0520 | 0.0685 | - | 0.0655 | 0.0675 | 0.0500 | 0.0565 | - | 0.0635 | 0.0580 |
| 15 | 0.0550 | 0.0550 | - | 0.0660 | 0.0680 | 0.0515 | 0.0580 | - | 0.0635 | 0.0835 |
| 16 | 0.0495 | 0.0550 | - | 0.0590 | 0.0655 | 0.0500 | 0.0600 | - | 0.0640 | 0.0765 |
| 17 | 0.0505 | 0.0605 | - | 0.0645 | 0.0690 | 0.0515 | 0.0575 | - | 0.0615 | 0.0825 |
| 18 | 0.0515 | 0.0545 | - | 0.0575 | 0.0685 | 0.0585 | 0.0550 | - | 0.0630 | 0.0855 |
| 19 | 0.0495 | 0.0585 | - | 0.0625 | 0.0675 | 0.0500 | 0.0575 | - | 0.0570 | 0.0785 |
| 20 | 0.0485 | 0.0550 | - | 0.0565 | 0.0665 | 0.0515 | 0.0565 | - | 0.0620 | 0.0550 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 0.0650 | 0.0615 | 0.0650 | 0.0560 | 0.0745 | - | 0.0605 | 0.0610 | 0.0780 | 0.0815 |
| 2 | 0.0565 | 0.0580 | 0.0655 | 0.0600 | 0.0785 | 0.0520 | 0.0580 | 0.0600 | 0.0720 | 0.0695 |
| 3 | 0.0480 | 0.0540 | 0.0605 | 0.0635 | 0.0745 | 0.0555 | 0.0570 | 0.0625 | 0.0755 | 0.0630 |
| 4 | 0.0650 | 0.0565 | 0.0455 | 0.0540 | 0.0650 | 0.0495 | 0.0515 | 0.0600 | 0.0715 | 0.0590 |
| 5 | 0.0550 | 0.0500 | 0.0610 | 0.0575 | 0.0710 | 0.0540 | 0.0525 | 0.0625 | 0.0710 | 0.0690 |
| 6 | 0.0545 | 0.0490 | 0.0610 | 0.0565 | 0.0675 | 0.0485 | 0.0520 | 0.0570 | 0.0700 | 0.0655 |
| 7 | 0.0465 | 0.0470 | 0.0595 | 0.0470 | 0.0680 | 0.0520 | 0.0550 | 0.0590 | 0.0695 | 0.0645 |
| 8 | 0.0465 | 0.0475 | 0.0620 | 0.0550 | 0.0670 | 0.0470 | 0.0520 | 0.0605 | 0.0575 | 0.0620 |
| 9 | 0.0475 | 0.0480 | 0.0595 | 0.0535 | 0.0685 | 0.0455 | 0.0520 | 0.0595 | 0.0555 | 0.0645 |
| 10 | 0.0475 | 0.0490 | 0.0625 | 0.0545 | 0.0690 | 0.0455 | 0.0555 | 0.0600 | 0.0560 | 0.0630 |
| 11 | 0.0445 | 0.0480 | 0.0615 | 0.0540 | 0.0740 | 0.0435 | 0.0535 | 0.0605 | 0.0550 | 0.0600 |
| 12 | 0.0450 | 0.0425 | 0.0570 | 0.0520 | 0.0660 | 0.0480 | 0.0530 | 0.0540 | 0.0590 | 0.0545 |
| 13 | 0.0460 | 0.0460 | 0.0580 | 0.0525 | 0.0680 | 0.0440 | 0.0525 | 0.0615 | 0.0545 | 0.0575 |
| 14 | 0.0475 | 0.0445 | 0.0590 | 0.0495 | 0.0655 | 0.0525 | 0.0545 | 0.0605 | 0.0565 | 0.0615 |
| 15 | 0.0480 | 0.0500 | 0.0580 | 0.0505 | 0.0650 | 0.0525 | 0.0525 | 0.0580 | 0.0560 | 0.0625 |
| 16 | 0.0475 | 0.0480 | 0.0590 | 0.0505 | 0.0655 | 0.0540 | 0.0505 | 0.0595 | 0.0560 | 0.0615 |
| 17 | 0.0445 | 0.0490 | 0.0610 | 0.0500 | 0.0695 | 0.0500 | 0.0495 | 0.0560 | 0.0550 | 0.0560 |
| 18 | 0.0450 | 0.0460 | 0.0605 | 0.0435 | 0.0640 | 0.0450 | 0.0480 | 0.0595 | 0.0565 | 0.0625 |
| 19 | 0.0455 | 0.0480 | 0.0605 | 0.0525 | 0.0650 | 0.0480 | 0.0535 | 0.0610 | 0.0520 | 0.0625 |
| 20 | 0.0510 | 0.0490 | 0.0595 | 0.0515 | 0.0675 | 0.0460 | 0.0525 | 0.0575 | 0.0530 | 0.0595 |

Table B.8.1: Pulse Duration Values

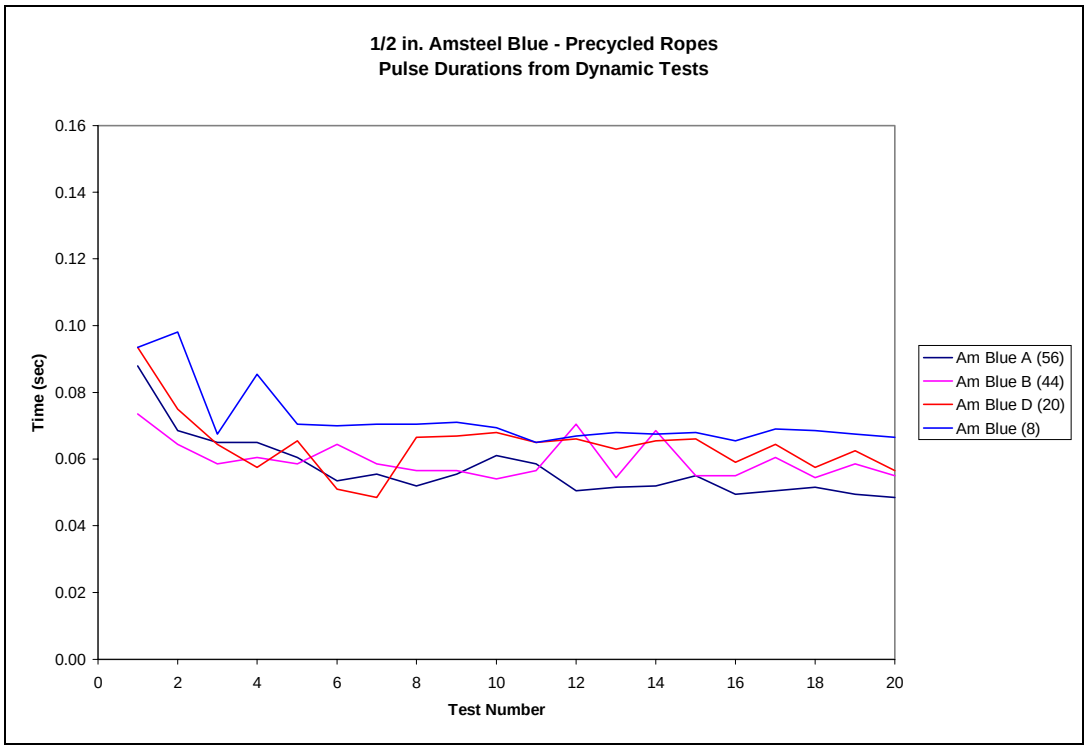


Figure B.8.1: Amsteel Blue – Precycled Ropes – Pulse Durations

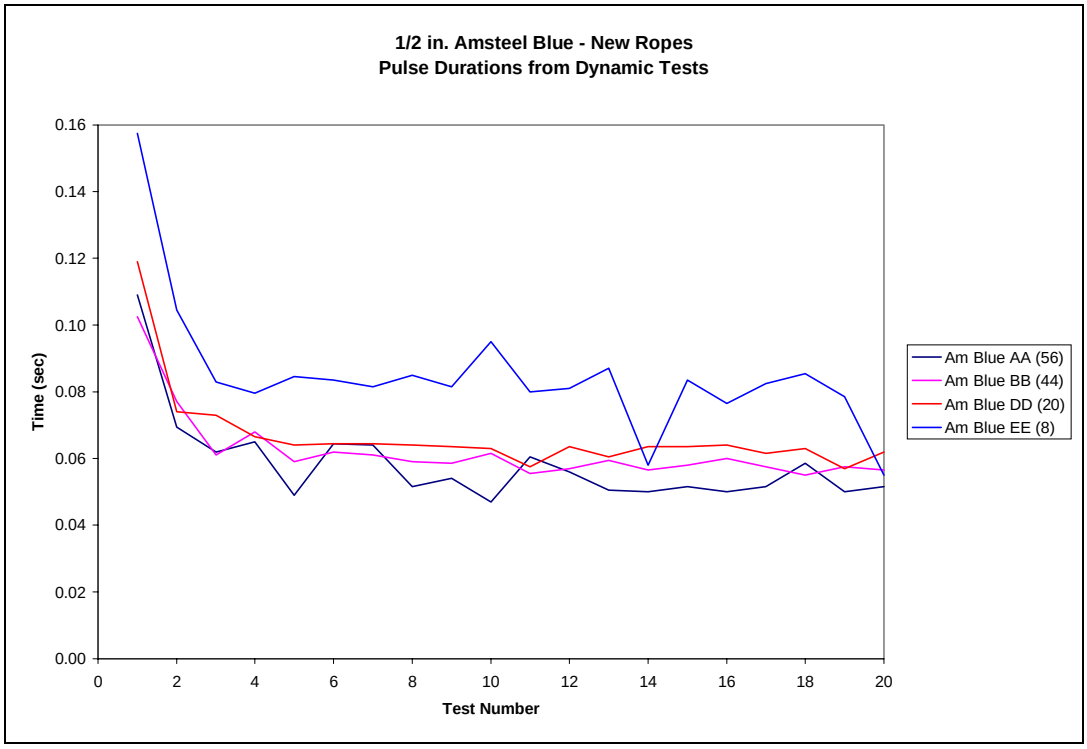


Figure B.8.2: Amsteel Blue – New Ropes – Pulse Durations

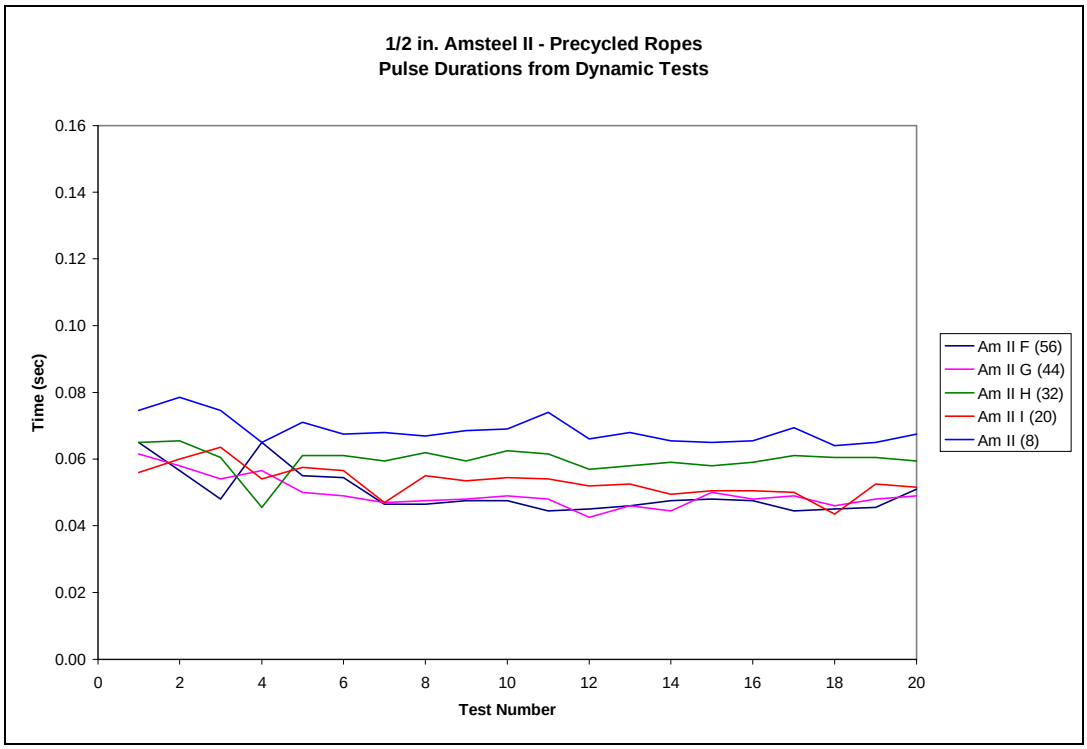


Figure B.8.3: Amsteel II – Precycled Ropes – Pulse Durations

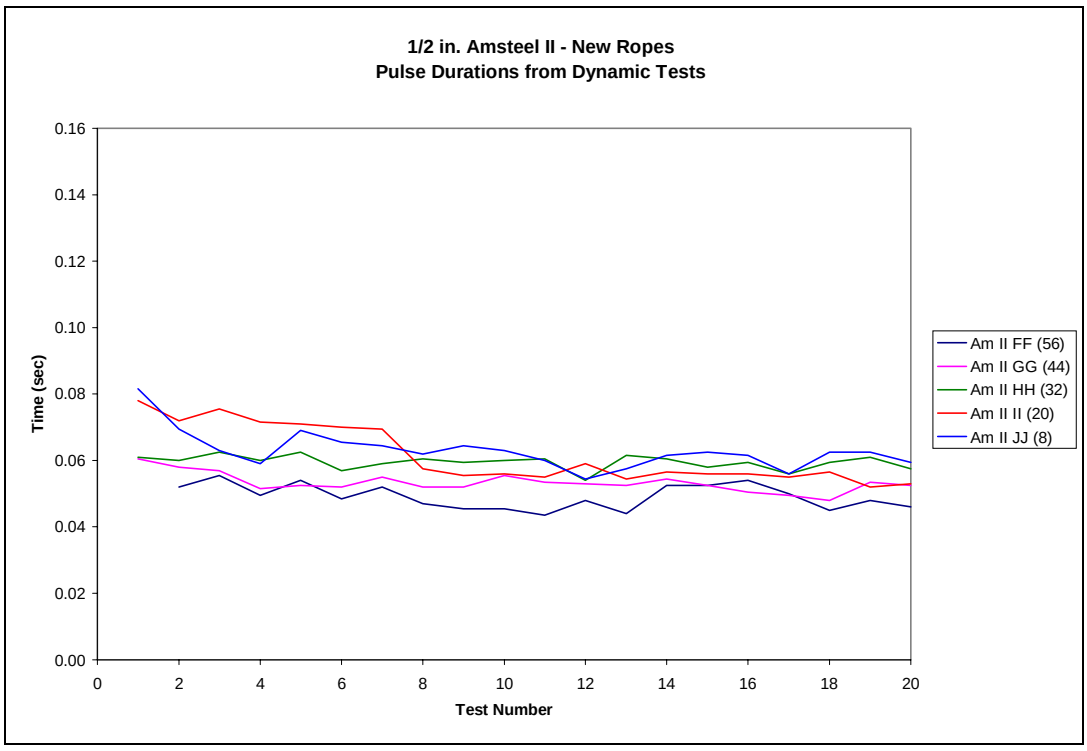


Figure B.8.4: Amsteel II – New Ropes – Pulse Durations

## B.9 Maximum Forces from the Dynamic Tests

| Maximum Force Values (kips) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 1.41 | 1.22 | - | 0.95 | 0.50 | 1.25 | 1.06 | - | 0.49 | 0.28 |
| 2 | 2.06 | 1.45 | - | 1.09 | 0.75 | 2.10 | 1.66 | - | 0.87 | 0.45 |
| 3 | 2.43 | 1.91 | - | 1.09 | 0.79 | 2.69 | 2.14 | - | 1.27 | 0.57 |
| 4 | 2.93 | 2.39 | - | 1.52 | 1.06 | 3.12 | 2.42 | - | 1.33 | 0.66 |
| 5 | 3.24 | 2.61 | - | 1.65 | 1.13 | 3.38 | 2.61 | - | 1.39 | 0.82 |
| 6 | 3.29 | 2.74 | - | 1.79 | 1.14 | 3.64 | 2.76 | - | 1.54 | 0.79 |
| 7 | 3.57 | 2.80 | - | 1.74 | 1.20 | 3.73 | 2.99 | - | 1.56 | 0.91 |
| 8 | 3.54 | 2.84 | - | 1.87 | 1.21 | 3.98 | 3.09 | - | 1.69 | 0.96 |
| 9 | 3.73 | 2.93 | - | 1.95 | 1.21 | 3.98 | 3.19 | - | 1.68 | 0.99 |
| 10 | 4.01 | 2.98 | - | 1.80 | 1.23 | 4.04 | 3.24 | - | 1.76 | 1.03 |
| 11 | 3.97 | 3.11 | - | 1.84 | 1.19 | 4.30 | 3.28 | - | 1.81 | 0.94 |
| 12 | 3.99 | 3.07 | - | 1.88 | 1.22 | 4.21 | 3.26 | - | 1.86 | 1.10 |
| 13 | 4.19 | 3.13 | - | 1.89 | 1.29 | 4.18 | 3.40 | - | 1.88 | 1.12 |
| 14 | 4.11 | 3.28 | - | 1.93 | 1.30 | 4.21 | 3.40 | - | 1.91 | 0.96 |
| 15 | 4.20 | 3.21 | - | 1.96 | 1.29 | 4.18 | 3.39 | - | 1.84 | 1.10 |
| 16 | 4.15 | 3.36 | - | 1.97 | 1.32 | 4.21 | 3.46 | - | 1.83 | 1.15 |
| 17 | 4.14 | 3.42 | - | 1.97 | 1.35 | 4.22 | 3.48 | - | 1.91 | 1.20 |
| 18 | 4.40 | 3.40 | - | 1.99 | 1.34 | 4.23 | 3.42 | - | 1.91 | 1.12 |
| 19 | 4.07 | 3.47 | - | 2.00 | 1.34 | 4.19 | 3.44 | - | 1.95 | 1.26 |
| 20 | 4.18 | 3.49 | - | 1.90 | 1.33 | 4.31 | 3.55 | - | 1.98 | 1.05 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 2.62 | 2.62 | 2.04 | 1.55 | 0.83 | - | 2.56 | 2.43 | 1.42 | 0.85 |
| 2 | 3.45 | 2.96 | 2.53 | 1.85 | 0.98 | 3.16 | 3.13 | 2.60 | 1.73 | 1.01 |
| 3 | 3.87 | 3.22 | 2.65 | 1.98 | 1.07 | 3.65 | 3.33 | 2.77 | 1.84 | 1.11 |
| 4 | 3.96 | 3.43 | 2.69 | 2.08 | 1.04 | 3.94 | 3.41 | 2.81 | 1.92 | 1.09 |
| 5 | 4.10 | 3.68 | 2.90 | 2.13 | 1.15 | 4.08 | 3.43 | 2.87 | 1.97 | 1.18 |
| 6 | 4.20 | 3.66 | 2.89 | 2.15 | 1.18 | 4.11 | 3.65 | 2.89 | 2.01 | 1.18 |
| 7 | 4.30 | 3.72 | 3.01 | 2.16 | 1.17 | 4.34 | 3.72 | 2.87 | 2.06 | 1.20 |
| 8 | 4.24 | 3.76 | 2.98 | 2.17 | 1.19 | 4.25 | 3.72 | 2.93 | 2.06 | 1.24 |
| 9 | 4.34 | 3.83 | 3.03 | 2.22 | 1.18 | 4.21 | 3.68 | 3.02 | 2.09 | 1.22 |
| 10 | 4.42 | 3.71 | 2.90 | 2.16 | 1.20 | 4.26 | 3.75 | 2.98 | 2.11 | 1.24 |
| 11 | 4.35 | 3.75 | 2.97 | 2.23 | 1.19 | 4.46 | 3.70 | 3.01 | 2.12 | 1.26 |
| 12 | 4.35 | 3.72 | 2.93 | 2.28 | 1.21 | 4.28 | 3.72 | 2.89 | 2.14 | 1.30 |
| 13 | 4.45 | 3.71 | 2.96 | 2.28 | 1.23 | 4.31 | 3.79 | 2.97 | 2.14 | 1.28 |
| 14 | 4.46 | 3.74 | 2.98 | 2.31 | 1.22 | 4.39 | 3.78 | 2.99 | 2.16 | 1.26 |
| 15 | 4.46 | 3.85 | 2.96 | 2.29 | 1.22 | 4.33 | 3.74 | 3.04 | 2.17 | 1.29 |
| 16 | 4.30 | 3.87 | 3.07 | 2.31 | 1.23 | 4.40 | 3.75 | 2.98 | 2.17 | 1.29 |
| 17 | 4.45 | 3.89 | 3.00 | 2.33 | 1.25 | 4.46 | 3.76 | 3.01 | 2.18 | 1.34 |
| 18 | 4.50 | 3.87 | 2.95 | 2.36 | 1.25 | 4.42 | 3.74 | 2.99 | 2.18 | 1.26 |
| 19 | 4.42 | 3.95 | 3.04 | 2.27 | 1.25 | 4.42 | 3.82 | 3.01 | 2.20 | 1.28 |
| 20 | 4.22 | 3.91 | 2.92 | 2.36 | 1.25 | 4.55 | 3.81 | 3.00 | 2.19 | 1.33 |

Table B.9.1: Maximum Force Values

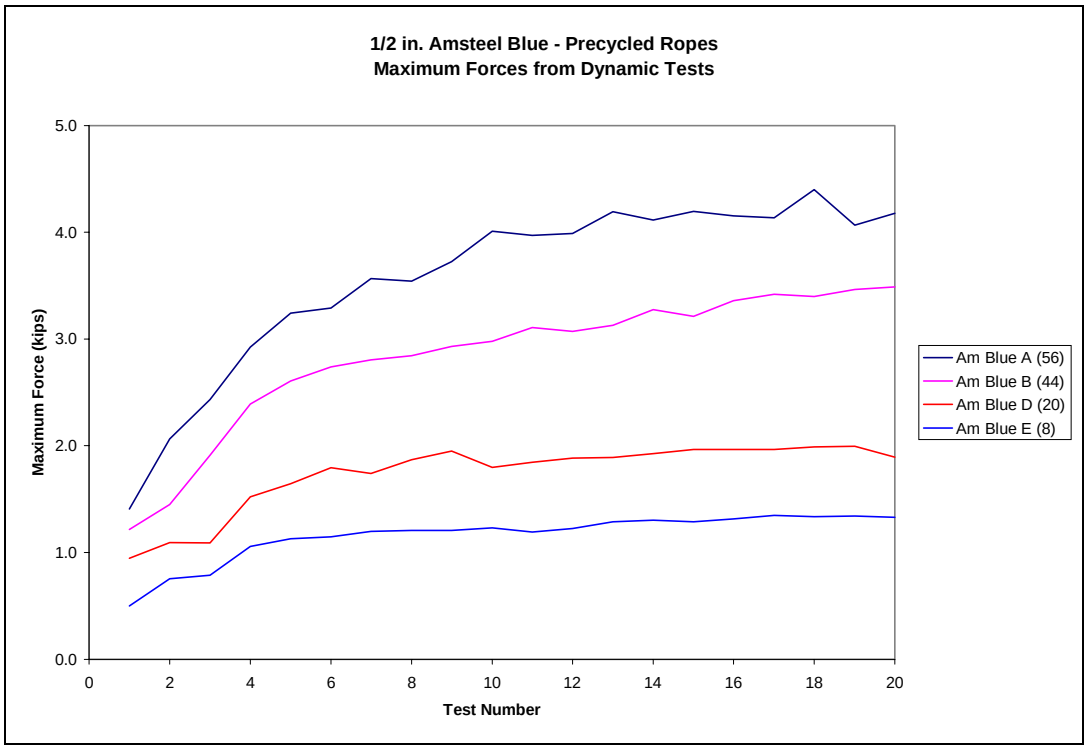


Figure B.9.1: Amsteel Blue – Precycled Ropes – Maximum Forces

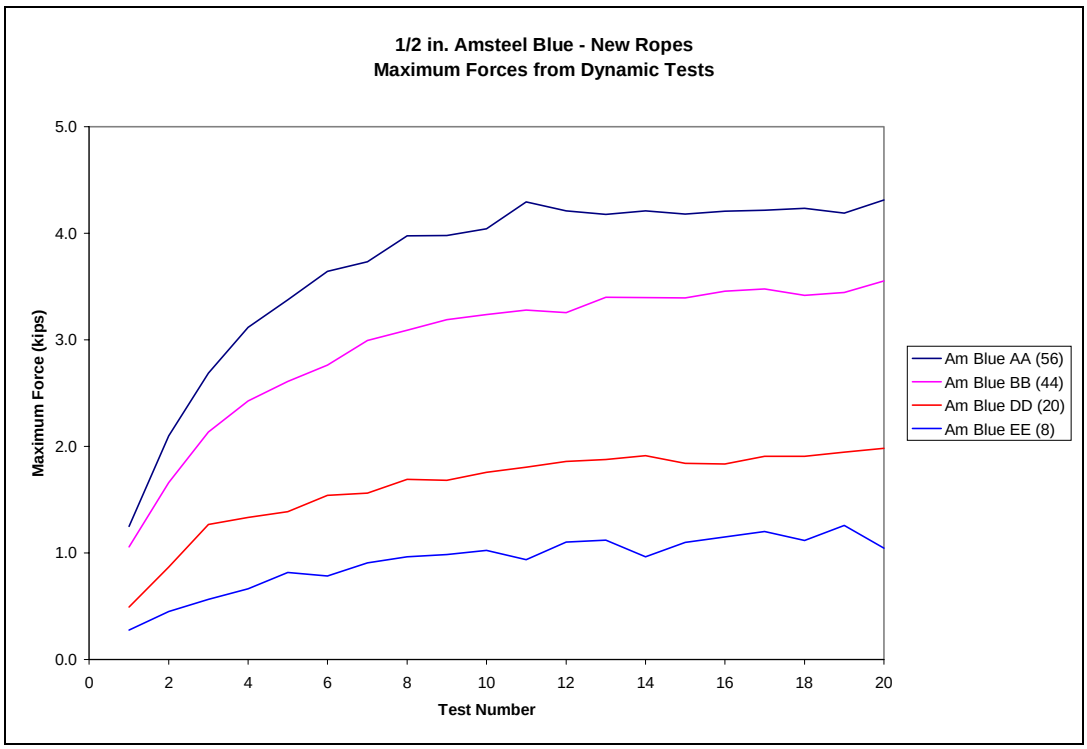


Figure B.9.2: Amsteel Blue – New Ropes – Maximum Forces

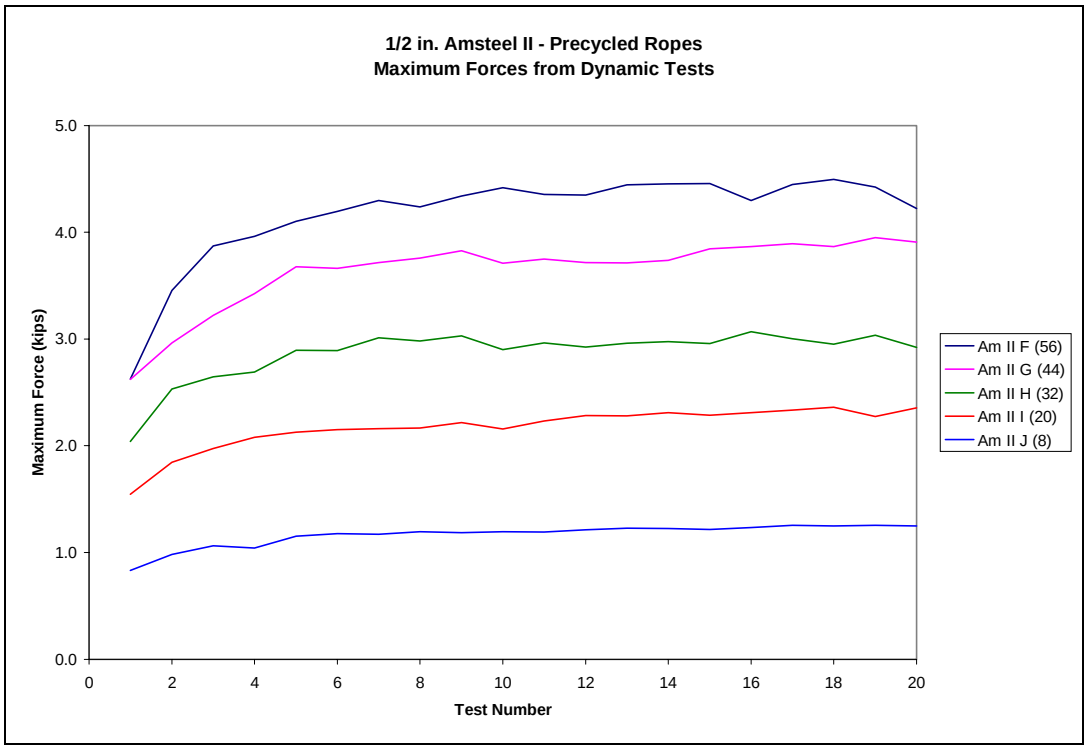


Figure B.9.3: Amsteel II – Precycled Ropes – Maximum Forces

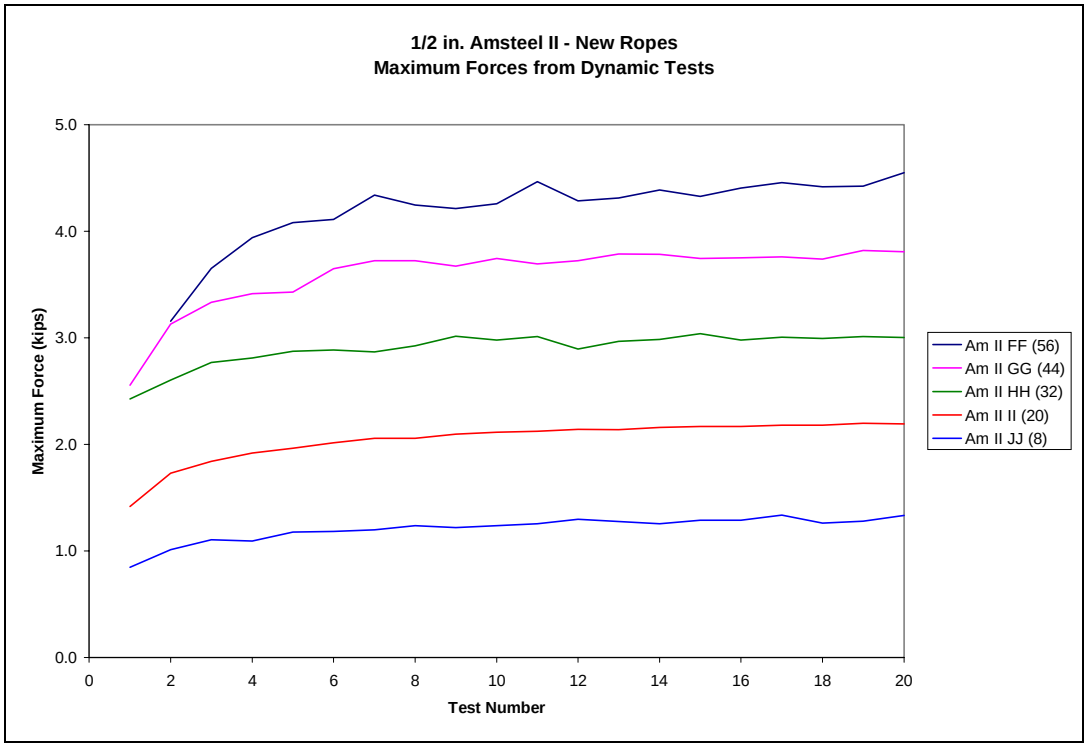


Figure B.9.4: Amsteel II – New Ropes – Maximum Forces

## B.10 Maximum Accelerations from the Dynamic Tests

| Maximum Acceleration Values (g) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 12.6 | 11.2 | - | 7.3 | 5.3 | 11.2 | 8.9 | - | 5.1 | 2.6 |
| 2 | 17.4 | 14.2 | - | 11.4 | 7.4 | 17.8 | 12.6 | - | 8.1 | 4.6 |
| 3 | 24.4 | 17.9 | - | 12.3 | 7.7 | 23.3 | 16.2 | - | 10.3 | 5.7 |
| 4 | 23.7 | 20.3 | - | 13.1 | 8.7 | 28.0 | 19.1 | - | 11.1 | 6.1 |
| 5 | 25.7 | 21.0 | - | 14.8 | 9.3 | 29.7 | 20.7 | - | 12.1 | 6.9 |
| 6 | 28.2 | 21.6 | - | 19.7 | 9.8 | 30.5 | 24.8 | - | 12.9 | 7.7 |
| 7 | 30.1 | 22.5 | - | 24.3 | 10.1 | 31.9 | 24.0 | - | 13.3 | 7.9 |
| 8 | 32.0 | 22.6 | - | 15.4 | 10.4 | 32.9 | 24.4 | - | 13.8 | 8.2 |
| 9 | 29.3 | 23.0 | - | 15.8 | 10.6 | 32.1 | 25.2 | - | 14.9 | 8.1 |
| 10 | 33.1 | 23.6 | - | 15.5 | 11.1 | 33.8 | 26.6 | - | 14.2 | 8.0 |
| 11 | 32.5 | 23.6 | - | 15.6 | 11.5 | 33.5 | 26.9 | - | 15.5 | 8.1 |
| 12 | 31.2 | 23.4 | - | 16.7 | 11.3 | 33.3 | 26.3 | - | 14.9 | 8.6 |
| 13 | 31.1 | 24.7 | - | 16.7 | 11.6 | 32.4 | 26.6 | - | 15.6 | 8.6 |
| 14 | 33.3 | 26.2 | - | 16.8 | 11.3 | 32.6 | 26.8 | - | 17.2 | 8.6 |
| 15 | 34.6 | 26.5 | - | 17.4 | 11.5 | 33.1 | 27.2 | - | 16.0 | 8.8 |
| 16 | 33.1 | 26.6 | - | 18.0 | 11.7 | 32.0 | 27.5 | - | 15.7 | 9.4 |
| 17 | 34.1 | 26.1 | - | 18.3 | 12.6 | 33.0 | 27.3 | - | 17.3 | 9.6 |
| 18 | 36.3 | 27.2 | - | 18.0 | 11.5 | 34.1 | 28.0 | - | 17.3 | 9.0 |
| 19 | 32.5 | 25.7 | - | 18.2 | 11.9 | 32.2 | 28.0 | - | 17.3 | 9.1 |
| 20 | 33.4 | 26.8 | - | 18.3 | 11.9 | 32.1 | 26.9 | - | 17.4 | 9.3 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 23.3 | 19.2 | 14.6 | 11.8 | 6.5 | - | 22.1 | 22.8 | 12.1 | 6.2 |
| 2 | 27.9 | 23.2 | 22.1 | 18.1 | 7.5 | 26.4 | 27.6 | 23.9 | 13.1 | 7.3 |
| 3 | 29.7 | 24.2 | 21.2 | 19.4 | 7.8 | 28.2 | 29.1 | 25.6 | 14.8 | 7.8 |
| 4 | 30.6 | 25.0 | 20.0 | 20.3 | 8.2 | 30.8 | 29.3 | 26.9 | 15.3 | 8.0 |
| 5 | 31.3 | 26.7 | 24.5 | 20.4 | 8.0 | 32.9 | 31.1 | 27.2 | 15.6 | 8.4 |
| 6 | 32.4 | 28.0 | 24.3 | 20.2 | 8.1 | 32.3 | 29.3 | 27.1 | 16.3 | 8.7 |
| 7 | 31.5 | 28.3 | 26.3 | 18.1 | 8.9 | 31.3 | 31.0 | 26.4 | 16.6 | 8.7 |
| 8 | 30.8 | 28.8 | 25.0 | 20.3 | 8.8 | 33.7 | 32.0 | 27.8 | 16.3 | 8.4 |
| 9 | 32.7 | 29.3 | 25.9 | 20.0 | 9.0 | 32.4 | 29.1 | 25.7 | 16.9 | 8.8 |
| 10 | 32.6 | 27.3 | 24.3 | 18.0 | 9.2 | 33.0 | 30.9 | 27.6 | 16.9 | 9.3 |
| 11 | 33.4 | 27.8 | 24.8 | 21.3 | 8.7 | 33.5 | 31.6 | 25.7 | 17.4 | 8.9 |
| 12 | 34.1 | 26.8 | 24.2 | 21.6 | 9.3 | 33.7 | 32.8 | 27.2 | 17.1 | 9.1 |
| 13 | 33.0 | 27.2 | 24.8 | 22.0 | 8.7 | 35.5 | 32.1 | 26.9 | 17.1 | 8.5 |
| 14 | 33.0 | 27.7 | 24.8 | 21.7 | 9.1 | 33.3 | 31.3 | 26.3 | 17.9 | 9.1 |
| 15 | 32.7 | 29.1 | 23.9 | 21.8 | 9.4 | 34.7 | 31.4 | 26.2 | 17.6 | 9.1 |
| 16 | 33.7 | 30.0 | 26.8 | 22.2 | 9.2 | 32.3 | 30.1 | 26.8 | 17.6 | 8.8 |
| 17 | 34.0 | 30.3 | 27.0 | 22.3 | 9.3 | 34.4 | 31.2 | 26.4 | 17.8 | 9.6 |
| 18 | 34.0 | 27.2 | 25.5 | 21.2 | 9.2 | 33.9 | 29.2 | 27.3 | 17.3 | 9.5 |
| 19 | 32.3 | 28.8 | 26.0 | 17.9 | 9.7 | 33.4 | 32.1 | 27.0 | 17.7 | 9.5 |
| 20 | 36.6 | 31.1 | 23.3 | 19.2 | 9.2 | 34.4 | 32.9 | 27.1 | 19.5 | 8.9 |

Table B.10.1: Maximum Acceleration Values

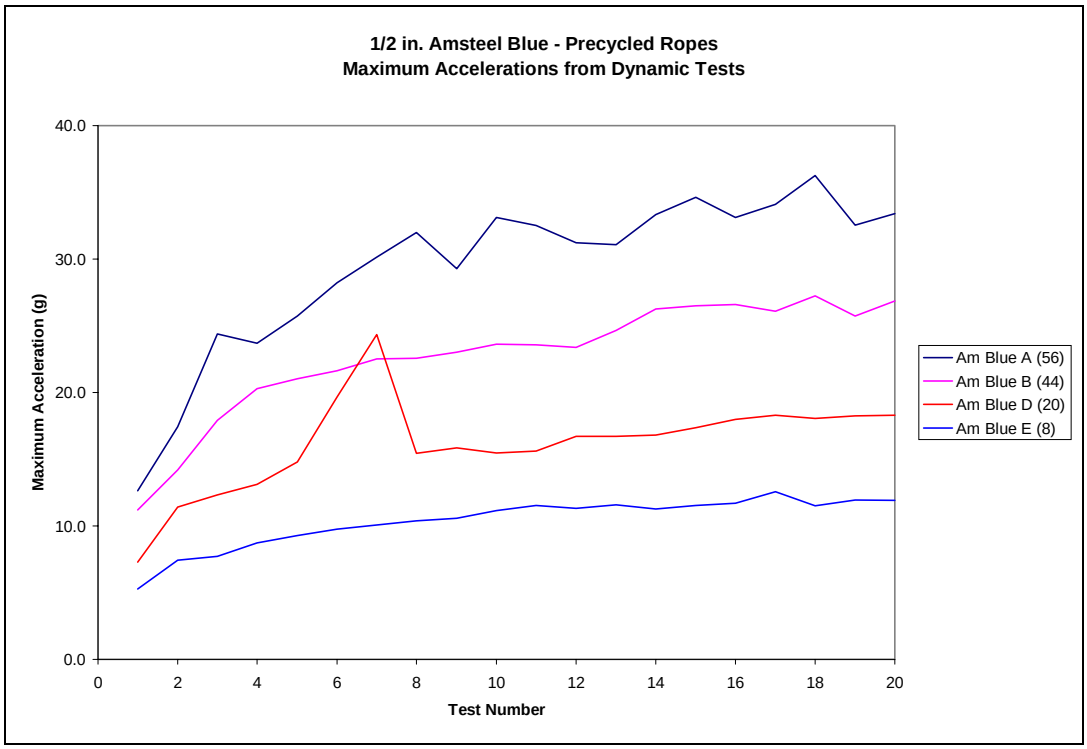


Figure B.10.1: Amsteel Blue – Precycled Ropes – Maximum Accelerations

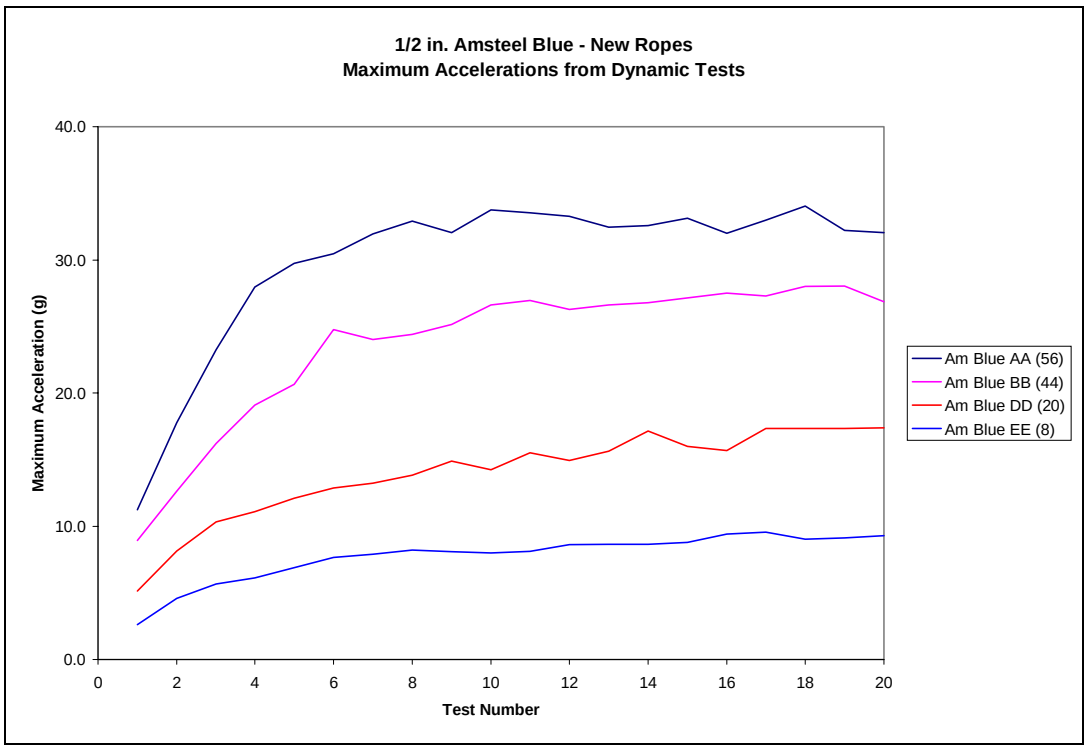


Figure B.10.2: Amsteel Blue – New Ropes – Maximum Accelerations

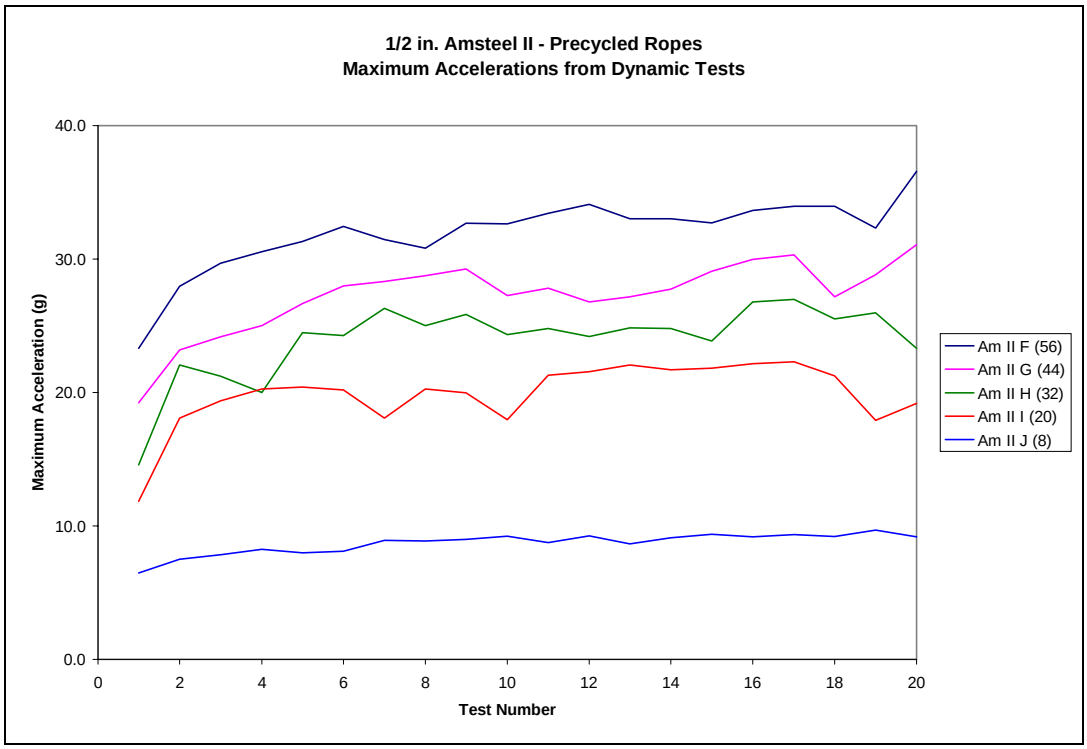


Figure B.10.3: Amsteel II – Precycled Ropes – Maximum Accelerations

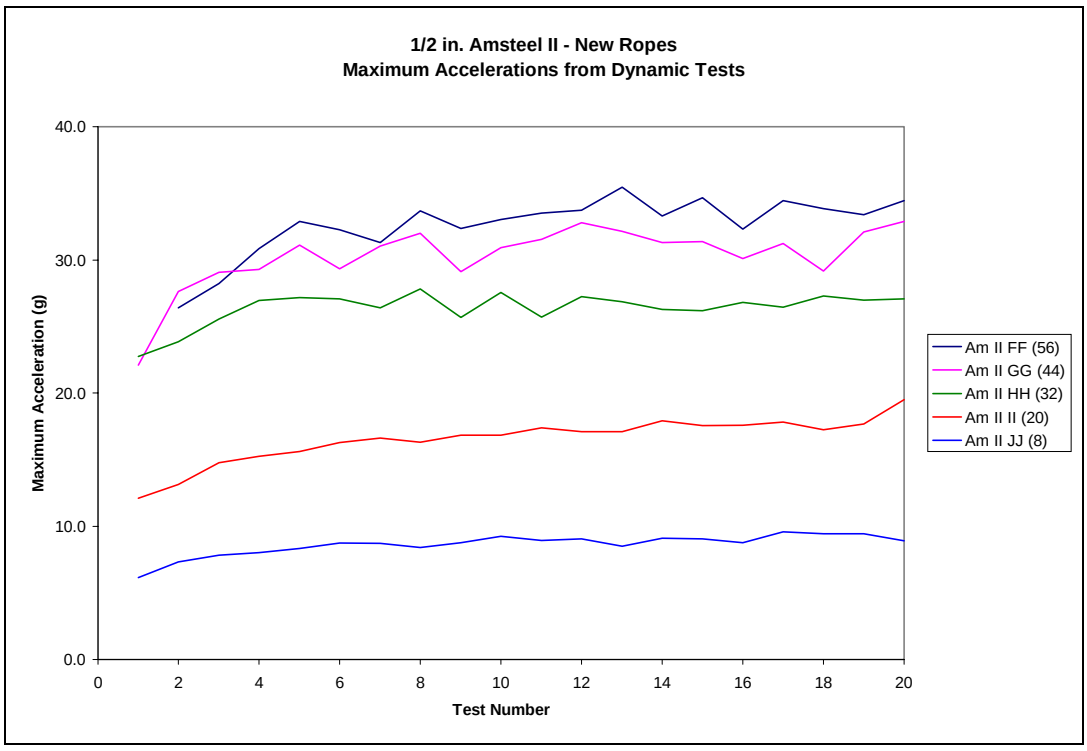


Figure B.10.4: Amsteel II – New Ropes – Maximum Accelerations

## B.11 Maximum Displacements from the Dynamic Tests

| Maximum Displacement Values (in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 9.81 | 6.09 | - | 6.15 | 4.55 | 11.66 | 9.08 | - | 7.35 | 5.13 |
| 2 | 8.39 | 6.01 | - | 4.88 | 3.65 | 7.89 | 6.99 | - | 4.70 | 3.60 |
| 3 | 7.93 | 5.17 | - | 4.93 | 3.55 | 7.03 | 5.38 | - | 4.33 | 3.13 |
| 4 | 7.69 | 5.08 | - | 4.13 | 3.42 | 8.51 | 6.60 | - | 3.94 | 3.07 |
| 5 | 7.60 | 4.92 | - | 4.23 | 3.45 | 5.93 | 5.73 | - | 4.04 | 3.23 |
| 6 | 6.80 | 6.18 | - | 3.85 | 3.43 | 8.70 | 5.99 | - | 4.06 | 3.11 |
| 7 | 6.99 | 4.91 | - | 3.86 | 3.28 | 8.41 | 5.91 | - | 3.96 | 3.12 |
| 8 | 6.76 | 3.23 | - | 4.38 | 3.45 | 6.20 | 6.11 | - | 3.50 | 3.22 |
| 9 | 7.57 | 2.15 | - | 4.52 | 3.36 | 6.60 | 6.12 | - | 3.80 | 3.46 |
| 10 | 7.34 | 5.25 | - | 4.65 | 3.37 | 5.55 | 6.72 | - | 3.39 | 4.14 |
| 11 | 7.06 | 4.33 | - | 4.17 | 3.27 | 7.90 | 5.72 | - | 3.59 | 3.33 |
| 12 | 6.85 | 7.01 | - | 4.18 | 3.29 | 7.25 | 5.97 | - | 3.62 | 3.02 |
| 13 | 6.65 | 5.33 | - | 4.30 | 3.37 | 6.48 | 6.01 | - | 2.10 | 3.32 |
| 14 | 6.63 | 7.11 | - | 4.11 | 3.22 | 6.41 | 6.16 | - | 3.85 | 3.13 |
| 15 | 6.74 | 5.64 | - | 4.37 | 3.25 | 6.30 | 5.81 | - | 3.32 | 3.22 |
| 16 | 6.73 | 5.69 | - | 4.16 | 3.17 | 6.23 | 5.89 | - | 3.87 | 3.30 |
| 17 | 6.69 | 6.29 | - | 4.29 | 3.49 | 6.55 | 5.94 | - | 3.92 | 3.11 |
| 18 | 6.81 | 5.77 | - | 4.16 | 3.38 | 7.70 | 5.70 | - | 3.81 | 3.25 |
| 19 | 6.49 | 6.16 | - | 4.09 | 3.41 | 6.58 | 5.80 | - | 3.77 | 3.17 |
| 20 | 6.42 | 5.65 | - | 4.05 | 3.12 | 6.13 | 5.94 | - | 3.70 | 3.09 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 7.57 | 5.97 | 5.25 | 3.26 | 2.23 | - | 6.06 | 4.50 | 4.58 | 2.85 |
| 2 | 6.14 | 5.36 | 5.31 | 3.46 | 2.62 | 5.64 | 5.90 | 4.39 | 3.62 | 2.26 |
| 3 | 5.13 | 5.12 | 4.62 | 3.70 | 2.44 | 6.27 | 5.57 | 4.72 | 3.75 | 2.26 |
| 4 | 7.84 | 5.31 | 3.70 | 3.58 | 2.38 | 5.55 | 5.10 | 4.52 | 3.53 | 2.18 |
| 5 | 6.15 | 4.87 | 4.77 | 3.55 | 2.53 | 6.22 | 5.05 | 4.85 | 3.51 | 2.50 |
| 6 | 5.90 | 4.93 | 4.71 | 3.31 | 2.34 | 5.39 | 5.34 | 4.54 | 3.45 | 2.36 |
| 7 | 5.02 | 5.21 | 4.57 | 3.07 | 2.56 | 5.81 | 5.60 | 4.55 | 3.32 | 2.47 |
| 8 | 5.03 | 5.05 | 4.76 | 3.74 | 2.46 | 5.04 | 4.81 | 4.64 | 3.34 | 2.34 |
| 9 | 4.89 | 5.09 | 4.65 | 3.50 | 2.61 | 4.97 | 4.66 | 4.57 | 3.42 | 2.47 |
| 10 | 5.07 | 5.15 | 4.50 | 3.46 | 2.48 | 4.66 | 5.59 | 4.56 | 3.34 | 2.37 |
| 11 | 4.91 | 4.87 | 4.63 | 3.50 | 2.83 | 4.18 | 4.95 | 4.90 | 3.48 | 2.38 |
| 12 | 5.00 | 4.20 | 4.50 | 3.53 | 2.55 | 5.13 | 4.83 | 4.26 | 3.43 | 2.03 |
| 13 | 5.21 | 4.41 | 4.72 | 3.39 | 2.61 | 4.44 | 4.92 | 4.78 | 3.39 | 2.22 |
| 14 | 5.09 | 4.34 | 4.58 | 3.01 | 2.56 | 5.98 | 5.27 | 4.59 | 3.37 | 2.41 |
| 15 | 5.47 | 5.18 | 4.32 | 3.31 | 2.57 | 5.90 | 4.84 | 4.70 | 3.41 | 2.53 |
| 16 | 5.63 | 5.20 | 4.51 | 3.03 | 2.63 | 5.82 | 4.63 | 4.70 | 3.42 | 2.51 |
| 17 | 4.97 | 4.82 | 4.69 | 3.17 | 2.80 | 5.30 | 4.77 | 4.48 | 3.36 | 2.19 |
| 18 | 4.90 | 5.05 | 4.60 | 2.61 | 2.55 | 4.64 | 4.40 | 4.72 | 3.44 | 2.46 |
| 19 | 4.86 | 4.97 | 4.48 | 3.57 | 2.57 | 5.18 | 5.12 | 4.63 | 3.10 | 2.53 |
| 20 | 5.58 | 5.06 | 4.29 | 3.43 | 2.69 | 4.59 | 5.21 | 4.61 | 3.69 | 2.40 |

Table B.11.1: Maximum Displacement Values

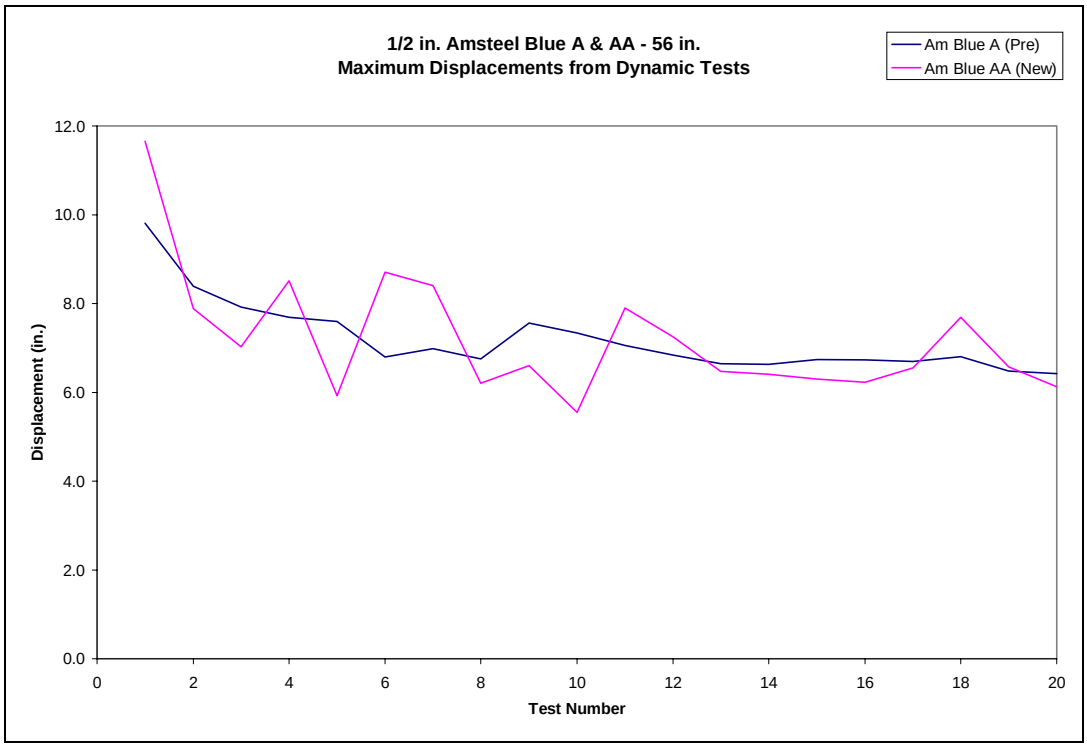


Figure B.11.1: Amsteel Blue A and AA- Maximum Displacements

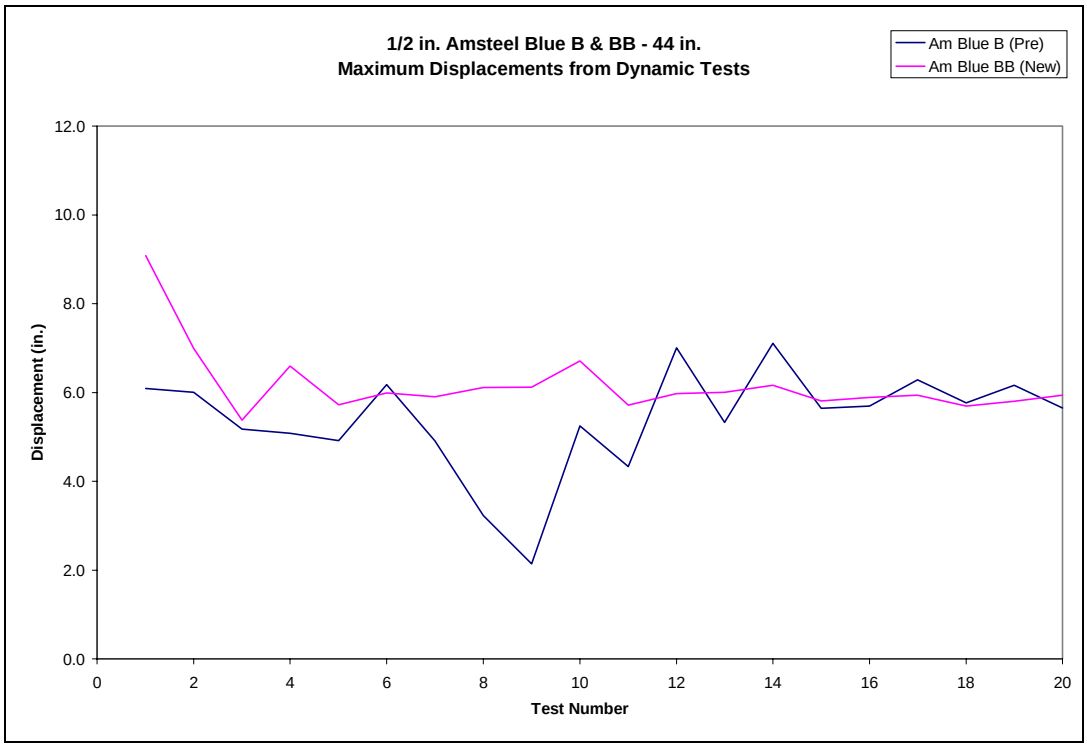


Figure B.11.2: Amsteel Blue B and BB – Maximum Displacements

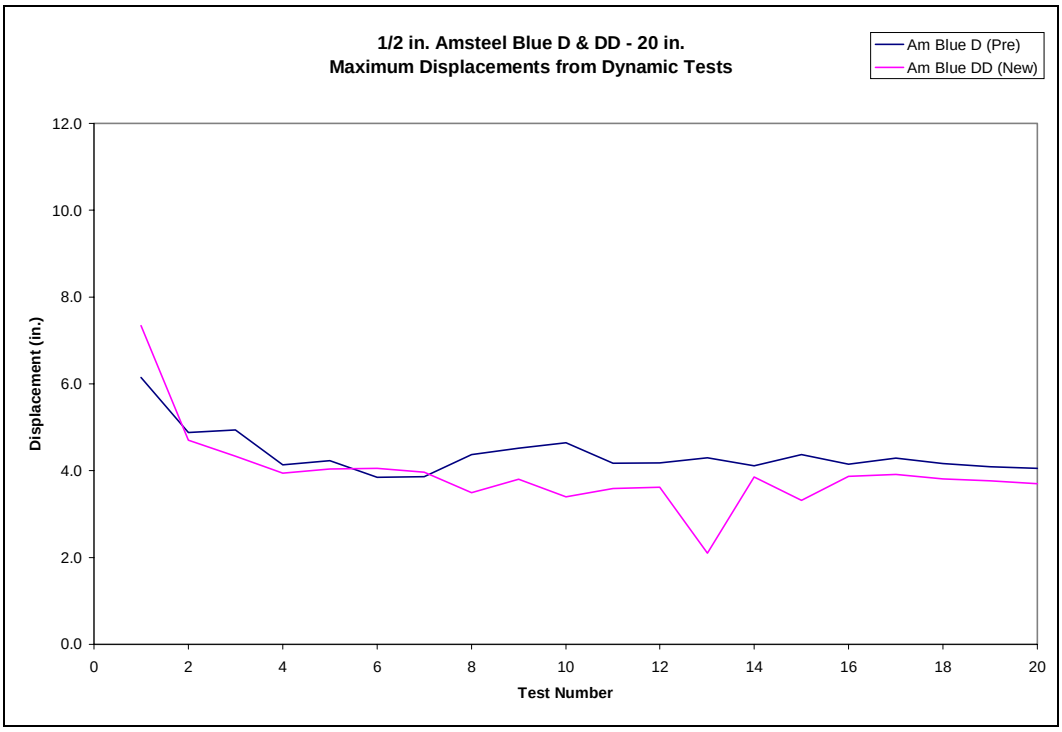


Figure B.11.3: Amsteel Blue D and DD – Maximum Displacements

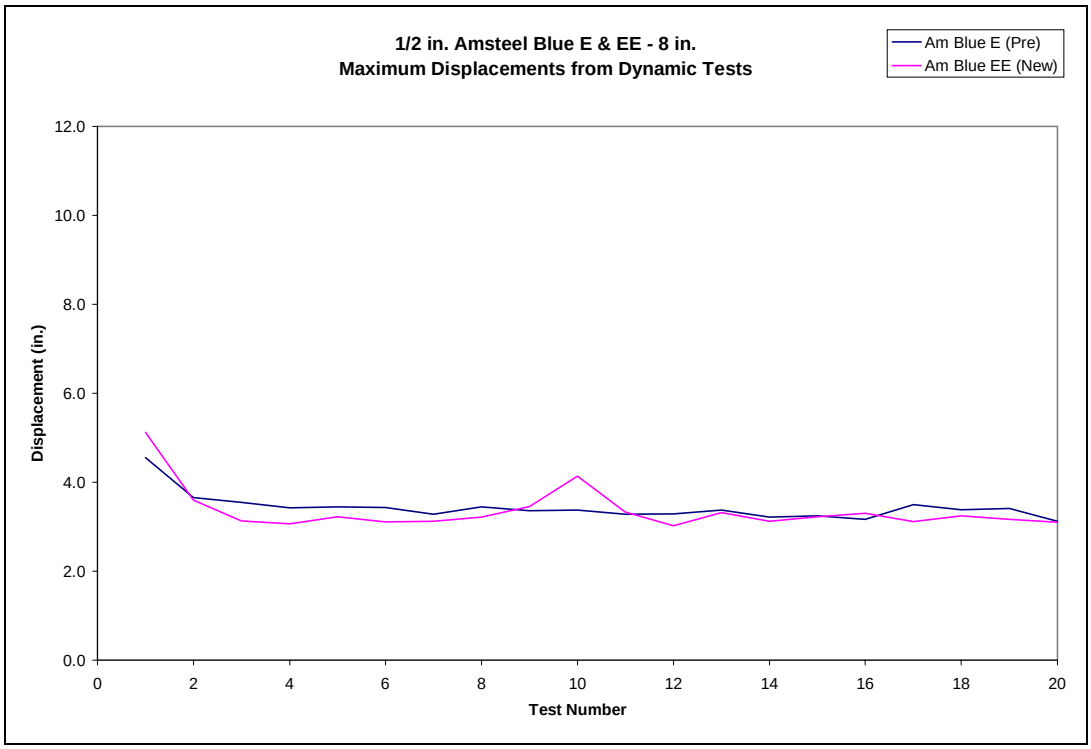


Figure B.11.4: Amsteel Blue E and EE – Maximum Displacements

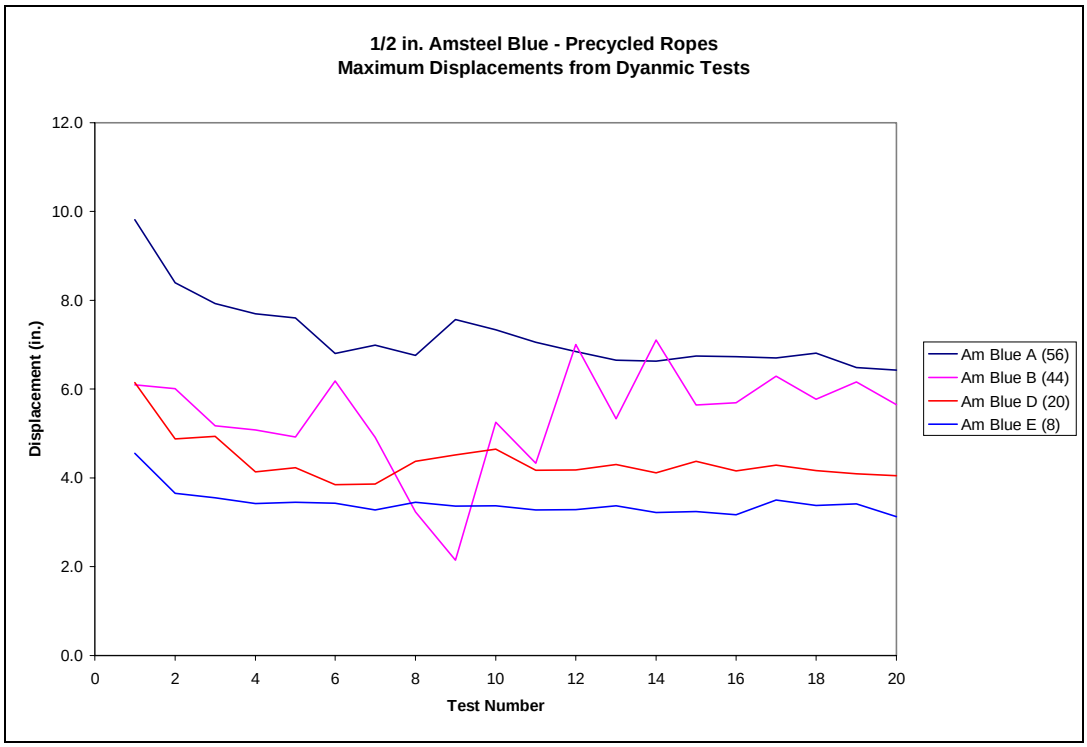


Figure B.11.5: Amsteel Blue – Precycled Ropes – Maximum Displacements

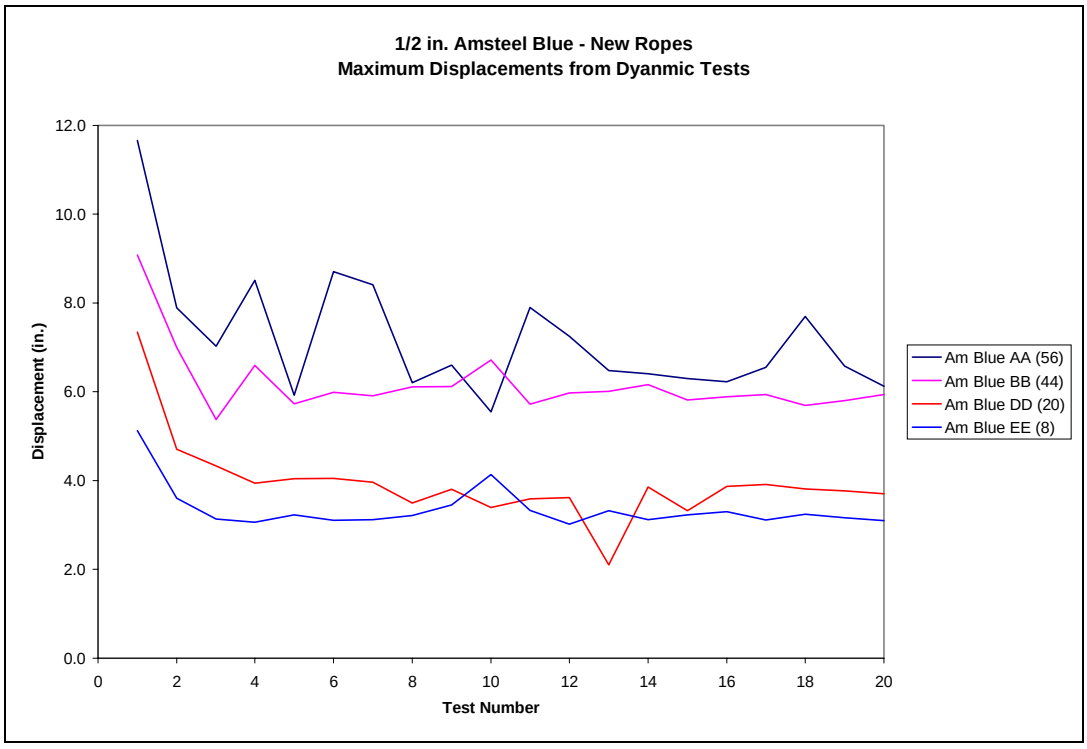


Figure B.11.6: Amsteel Blue – New Ropes – Maximum Displacements

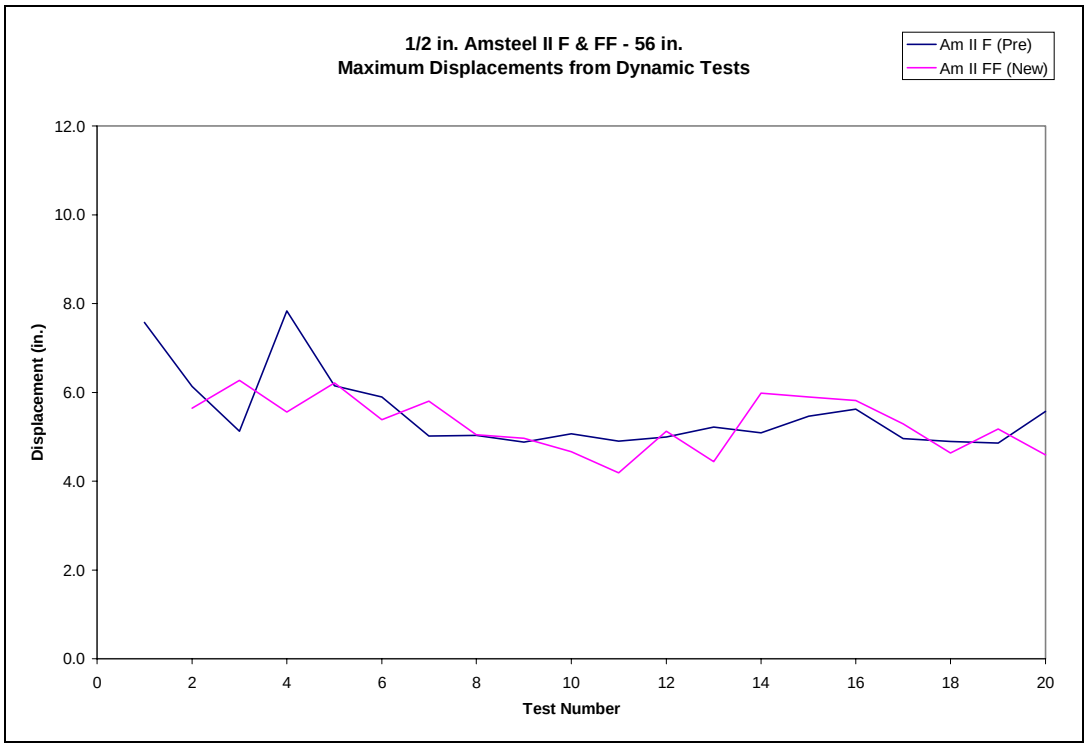


Figure B.11.7: Amsteel II F and FF – Maximum Displacements

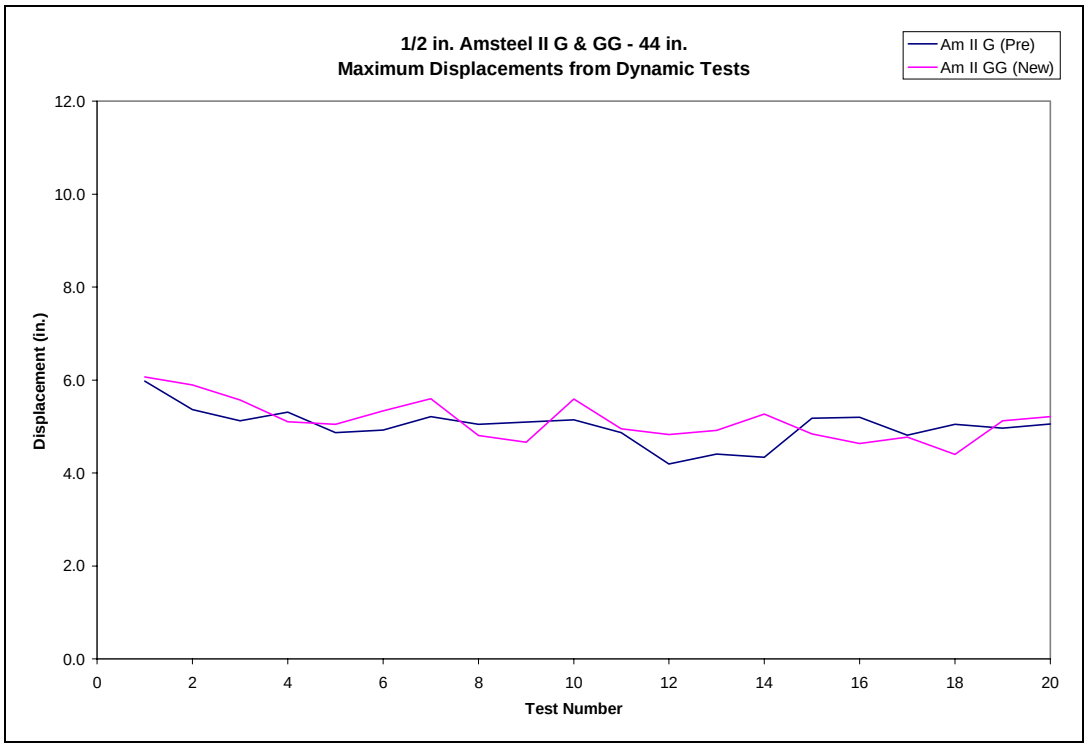


Figure B.11.8: Amsteel II G and GG – Maximum Displacements

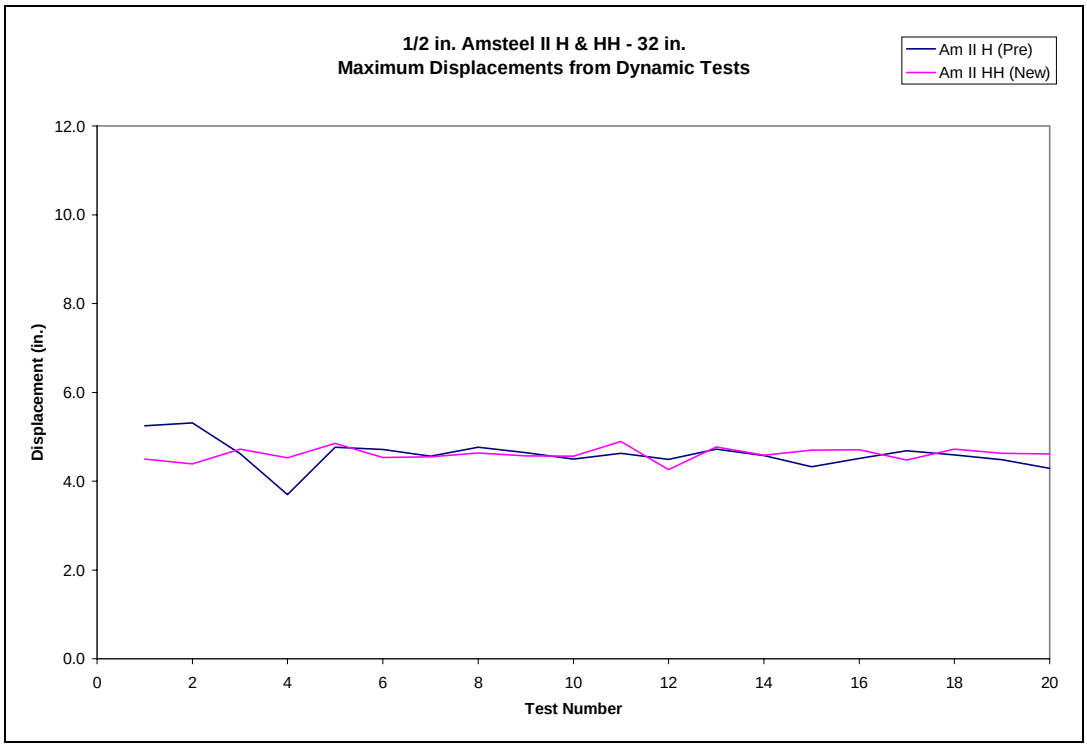


Figure B.11.9: Amsteel II H and HH – Maximum Displacements

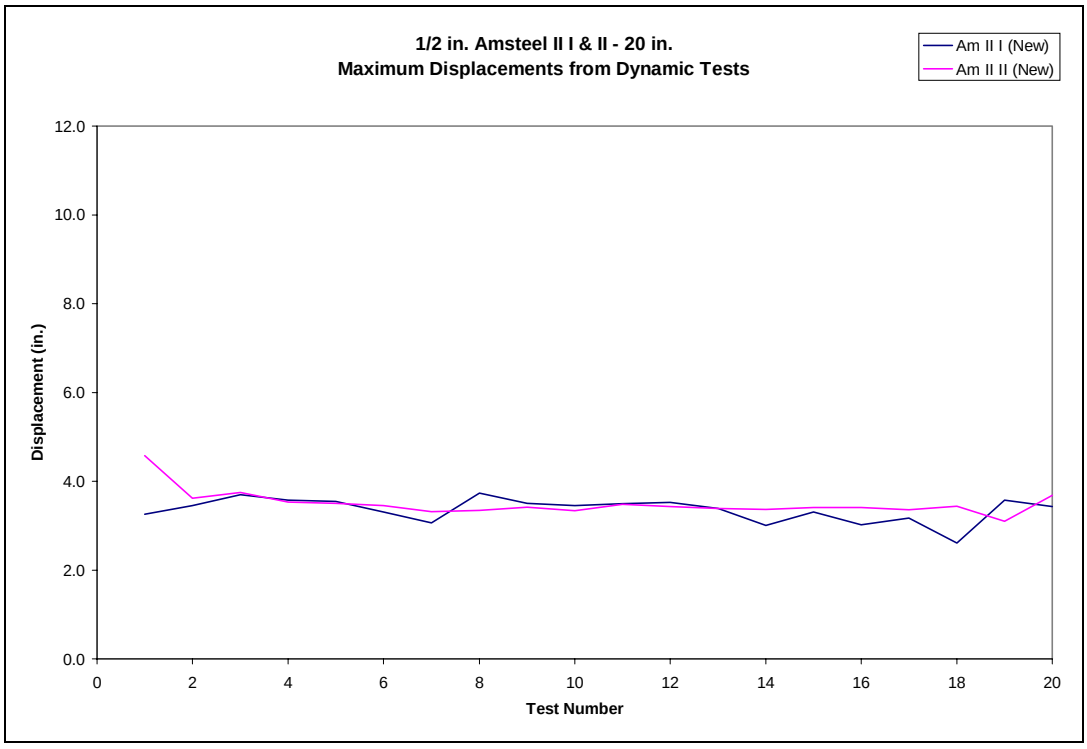


Figure B.11.10: Amsteel II I and II – Maximum Displacements

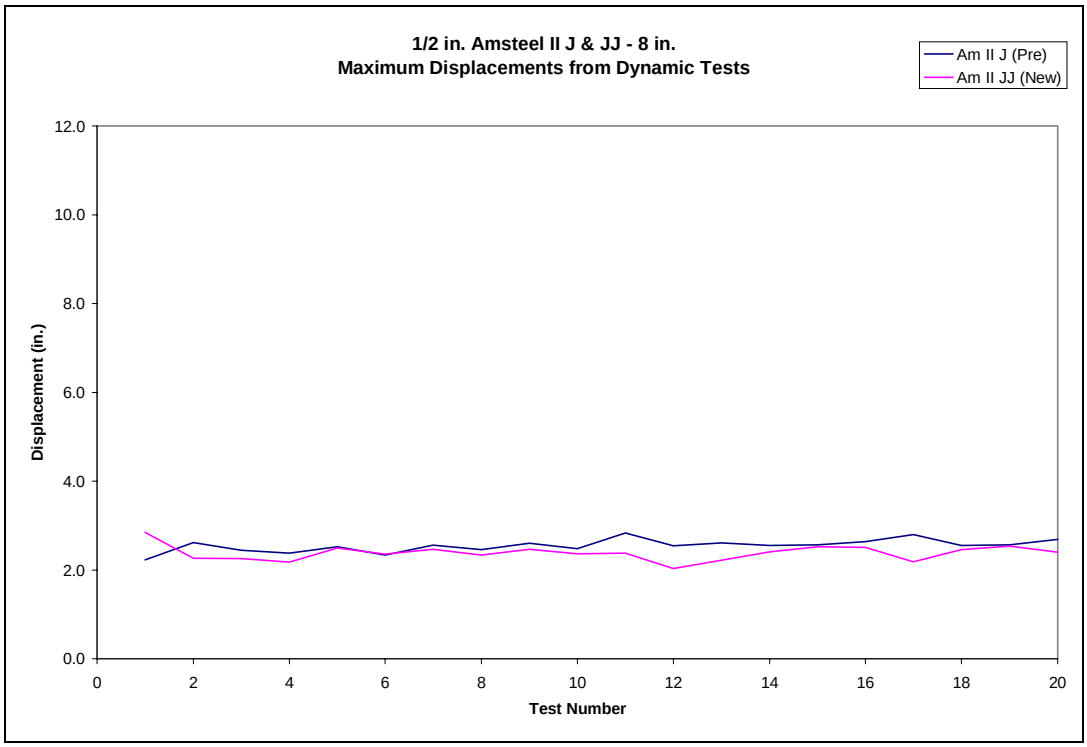


Figure B.11.11: Amsteel J and JJ – Maximum Displacements

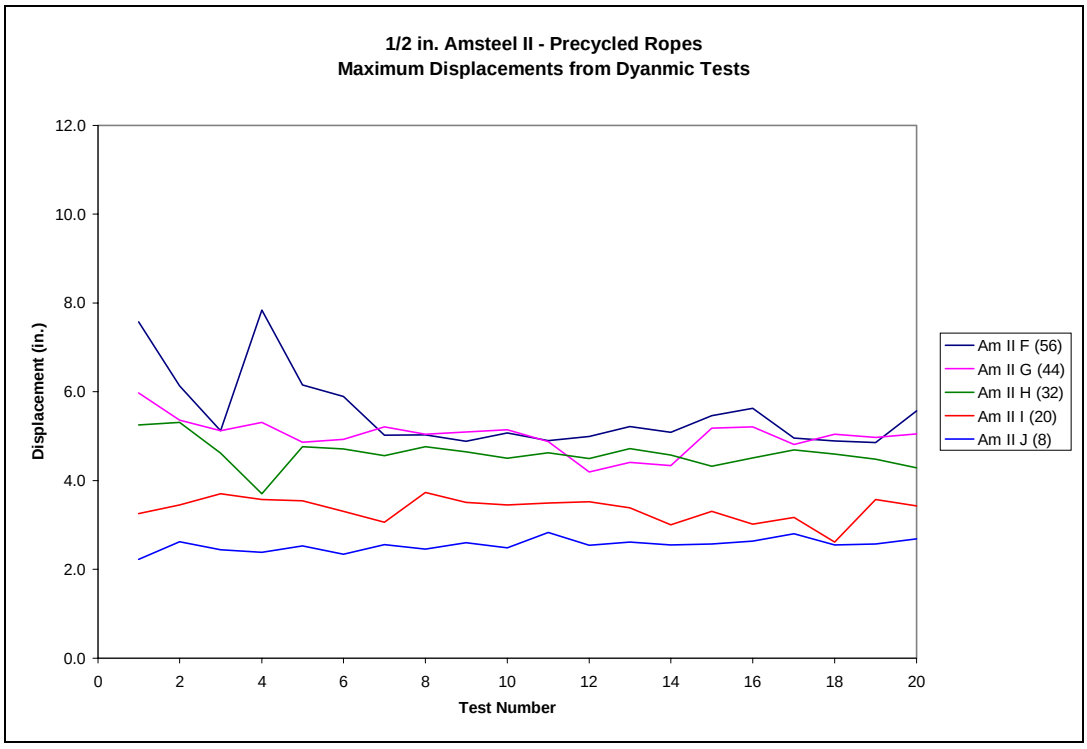


Figure B.11.12: Amsteel II – Precycled Ropes – Maximum Displacements

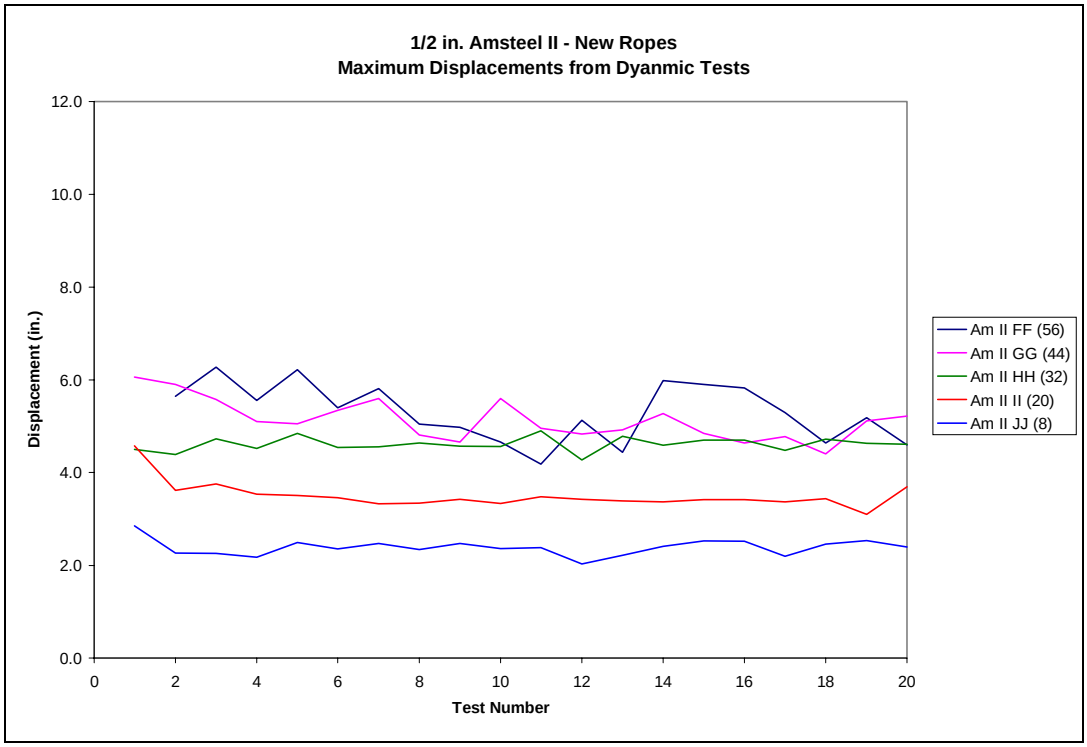


Figure B.11.13: Amsteel II – New Ropes – Maximum Displacements

## B.12 Impact Velocities from the Dynamic Tests

| Impact Velocity Values (ft/sec) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 14.65 | 10.44 | - | 8.17 | 5.73 | 14.33 | 11.62 | - | 7.17 | 3.78 |
| 2 | 14.44 | 11.55 | - | 8.64 | 6.16 | 14.91 | 11.88 | - | 7.98 | 4.99 |
| 3 | 14.69 | 11.33 | - | 8.89 | 6.25 | 15.31 | 12.19 | - | 8.38 | 5.17 |
| 4 | 15.01 | 11.17 | - | 9.36 | 6.34 | 14.64 | 12.02 | - | 8.26 | 5.38 |
| 5 | 14.97 | 11.40 | - | 9.28 | 6.40 | 15.56 | 12.48 | - | 8.56 | 5.70 |
| 6 | 15.02 | 11.47 | - | 9.20 | 6.52 | 15.07 | 12.05 | - | 8.64 | 5.64 |
| 7 | 15.15 | 11.20 | - | 9.38 | 6.37 | 14.90 | 12.41 | - | 8.63 | 5.74 |
| 8 | 15.29 | 8.39 | - | 9.26 | 6.61 | 15.29 | 12.32 | - | 8.23 | 5.89 |
| 9 | 15.26 | 6.14 | - | 9.33 | 6.40 | 15.27 | 12.40 | - | 8.56 | 6.21 |
| 10 | 15.38 | 12.47 | - | 9.14 | 6.69 | 15.39 | 12.44 | - | 7.97 | 7.15 |
| 11 | 15.08 | 10.52 | - | 8.99 | 6.60 | 15.30 | 12.26 | - | 8.51 | 6.03 |
| 12 | 15.49 | 14.82 | - | 8.98 | 6.68 | 15.25 | 12.49 | - | 8.25 | 5.88 |
| 13 | 15.40 | 12.42 | - | 9.24 | 6.76 | 15.47 | 12.31 | - | 5.59 | 5.99 |
| 14 | 15.11 | 12.34 | - | 8.85 | 6.52 | 15.48 | 12.74 | - | 8.77 | 6.22 |
| 15 | 15.24 | 12.12 | - | 9.25 | 6.55 | 15.26 | 12.55 | - | 7.94 | 6.16 |
| 16 | 15.74 | 12.42 | - | 9.07 | 6.51 | 15.25 | 12.38 | - | 8.75 | 6.15 |
| 17 | 15.49 | 12.46 | - | 9.36 | 6.76 | 15.06 | 12.57 | - | 9.05 | 6.11 |
| 18 | 15.67 | 12.46 | - | 9.43 | 6.68 | 15.09 | 12.32 | - | 8.73 | 6.01 |
| 19 | 15.37 | 12.41 | - | 9.44 | 6.78 | 15.40 | 12.31 | - | 8.88 | 6.06 |
| 20 | 15.40 | 12.57 | - | 9.23 | 6.61 | 14.94 | 12.56 | - | 8.74 | 6.28 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 13.94 | 12.48 | 10.39 | 8.31 | 4.57 | - | 12.21 | 10.77 | 7.68 | 4.61 |
| 2 | 14.40 | 12.54 | 10.50 | 8.04 | 4.73 | 14.15 | 12.38 | 10.39 | 8.10 | 4.68 |
| 3 | 14.52 | 12.52 | 10.59 | 8.25 | 4.71 | 14.39 | 12.40 | 10.20 | 8.27 | 4.81 |
| 4 | 14.15 | 13.20 | 10.78 | 8.43 | 4.81 | 14.37 | 12.63 | 10.49 | 8.18 | 4.56 |
| 5 | 14.34 | 12.74 | 10.64 | 8.13 | 4.66 | 14.11 | 12.49 | 10.51 | 8.23 | 4.71 |
| 6 | 14.07 | 12.98 | 10.45 | 8.22 | 4.86 | 14.26 | 12.77 | 10.48 | 8.29 | 4.63 |
| 7 | 14.52 | 13.62 | 10.47 | 8.35 | 4.80 | 14.56 | 12.55 | 10.58 | 8.01 | 4.76 |
| 8 | 14.55 | 12.97 | 10.65 | 8.51 | 4.70 | 14.51 | 12.23 | 10.50 | 8.17 | 4.72 |
| 9 | 14.20 | 13.24 | 10.61 | 8.44 | 4.81 | 14.44 | 12.05 | 10.56 | 8.38 | 4.77 |
| 10 | 14.28 | 13.04 | 10.34 | 7.80 | 4.56 | 14.22 | 12.21 | 10.46 | 8.20 | 4.68 |
| 11 | 14.37 | 12.71 | 10.29 | 8.19 | 4.71 | 14.46 | 12.26 | 10.83 | 8.41 | 4.80 |
| 12 | 14.52 | 12.83 | 10.59 | 8.40 | 4.84 | 14.27 | 12.15 | 10.53 | 8.38 | 4.88 |
| 13 | 14.54 | 12.66 | 10.85 | 8.20 | 4.78 | 14.39 | 12.14 | 10.55 | 8.51 | 4.77 |
| 14 | 14.43 | 12.80 | 10.84 | 7.84 | 4.89 | 14.56 | 12.23 | 10.55 | 8.37 | 4.69 |
| 15 | 14.56 | 13.18 | 10.06 | 8.04 | 4.86 | 14.44 | 12.50 | 10.53 | 8.36 | 4.83 |
| 16 | 14.48 | 12.97 | 10.31 | 7.63 | 4.93 | 14.24 | 12.40 | 10.75 | 8.20 | 4.91 |
| 17 | 14.74 | 12.92 | 10.58 | 7.79 | 4.86 | 13.85 | 12.66 | 10.57 | 8.25 | 4.91 |
| 18 | 14.52 | 13.30 | 10.55 | 8.10 | 4.90 | 14.53 | 12.78 | 10.67 | 8.34 | 4.71 |
| 19 | 14.18 | 12.90 | 10.19 | 8.20 | 4.88 | 14.11 | 12.01 | 10.57 | 8.34 | 4.83 |
| 20 | 13.81 | 12.90 | 10.40 | 7.99 | 4.85 | 14.01 | 12.40 | 10.79 | 8.26 | 4.99 |

Table B.12.1: Impact Velocity Values

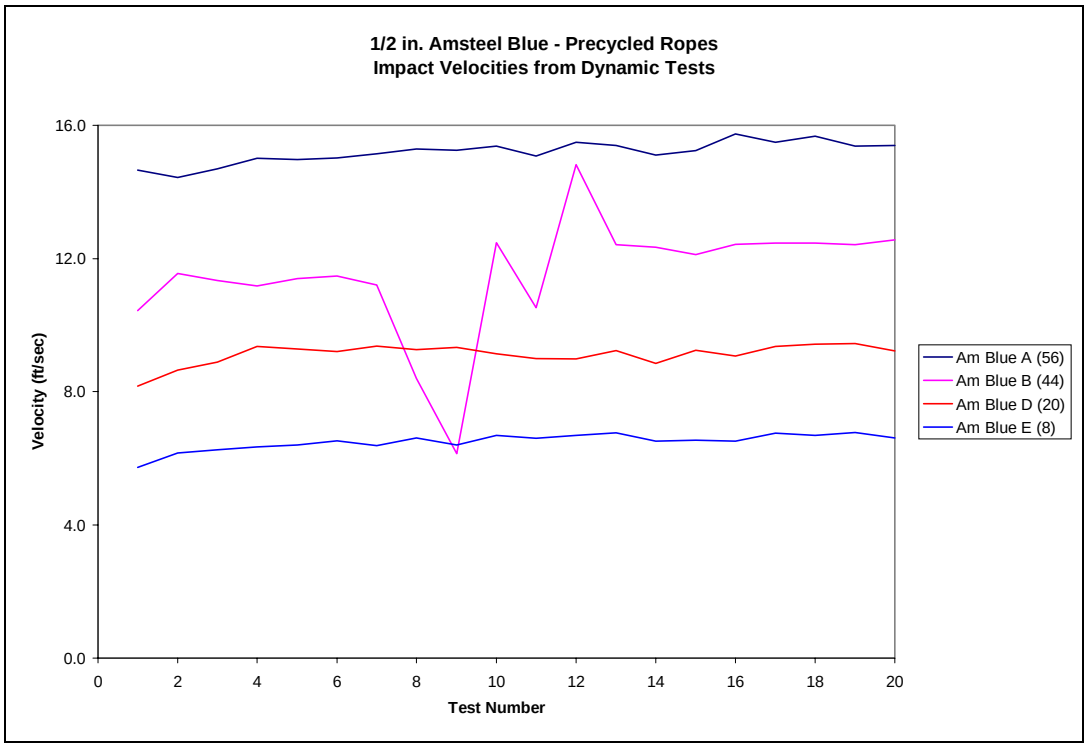


Figure B.12.1: Amsteel Blue – Precycled Ropes – Impact Velocities

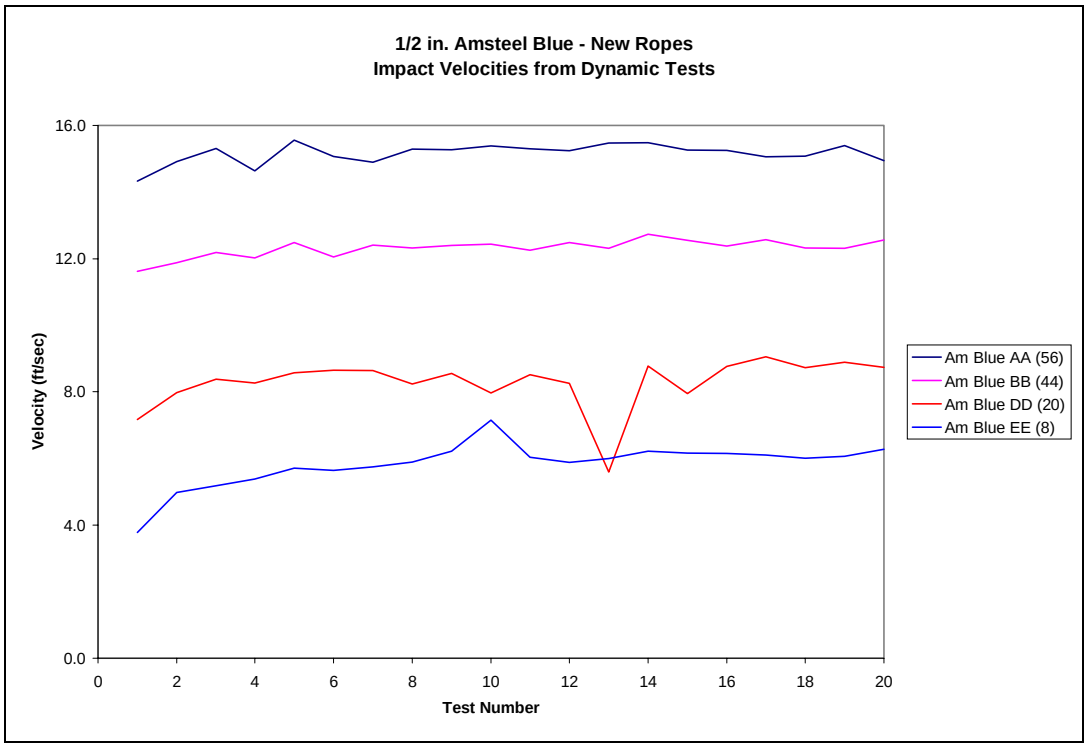


Figure B.12.2: Amsteel Blue – New Ropes – Impact Velocities

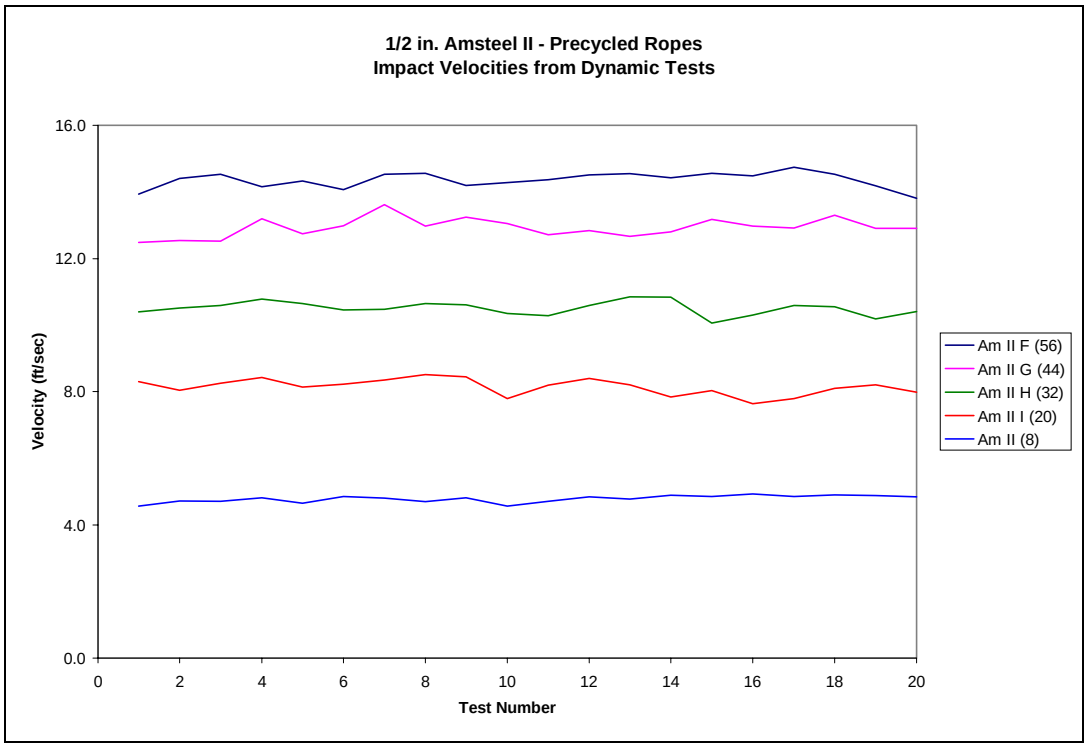


Figure B.12.3: Amsteel II – Precycled Ropes – Impact Velocities

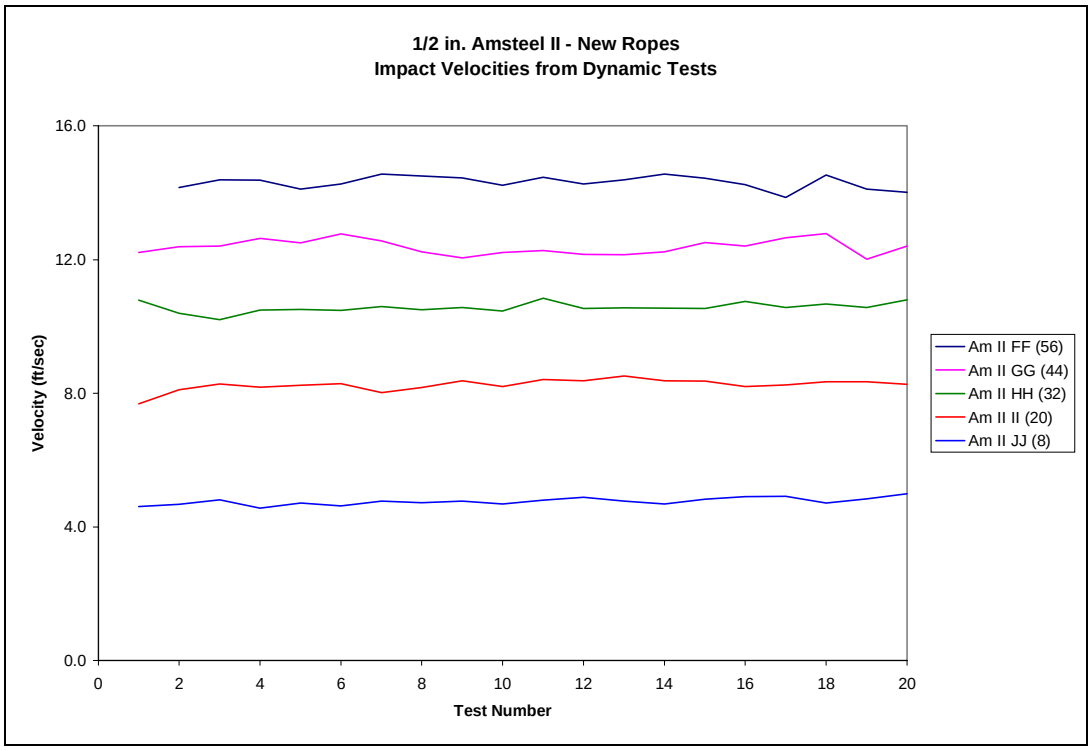


Figure B.12.4: Amsteel II – New Ropes – Impact Velocities

## B.13 Impulses from the Dynamic Tests

| Impulse Values (kip-sec) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 0.0542 | 0.0460 | - | 0.0364 | 0.0206 | 0.0525 | 0.0453 | - | 0.0242 | 0.0188 |
| 2 | 0.0546 | 0.0365 | - | 0.0377 | 0.0274 | 0.0578 | 0.0483 | - | 0.0299 | 0.0202 |
| 3 | 0.0552 | 0.0414 | - | 0.0272 | 0.0219 | 0.0580 | 0.0519 | - | 0.0395 | 0.0202 |
| 4 | 0.0628 | 0.0511 | - | 0.0357 | 0.0308 | 0.0609 | 0.0536 | - | 0.0364 | 0.0216 |
| 5 | 0.0664 | 0.0532 | - | 0.0434 | 0.0286 | 0.0607 | 0.0550 | - | 0.0347 | 0.0244 |
| 6 | 0.0619 | 0.0547 | - | 0.0358 | 0.0291 | 0.0638 | 0.0554 | - | 0.0372 | 0.0236 |
| 7 | 0.0661 | 0.0540 | - | 0.0317 | 0.0298 | 0.0628 | 0.0574 | - | 0.0365 | 0.0247 |
| 8 | 0.0628 | 0.0527 | - | 0.0448 | 0.0298 | 0.0669 | 0.0576 | - | 0.0396 | 0.0254 |
| 9 | 0.0638 | 0.0535 | - | 0.0437 | 0.0288 | 0.0656 | 0.0585 | - | 0.0369 | 0.0263 |
| 10 | 0.0710 | 0.0551 | - | 0.0450 | 0.0293 | 0.0640 | 0.0588 | - | 0.0395 | 0.0268 |
| 11 | 0.0707 | 0.0590 | - | 0.0418 | 0.0289 | 0.0732 | 0.0592 | - | 0.0395 | 0.0262 |
| 12 | 0.0663 | 0.0574 | - | 0.0407 | 0.0292 | 0.0671 | 0.0596 | - | 0.0412 | 0.0269 |
| 13 | 0.0715 | 0.0571 | - | 0.0398 | 0.0292 | 0.0668 | 0.0599 | - | 0.0407 | 0.0336 |
| 14 | 0.0704 | 0.0603 | - | 0.0409 | 0.0292 | 0.0661 | 0.0598 | - | 0.0410 | 0.0227 |
| 15 | 0.0722 | 0.0556 | - | 0.0415 | 0.0296 | 0.0652 | 0.0602 | - | 0.0396 | 0.0287 |
| 16 | 0.0680 | 0.0594 | - | 0.0399 | 0.0290 | 0.0653 | 0.0606 | - | 0.0386 | 0.0300 |
| 17 | 0.0699 | 0.0614 | - | 0.0411 | 0.0302 | 0.0654 | 0.0603 | - | 0.0398 | 0.0313 |
| 18 | 0.0730 | 0.0587 | - | 0.0408 | 0.0297 | 0.0657 | 0.0604 | - | 0.0397 | 0.0305 |
| 19 | 0.0677 | 0.0614 | - | 0.0413 | 0.0296 | 0.0645 | 0.0606 | - | 0.0392 | 0.0363 |
| 20 | 0.0664 | 0.0605 | - | 0.0385 | 0.0298 | 0.0649 | 0.0610 | - | 0.0411 | 0.0230 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 0.0589 | 0.0554 | 0.0465 | 0.0381 | 0.0288 | - | 0.0546 | 0.0498 | 0.0369 | 0.0246 |
| 2 | 0.0579 | 0.0592 | 0.0502 | 0.0401 | 0.0302 | 0.0633 | 0.0590 | 0.0509 | 0.0402 | 0.0300 |
| 3 | 0.0634 | 0.0607 | 0.0514 | 0.0410 | 0.0295 | 0.0672 | 0.0611 | 0.0519 | 0.0414 | 0.0251 |
| 4 | 0.0642 | 0.0617 | 0.0503 | 0.0409 | 0.0249 | 0.0693 | 0.0612 | 0.0526 | 0.0418 | 0.0237 |
| 5 | 0.0652 | 0.0623 | 0.0530 | 0.0414 | 0.0288 | 0.0700 | 0.0619 | 0.0527 | 0.0423 | 0.0288 |
| 6 | 0.0646 | 0.0624 | 0.0535 | 0.0416 | 0.0285 | 0.0703 | 0.0616 | 0.0527 | 0.0425 | 0.0270 |
| 7 | 0.0670 | 0.0622 | 0.0540 | 0.0415 | 0.0274 | 0.0707 | 0.0619 | 0.0528 | 0.0426 | 0.0270 |
| 8 | 0.0675 | 0.0626 | 0.0535 | 0.0415 | 0.0278 | 0.0711 | 0.0620 | 0.0532 | 0.0419 | 0.0270 |
| 9 | 0.0655 | 0.0629 | 0.0541 | 0.0419 | 0.0274 | 0.0710 | 0.0625 | 0.0537 | 0.0419 | 0.0271 |
| 10 | 0.0673 | 0.0628 | 0.0537 | 0.0418 | 0.0274 | 0.0707 | 0.0624 | 0.0533 | 0.0420 | 0.0271 |
| 11 | 0.0691 | 0.0629 | 0.0536 | 0.0419 | 0.0278 | 0.0708 | 0.0630 | 0.0538 | 0.0420 | 0.0272 |
| 12 | 0.0730 | 0.0630 | 0.0532 | 0.0419 | 0.0273 | 0.0708 | 0.0625 | 0.0528 | 0.0423 | 0.0275 |
| 13 | 0.0696 | 0.0631 | 0.0534 | 0.0421 | 0.0276 | 0.0709 | 0.0625 | 0.0533 | 0.0423 | 0.0273 |
| 14 | 0.0701 | 0.0631 | 0.0543 | 0.0420 | 0.0278 | 0.0709 | 0.0627 | 0.0535 | 0.0424 | 0.0273 |
| 15 | 0.0699 | 0.0640 | 0.0539 | 0.0420 | 0.0275 | 0.0710 | 0.0629 | 0.0535 | 0.0423 | 0.0273 |
| 16 | 0.0690 | 0.0634 | 0.0539 | 0.0422 | 0.0275 | 0.0705 | 0.0629 | 0.0535 | 0.0424 | 0.0274 |
| 17 | 0.0698 | 0.0636 | 0.0536 | 0.0422 | 0.0276 | 0.0706 | 0.0630 | 0.0531 | 0.0424 | 0.0277 |
| 18 | 0.0701 | 0.0635 | 0.0536 | 0.0423 | 0.0275 | 0.0703 | 0.0629 | 0.0536 | 0.0426 | 0.0274 |
| 19 | 0.0695 | 0.0636 | 0.0537 | 0.0422 | 0.0276 | 0.0703 | 0.0627 | 0.0536 | 0.0426 | 0.0275 |
| 20 | 0.0690 | 0.0636 | 0.0538 | 0.0422 | 0.0276 | 0.0703 | 0.0627 | 0.0536 | 0.0435 | 0.0278 |

Table B.13.1: Impulse Values

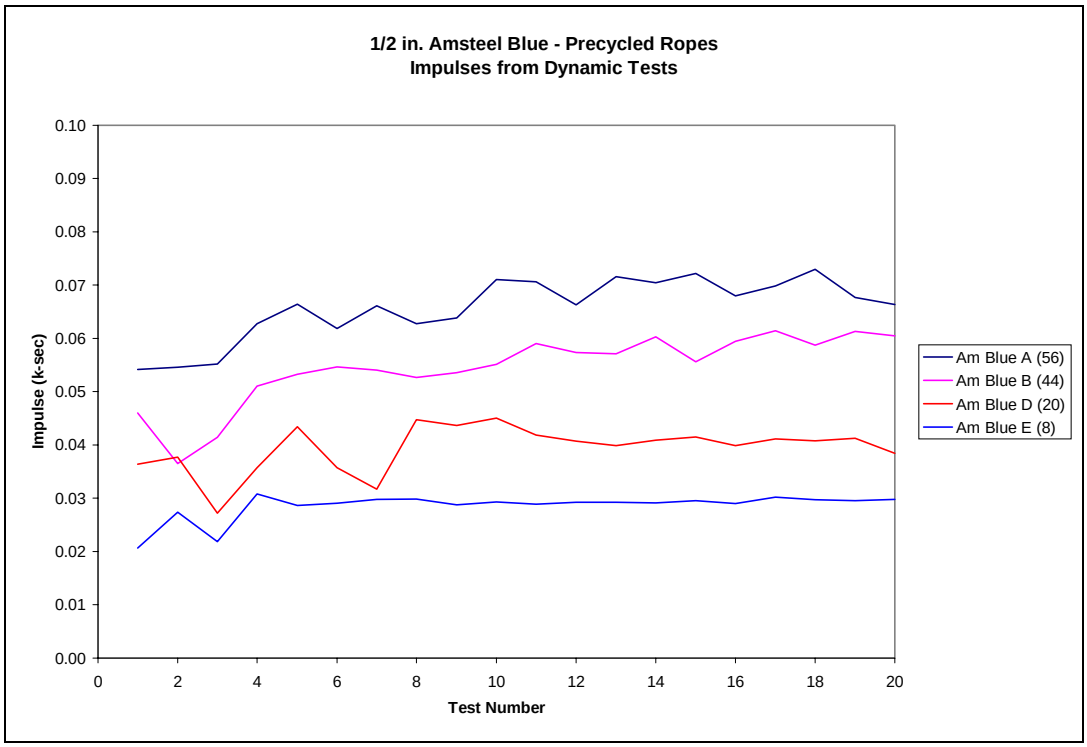


Figure B.13.1: Amsteel Blue – Precycled Ropes – Impulse Trends

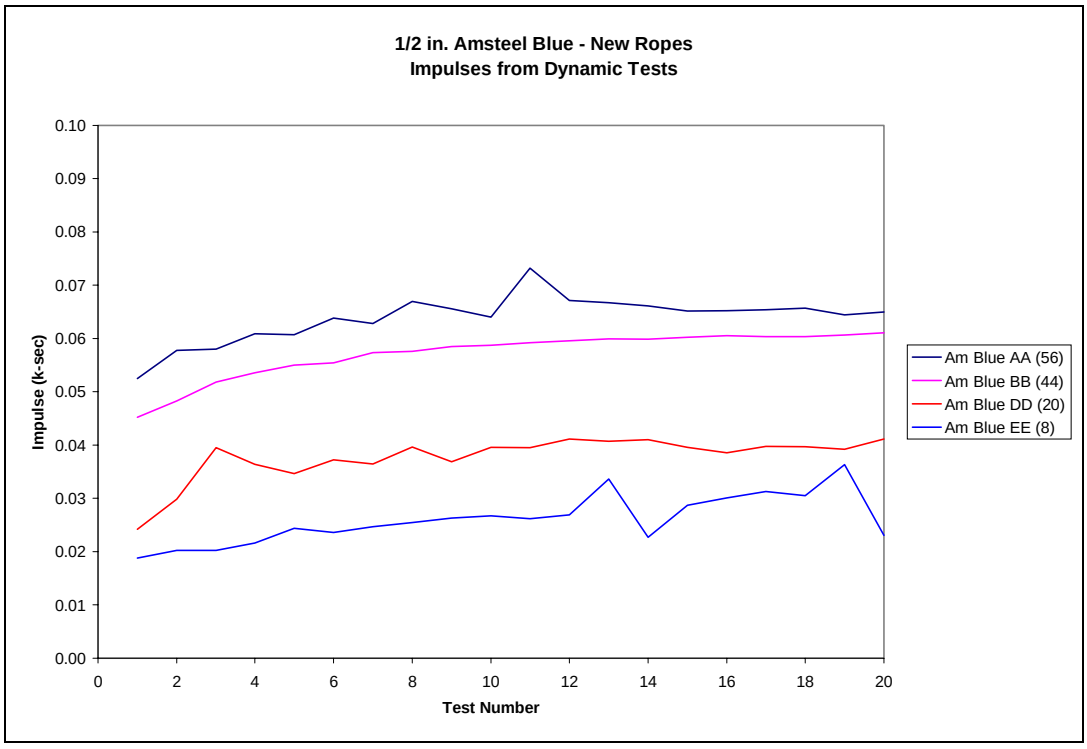


Figure B.13.2: Amsteel Blue – New Ropes – Impulse Trends

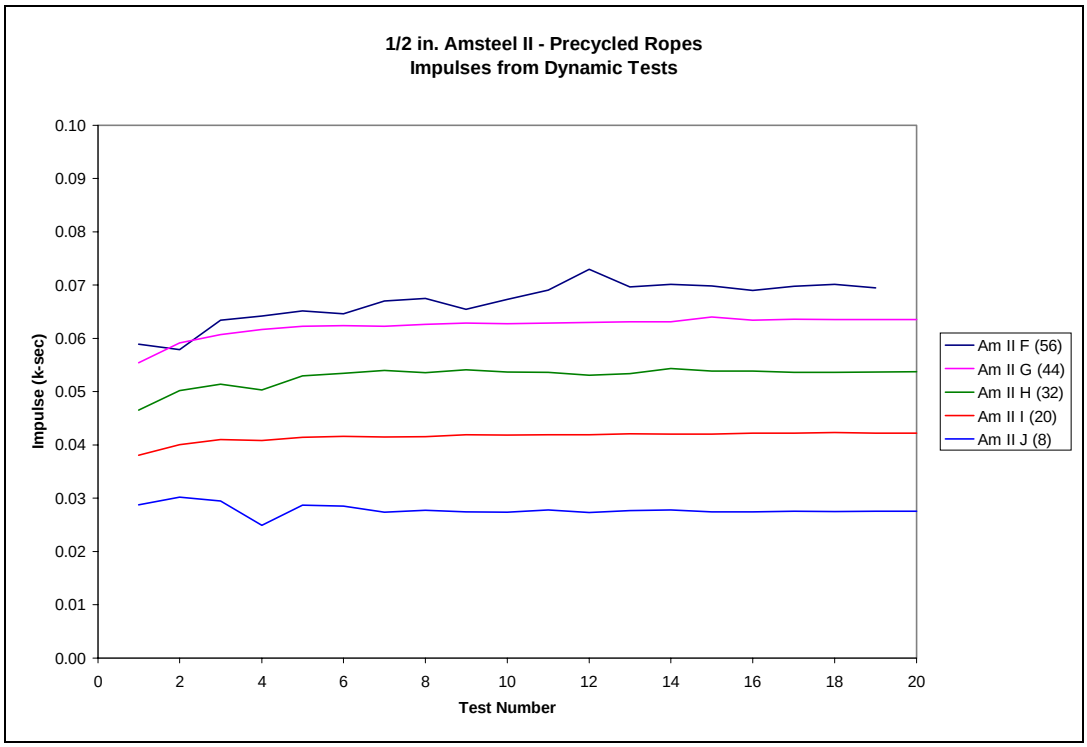


Figure B.13.3: Amsteel II – Precycled Ropes – Impulse Trends

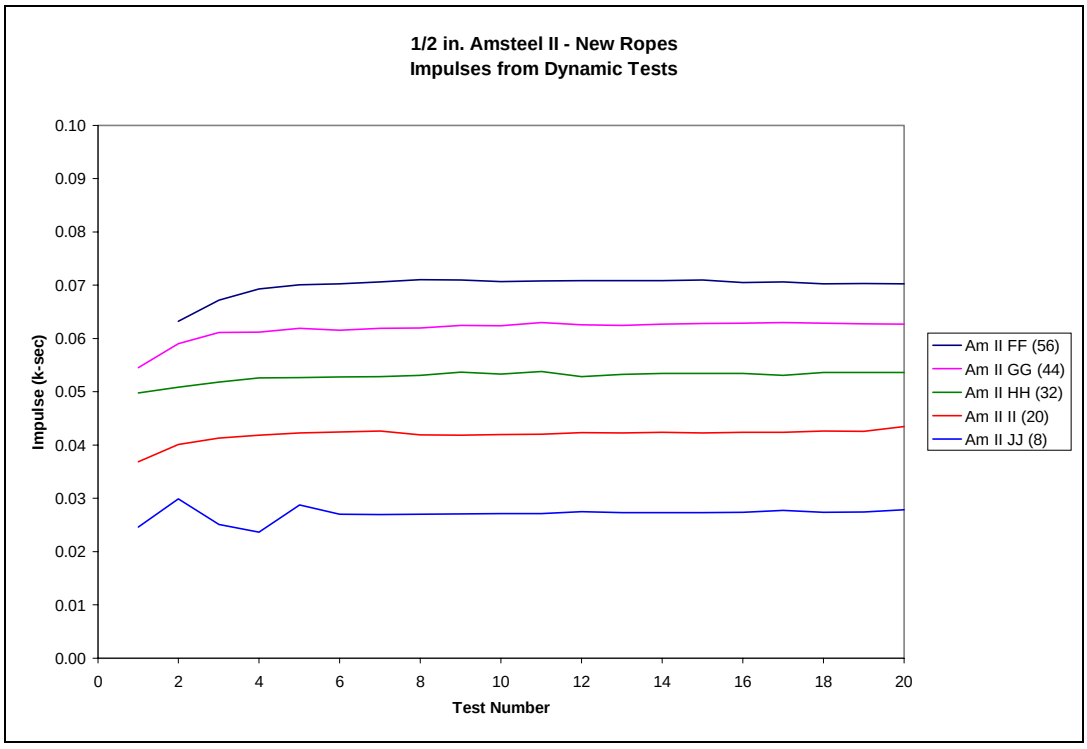


Figure B.13.4: Amsteel II – New Ropes – Impulse Trends

## B.14 Energy Losses from the Dynamic Tests

| Energy Loss Values (kip-sec) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 2.65 | 1.32 | - | 0.87 | 0.45 | 2.56 | 1.67 | - | 0.69 | 0.23 |
| 2 | 2.51 | 1.56 | - | 0.93 | 0.48 | 2.67 | 1.71 | - | 0.78 | 0.34 |
| 3 | 2.55 | 1.48 | - | 0.96 | 0.48 | 2.77 | 1.72 | - | 0.84 | 0.35 |
| 4 | 2.63 | 1.33 | - | 1.03 | 0.49 | 2.47 | 1.69 | - | 0.79 | 0.38 |
| 5 | 2.52 | 1.38 | - | 1.04 | 0.53 | 2.71 | 1.78 | - | 0.86 | 0.42 |
| 6 | 2.44 | 1.41 | - | 0.95 | 0.55 | 2.57 | 1.58 | - | 0.87 | 0.40 |
| 7 | 2.46 | 1.24 | - | 0.99 | 0.48 | 2.43 | 1.66 | - | 0.92 | 0.41 |
| 8 | 2.50 | 0.23 | - | 0.97 | 0.54 | 2.45 | 1.62 | - | 0.73 | 0.44 |
| 9 | 2.45 | -0.45 | - | 0.99 | 0.48 | 2.43 | 1.61 | - | 0.80 | 0.50 |
| 10 | 2.51 | 1.75 | - | 1.00 | 0.54 | 2.41 | 1.65 | - | 0.60 | 0.68 |
| 11 | 2.36 | 0.91 | - | 0.87 | 0.50 | 2.46 | 1.50 | - | 0.78 | 0.45 |
| 12 | 2.48 | 2.71 | - | 0.85 | 0.53 | 2.40 | 1.59 | - | 0.68 | 0.43 |
| 13 | 2.43 | 1.68 | - | 0.93 | 0.54 | 2.42 | 1.50 | - | -0.06 | 0.47 |
| 14 | 2.30 | 1.64 | - | 0.78 | 0.46 | 2.44 | 1.70 | - | 0.80 | 0.51 |
| 15 | 2.32 | 1.44 | - | 0.92 | 0.47 | 2.36 | 1.59 | - | 0.55 | 0.49 |
| 16 | 2.58 | 1.54 | - | 0.85 | 0.45 | 2.34 | 1.52 | - | 0.83 | 0.49 |
| 17 | 2.46 | 1.58 | - | 0.94 | 0.52 | 2.23 | 1.61 | - | 0.88 | 0.45 |
| 18 | 2.52 | 1.55 | - | 0.95 | 0.51 | 2.33 | 1.49 | - | 0.77 | 0.44 |
| 19 | 2.45 | 1.56 | - | 0.94 | 0.53 | 2.42 | 1.46 | - | 0.81 | 0.44 |
| 20 | 2.36 | 1.58 | - | 0.90 | 0.47 | 2.13 | 1.57 | - | 0.78 | 0.49 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 2.22 | 1.76 | 1.27 | 0.80 | 0.23 | - | 1.65 | 1.24 | 0.70 | 0.24 |
| 2 | 2.13 | 1.58 | 1.14 | 0.65 | 0.24 | 2.13 | 1.52 | 1.06 | 0.69 | 0.26 |
| 3 | 2.12 | 1.51 | 1.11 | 0.69 | 0.23 | 2.06 | 1.45 | 0.95 | 0.71 | 0.27 |
| 4 | 1.89 | 1.81 | 1.18 | 0.73 | 0.25 | 1.96 | 1.55 | 1.02 | 0.65 | 0.21 |
| 5 | 1.95 | 1.55 | 1.09 | 0.62 | 0.22 | 1.82 | 1.46 | 1.04 | 0.66 | 0.24 |
| 6 | 1.82 | 1.39 | 1.00 | 0.65 | 0.25 | 1.87 | 1.58 | 1.01 | 0.67 | 0.22 |
| 7 | 2.04 | 1.91 | 1.00 | 0.68 | 0.25 | 2.00 | 1.47 | 1.06 | 0.58 | 0.23 |
| 8 | 2.01 | 1.59 | 1.06 | 0.73 | 0.23 | 1.95 | 1.33 | 1.02 | 0.62 | 0.23 |
| 9 | 1.81 | 1.67 | 1.04 | 0.73 | 0.25 | 1.91 | 1.26 | 1.04 | 0.69 | 0.24 |
| 10 | 1.92 | 1.62 | 0.96 | 0.50 | 0.20 | 1.82 | 1.31 | 0.99 | 0.63 | 0.22 |
| 11 | 1.94 | 1.48 | 0.93 | 0.63 | 0.22 | 1.91 | 1.30 | 1.12 | 0.70 | 0.24 |
| 12 | 1.98 | 1.55 | 1.03 | 0.68 | 0.25 | 1.84 | 1.28 | 1.03 | 0.67 | 0.24 |
| 13 | 2.02 | 1.47 | 1.14 | 0.62 | 0.24 | 1.89 | 1.27 | 1.03 | 0.72 | 0.23 |
| 14 | 1.91 | 1.52 | 1.11 | 0.53 | 0.26 | 1.99 | 1.31 | 1.02 | 0.67 | 0.21 |
| 15 | 2.03 | 1.66 | 0.83 | 0.58 | 0.25 | 1.91 | 1.38 | 1.02 | 0.67 | 0.25 |
| 16 | 2.03 | 1.58 | 0.93 | 0.46 | 0.26 | 1.83 | 1.38 | 1.09 | 0.62 | 0.26 |
| 17 | 2.07 | 1.54 | 1.05 | 0.49 | 0.25 | 1.66 | 1.48 | 1.04 | 0.63 | 0.25 |
| 18 | 1.98 | 1.70 | 1.03 | 0.60 | 0.26 | 1.96 | 1.52 | 1.06 | 0.66 | 0.22 |
| 19 | 1.85 | 1.55 | 0.89 | 0.63 | 0.25 | 1.77 | 1.22 | 1.03 | 0.66 | 0.24 |
| 20 | 1.71 | 1.53 | 0.97 | 0.57 | 0.25 | 1.70 | 1.38 | 1.10 | 0.63 | 0.26 |

Table B.14.1: Energy Loss Values

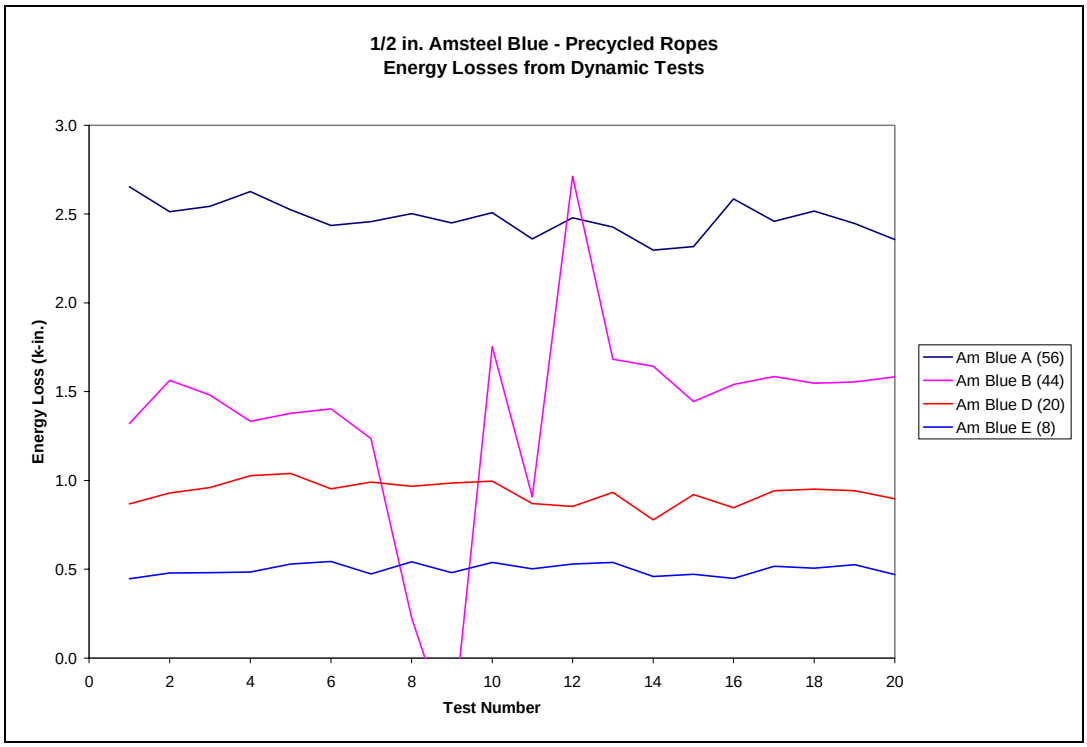


Figure B.14.1: Amsteel Blue – Precycled Ropes –Energy Loss Trends

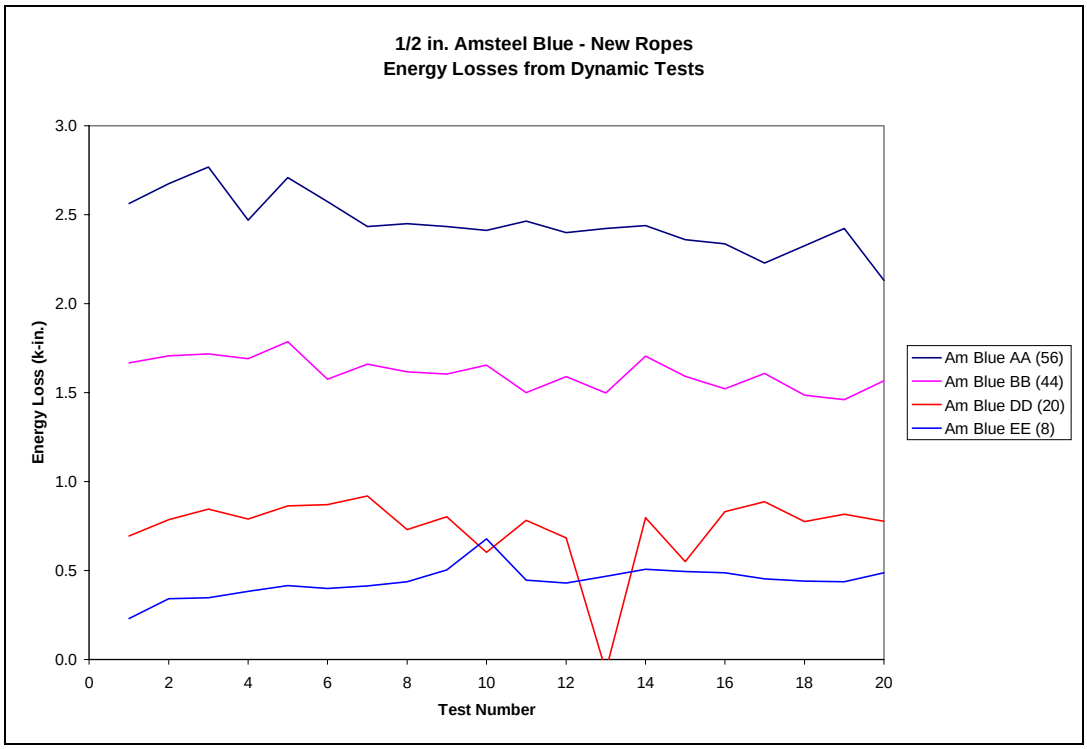


Figure B.14.2: Amsteel Blue – New Ropes –Energy Loss Trends

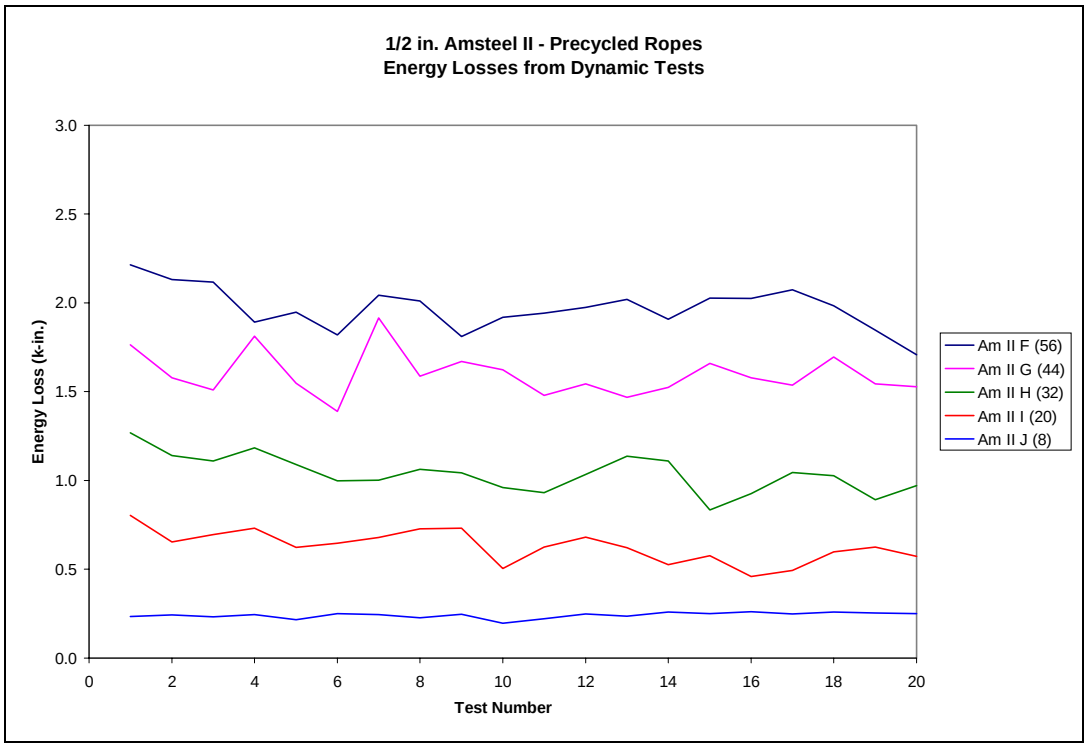


Figure B.14.3: Amsteel II – Precycled Ropes –Energy Loss Trends

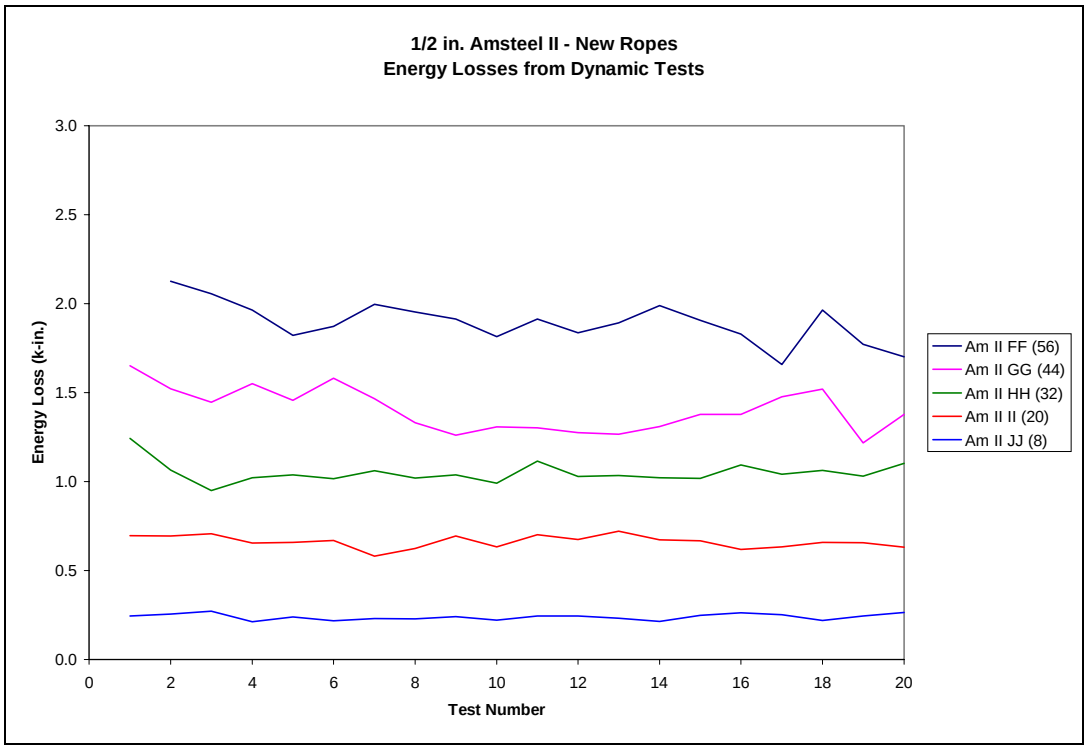


Figure B.14.4: Amsteel II – New Ropes –Energy Loss Trends

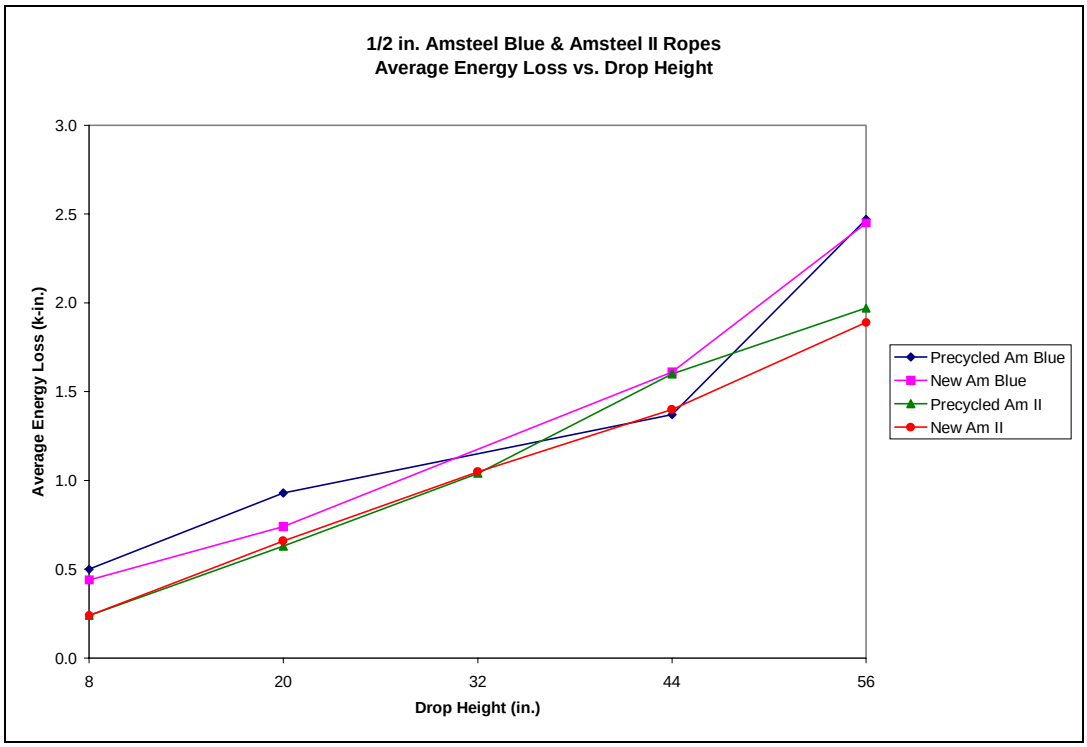


Figure B.14.5: Average Energy Loss vs. Drop Height

## B.15 Dynamic Areas from the Dynamic Tests

| Dynamic Area Values (kip-sec) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes | | | | | | | | | |
| | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 5.85 | 3.01 | - | 2.25 | 0.92 | 5.38 | 3.93 | - | 1.38 | 0.59 |
| 2 | 5.71 | 3.07 | - | 2.17 | 1.12 | 6.29 | 4.23 | - | 1.76 | 0.77 |
| 3 | 5.85 | 3.26 | - | 1.87 | 1.09 | 6.40 | 4.55 | - | 2.23 | 0.80 |
| 4 | 6.63 | 3.60 | - | 2.47 | 1.28 | 6.23 | 4.61 | - | 1.98 | 0.87 |
| 5 | 6.90 | 3.79 | - | 2.69 | 1.30 | 6.58 | 4.87 | - | 2.08 | 0.98 |
| 6 | 6.37 | 4.03 | - | 2.38 | 1.33 | 6.79 | 4.67 | - | 2.23 | 0.92 |
| 7 | 7.04 | 3.78 | - | 2.19 | 1.24 | 6.52 | 4.90 | - | 2.16 | 1.01 |
| 8 | 6.73 | 1.93 | - | 2.92 | 1.35 | 6.94 | 4.93 | - | 1.94 | 1.07 |
| 9 | 6.81 | 0.30 | - | 2.77 | 1.27 | 6.77 | 5.12 | - | 2.17 | 1.19 |
| 10 | 7.70 | 4.61 | - | 2.68 | 1.34 | 6.61 | 5.20 | - | 1.84 | 1.49 |
| 11 | 7.07 | 3.53 | - | 2.35 | 1.31 | 7.56 | 4.82 | - | 2.05 | 1.08 |
| 12 | 7.11 | 6.20 | - | 2.39 | 1.33 | 6.96 | 5.14 | - | 2.06 | 1.06 |
| 13 | 7.61 | 4.85 | - | 2.50 | 1.39 | 6.89 | 5.14 | - | 0.66 | 1.11 |
| 14 | 7.22 | 4.95 | - | 2.25 | 1.31 | 6.86 | 5.35 | - | 2.24 | 1.07 |
| 15 | 7.58 | 4.59 | - | 2.53 | 1.33 | 6.51 | 5.20 | - | 1.73 | 1.16 |
| 16 | 7.50 | 5.11 | - | 2.37 | 1.27 | 6.63 | 5.15 | - | 2.12 | 1.23 |
| 17 | 7.50 | 5.16 | - | 2.57 | 1.41 | 6.69 | 5.22 | - | 2.39 | 1.21 |
| 18 | 7.96 | 5.15 | - | 2.59 | 1.38 | 6.83 | 4.96 | - | 2.20 | 1.13 |
| 19 | 7.32 | 5.37 | - | 2.55 | 1.42 | 6.91 | 4.89 | - | 2.26 | 1.17 |
| 20 | 6.94 | 5.08 | - | 2.42 | 1.27 | 6.48 | 5.35 | - | 2.21 | 1.07 |

| Drop Test Number | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 5.87 | 4.81 | 3.35 | 2.19 | 0.74 | - | 4.66 | 3.63 | 1.90 | 0.78 |
| 2 | 6.51 | 4.75 | 3.55 | 2.18 | 0.82 | 6.30 | 4.99 | 3.42 | 2.15 | 0.76 |
| 3 | 6.60 | 5.12 | 3.63 | 2.22 | 0.79 | 6.57 | 4.91 | 3.47 | 2.26 | 0.75 |
| 4 | 6.39 | 5.61 | 3.78 | 2.41 | 0.73 | 6.61 | 5.16 | 3.57 | 2.21 | 0.69 |
| 5 | 6.48 | 5.21 | 3.63 | 2.23 | 0.77 | 6.35 | 5.02 | 3.57 | 2.22 | 0.81 |
| 6 | 6.29 | 4.13 | 3.64 | 2.25 | 0.84 | 6.80 | 5.25 | 3.66 | 2.29 | 0.78 |
| 7 | 6.98 | 6.06 | 3.58 | 2.34 | 0.86 | 7.07 | 5.11 | 3.65 | 2.19 | 0.83 |
| 8 | 6.64 | 5.64 | 3.69 | 2.41 | 0.83 | 6.92 | 4.91 | 3.55 | 2.21 | 0.81 |
| 9 | 6.39 | 5.72 | 3.69 | 2.40 | 0.84 | 6.80 | 4.95 | 3.64 | 2.39 | 0.83 |
| 10 | 6.52 | 5.37 | 3.44 | 2.07 | 0.75 | 6.52 | 4.93 | 3.60 | 2.32 | 0.82 |
| 11 | 6.76 | 5.45 | 3.51 | 2.23 | 0.82 | 6.81 | 4.82 | 3.84 | 2.41 | 0.82 |
| 12 | 7.00 | 5.39 | 3.70 | 2.35 | 0.88 | 6.73 | 4.76 | 3.67 | 2.30 | 0.84 |
| 13 | 6.81 | 5.18 | 3.79 | 2.29 | 0.86 | 6.85 | 4.79 | 3.65 | 2.46 | 0.83 |
| 14 | 6.58 | 5.08 | 3.79 | 2.04 | 0.90 | 6.82 | 4.65 | 3.63 | 2.35 | 0.81 |
| 15 | 7.05 | 5.76 | 3.35 | 2.24 | 0.87 | 6.87 | 4.94 | 3.59 | 2.41 | 0.86 |
| 16 | 6.78 | 5.58 | 3.55 | 2.07 | 0.91 | 6.54 | 4.97 | 3.81 | 2.21 | 0.87 |
| 17 | 6.96 | 5.30 | 3.69 | 2.10 | 0.89 | 6.39 | 5.18 | 3.60 | 2.37 | 0.88 |
| 18 | 6.98 | 5.89 | 3.62 | 2.22 | 0.90 | 6.90 | 5.02 | 3.72 | 2.36 | 0.81 |
| 19 | 6.34 | 5.43 | 3.45 | 2.28 | 0.89 | 6.54 | 4.89 | 3.62 | 2.38 | 0.85 |
| 20 | 5.98 | 5.42 | 3.40 | 2.16 | 0.87 | 6.35 | 5.12 | 3.77 | 2.27 | 0.88 |

Table B.15.1: Dynamic Area Values

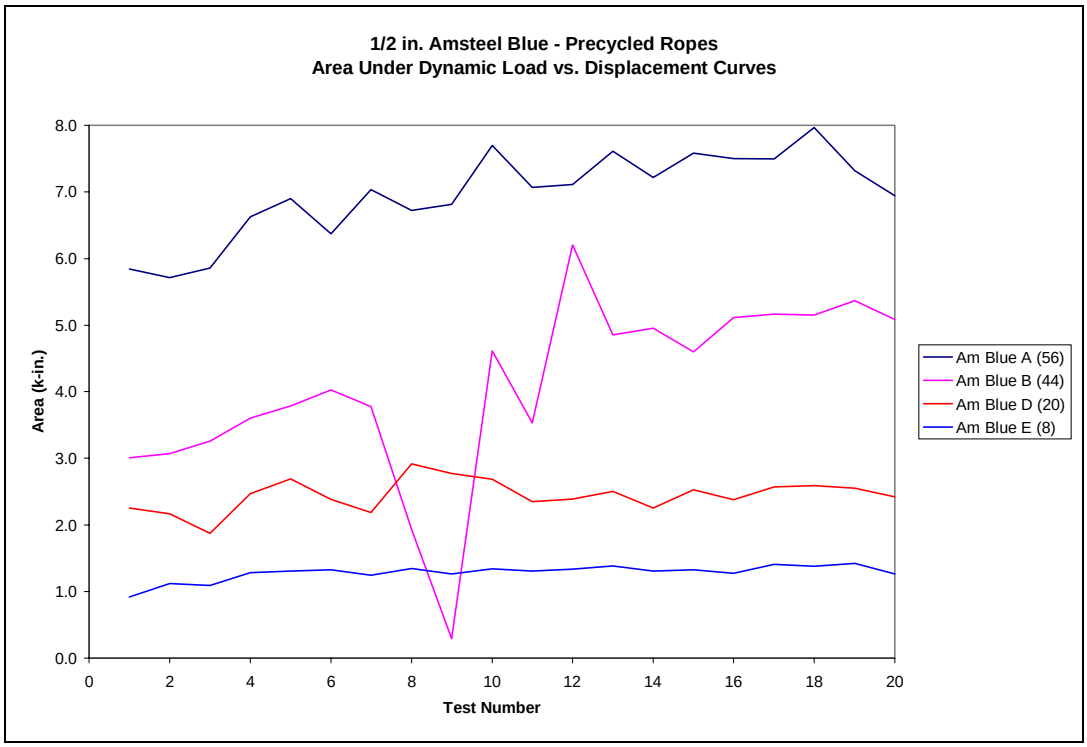


Figure B.15.1: Amsteel Blue – Precycled Ropes - Dynamic Area Trends

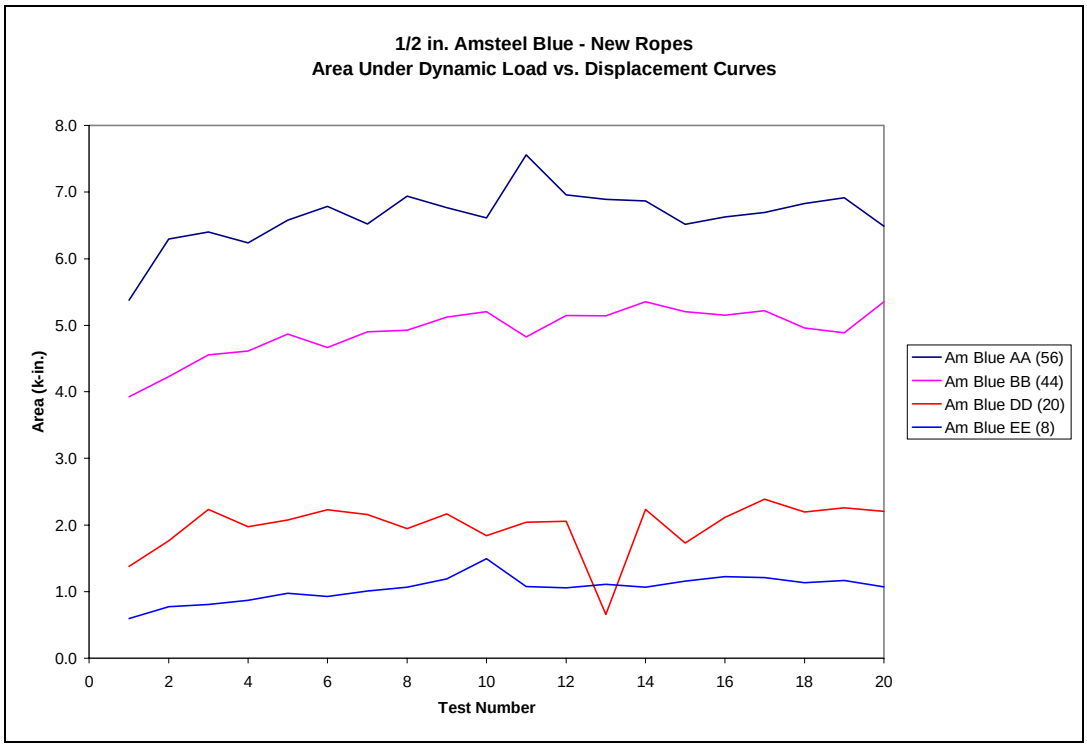


Figure B.15.2: Amsteel Blue – New Ropes - Dynamic Area Trends

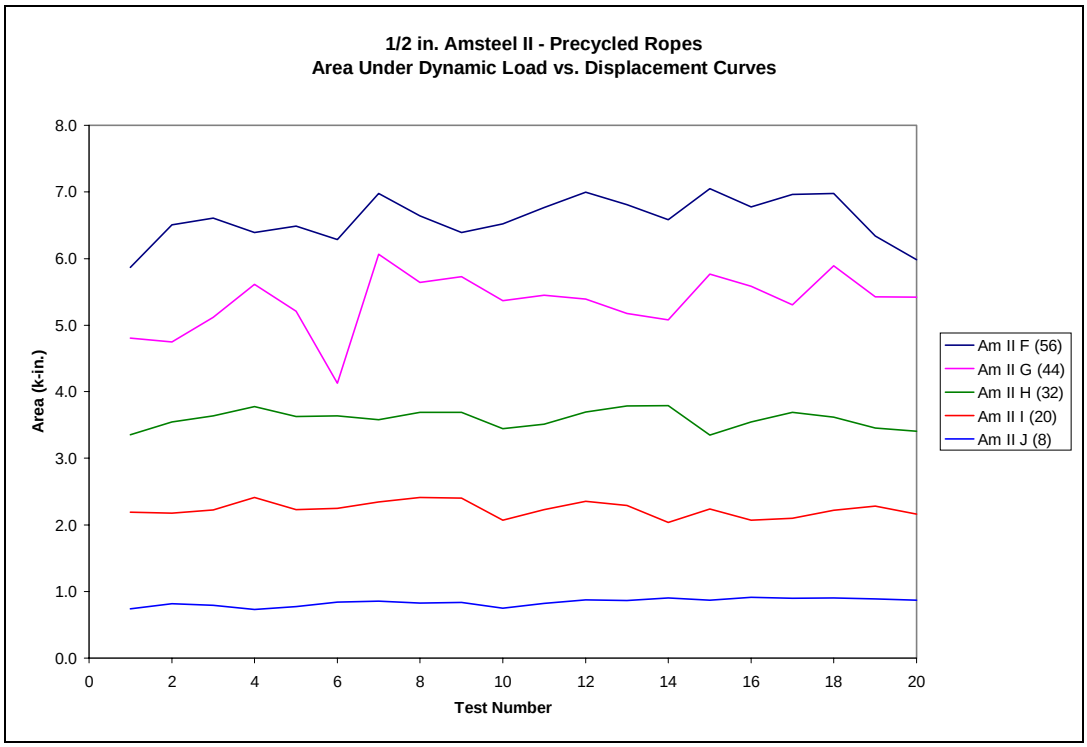


Figure B.15.3: Amsteel II – Precycled Ropes - Dynamic Area Trends

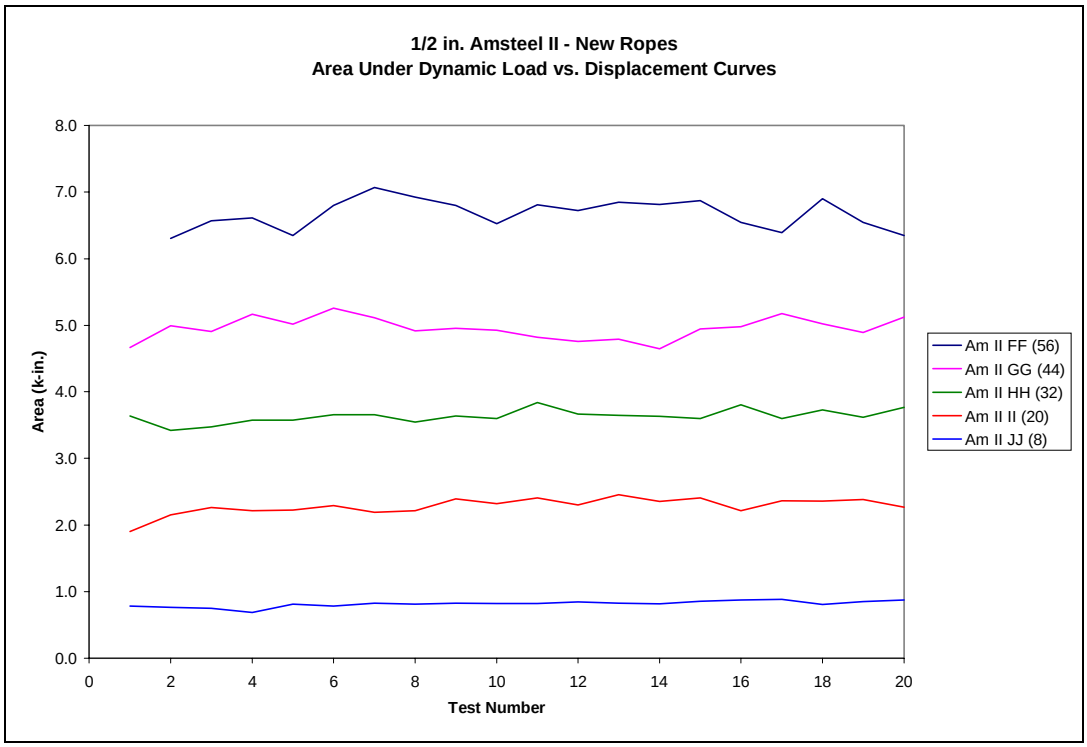


Figure B.15.4: Amsteel II – New Ropes - Dynamic Area Trends

## B.16 Comparison of the Area Inside the Dynamic Hysteresis Loops

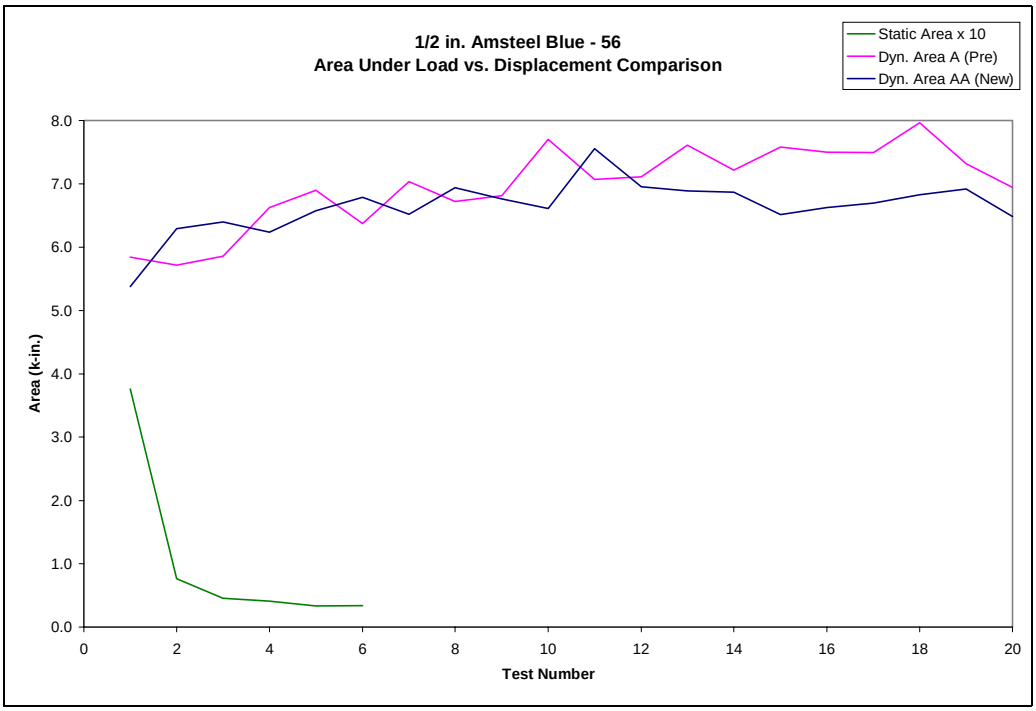


Figure B.16.1: Amsteel Blue A and AA – Area Beneath the Dynamic Hysteresis Loop Comparison

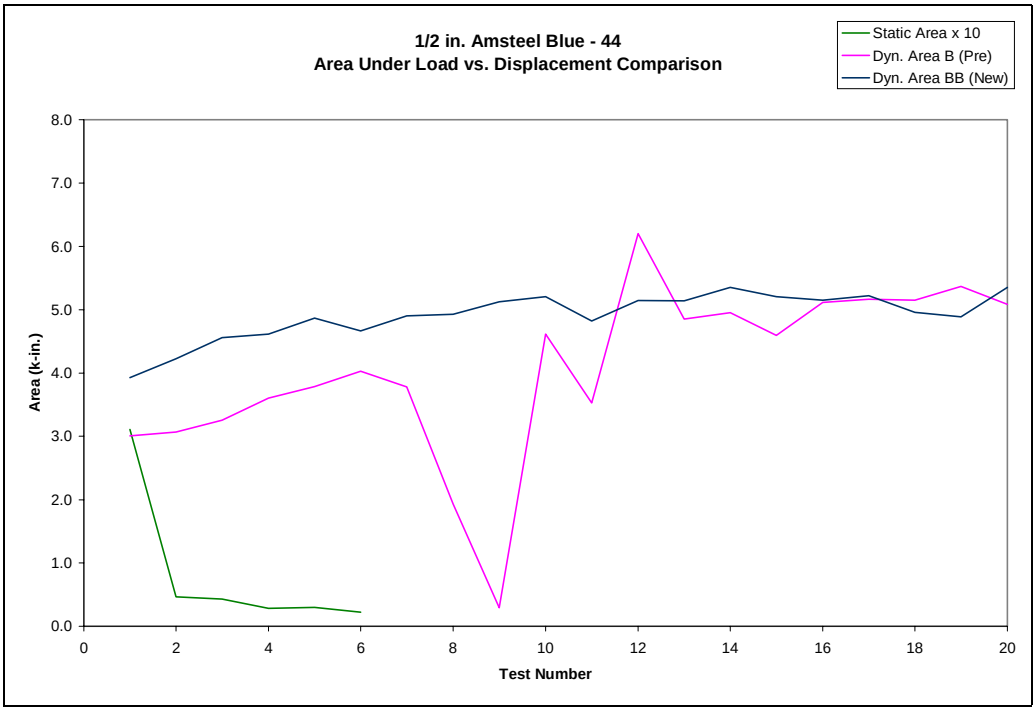


Figure B.16.2: Amsteel Blue B and BB – Area Beneath the Dynamic Hysteresis Loop Comparison

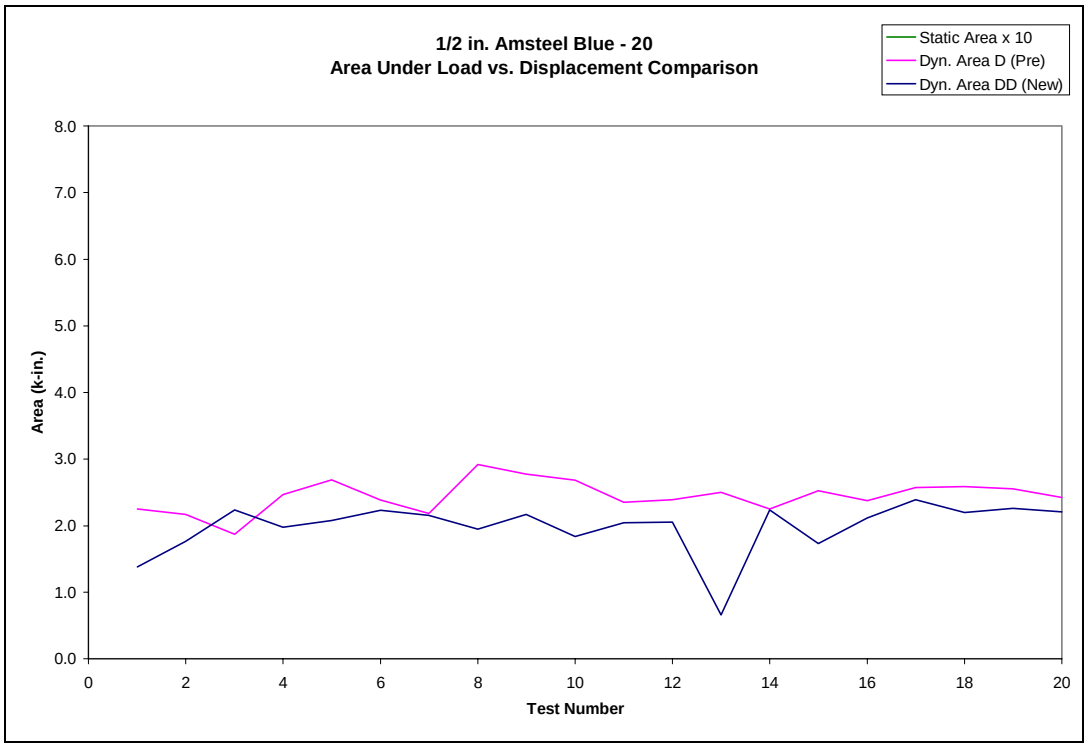


Figure B.16.3: Amsteel Blue D and DD – Area Beneath the Dynamic Hysteresis Loop Comparison

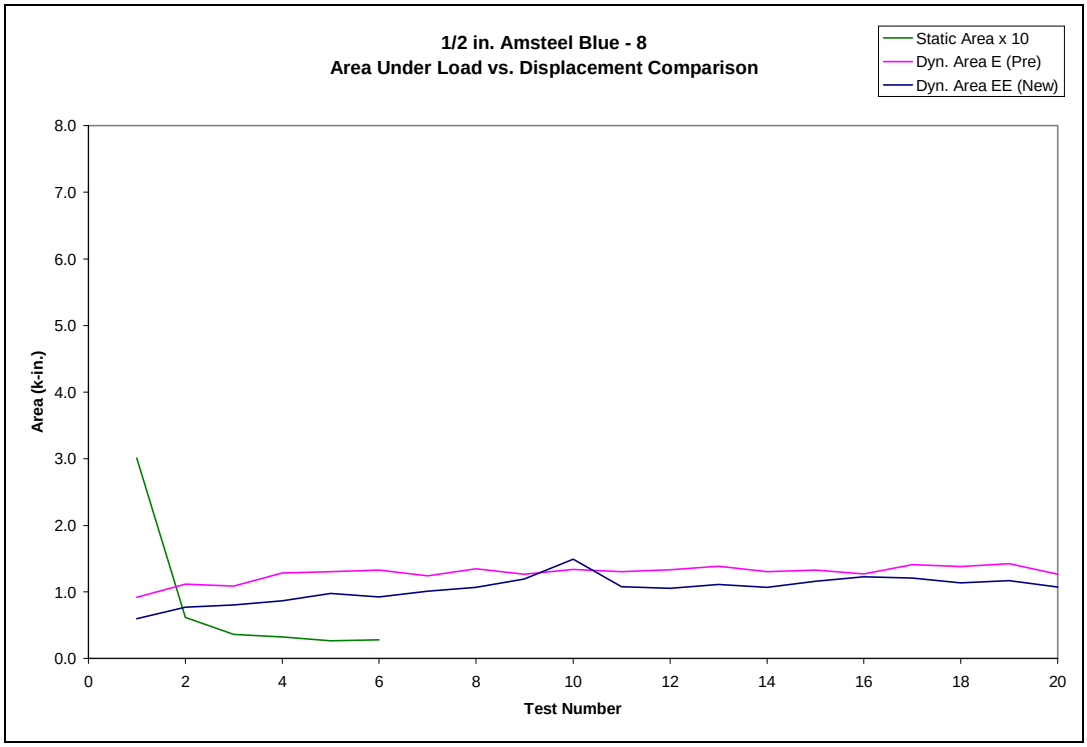


Figure B.16.4: Amsteel Blue E and EE – Area Beneath the Dynamic Hysteresis Loop Comparison

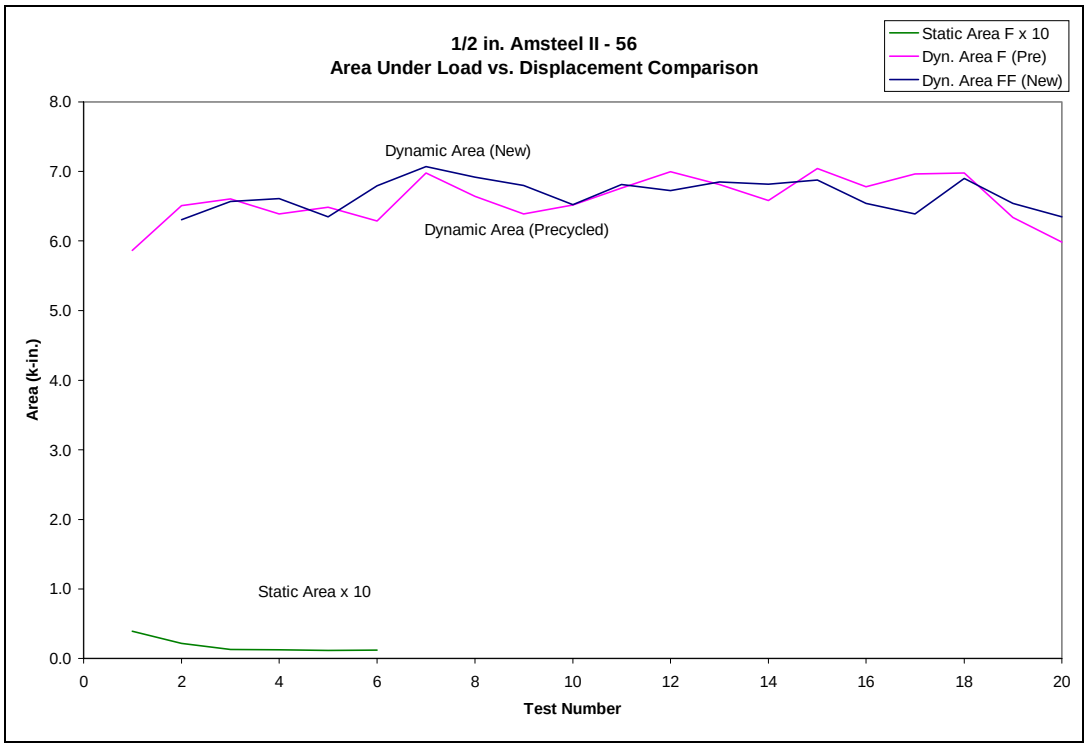


Figure B.16.5: Amsteel II F and FF – Area Beneath the Dynamic Hysteresis Loop Comparison

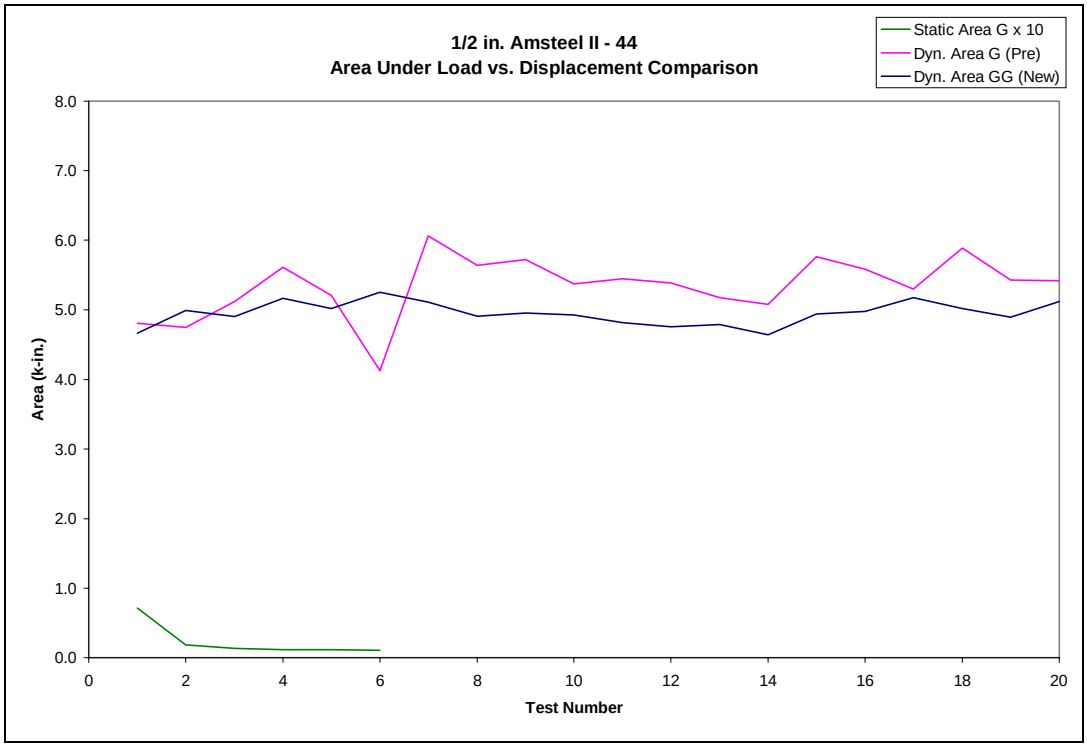


Figure B.16.6: Amsteel II G and GG – Area Beneath the Dynamic Hysteresis Loop Comparison

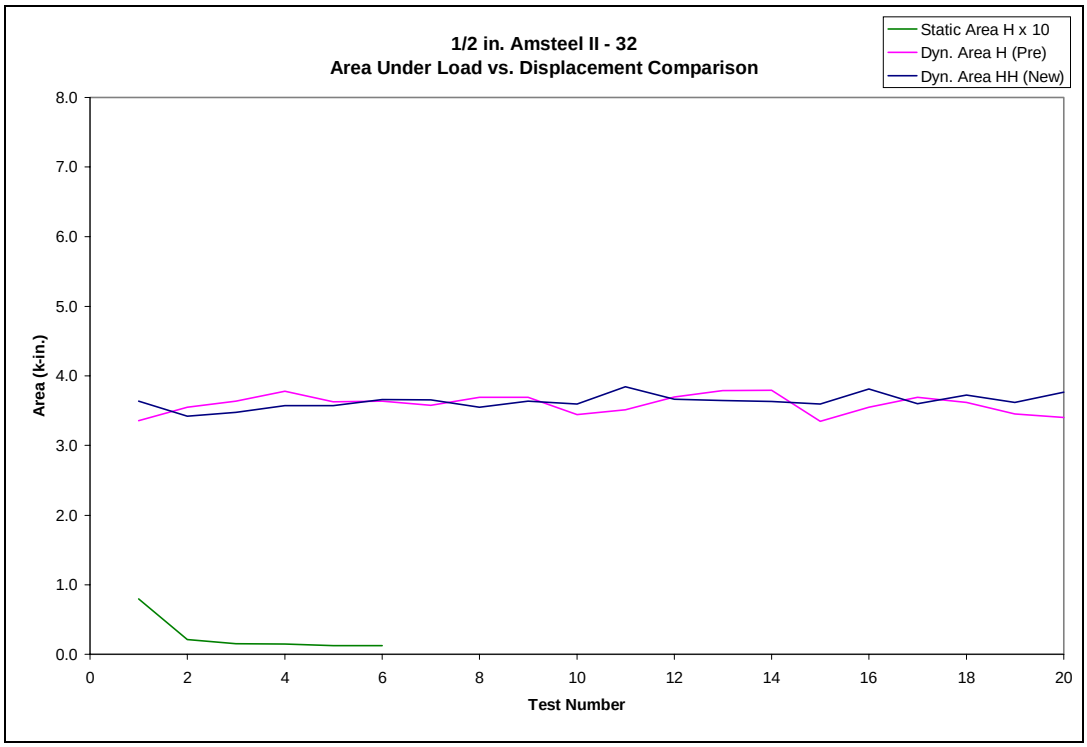


Figure B.16.7: Amsteel II H and HH – Area Beneath the Dynamic Hysteresis Loop Comparison

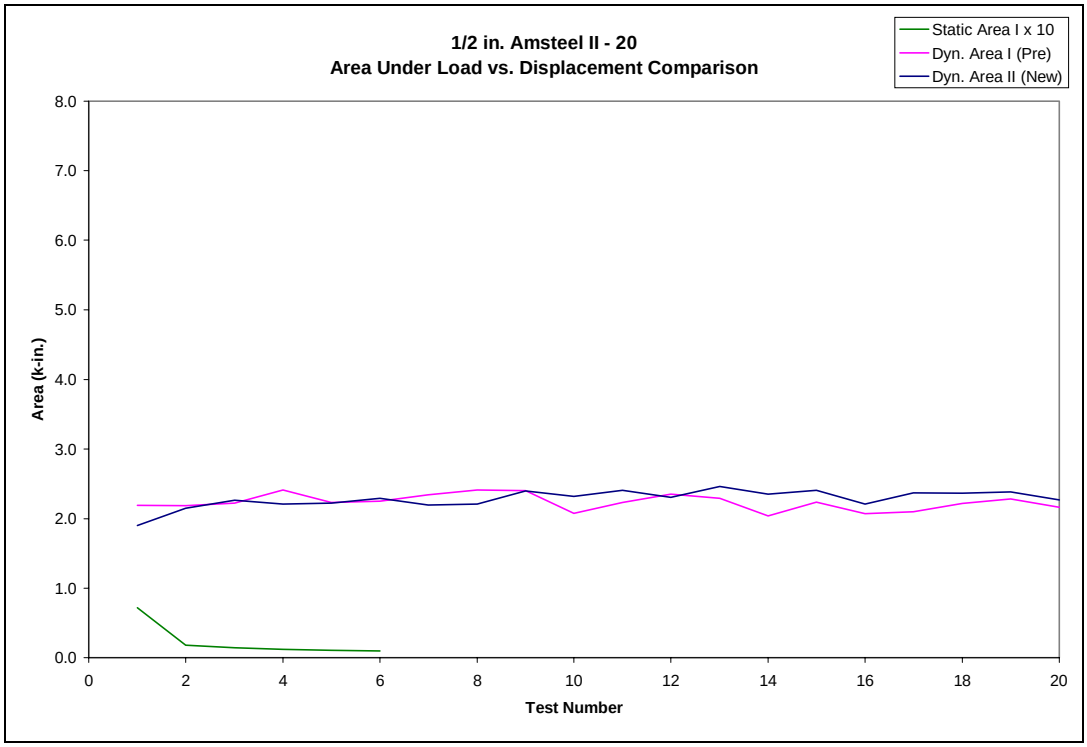


Figure B.16.8: Amsteel II I and II – Area Beneath the Dynamic Hysteresis Loop Comparison

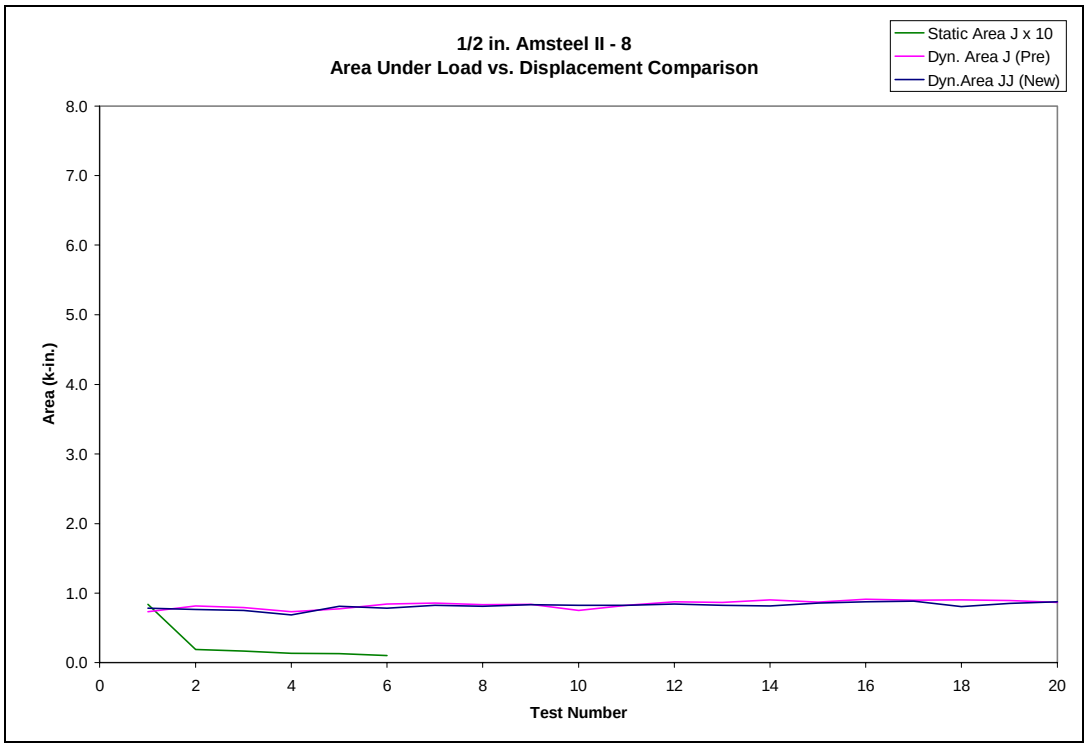


Figure B.16.9: Amsteel II J and JJ – Area Beneath the Dynamic Hysteresis Loop Comparison

## B.17 Dynamic Hysteresis Comparisons

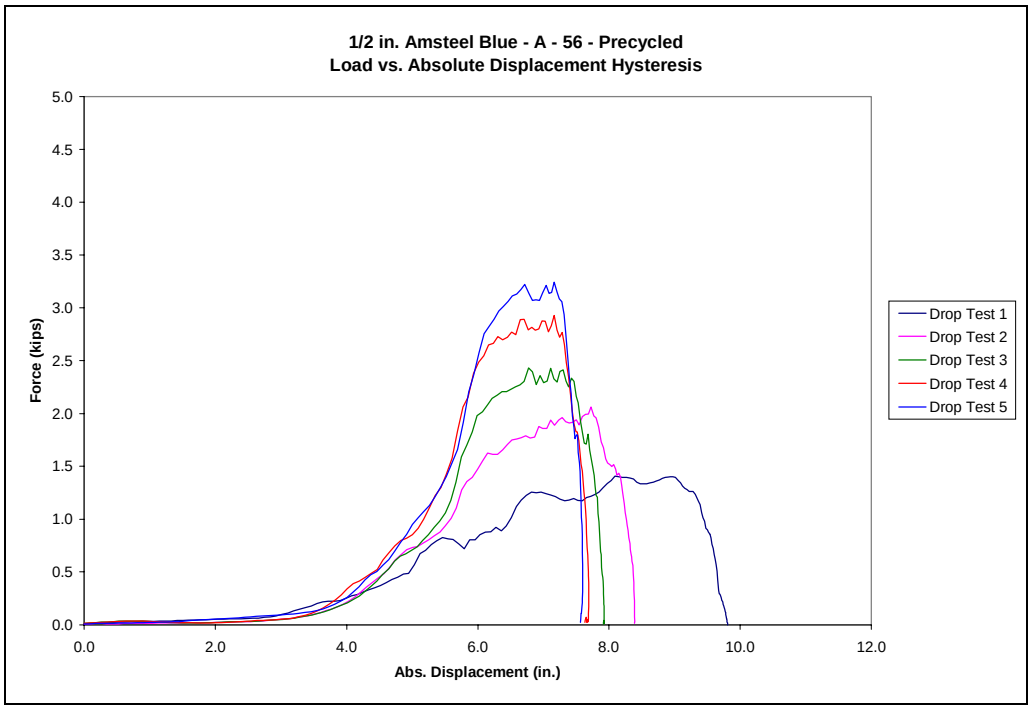


Figure B.17.1: Amsteel Blue A – Dynamic Hysteresis Comparison – Cycles 1-5

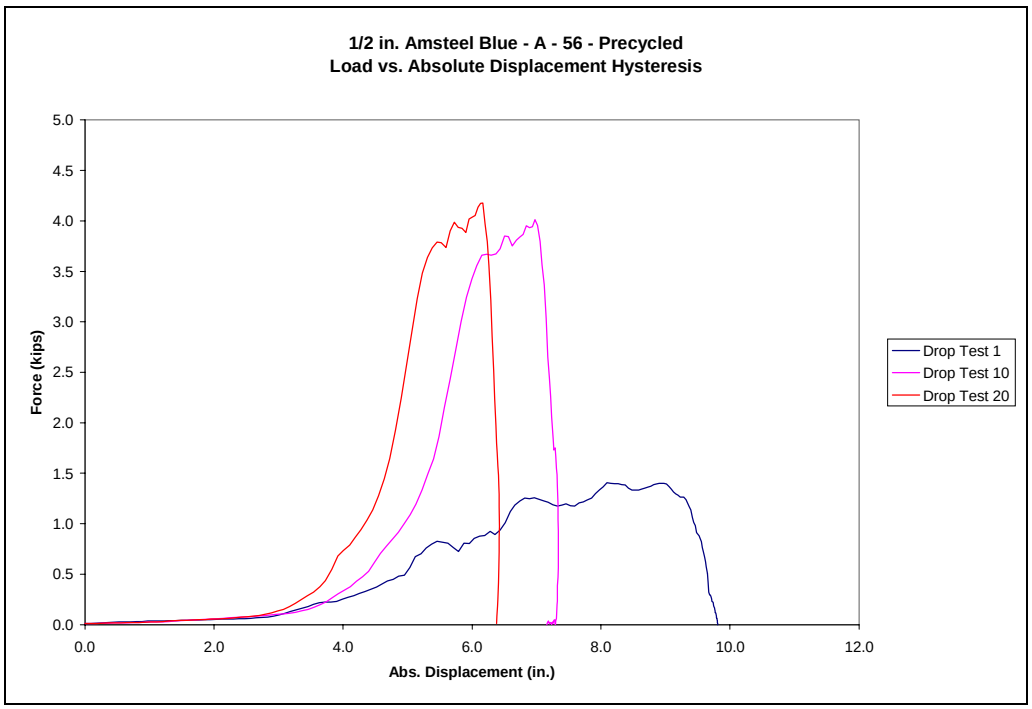


Figure B.17.2: Amsteel Blue A – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

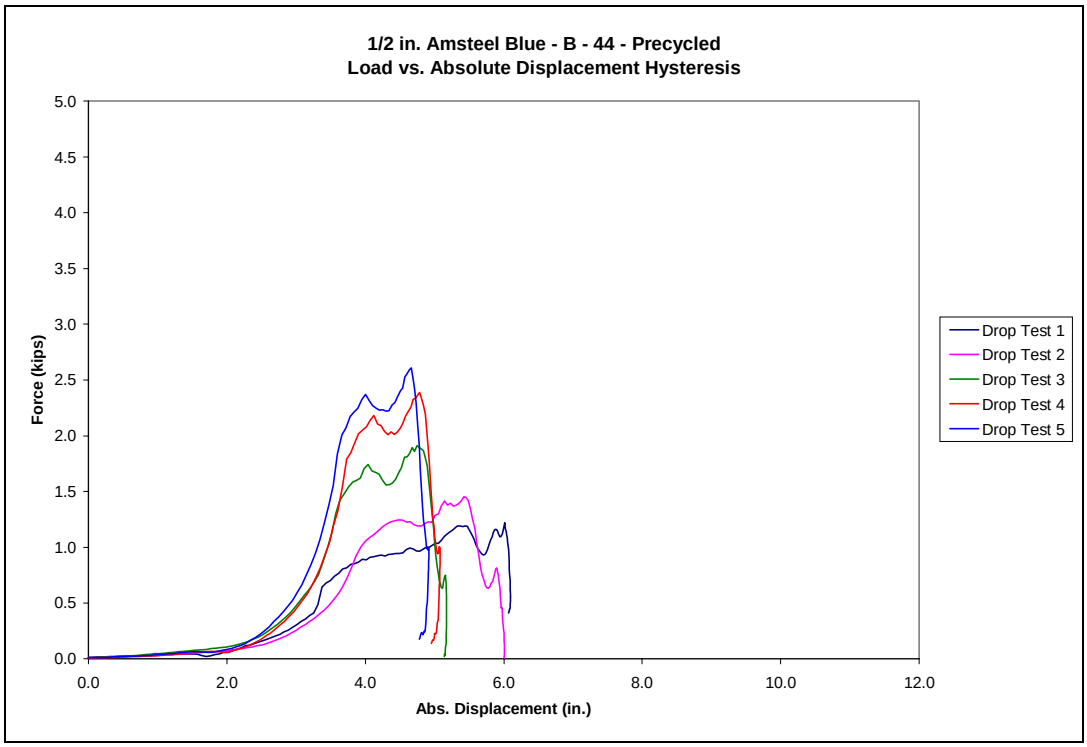


Figure B.17.3: Amsteel Blue B – Dynamic Hysteresis Comparison – Cycles 1-5

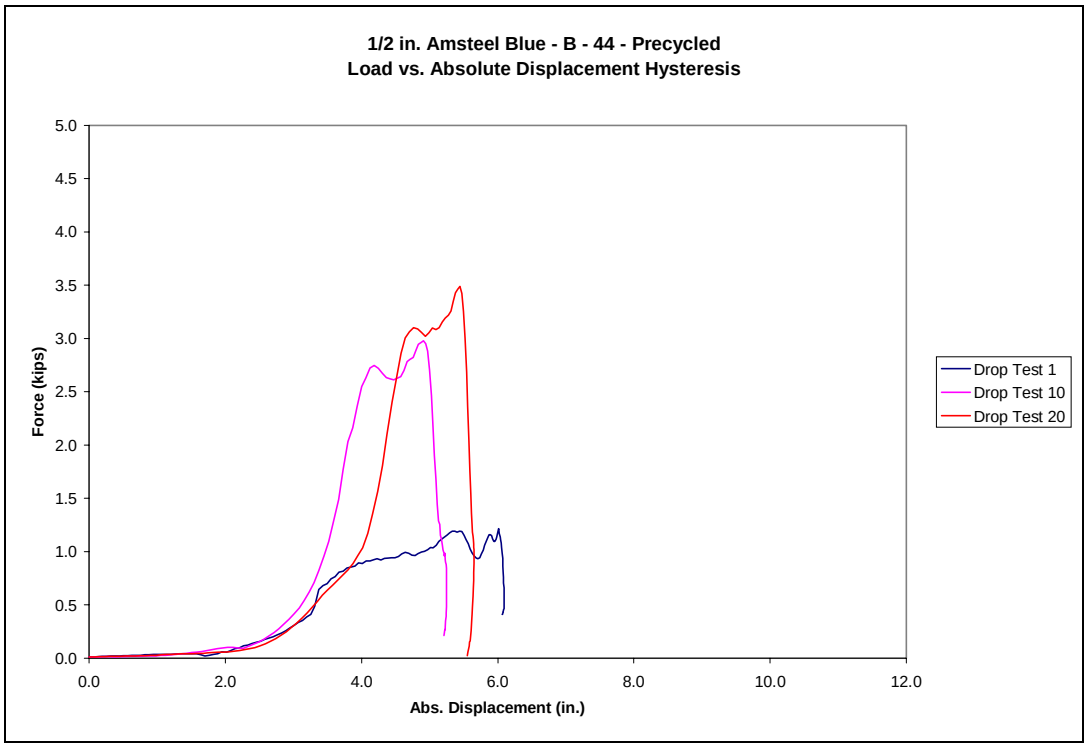


Figure B.17.4: Amsteel Blue B – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

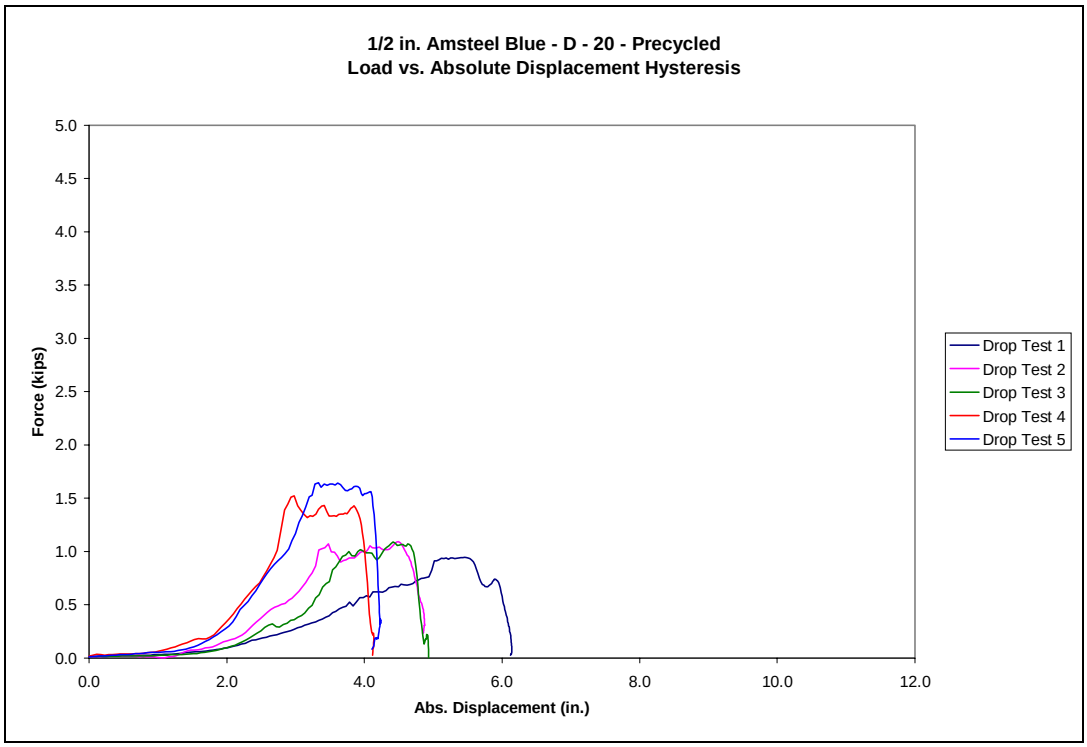


Figure B.17.5: Amsteel Blue D – Dynamic Hysteresis Comparison – Cycles 1-5

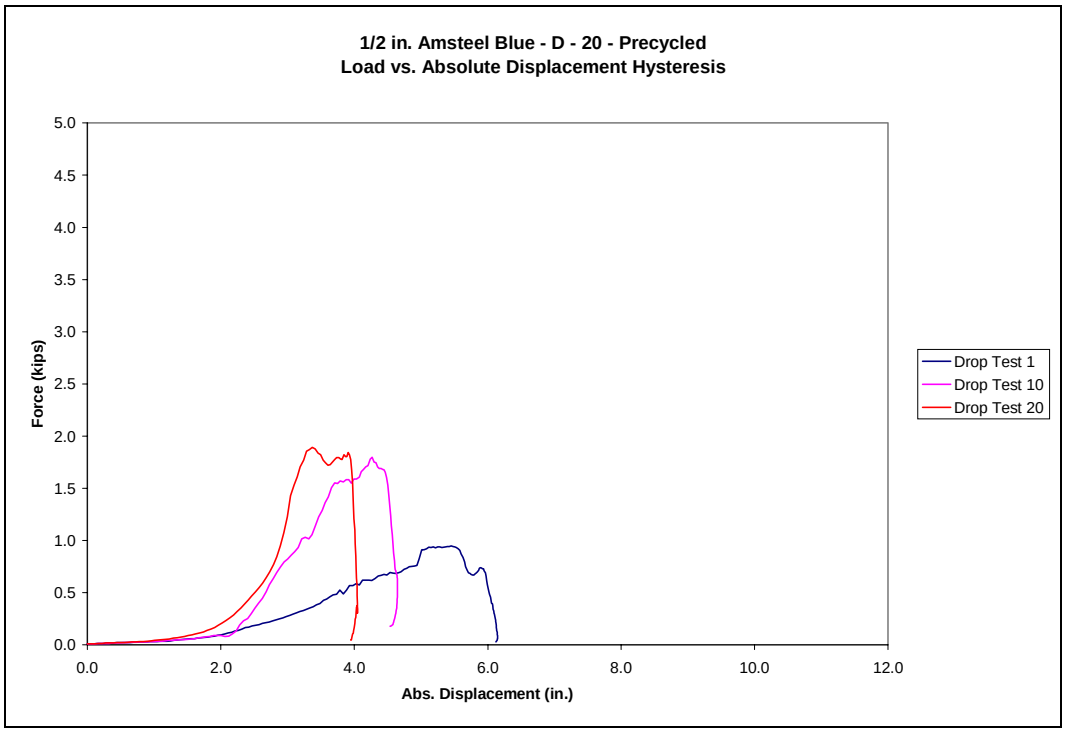


Figure B.17.6: Amsteel Blue D – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

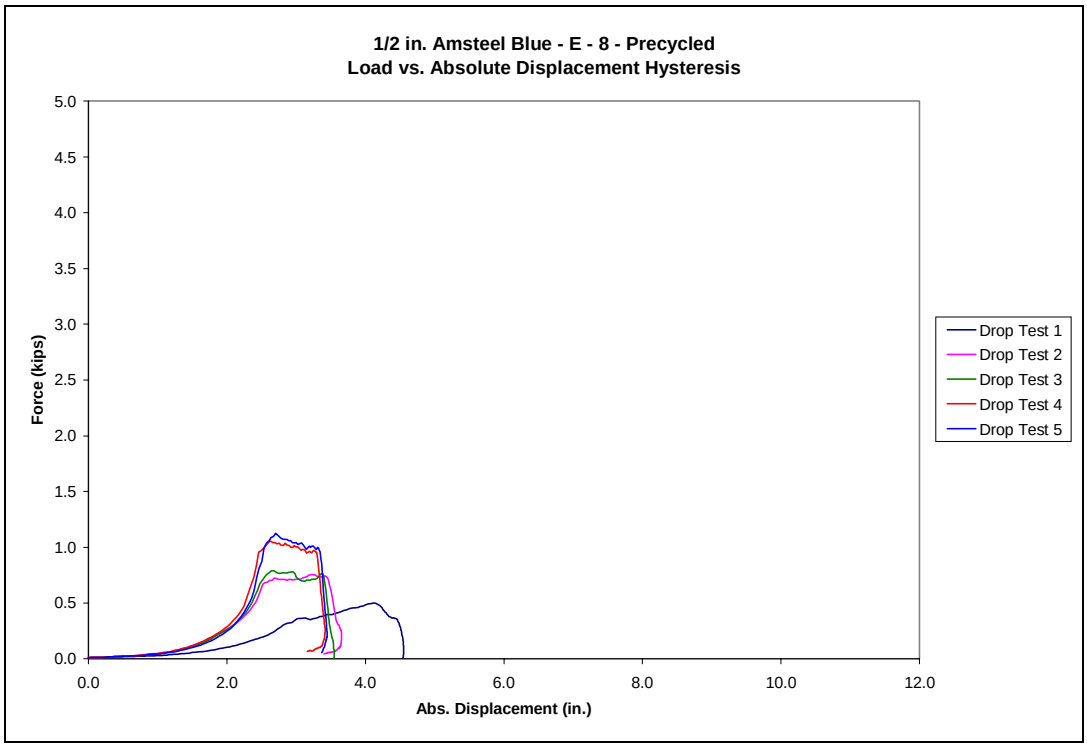


Figure B.17.7: Amsteel Blue E – Dynamic Hysteresis Comparison – Cycles 1-5

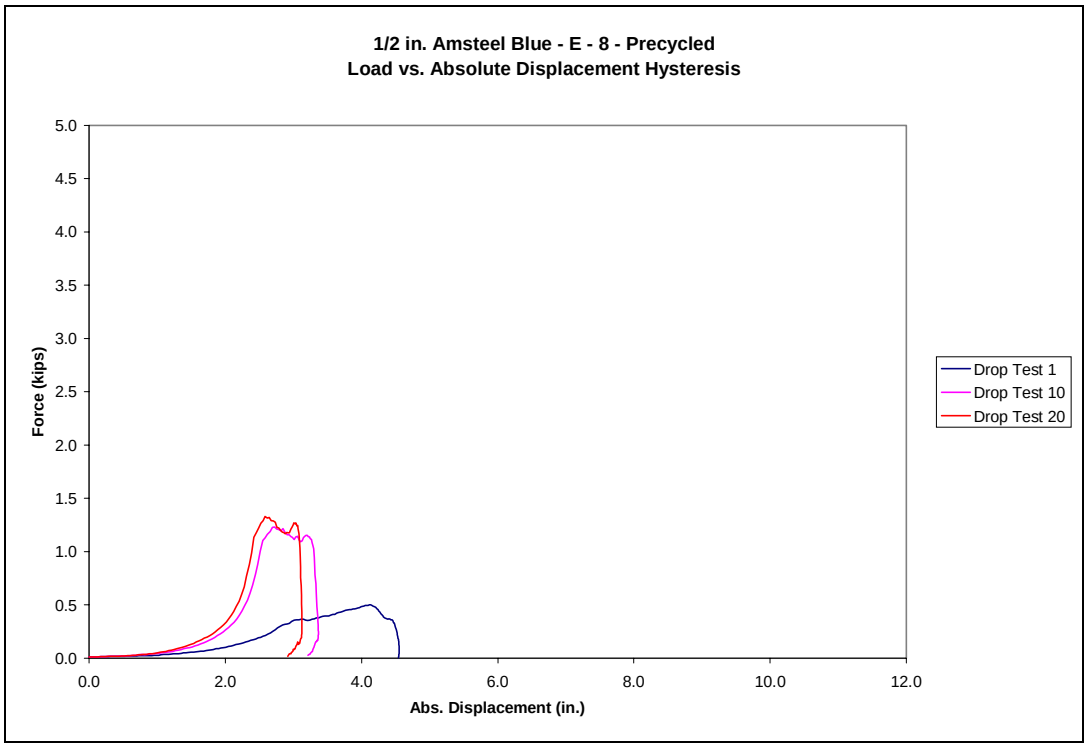


Figure B.17.8: Amsteel Blue E – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

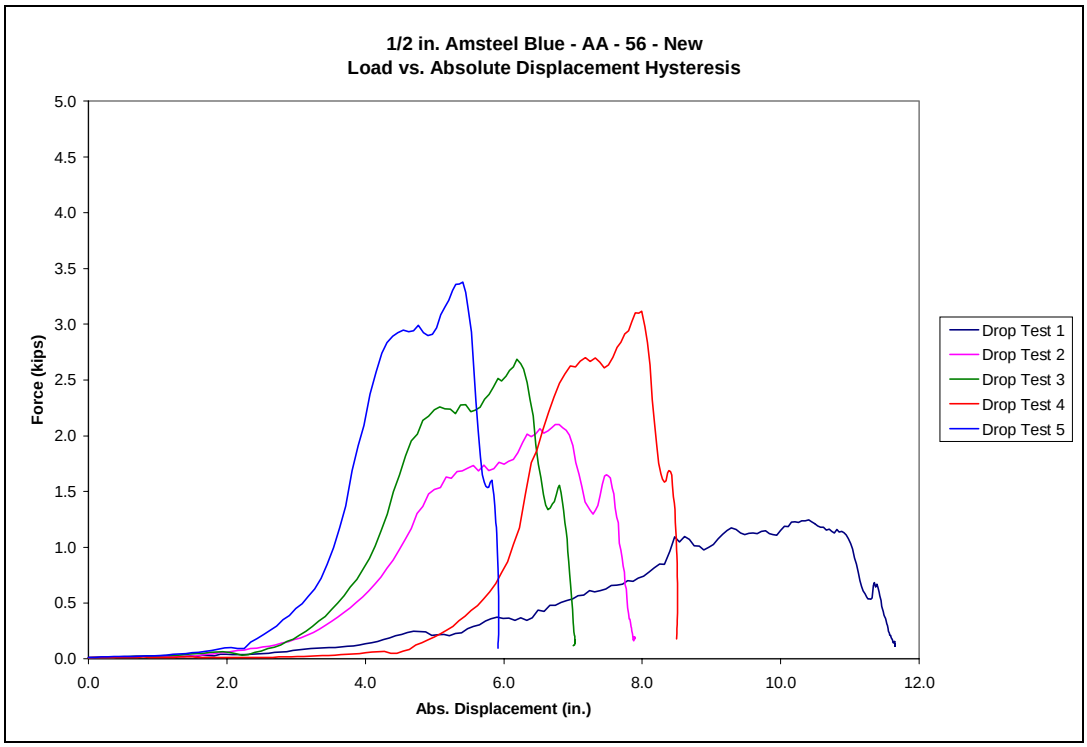


Figure B.17.9: Amsteel Blue AA – Dynamic Hysteresis Comparison – Cycles 1-5

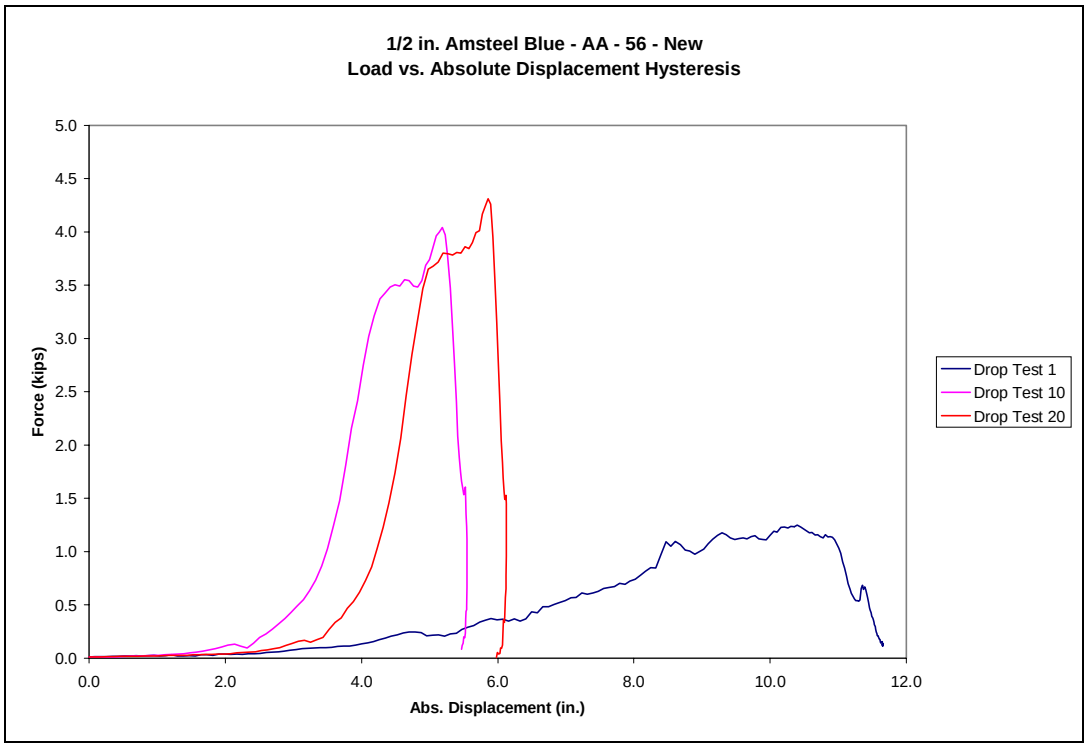


Figure B.17.10: Amsteel Blue AA – Dyn. Hysteresis Comparison – Cycles 1, 10, and 20

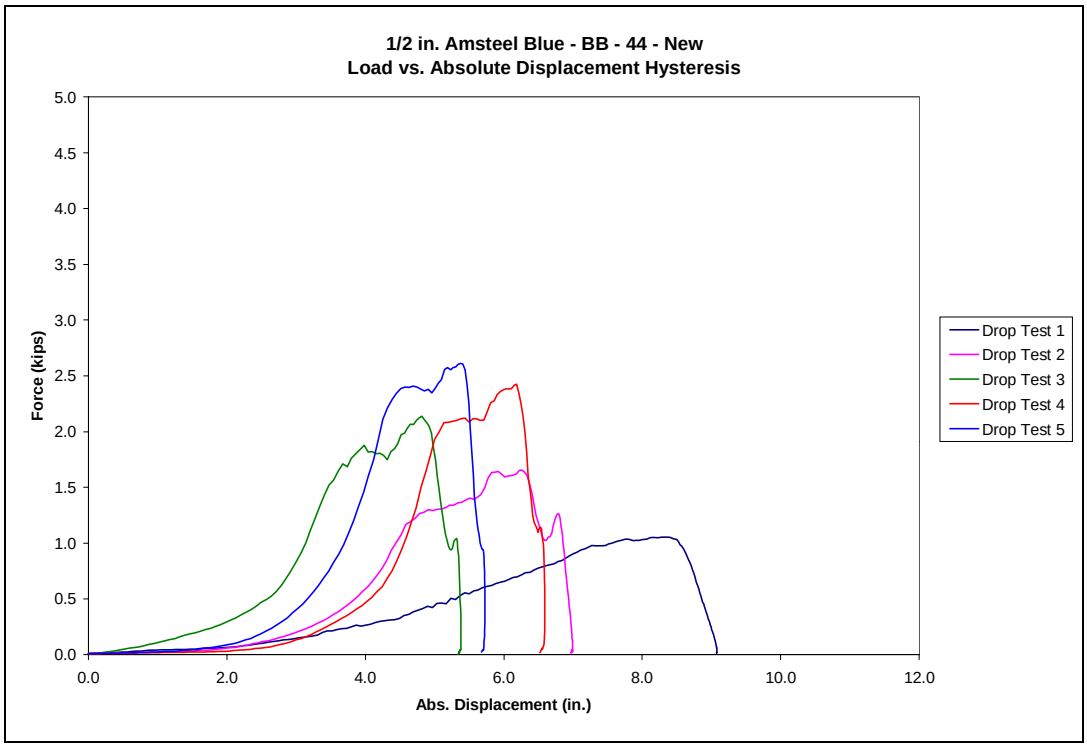


Figure B.17.11: Amsteel Blue BB – Dynamic Hysteresis Comparison – Cycles 1-5

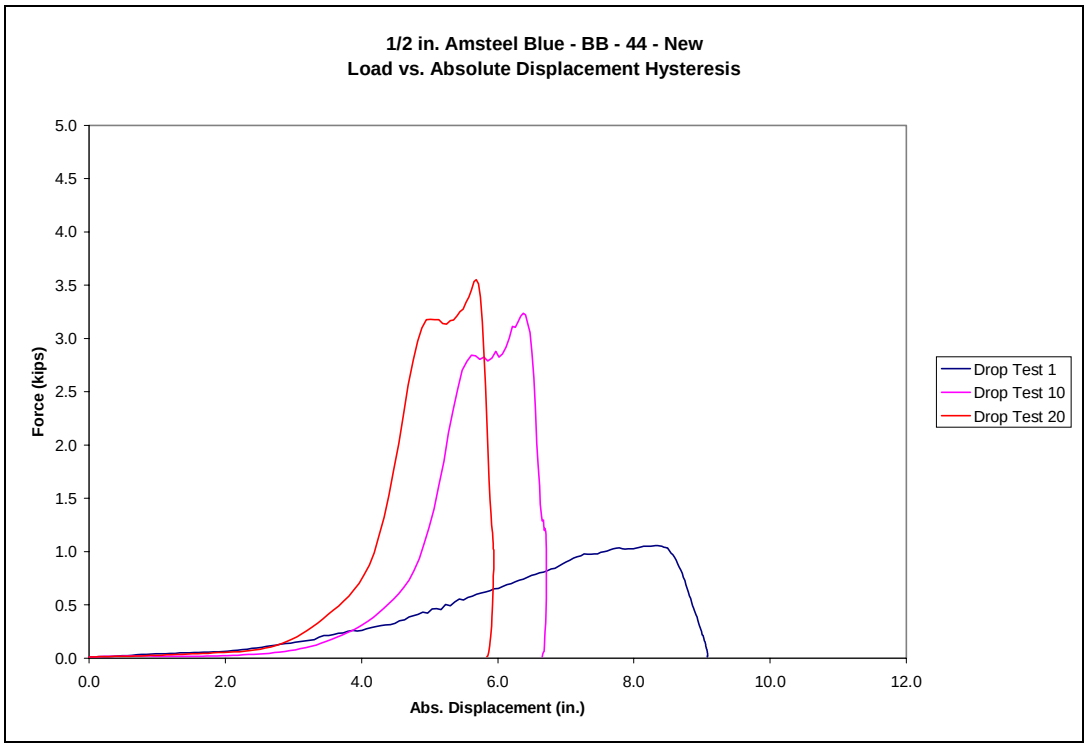


Figure B.17.12: Amsteel Blue BB – Dyn. Hysteresis Comparison – Cycles 1, 10, and 20

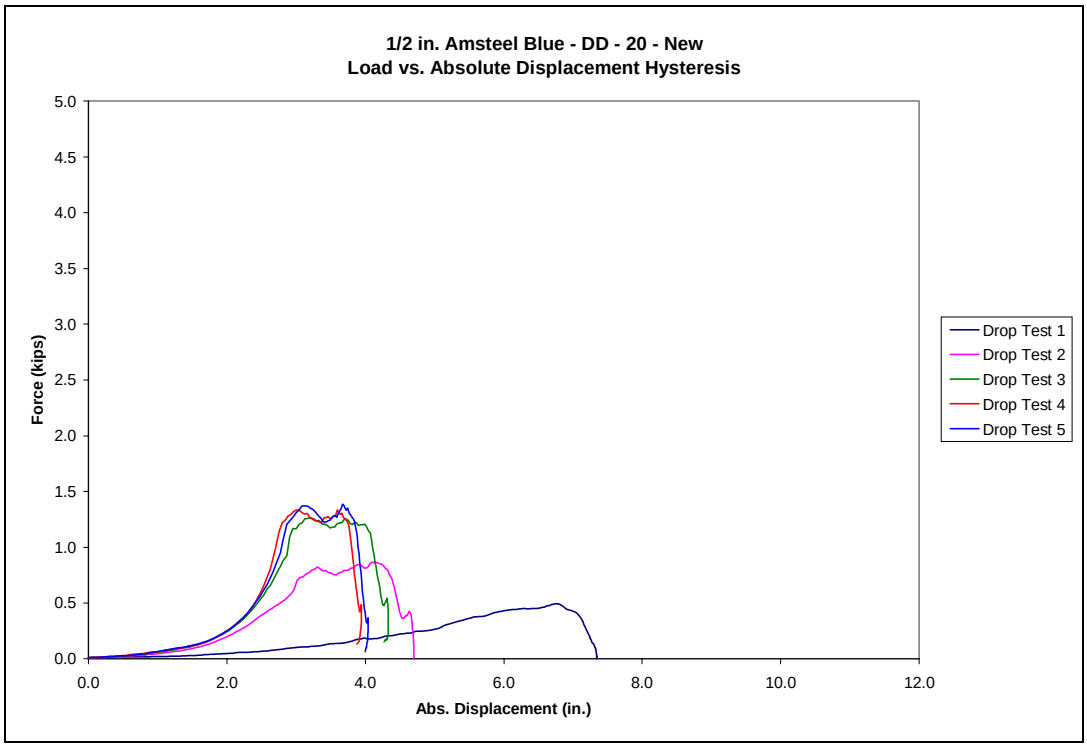


Figure B.17.13: Amsteel Blue DD – Dynamic Hysteresis Comparison – Cycles 1-5

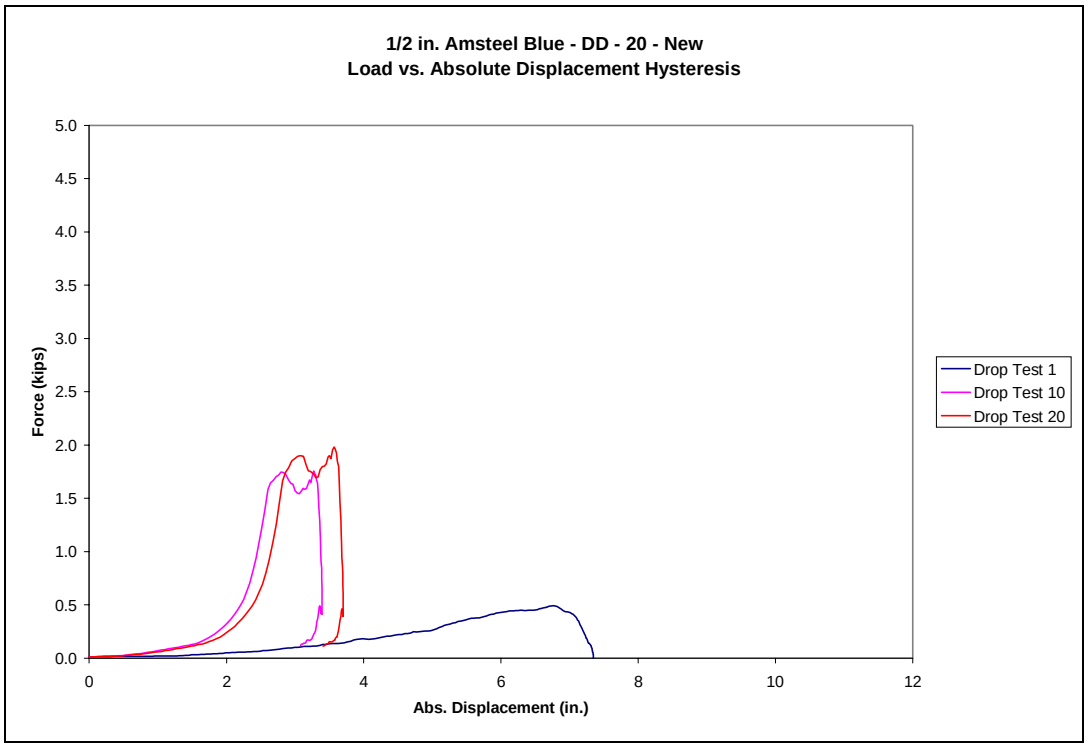


Figure B.17.14: Amsteel Blue DD – Dyn. Hysteresis Comparison – Cycles 1, 10, and 20

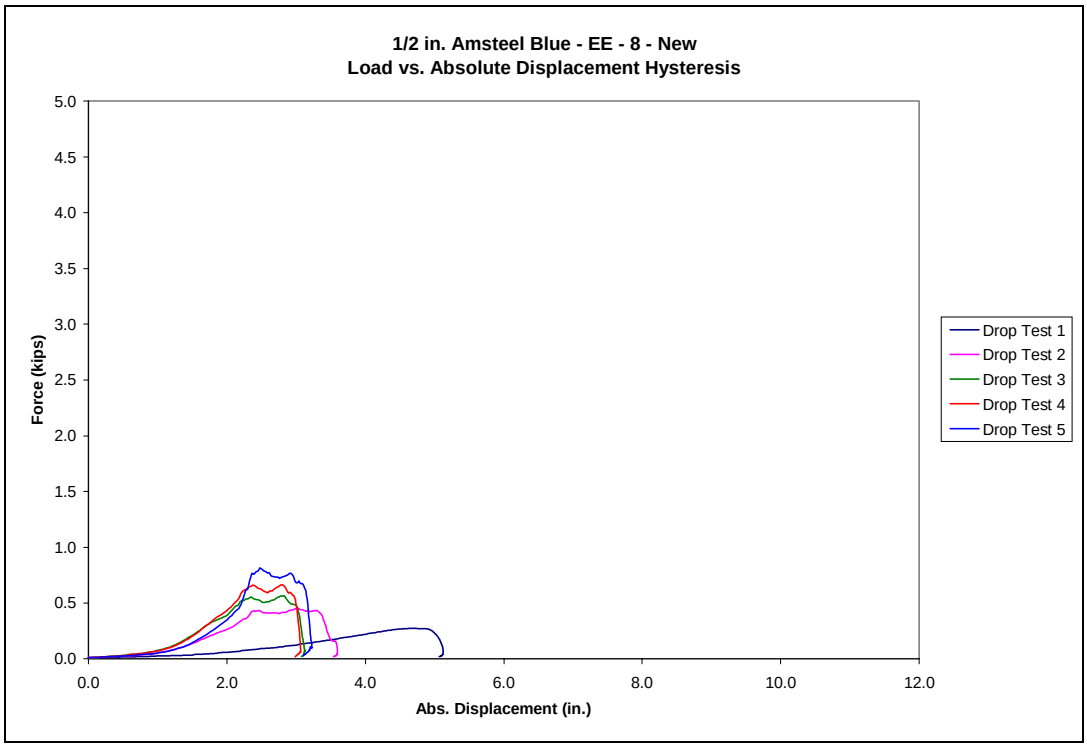


Figure B.17.15: Amsteel Blue EE – Dynamic Hysteresis Comparison – Cycles 1-5

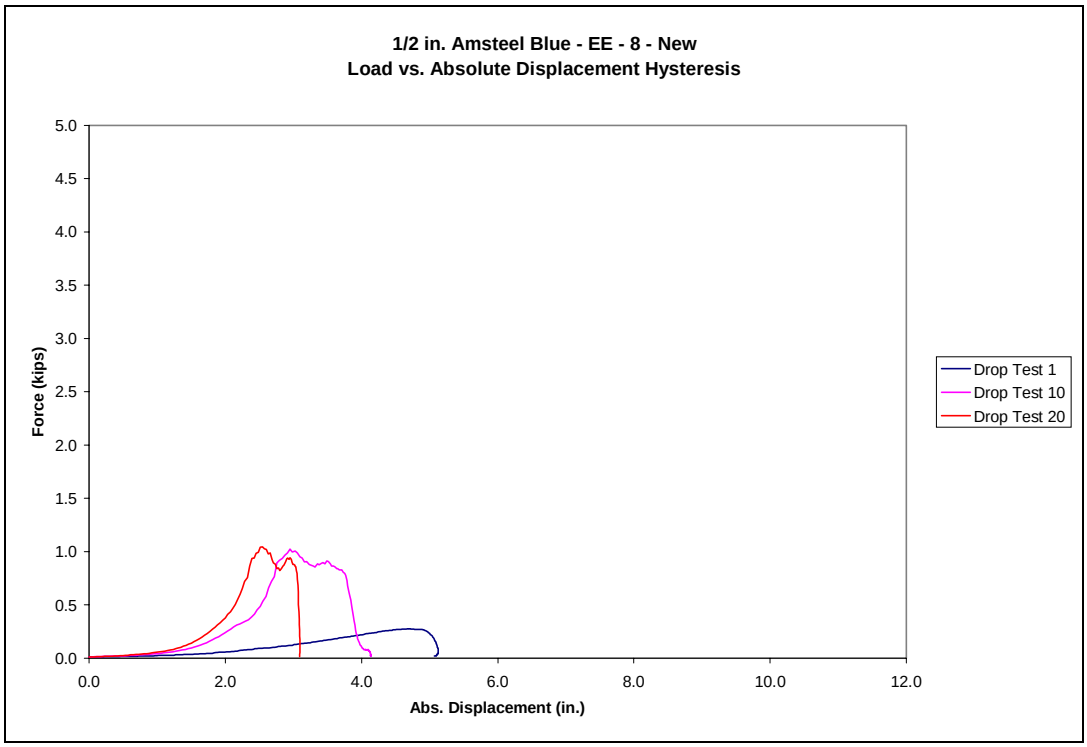


Figure B.17.16: Amsteel Blue EE – Dyn. Hysteresis Comparison – Cycles 1, 10, and 20

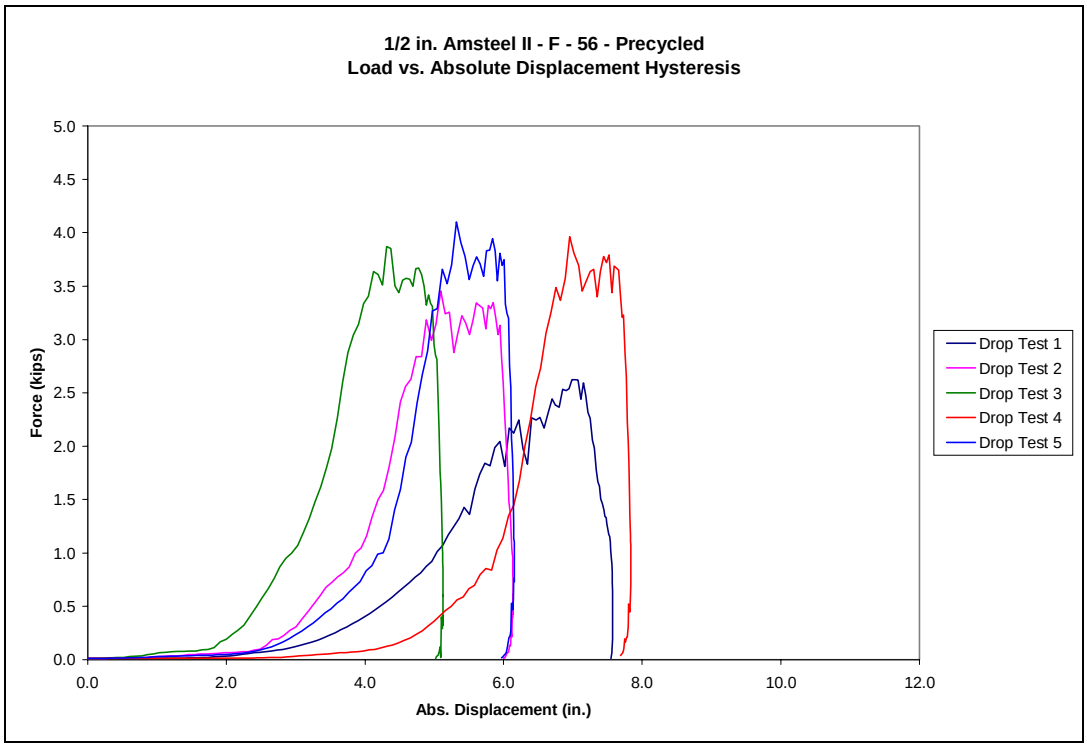


Figure B.17.17: Amsteel II F – Dynamic Hysteresis Comparison – Cycles 1-5

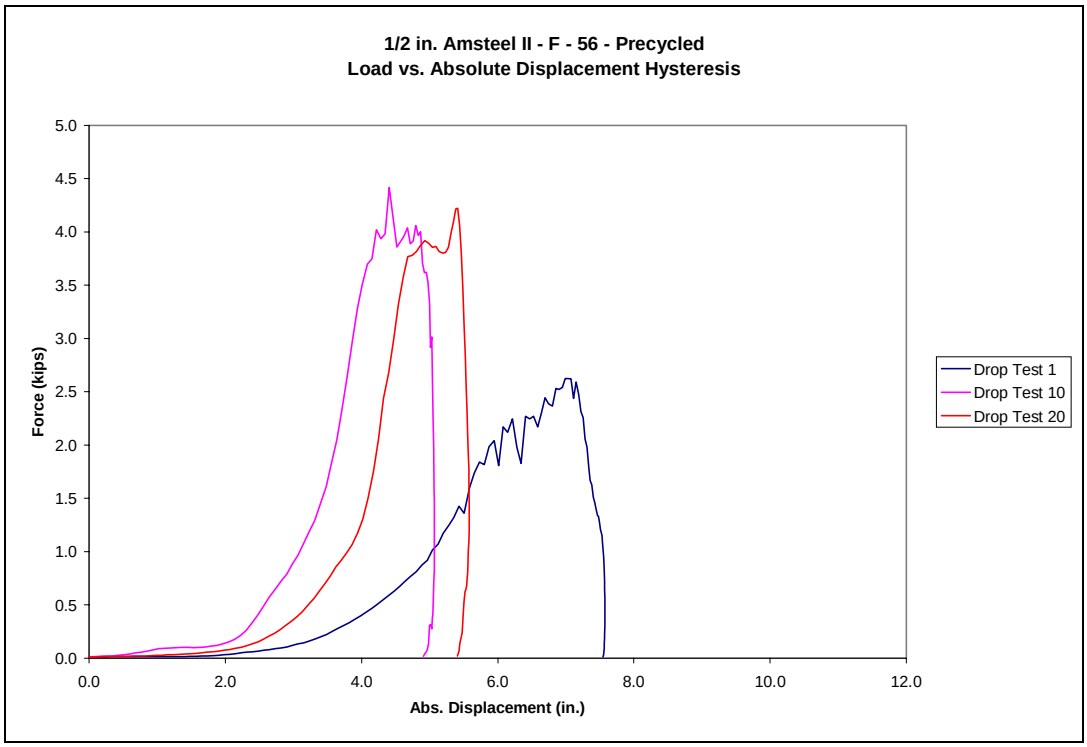


Figure B.17.18: Amsteel II F – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

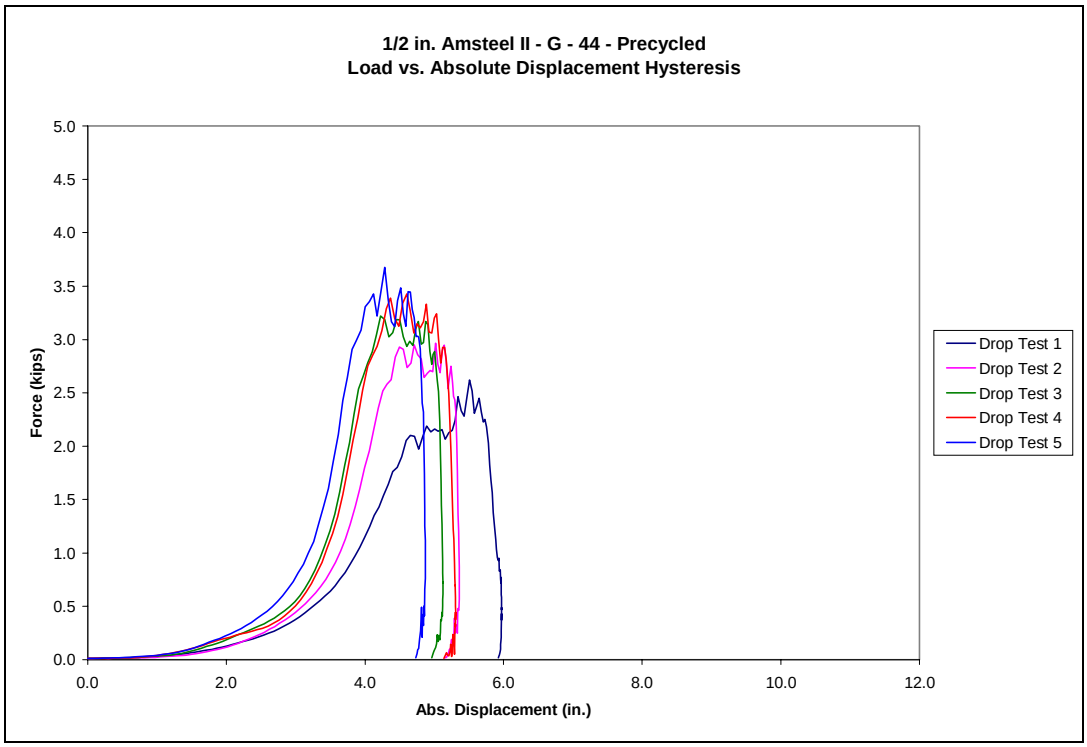


Figure B.17.19: Amsteel II G – Dynamic Hysteresis Comparison – Cycles 1-5

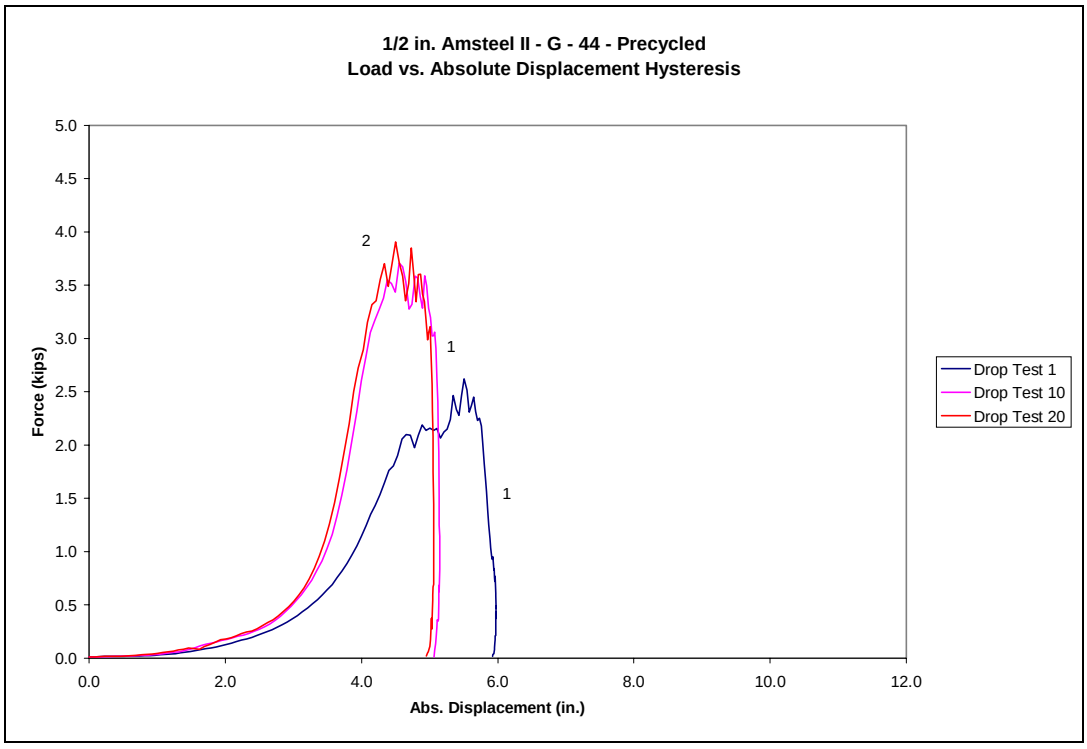


Figure B.17.20: Amsteel II F – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

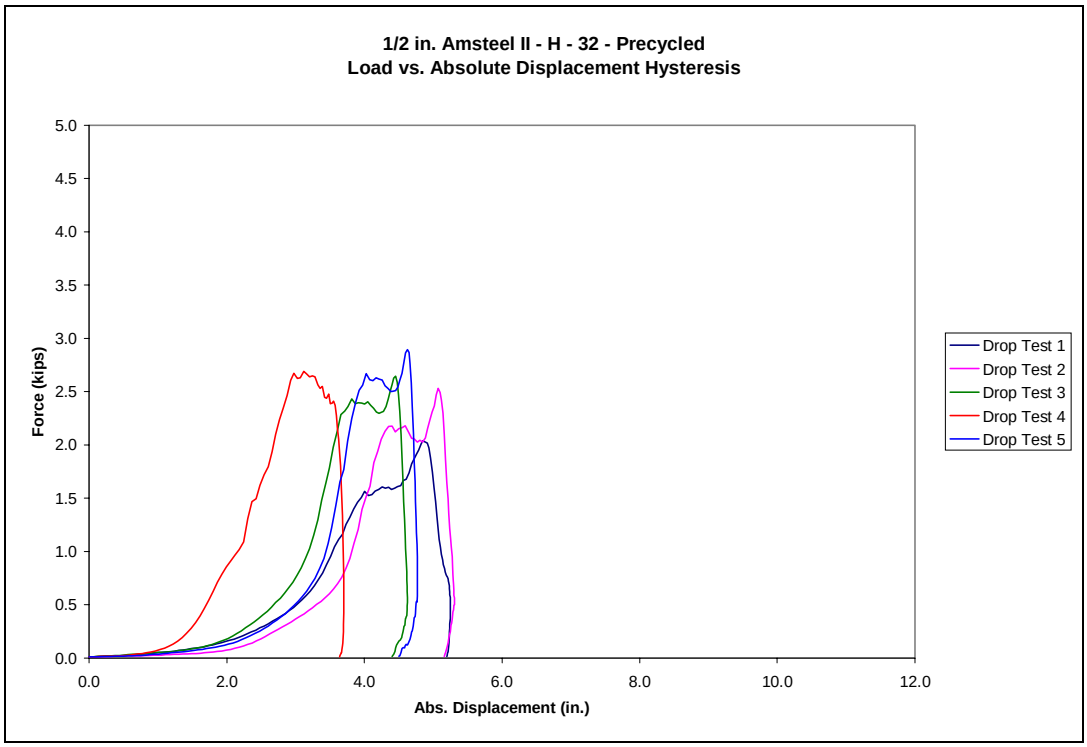


Figure B.17.21: Amsteel II H – Dynamic Hysteresis Comparison – Cycles 1-5

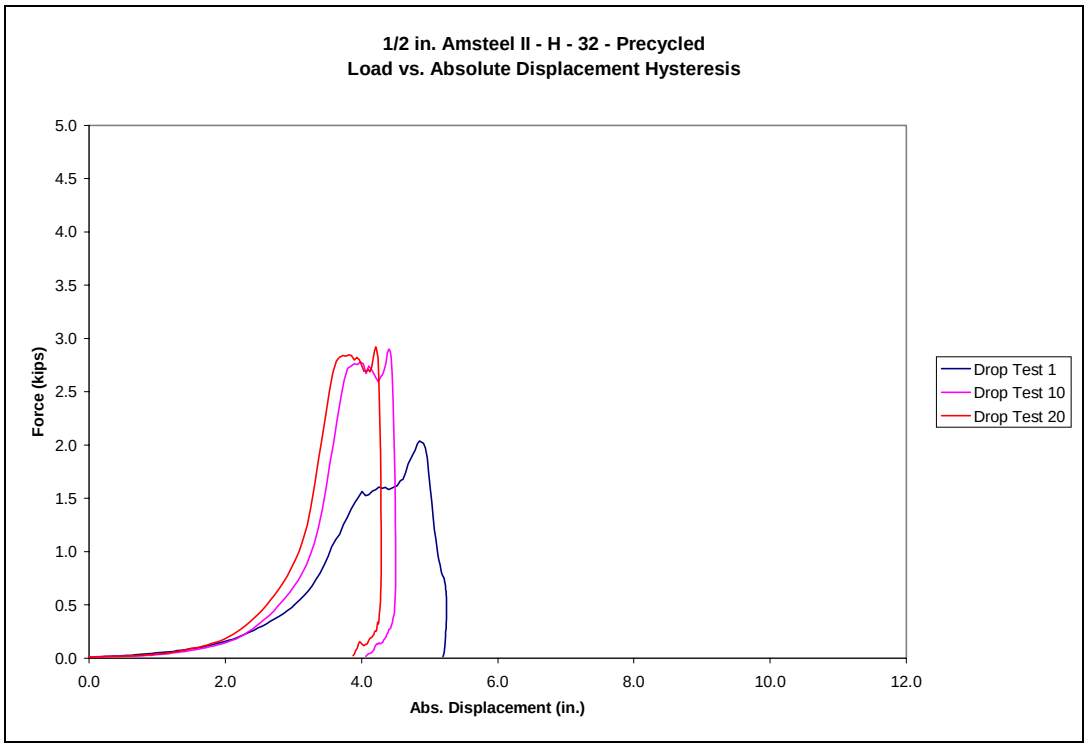


Figure B.17.22: Amsteel II H – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

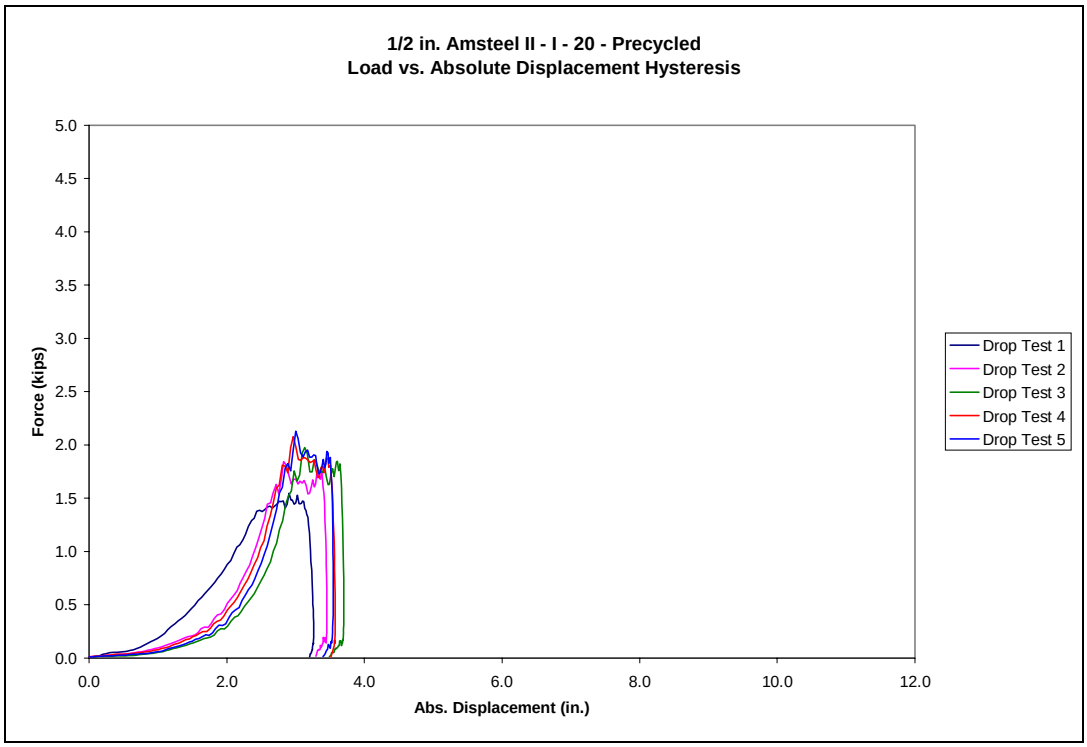


Figure B.17.23: Amsteel II I – Dynamic Hysteresis Comparison – Cycles 1-5

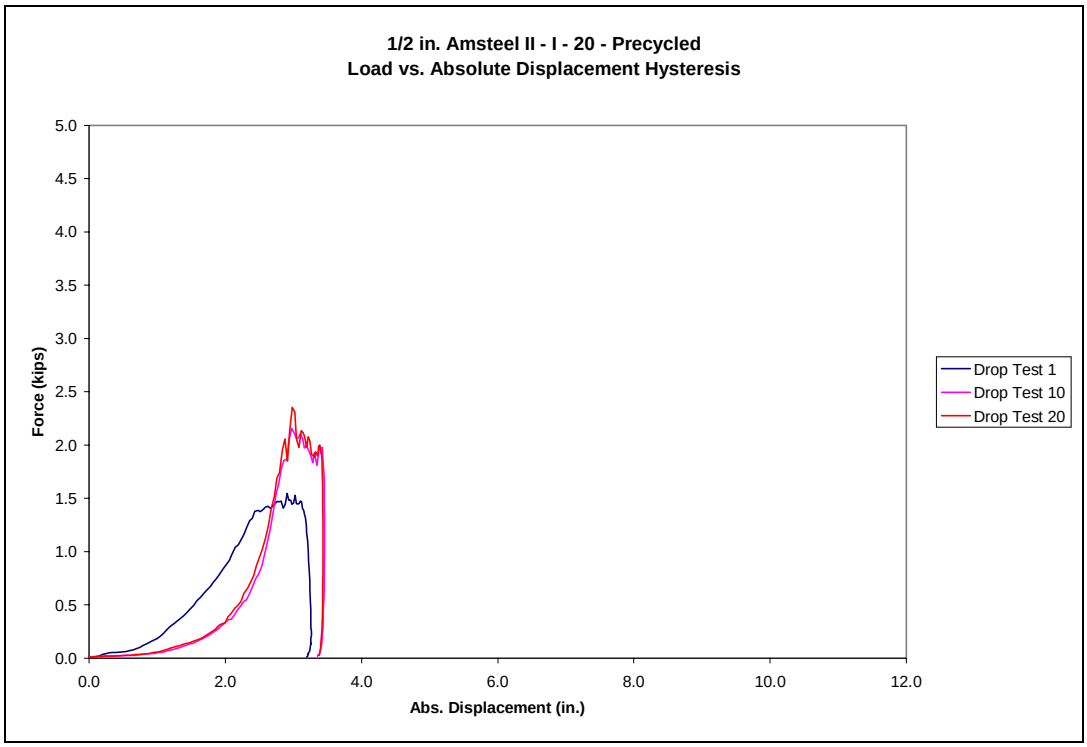


Figure B.17.24: Amsteel II I – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

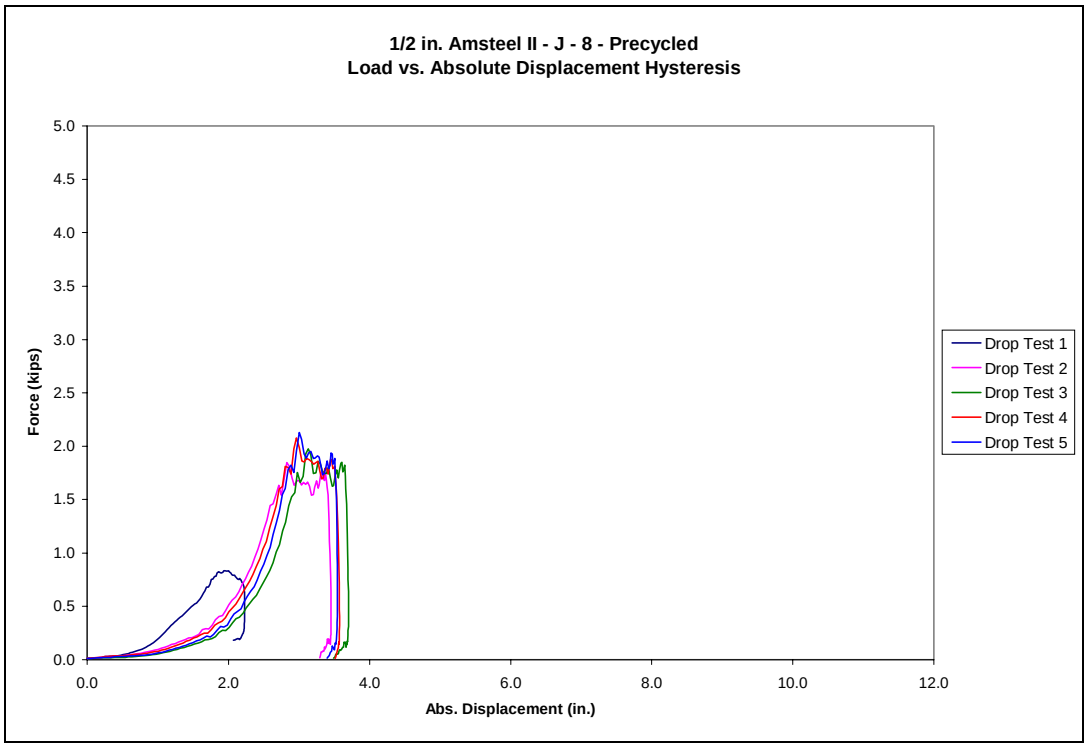


Figure B.17.25: Amsteel II J – Dynamic Hysteresis Comparison – Cycles 1-5

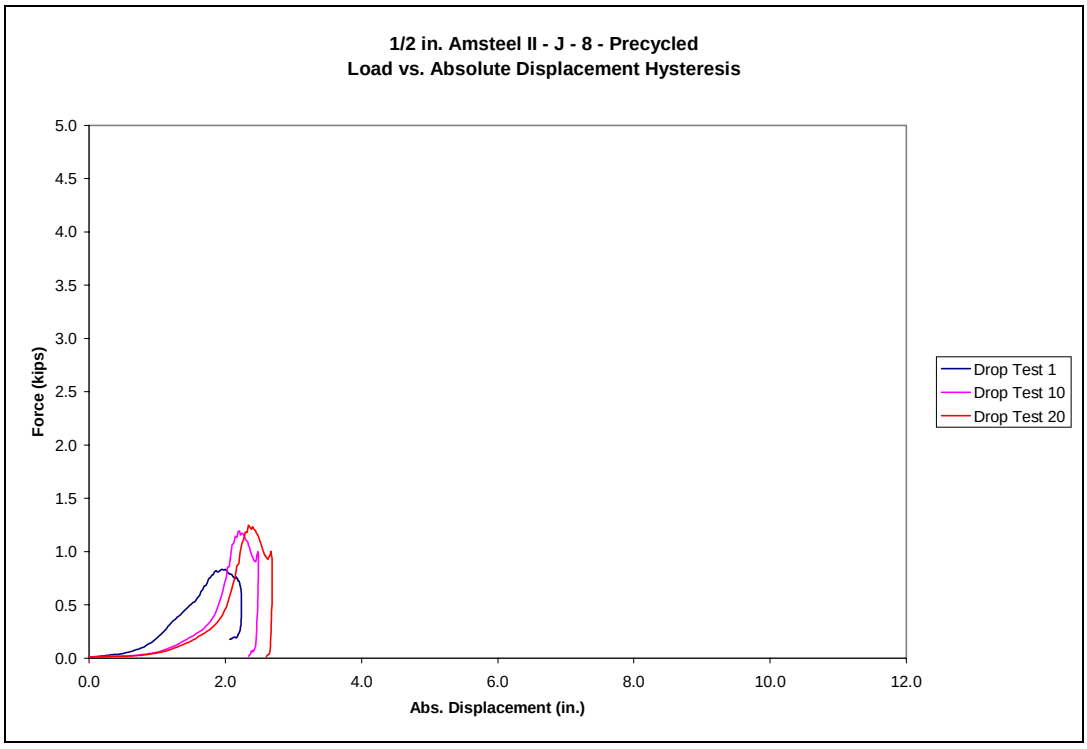


Figure B.17.26: Amsteel II J – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

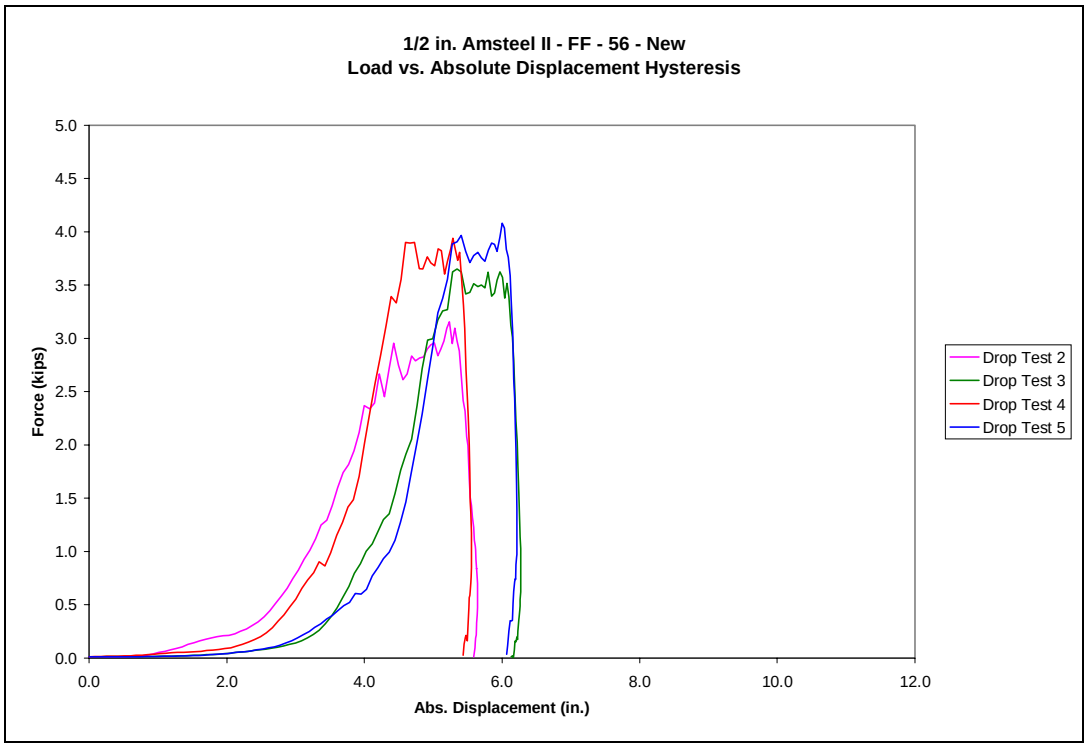


Figure B.17.27: Amsteel II FF – Dynamic Hysteresis Comparison – Cycles 1-5

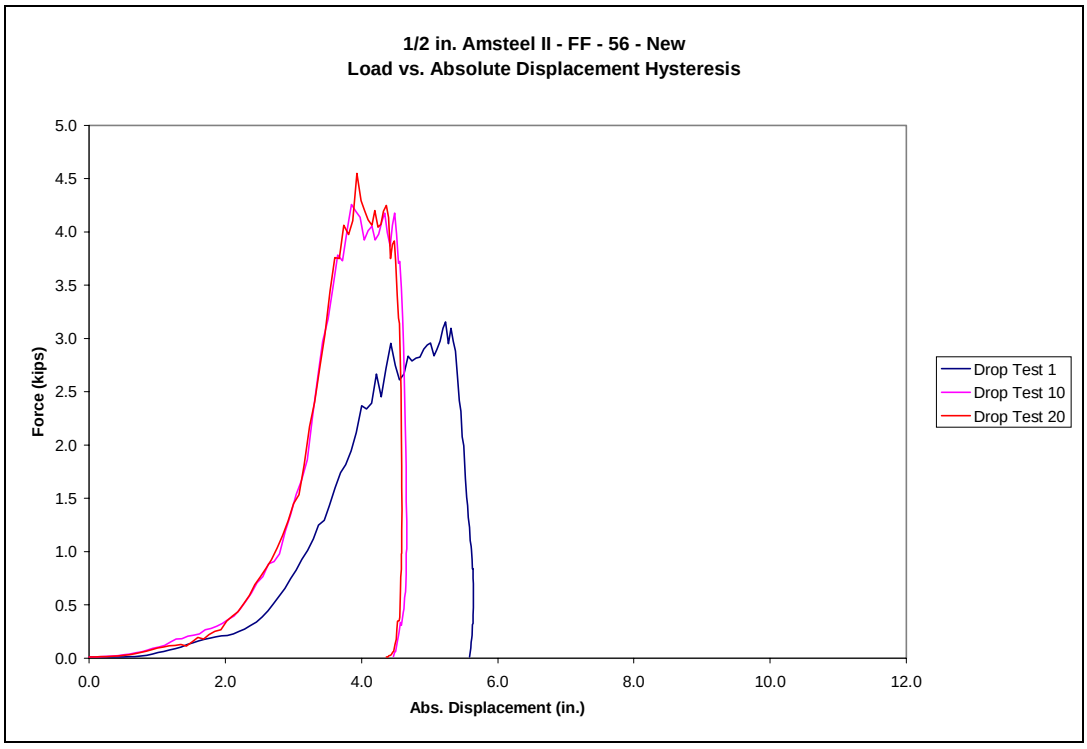


Figure B.17.28: Amsteel II FF – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

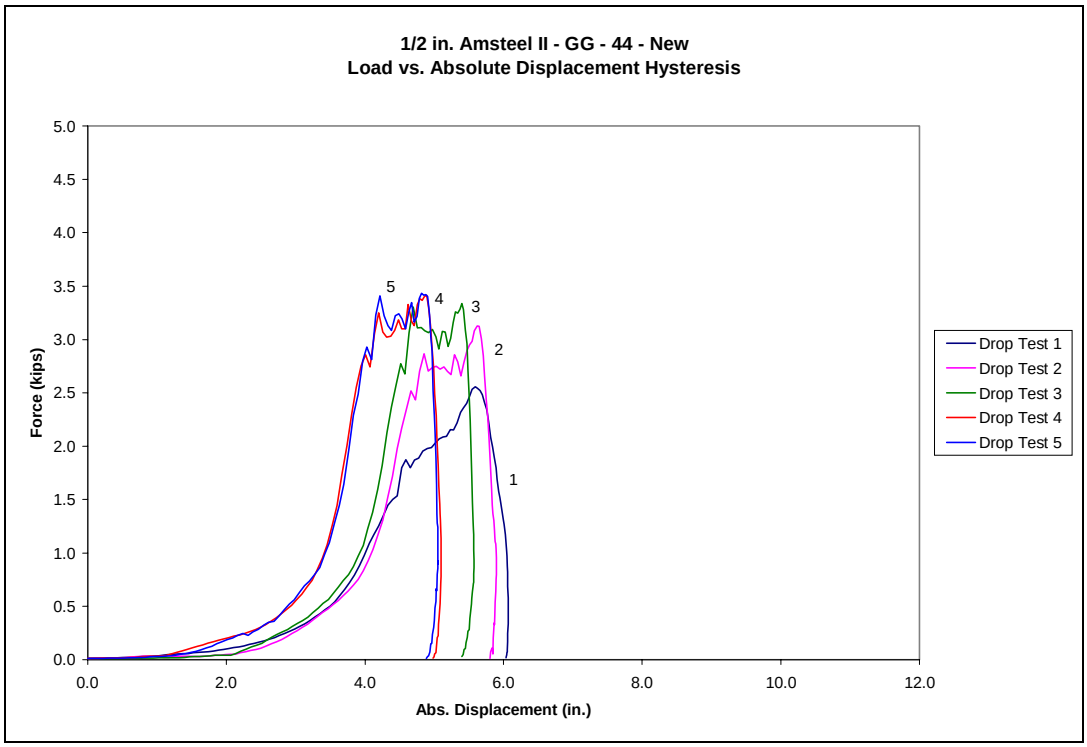


Figure B.17.29: Amsteel II GG – Dynamic Hysteresis Comparison – Cycles 1-5

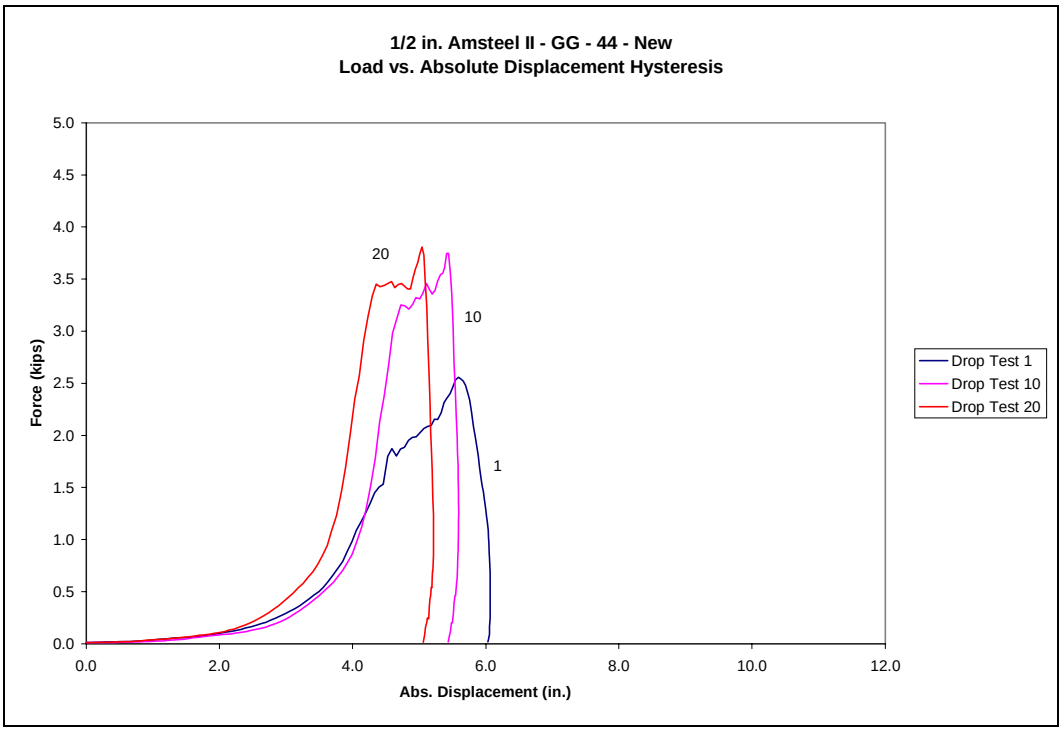


Figure B.17.30: Amsteel II GG – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

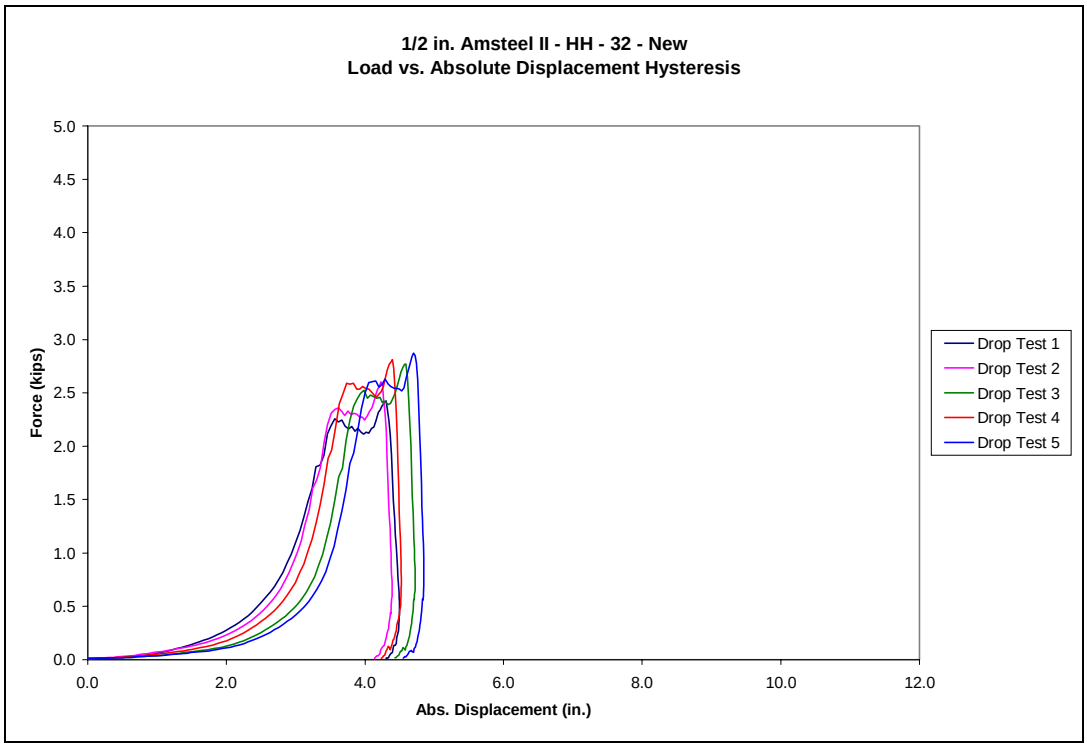


Figure B.17.31: Amsteel II HH – Dynamic Hysteresis Comparison – Cycles 1-5

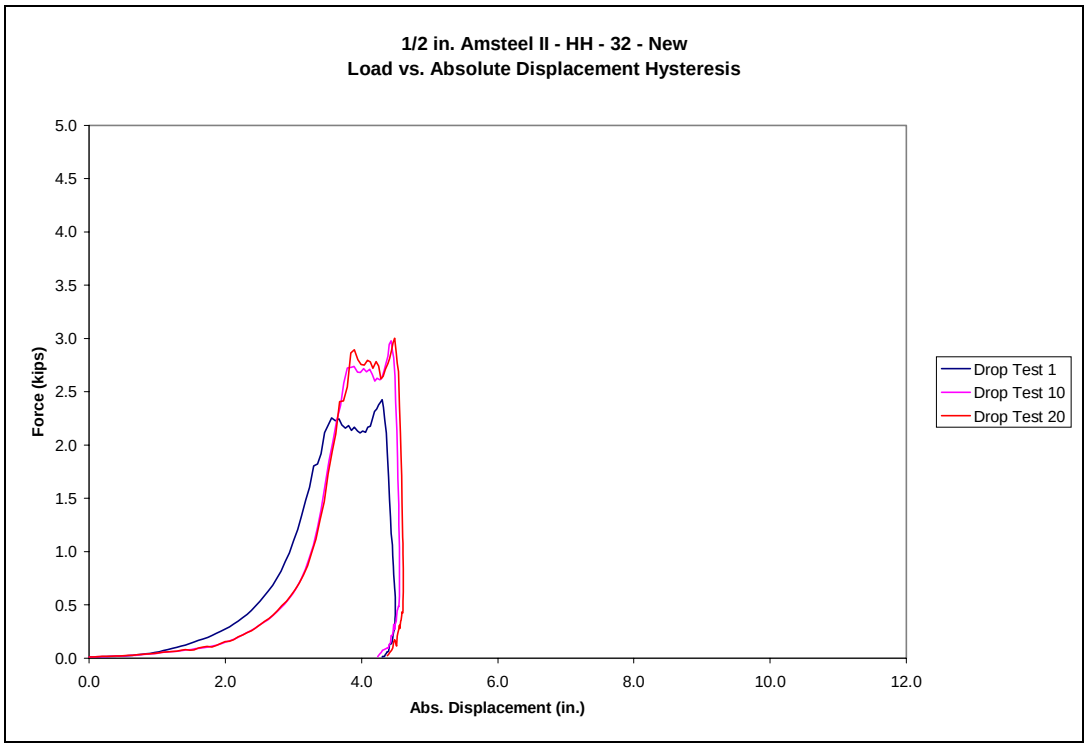


Figure B.17.32: Amsteel II HH – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

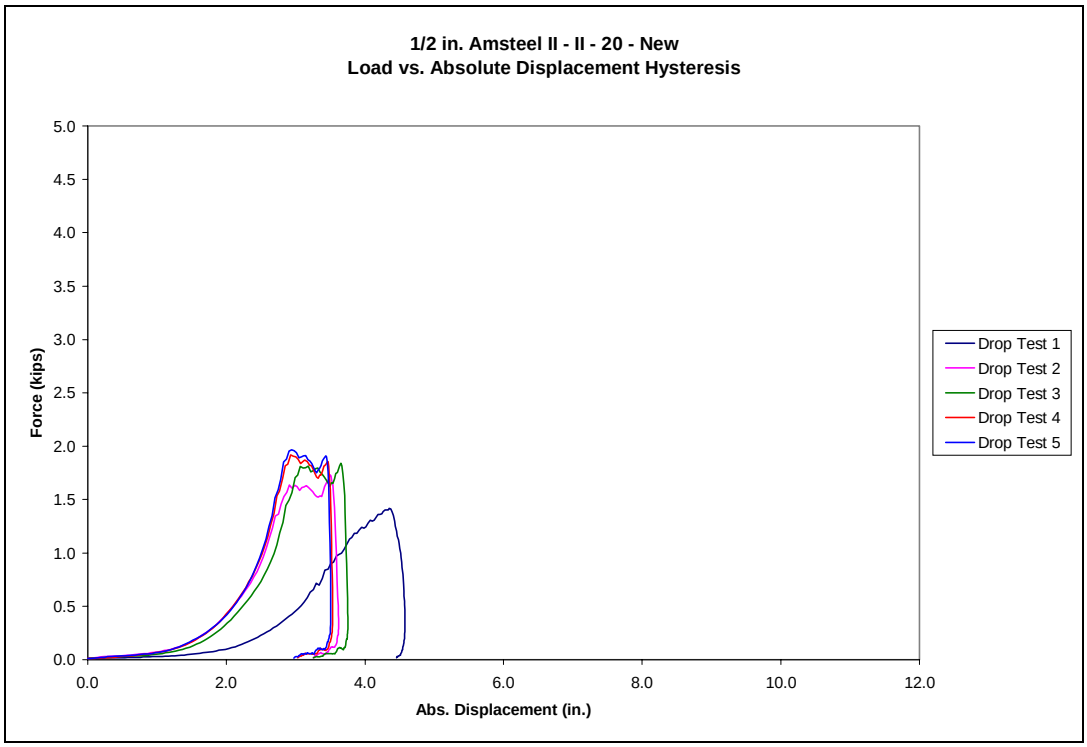


Figure B.17.33: Amsteel II II – Dynamic Hysteresis Comparison – Cycles 1-5

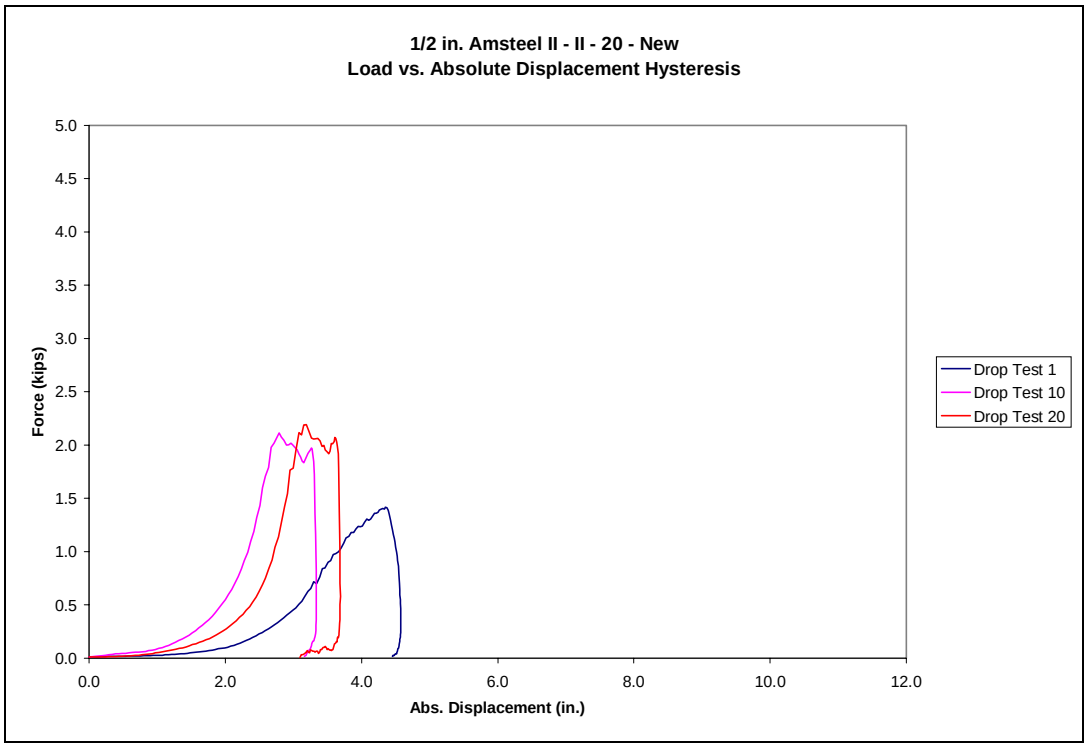


Figure B.17.34: Amsteel II II – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

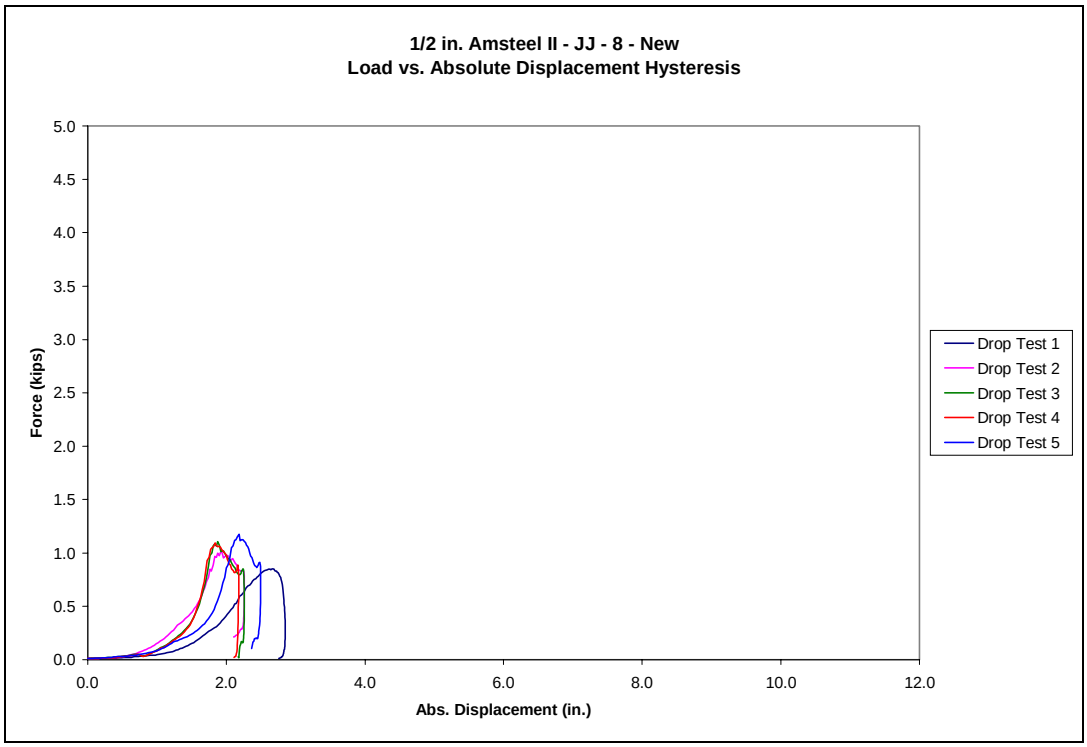


Figure B.17.35: Amsteel II JJ – Dynamic Hysteresis Comparison – Cycles 1-5

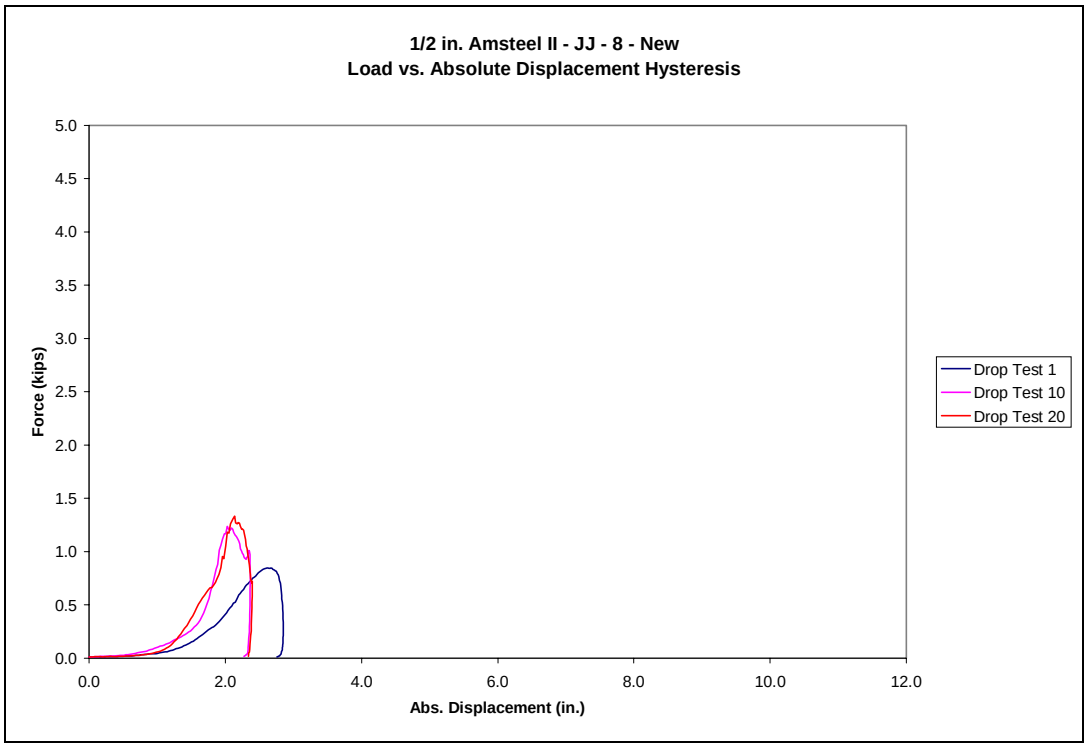


Figure B.17.36: Amsteel II JJ – Dynamic Hysteresis Comparison – Cycles 1, 10, and 20

## B.18 Impulse, Energy Loss, and Dynamic Area Comparisons

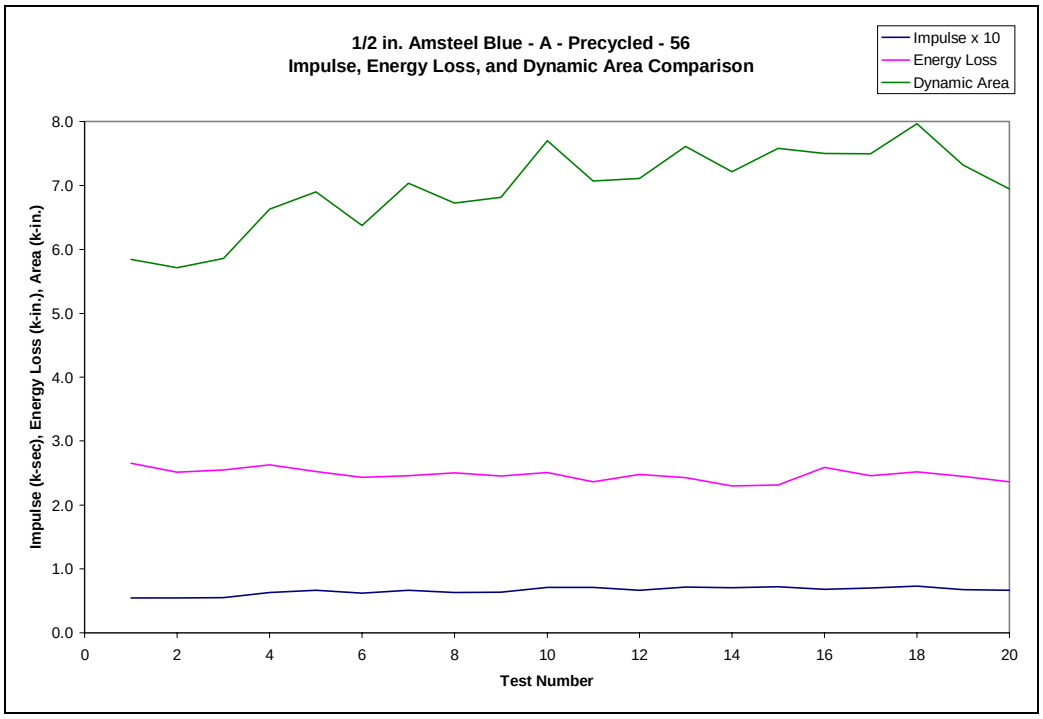


Figure B.18.1: Amsteel Blue A – Impulse, Energy Loss and Dynamic Area Comparison

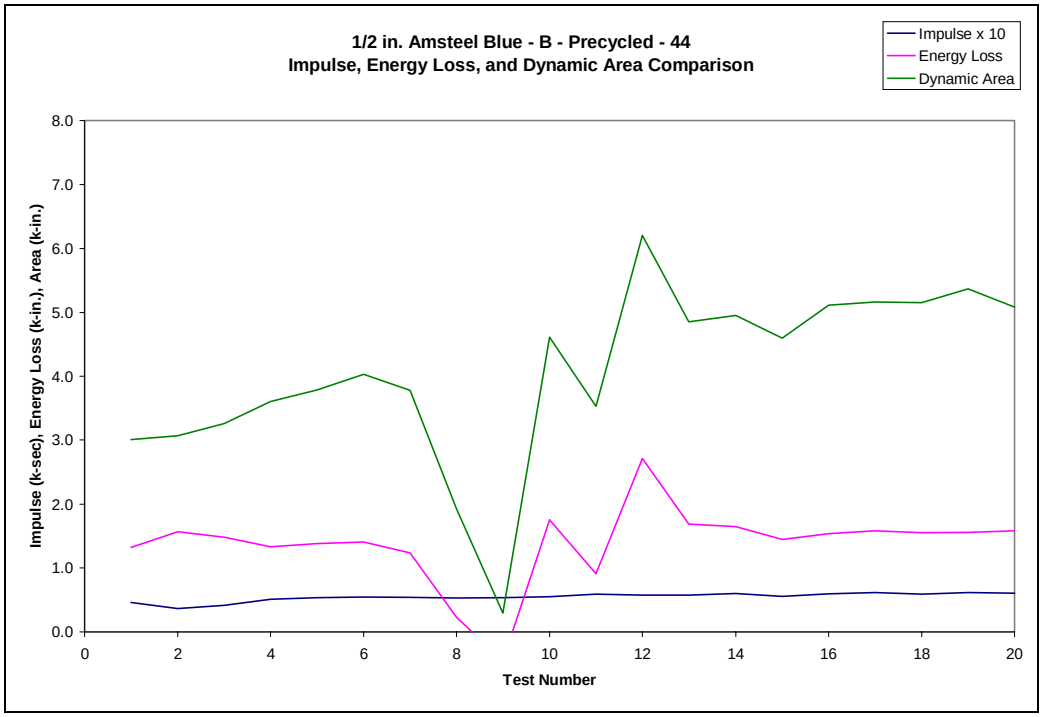


Figure B.18.2: Amsteel Blue B – Impulse, Energy Loss and Dynamic Area Comparison

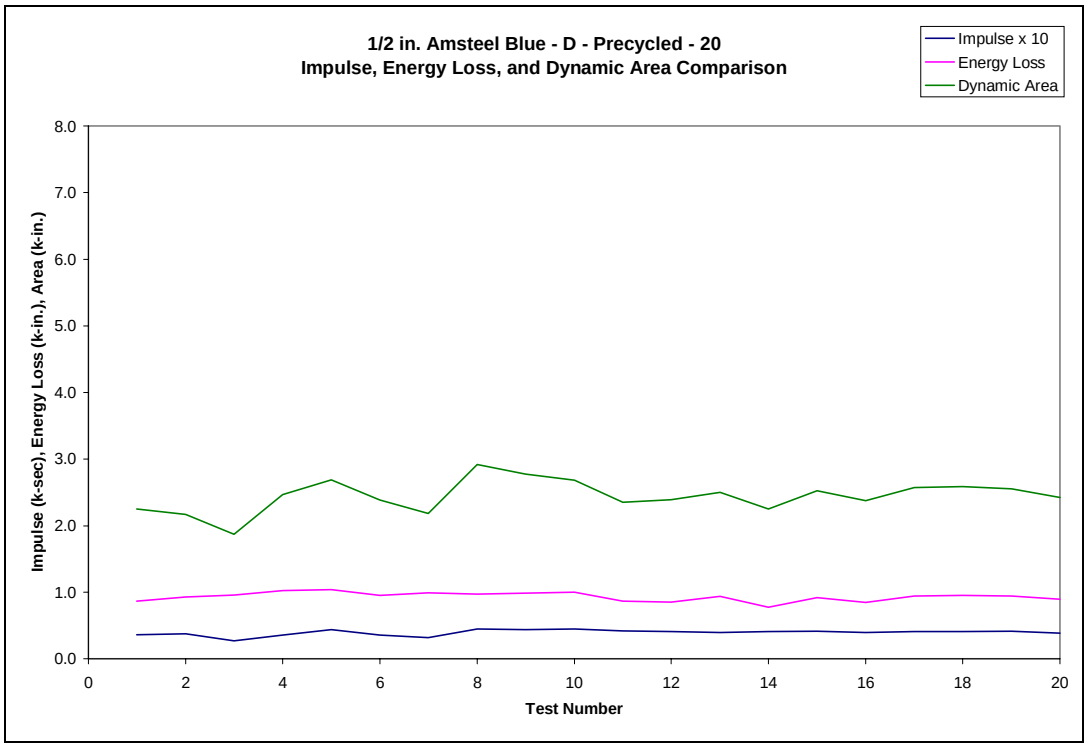


Figure B.18.3: Amsteel Blue D – Impulse, Energy Loss and Dynamic Area Comparison

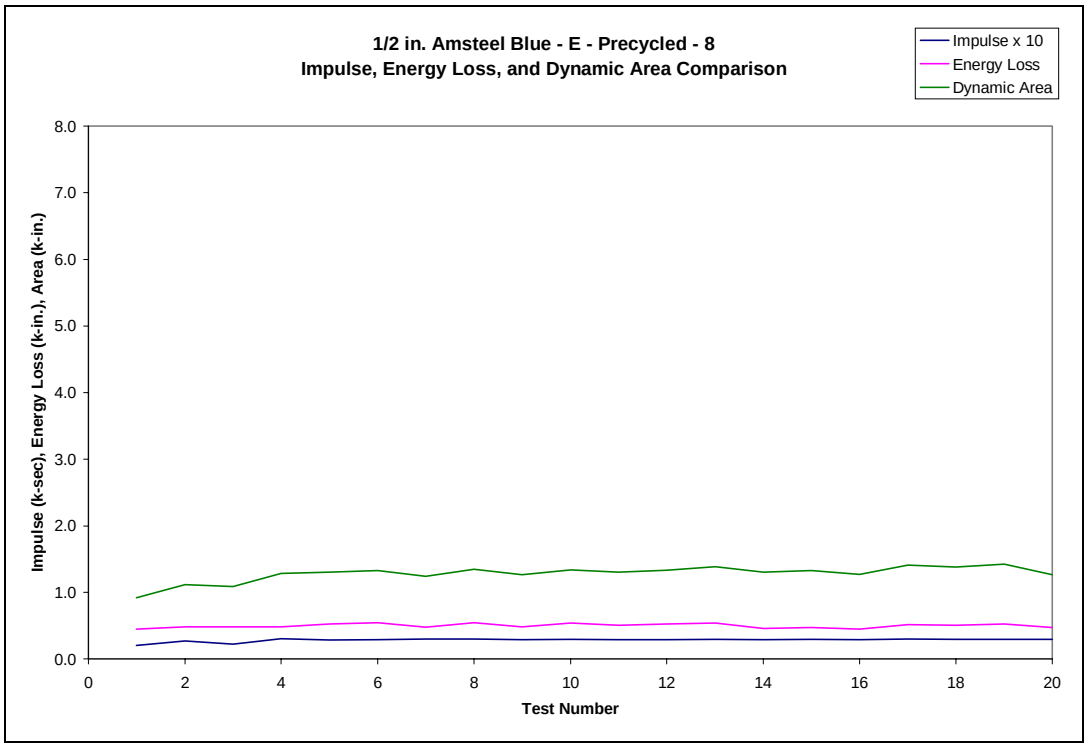


Figure B.18.4: Amsteel Blue E – Impulse, Energy Loss and Dynamic Area Comparison

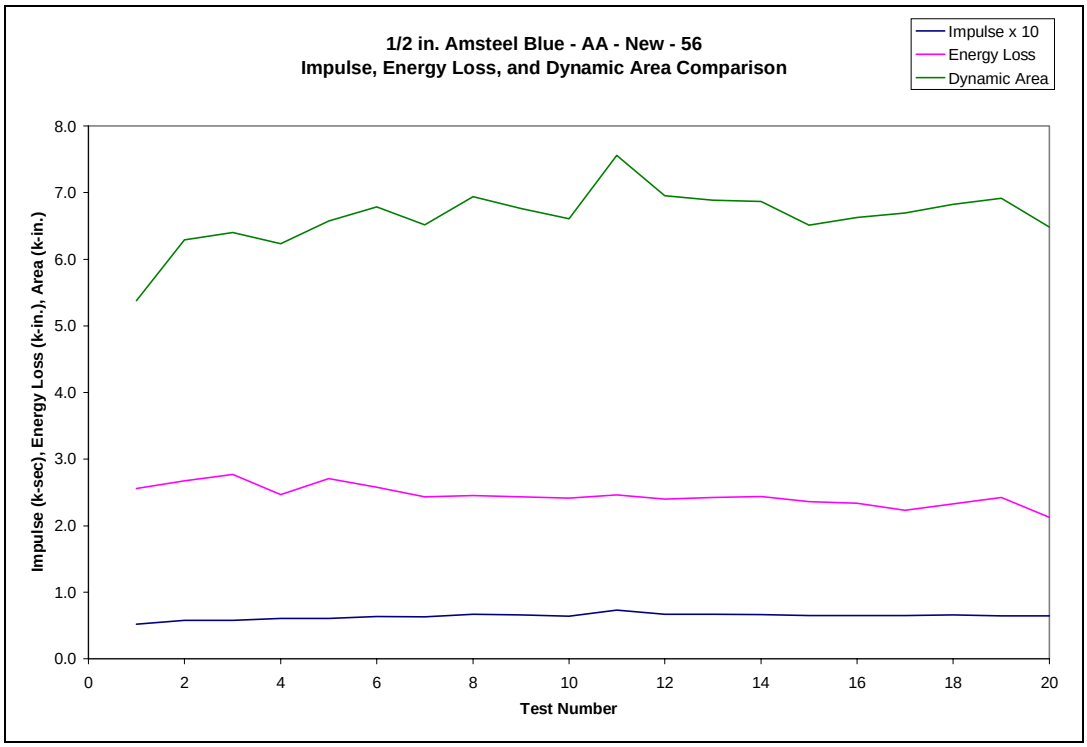


Figure B.18.5: Amsteel Blue AA – Impulse, Energy Loss and Dynamic Area Comparison

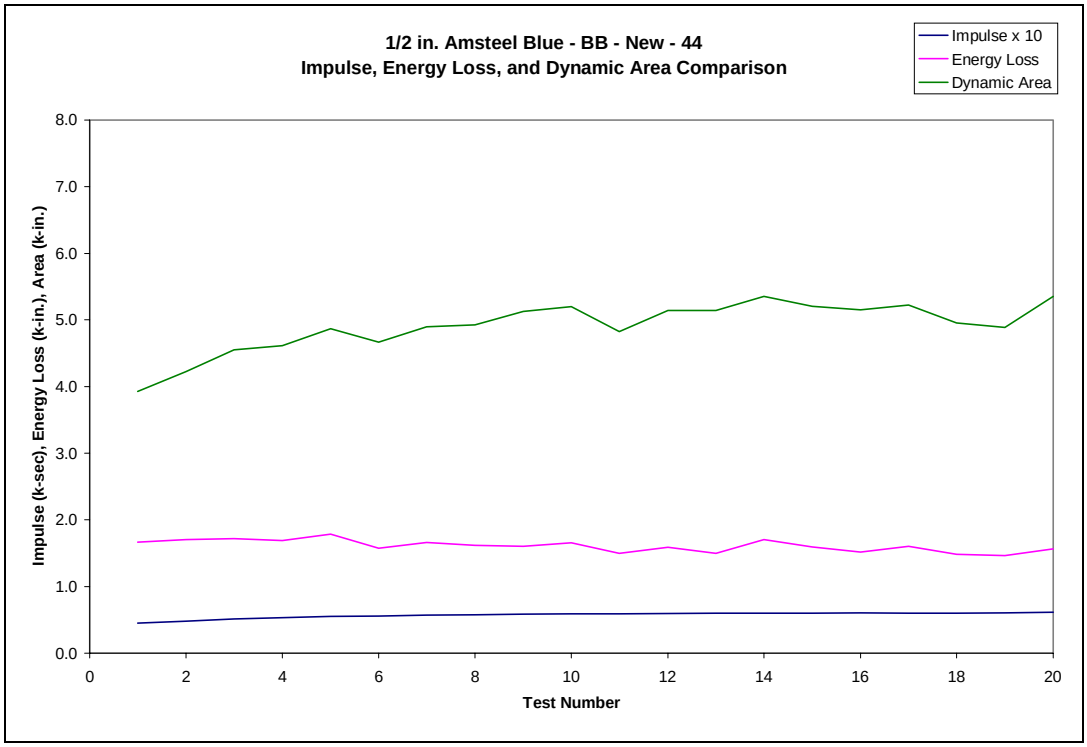


Figure B.18.6: Amsteel Blue BB – Impulse, Energy Loss and Dynamic Area Comparison

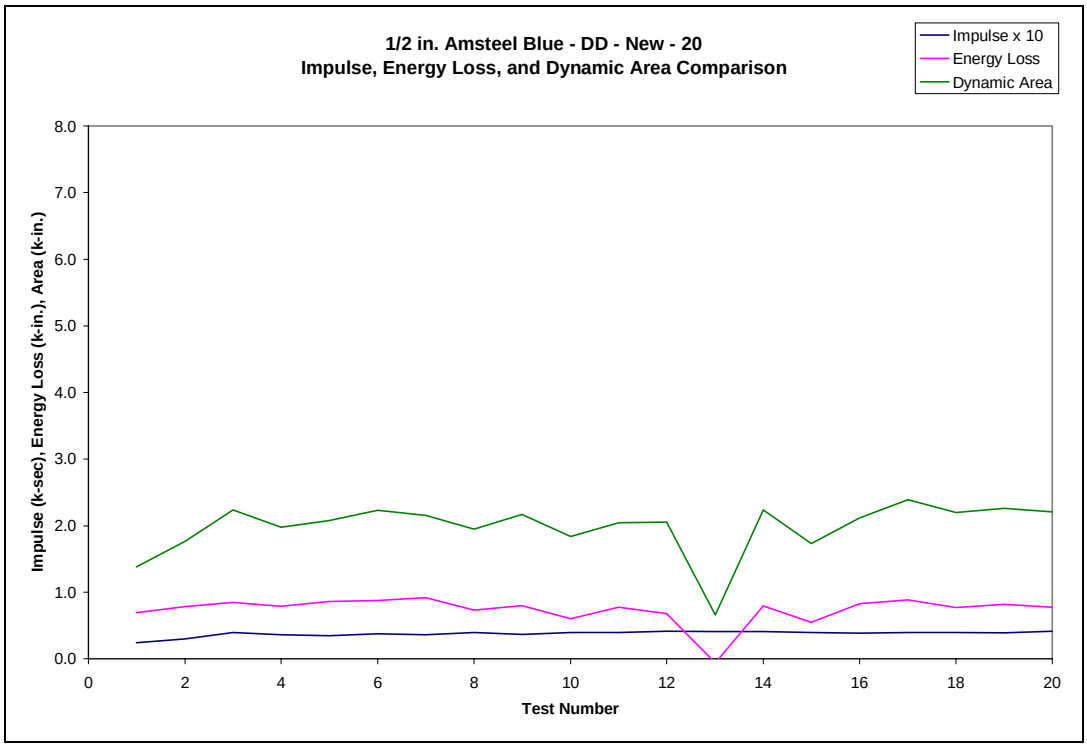


Figure B.18.7: Amsteel Blue DD – Impulse, Energy Loss and Dynamic Area Comparison

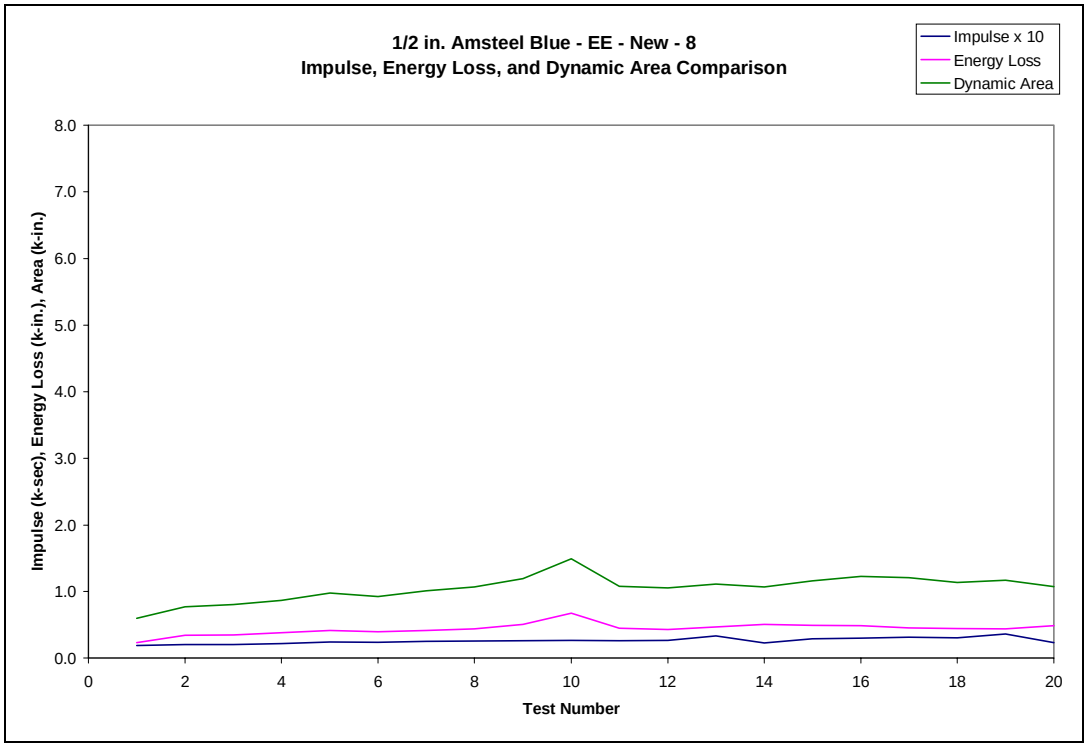


Figure B.18.8: Amsteel Blue EE – Impulse, Energy Loss and Dynamic Area Comparison

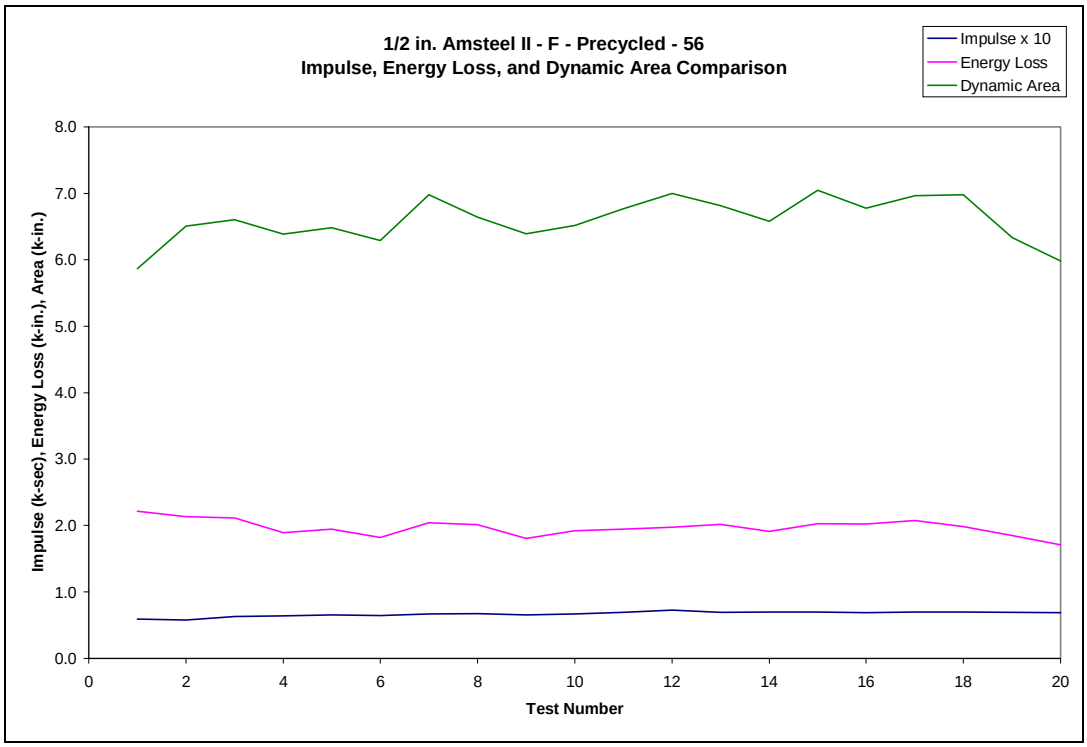


Figure B.18.9: Amsteel II F – Impulse, Energy Loss and Dynamic Area Comparison

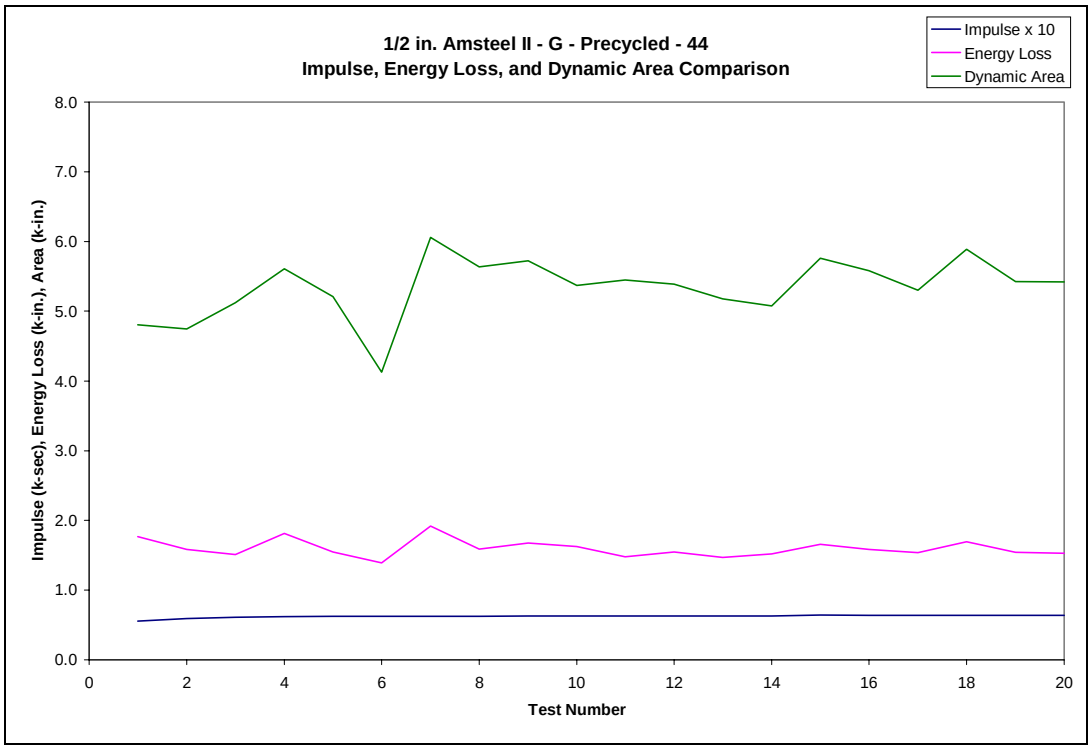


Figure B.18.10: Amsteel II G – Impulse, Energy Loss and Dynamic Area Comparison

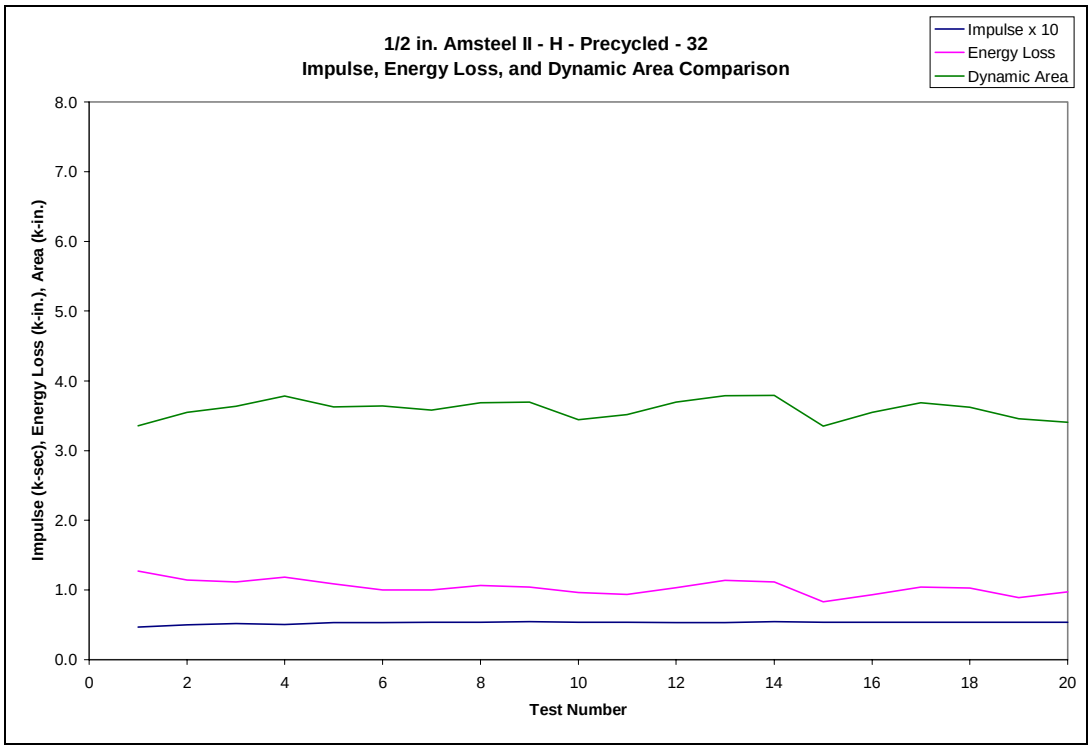


Figure B.18.11: Amsteel II H – Impulse, Energy Loss and Dynamic Area Comparison

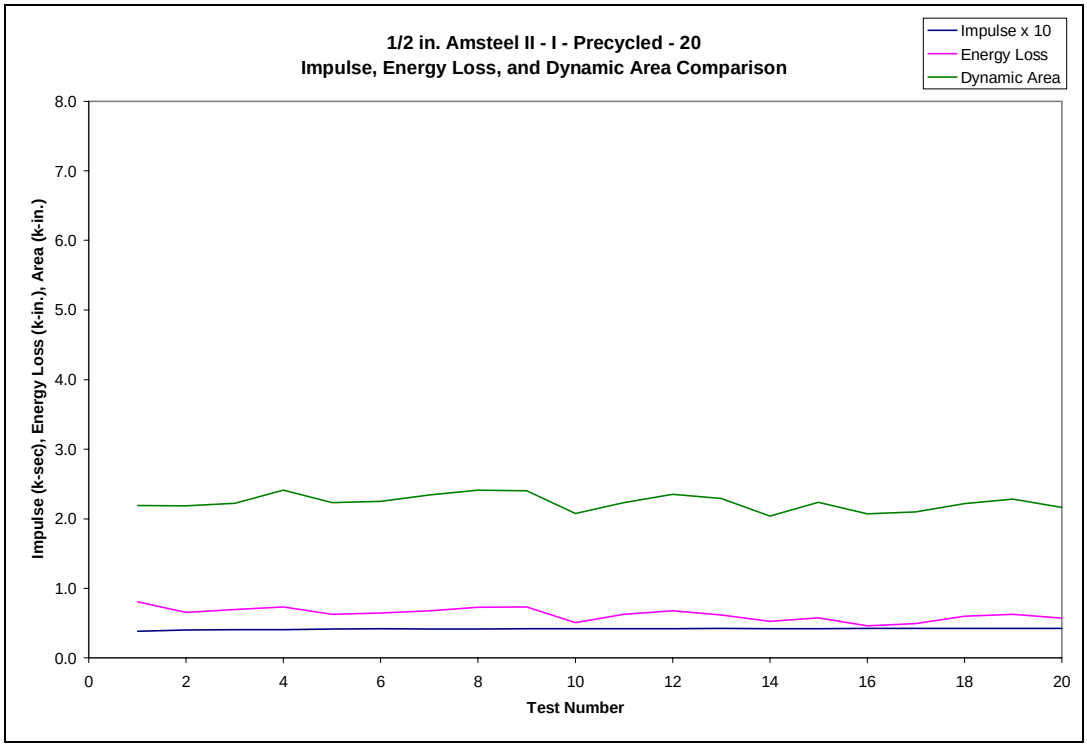


Figure B.18.12: Amsteel II I – Impulse, Energy Loss and Dynamic Area Comparison

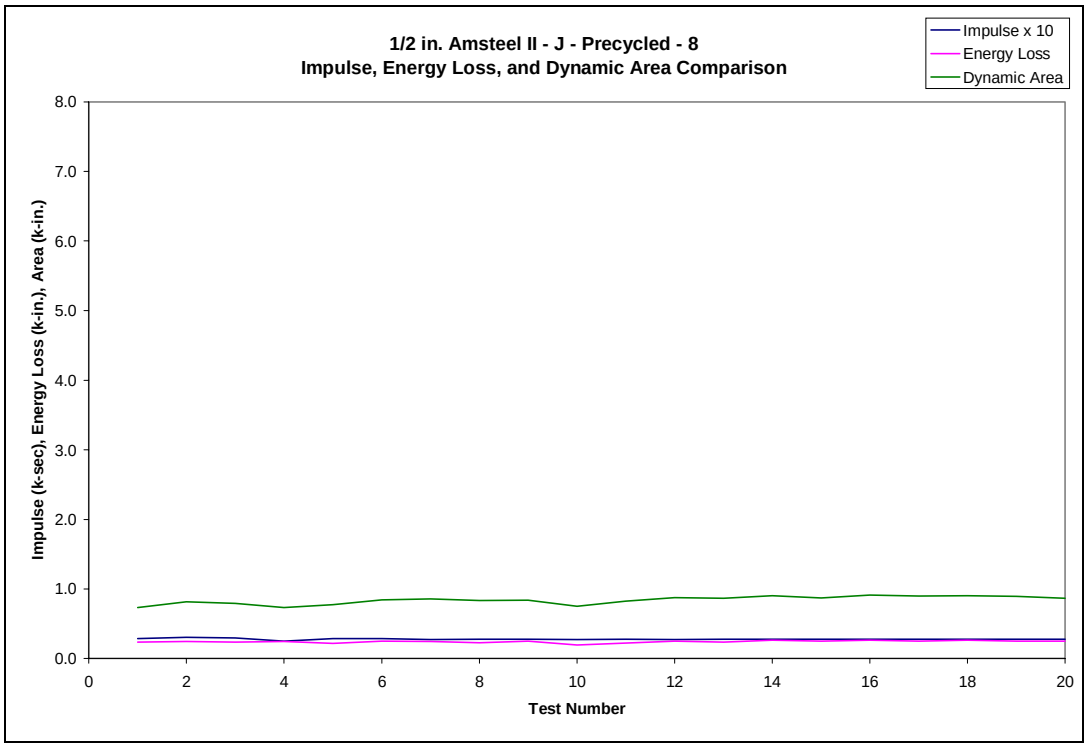


Figure B.18.13: Amsteel II J – Impulse, Energy Loss and Dynamic Area Comparison

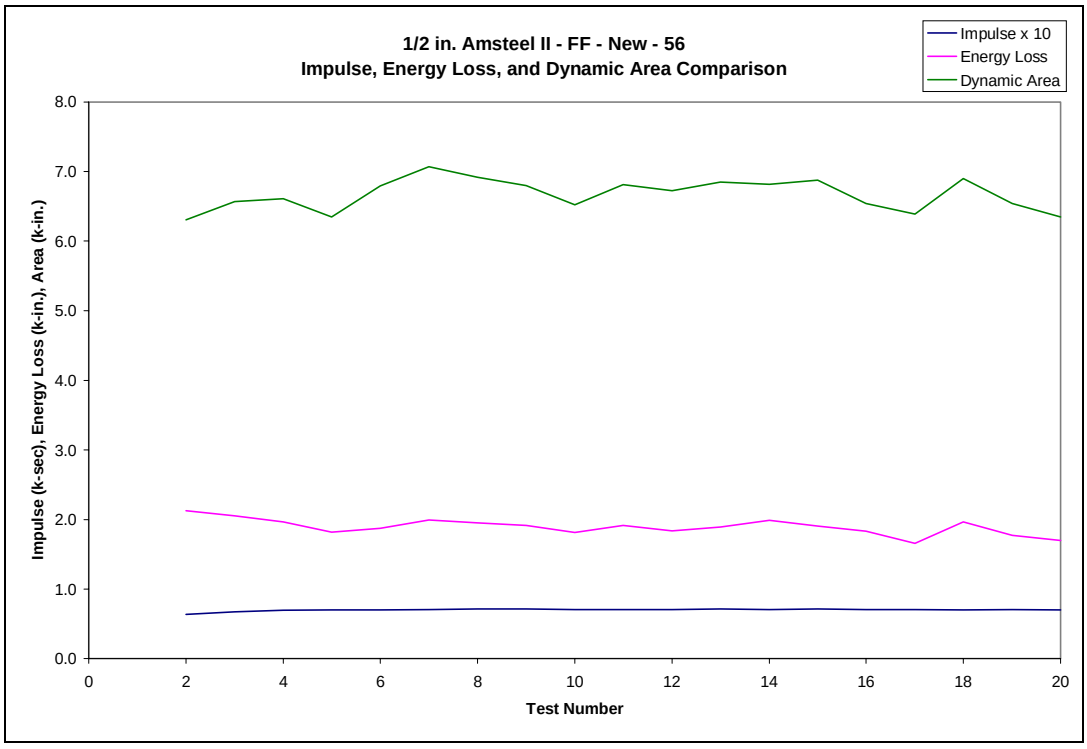


Figure B.18.14: Amsteel II FF – Impulse, Energy Loss and Dynamic Area Comparison

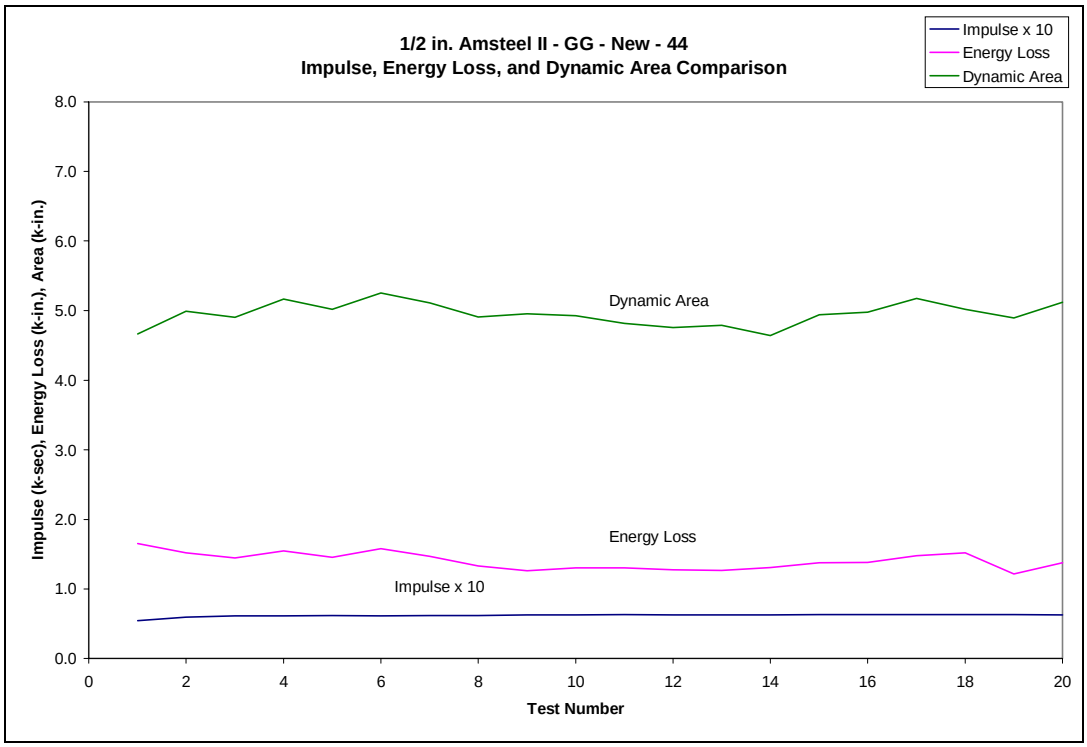


Figure B.18.15: Amsteel II GG – Impulse, Energy Loss and Dynamic Area Comparison

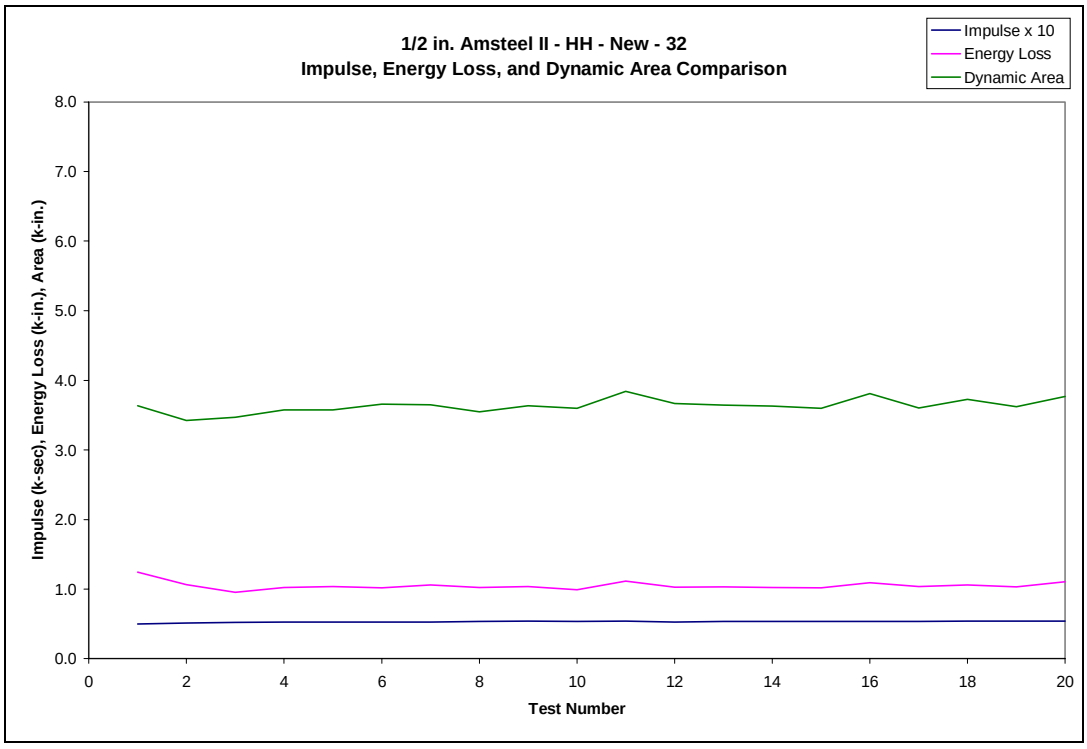


Figure B.18.16: Amsteel II HH – Impulse, Energy Loss and Dynamic Area Comparison

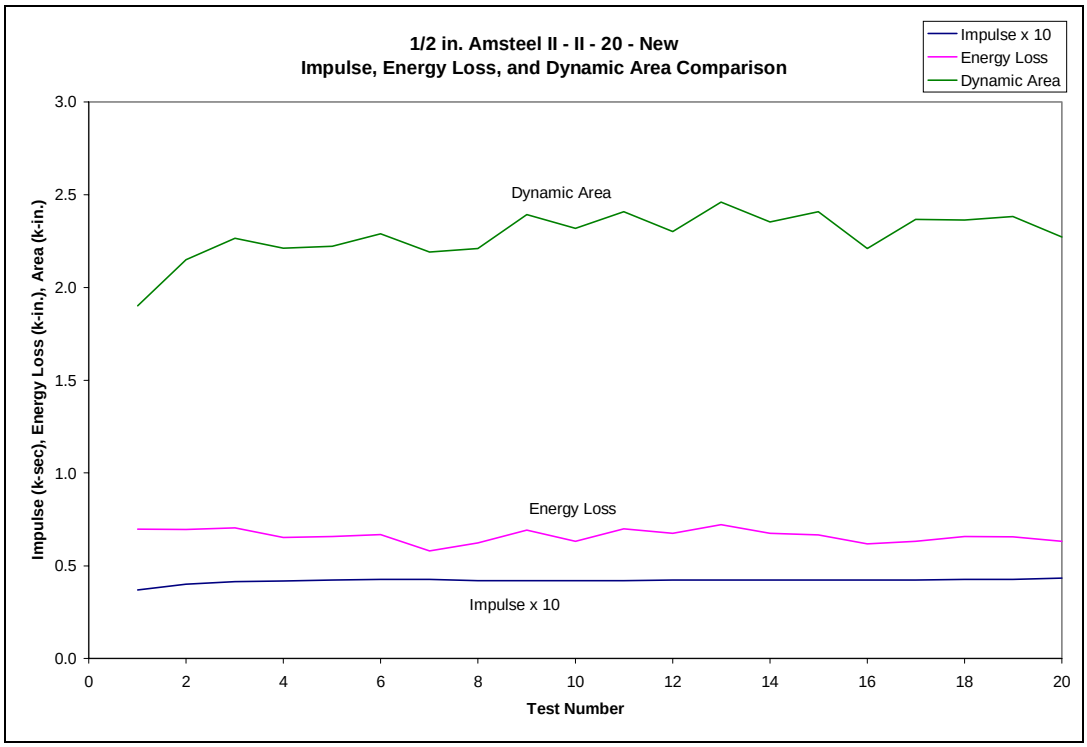


Figure B.18.17: Amsteel II II – Impulse, Energy Loss and Dynamic Area Comparison

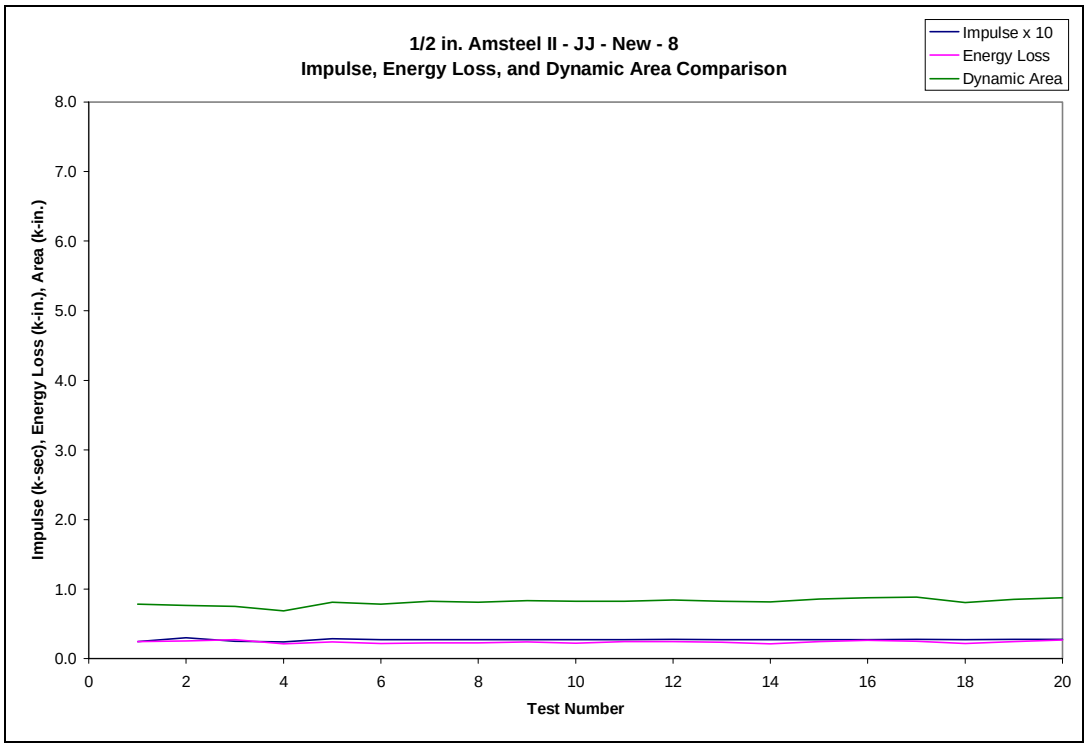


Figure B.18.18: Amsteel II JJ – Impulse, Energy Loss and Dynamic Area Comparison

## B.19 Energy Dissipation and Recorded Data Trend Comparisons

| Amsteel Blue & II - Average Results | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rope | Drop Height (in.) | Average ΔE (k-in.) | Av. Dyn. Area (k-in.) | DA/ΔE | Av. Max. Accel. (g) | Av. Max. Force (kips) | Av. Impulse (k-sec) |
| Amsteel Blue - A | 56 | 2.47 | 6.97 | 2.82 | 29.4 | 3.58 | 0.0657 |
| Amsteel Blue - AA | 56 | 2.45 | 6.64 | 2.71 | 30.0 | 3.71 | 0.0639 |
| Amsteel II - F | 56 | 1.97 | 6.59 | 3.35 | 32.0 | 4.17 | 0.0670 |
| Amsteel II - FF | 56 | 1.89 | 6.67 | 3.52 | 32.6 | 4.21 | 0.0700 |
| Amsteel Blue - B | 44 | 1.37 | 4.07 | 2.96 | 22.7 | 2.84 | 0.0545 |
| Amsteel Blue - BB | 44 | 1.61 | 4.91 | 3.05 | 23.7 | 2.96 | 0.0572 |
| Amsteel II - G | 44 | 1.60 | 5.34 | 3.35 | 27.3 | 3.64 | 0.0623 |
| Amsteel II - GG | 44 | 1.40 | 4.95 | 3.53 | 30.3 | 3.60 | 0.0618 |
| Amsteel II - H | 32 | 1.04 | 3.59 | 3.46 | 24.0 | 2.87 | 0.0529 |
| Amsteel II - HH | 32 | 1.05 | 3.63 | 3.46 | 26.4 | 2.90 | 0.0529 |
| Amsteel Blue - D | 20 | 0.93 | 2.45 | 2.62 | 16.2 | 1.74 | 0.0394 |
| Amsteel Blue - DD | 20 | 0.74 | 1.98 | 2.69 | 14.0 | 1.62 | 0.0377 |
| Amsteel II - I | 20 | 0.63 | 2.23 | 3.55 | 19.9 | 2.17 | 0.0415 |
| Amsteel II - II | 20 | 0.66 | 2.28 | 3.45 | 16.5 | 2.04 | 0.0419 |
| Amsteel Blue - E | 8 | 0.50 | 1.28 | 2.57 | 10.4 | 1.16 | 0.0285 |
| Amsteel Blue - EE | 8 | 0.44 | 1.05 | 2.39 | 7.8 | 0.92 | 0.0261 |
| Amsteel II - J | 8 | 0.24 | 0.84 | 3.47 | 8.7 | 1.17 | 0.0278 |
| Amsteel II - JJ | 8 | 0.24 | 0.82 | 3.42 | 8.6 | 1.21 | 0.0271 |

| Average DA/DE = | 3.13 |
|---|---|

Table B.19.1: Average Results for the Energy Dissipation and Recorded Data

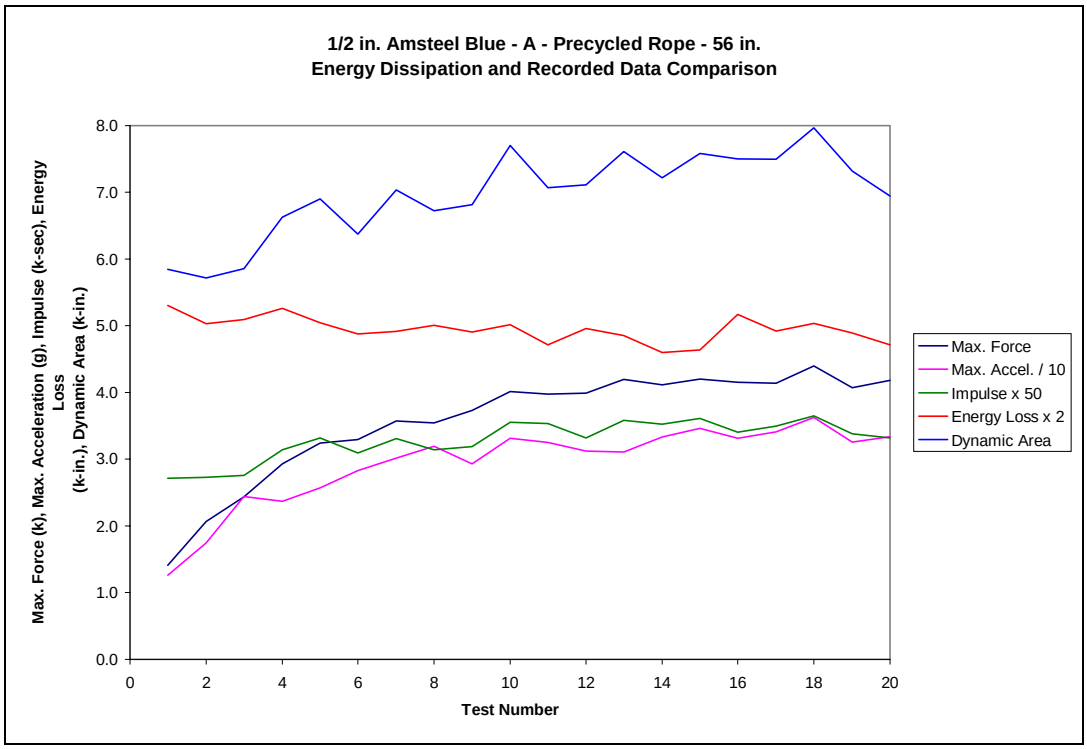


Figure B.19.1: Amsteel Blue A – Trend Comparison

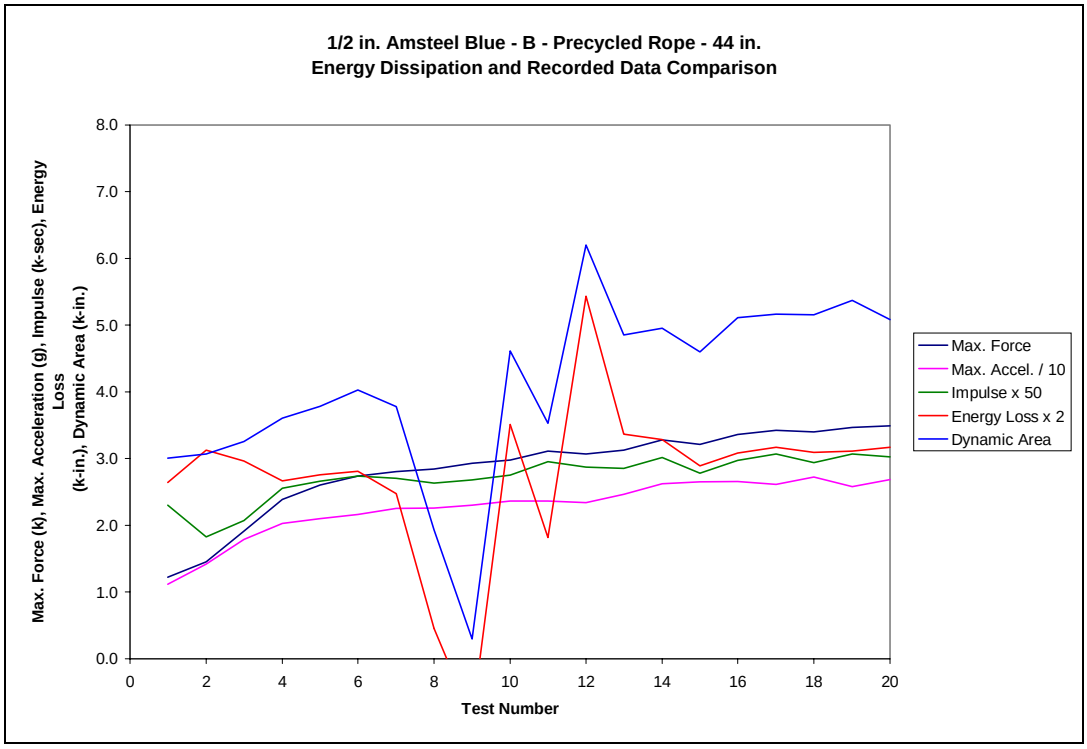


Figure B.19.2: Amsteel Blue B – Trend Comparison

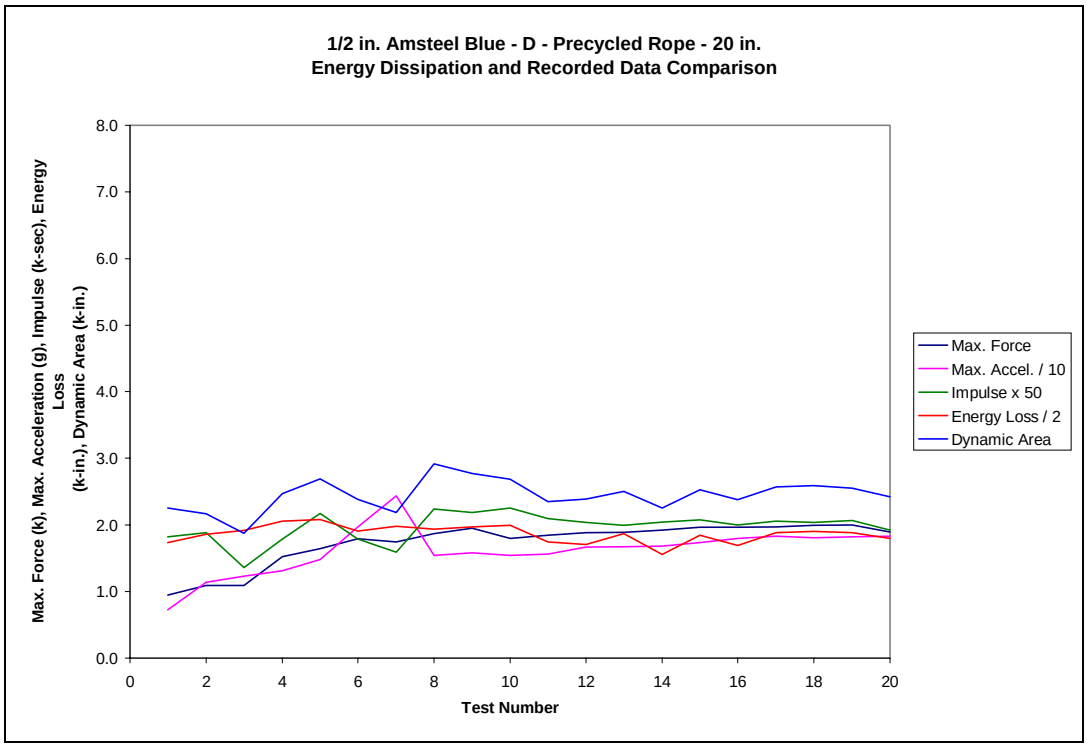


Figure B.19.3: Amsteel Blue D – Trend Comparison

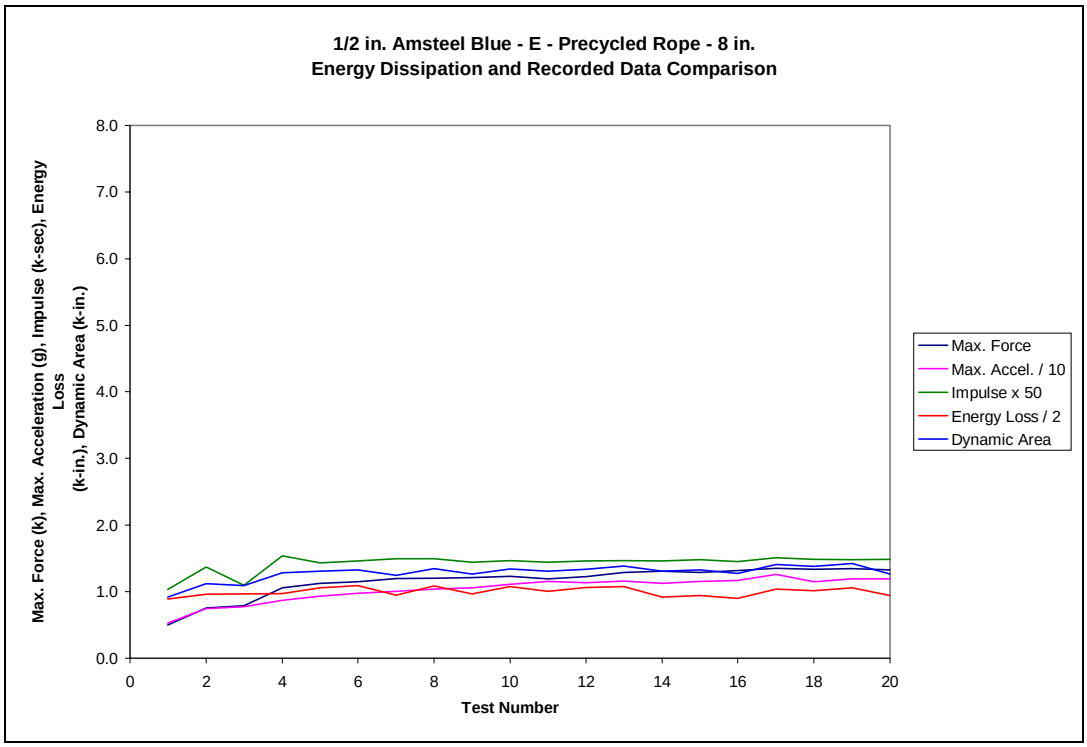


Figure B.19.4: Amsteel Blue E – Trend Comparison

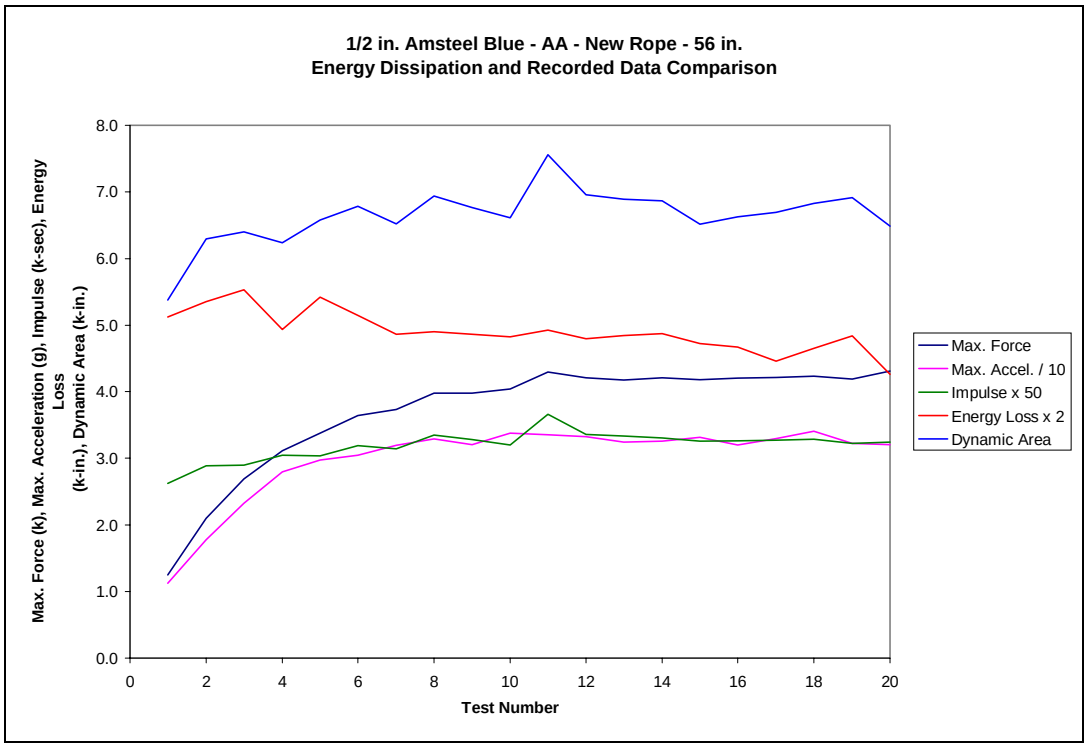


Figure B.19.5: Amsteel Blue AA – Trend Comparison

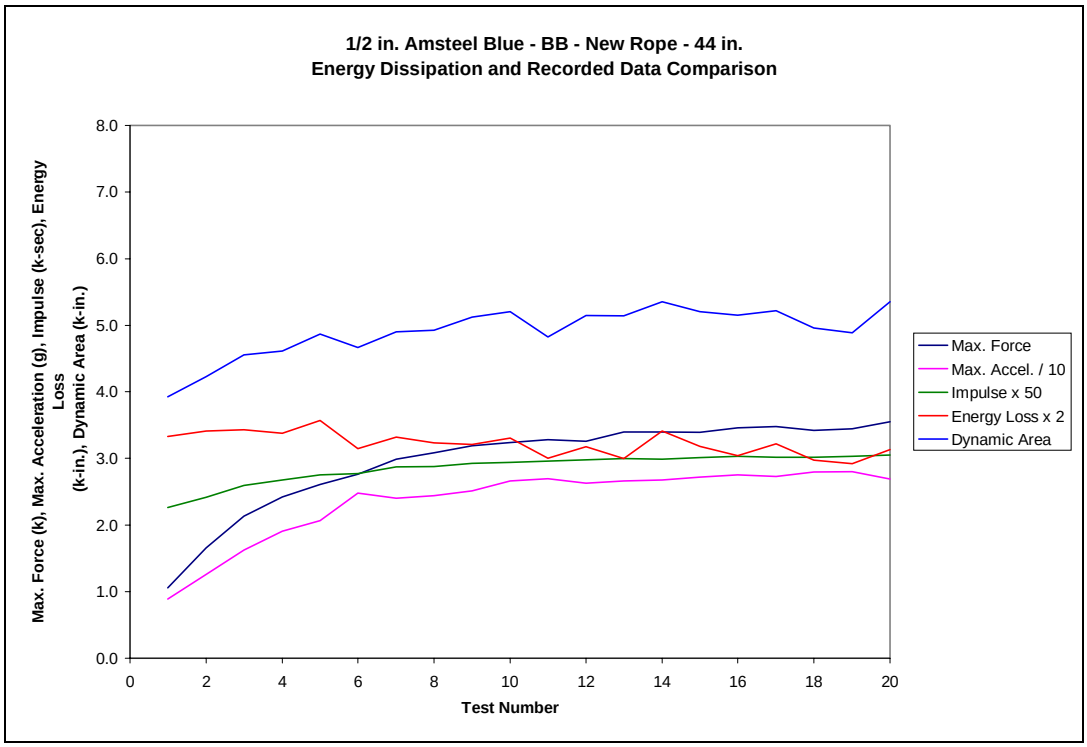


Figure B.19.6: Amsteel Blue BB – Trend Comparison

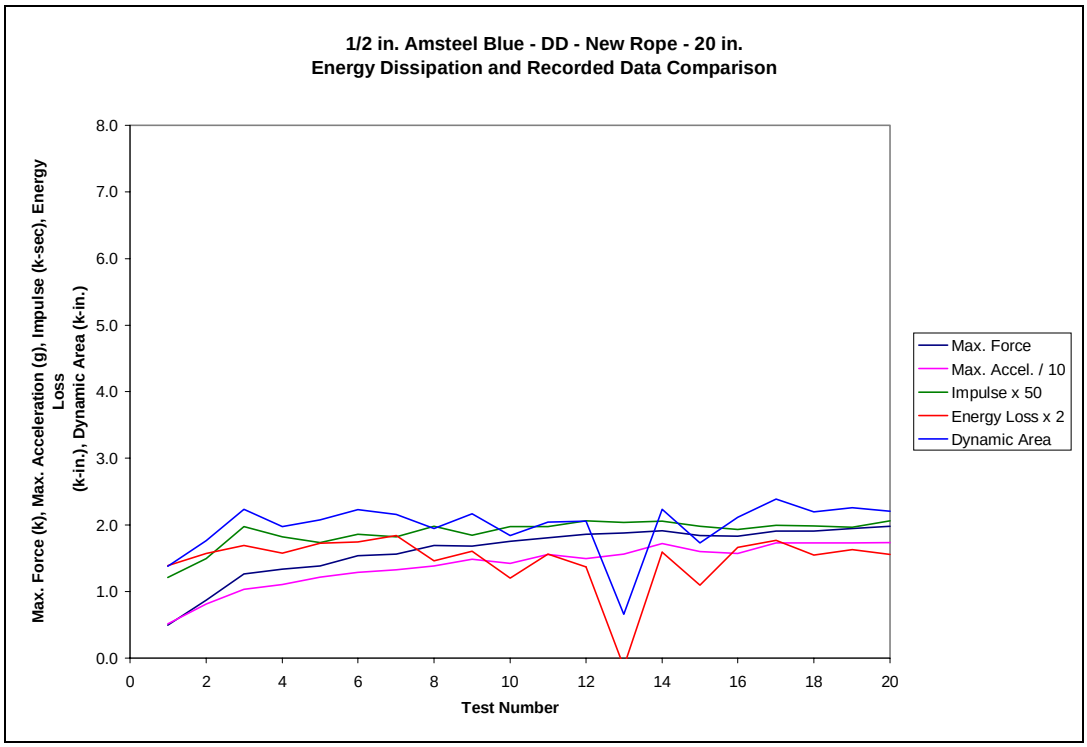


Figure B.19.7: Amsteel Blue DD – Trend Comparison

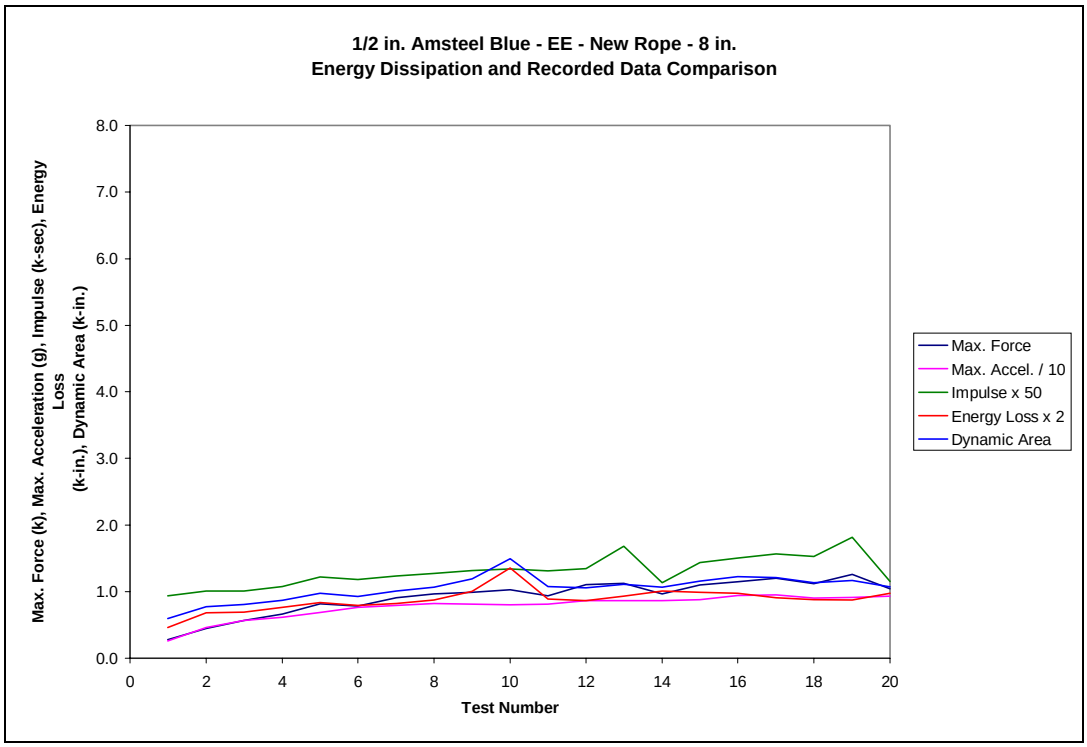


Figure B.19.8: Amsteel Blue EE – Trend Comparison

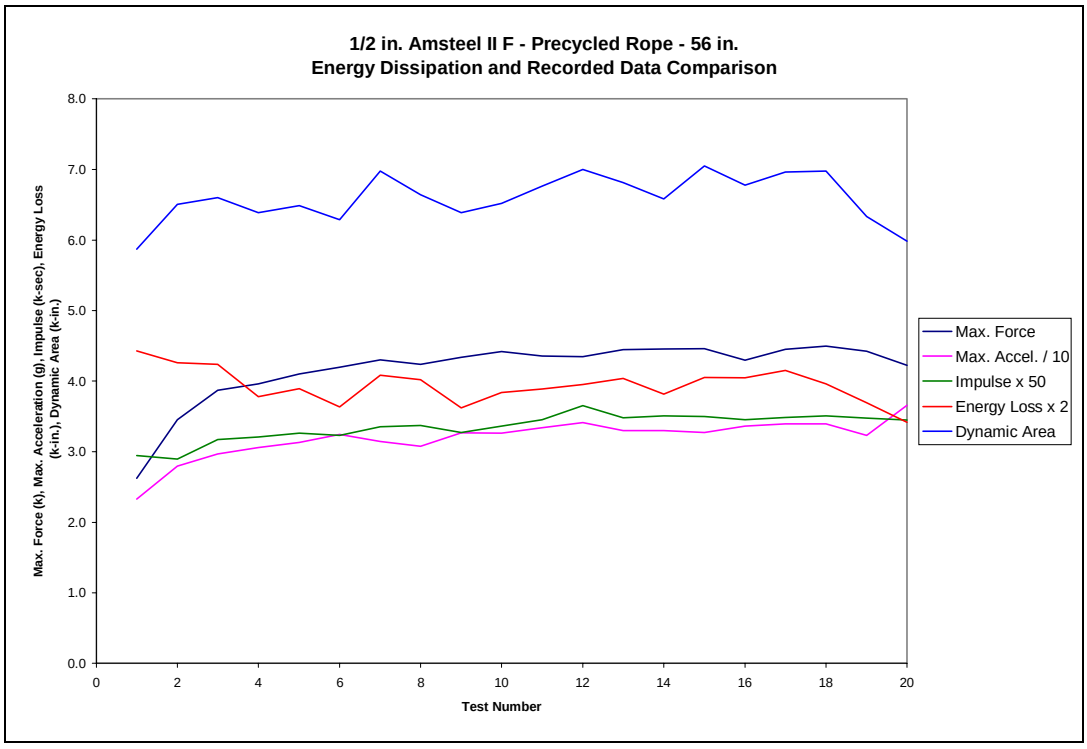


Figure B.19.9: Amsteel II F – Trend Comparison

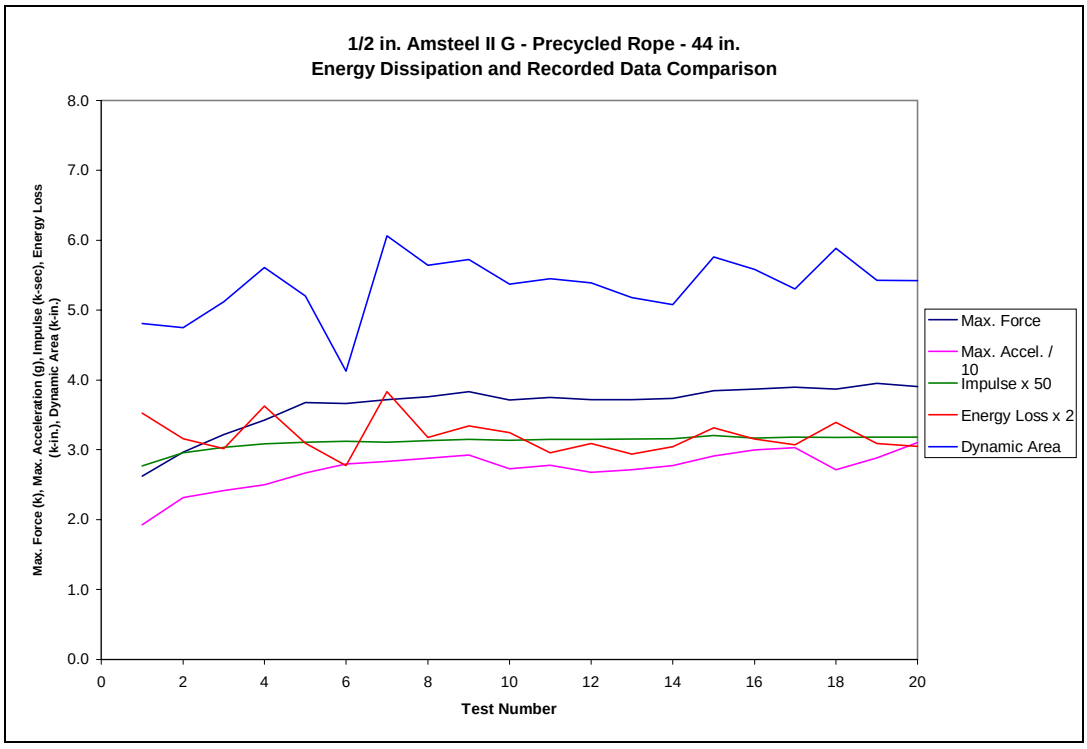


Figure B.19.10: Amsteel II G – Trend Comparison

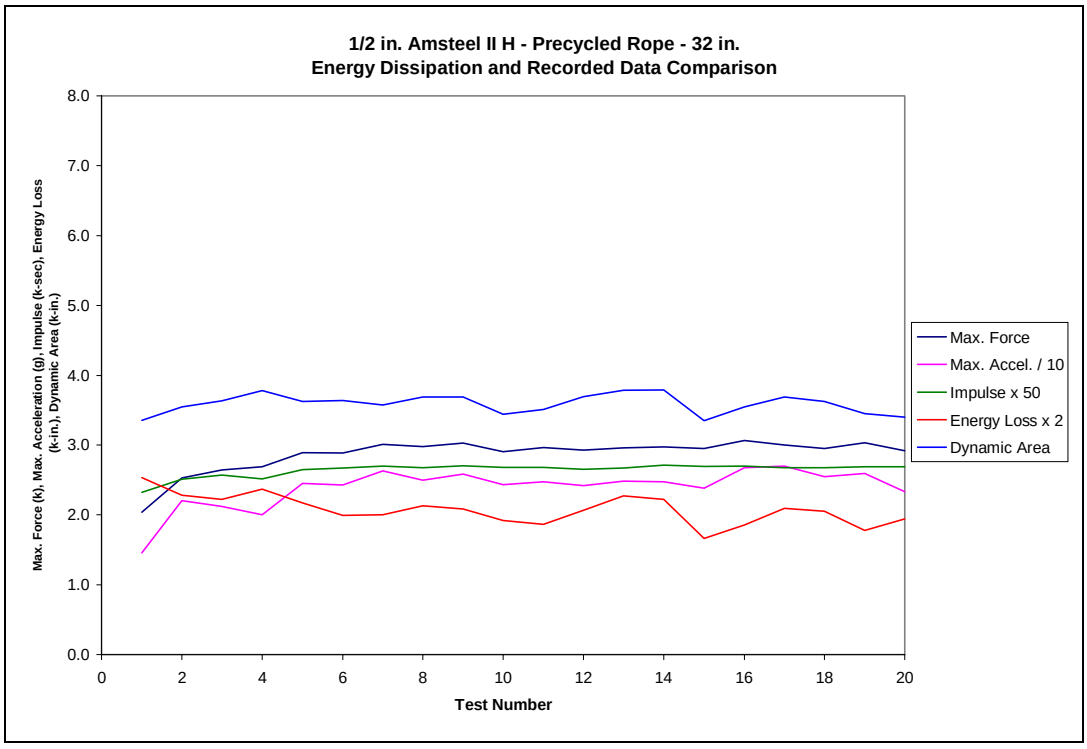


Figure B.19.11: Amsteel II H – Trend Comparison

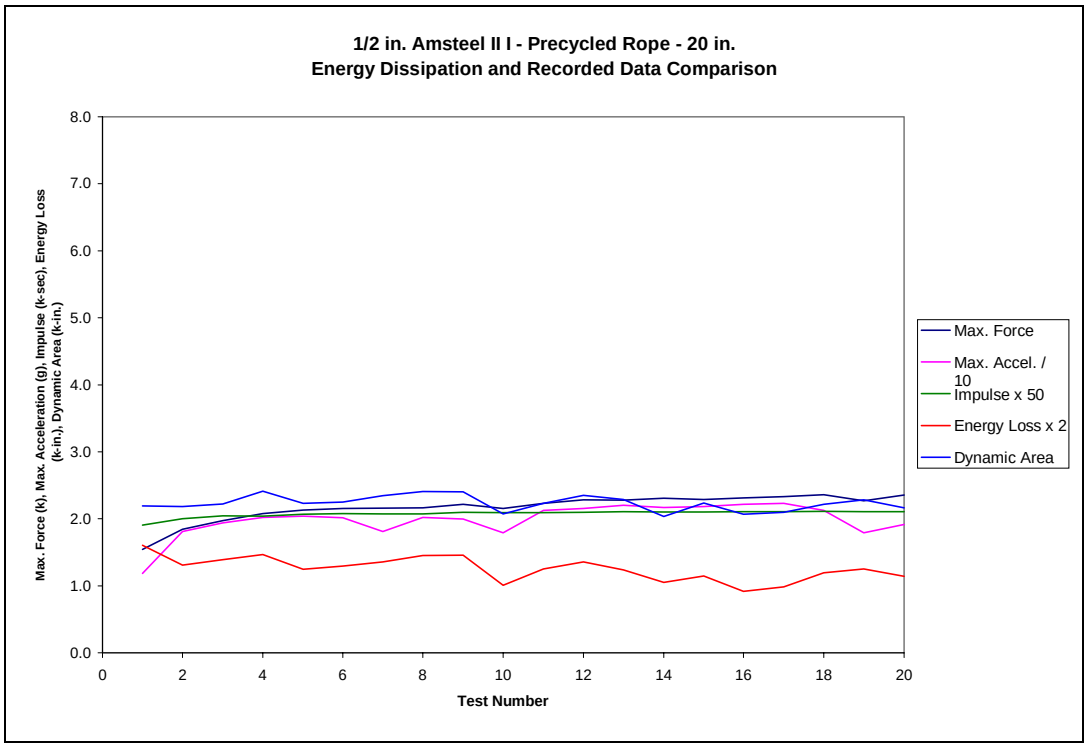


Figure B.19.12: Amsteel II I – Trend Comparison

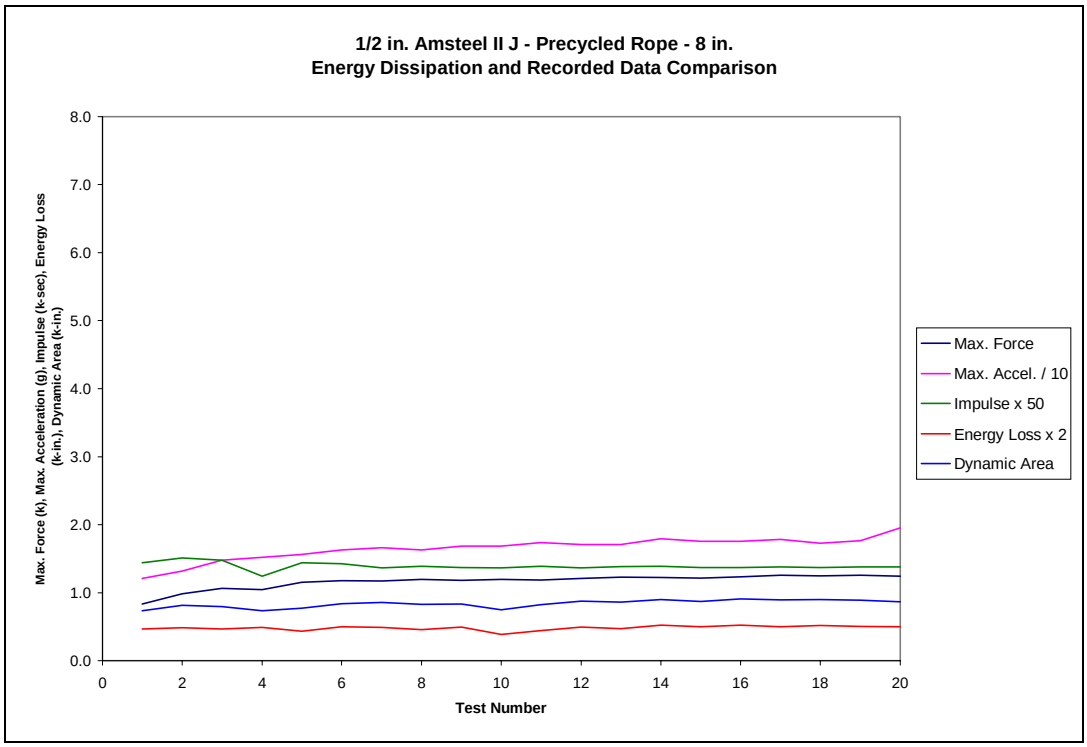


Figure B.19.13: Amsteel II J – Trend Comparison

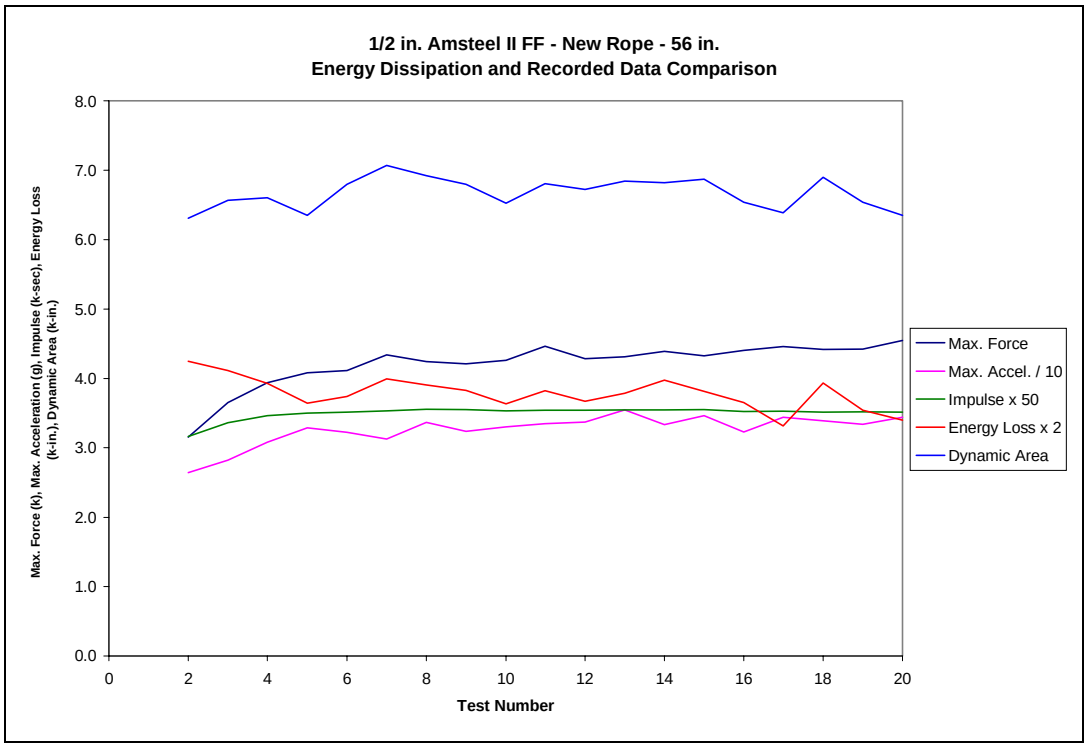


Figure B.19.14: Amsteel II FF – Trend Comparison

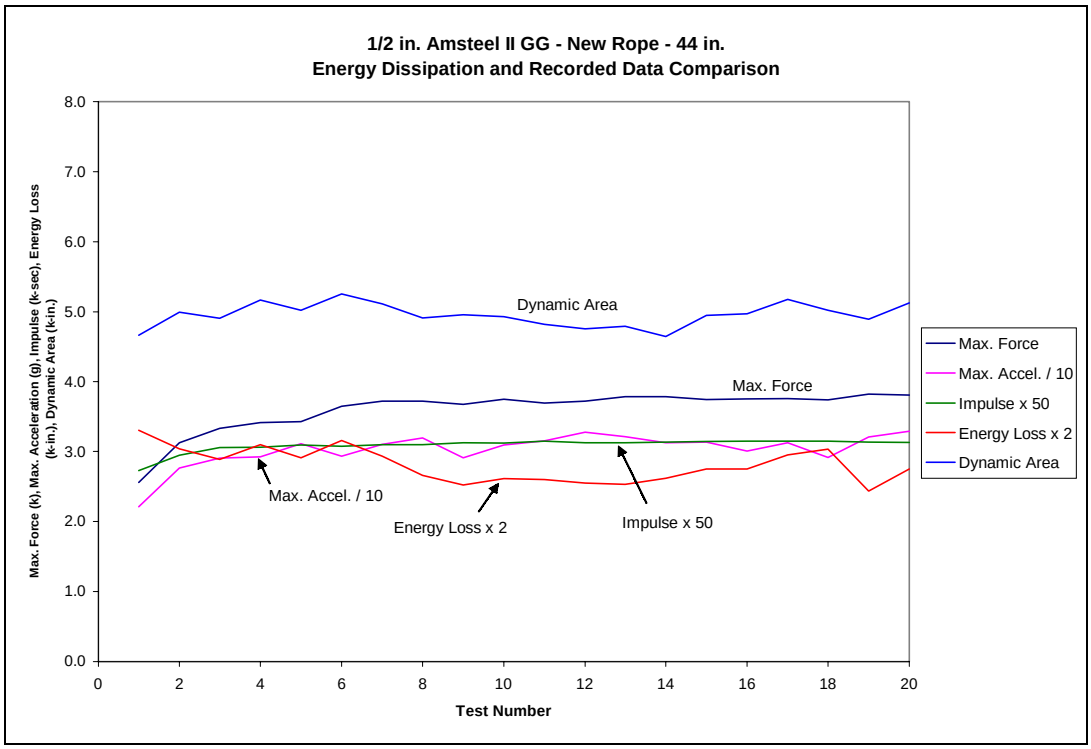


Figure B.19.15: Amsteel II GG – Trend Comparison

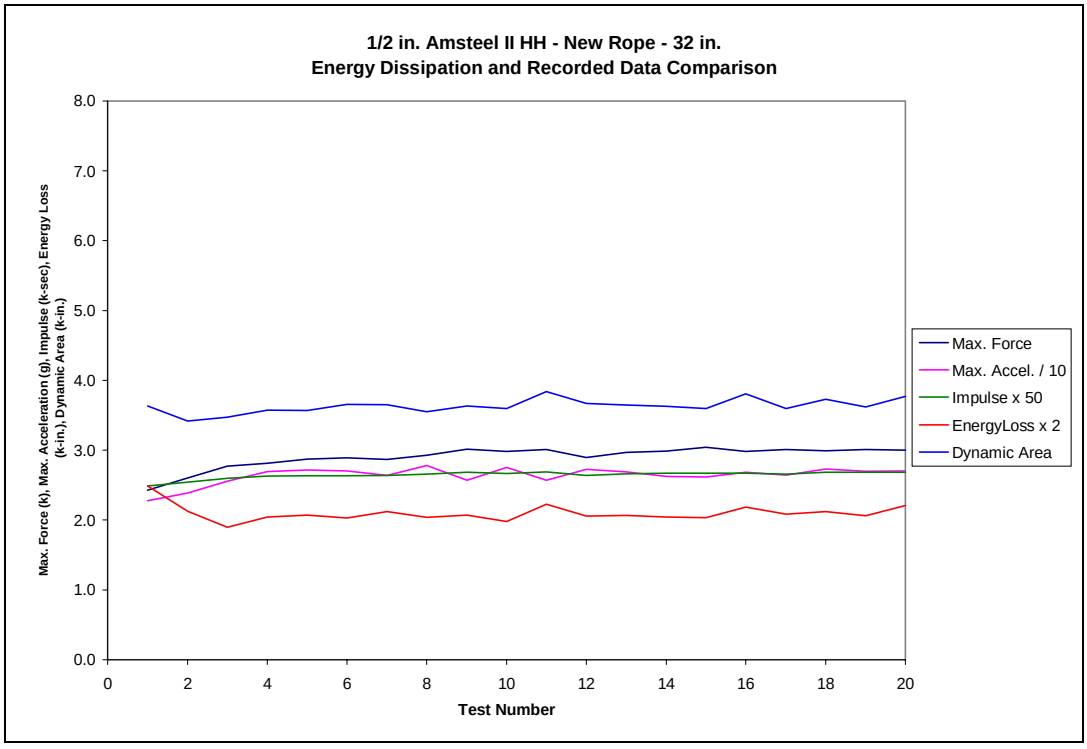


Figure B.19.16: Amsteel II HH – Trend Comparison

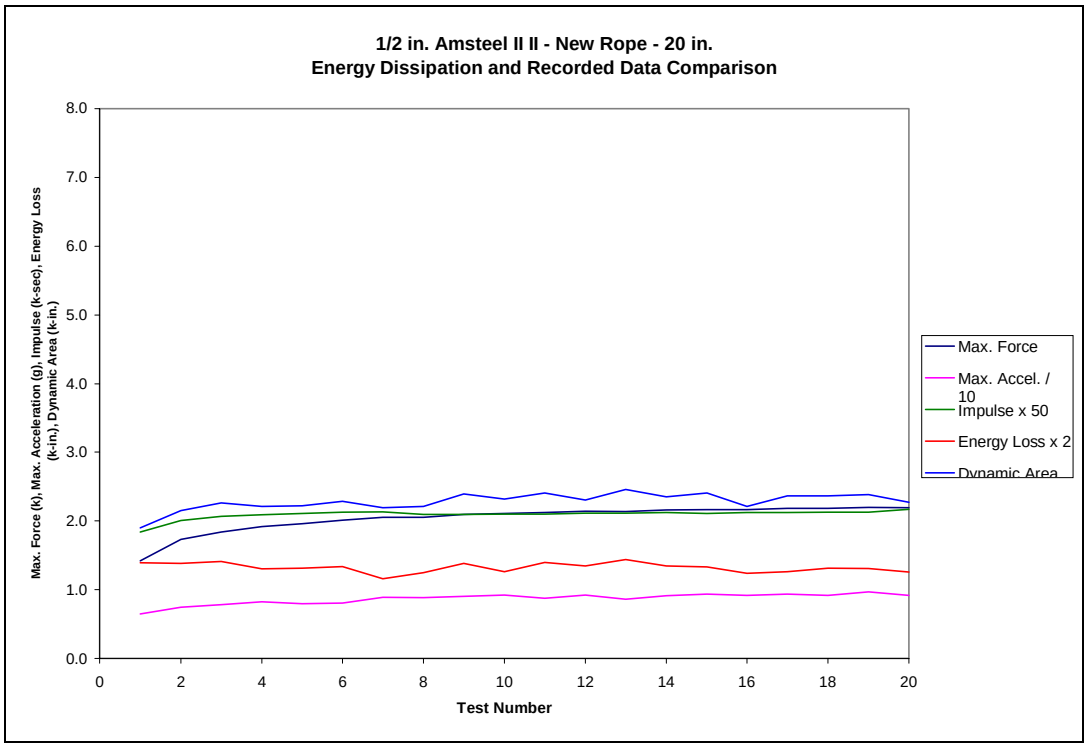


Figure B.19.17: Amsteel II II – Trend Comparison

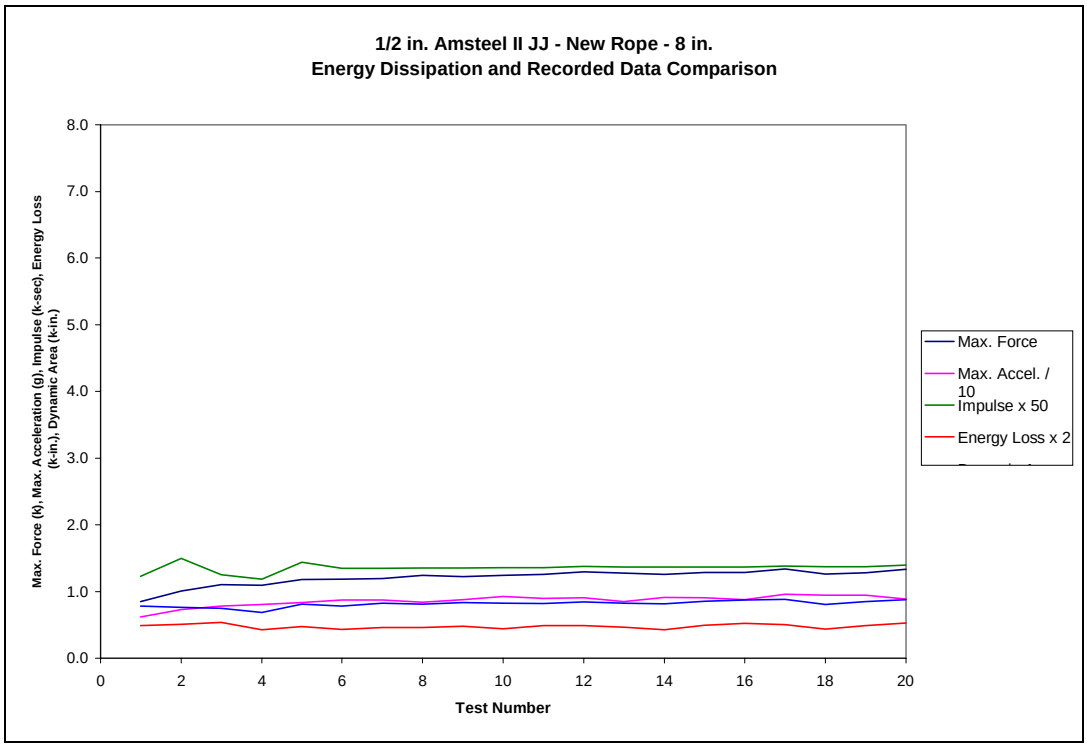


Figure B.19.18: Amsteel II JJ – Trend Comparison

## B.20 Longitudinal Stress Waves

| 1/2 in. Amsteel Blue - Longitudinal Stress Waves | | | | |
|---|---|---|---|---|
| Rope | Approx. Drop Height (in.) | Wave Speed (ft/sec) | Time of Wave (sec) | # Waves in Taut Phase |
| A | 56 | 2720.4 | 0.0035 | 16.5 |
| B | 44 | 4455.4 | 0.0021 | 28.5 |
| C | 32 | 5733.1 | 0.0016 | 40.7 |
| D | 20 | 3464.4 | 0.0027 | 26.7 |
| | Averages | 4093.3 | 0.0025 | 28.1 |

| 1/2 in. Amsteel II - Longitudinal Stress Waves | | | | |
|---|---|---|---|---|
| Rope | Approx. Drop Height (in.) | Wave Speed (ft/sec) | Time of Wave (sec) | # Waves in Taut Phase |
| F | 56 | 6233.9 | 0.0015 | 32.2 |
| G | 44 | 8531.3 | 0.0011 | 44.0 |
| H | 32 | 4905.8 | 0.0019 | 32.2 |
| I | 20 | 6244.9 | 0.0015 | 35.2 |
| J | 8 | 5317.6 | 0.0017 | 39.0 |
| | Averages | 6246.7 | 0.0015 | 36.5 |

Table B.20.1: Longitudinal Stress Wave Data

## B.21 Recorded and Theoretical Stiffness Comparison

| Recorded Stiffness vs. Theoretical Stiffness Comparison (k/in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes (Precycled) | | | | | | | | | |
| | A (56 in.) | | B (44 in.) | | C (32 in.) | | D (20 in.) | | E (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 0.24 | 2.57 | 0.36 | 3.69 | - | - | 0.25 | 2.28 | 0.19 | 2.28 |
| 2 | 0.53 | 4.25 | 0.81 | 4.79 | - | - | 0.46 | 3.54 | 0.73 | 2.07 |
| 3 | 0.95 | 4.72 | 1.41 | 5.82 | - | - | 0.57 | 4.79 | 0.96 | 4.37 |
| 4 | 1.31 | 4.72 | 1.88 | 5.44 | - | - | 1.08 | 6.03 | 1.63 | 2.73 |
| 5 | 1.44 | 5.44 | 2.29 | 5.82 | - | - | 1.03 | 4.64 | 1.71 | 4.01 |
| 6 | 1.84 | 6.96 | 2.37 | 4.79 | - | - | 1.33 | 7.66 | 1.73 | 4.07 |
| 7 | 1.94 | 6.47 | 2.49 | 5.82 | - | - | 1.50 | 8.47 | 1.96 | 4.01 |
| 8 | 2.27 | 7.37 | 3.74 | 6.24 | - | - | 1.95 | 4.51 | 1.94 | 4.01 |
| 9 | 2.47 | 6.47 | 5.65 | 6.24 | - | - | 1.95 | 4.44 | 1.92 | 3.95 |
| 10 | 2.57 | 5.35 | 2.59 | 6.83 | - | - | 0.92 | 4.31 | 1.93 | 4.12 |
| 11 | 2.65 | 5.82 | 3.27 | 6.24 | - | - | 2.47 | 4.72 | 1.97 | 4.72 |
| 12 | 2.71 | 7.81 | 2.26 | 4.01 | - | - | 2.55 | 4.57 | 2.00 | 4.44 |
| 13 | 2.82 | 7.51 | 2.82 | 6.71 | - | - | 2.51 | 5.02 | 2.17 | 4.31 |
| 14 | 2.93 | 7.37 | 2.77 | 4.25 | - | - | 2.77 | 4.64 | 2.40 | 4.37 |
| 15 | 2.42 | 6.59 | 2.96 | 6.59 | - | - | 2.78 | 4.57 | 2.37 | 4.31 |
| 16 | 2.34 | 8.13 | 3.00 | 6.59 | - | - | 2.63 | 5.72 | 2.42 | 4.64 |
| 17 | 2.52 | 7.81 | 3.04 | 5.44 | - | - | 2.66 | 4.79 | 2.41 | 4.18 |
| 18 | 2.73 | 7.51 | 3.05 | 6.71 | - | - | 3.00 | 6.03 | 2.45 | 4.25 |
| 19 | 2.45 | 8.13 | 3.05 | 5.82 | - | - | 3.02 | 5.10 | 2.54 | 4.37 |
| 20 | 2.91 | 8.47 | 3.13 | 6.59 | - | - | 2.34 | 6.24 | 2.62 | 4.51 |

| Drop Test Number | Amsteel Blue Ropes (New) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AA (56 in.) | | BB (44 in.) | | CC (32 in.) | | DD (20 in.) | | EE (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 0.21 | 1.68 | 0.20 | 1.90 | - | - | 0.12 | 1.41 | 0.09 | 0.80 |
| 2 | 0.59 | 4.12 | 0.55 | 3.36 | - | - | 0.37 | 3.64 | 0.22 | 1.82 |
| 3 | 1.33 | 5.18 | 1.12 | 5.35 | - | - | 1.13 | 3.74 | 0.41 | 2.89 |
| 4 | 1.83 | 4.72 | 1.77 | 4.31 | - | - | 1.81 | 4.51 | 0.53 | 3.15 |
| 5 | 2.23 | 8.30 | 1.77 | 5.72 | - | - | 1.74 | 4.86 | 1.00 | 2.79 |
| 6 | 2.18 | 4.79 | 1.84 | 5.18 | - | - | 2.22 | 4.79 | 1.00 | 2.86 |
| 7 | 2.23 | 4.86 | 2.31 | 5.35 | - | - | 2.33 | 4.79 | 1.31 | 3.00 |
| 8 | 2.50 | 7.51 | 2.48 | 5.72 | - | - | 2.69 | 4.86 | 1.43 | 2.76 |
| 9 | 2.91 | 6.83 | 2.62 | 5.82 | - | - | 2.58 | 4.94 | 1.44 | 3.00 |
| 10 | 2.96 | 9.02 | 2.58 | 5.27 | - | - | 3.13 | 5.02 | 1.22 | 2.21 |
| 11 | 2.69 | 5.44 | 2.75 | 6.47 | - | - | 3.12 | 6.03 | 1.29 | 3.11 |
| 12 | 2.87 | 6.35 | 2.65 | 6.13 | - | - | 3.15 | 4.94 | 1.67 | 3.04 |
| 13 | 2.99 | 7.81 | 2.79 | 5.63 | - | - | 5.07 | 5.44 | 1.64 | 2.63 |
| 14 | 3.07 | 7.97 | 2.92 | 6.24 | - | - | 3.01 | 4.94 | 1.31 | 5.92 |
| 15 | 3.21 | 7.51 | 2.91 | 5.92 | - | - | 3.36 | 4.94 | 1.60 | 2.86 |
| 16 | 2.92 | 7.97 | 2.98 | 5.53 | - | - | 2.95 | 4.86 | 1.67 | 3.40 |
| 17 | 3.17 | 7.51 | 3.06 | 6.03 | - | - | 2.92 | 5.27 | 1.64 | 2.93 |
| 18 | 3.03 | 5.82 | 3.10 | 6.59 | - | - | 3.06 | 5.02 | 1.61 | 2.73 |
| 19 | 3.22 | 7.97 | 3.17 | 6.03 | - | - | 3.16 | 6.13 | 1.81 | 3.23 |
| 20 | 3.34 | 7.51 | 3.02 | 6.24 | - | - | 3.30 | 5.18 | 1.52 | 6.59 |

Table B.21.1: Amsteel Blue Ropes – Recorded and Theoretical Stiffness Values

| Recorded Stiffness vs. Theoretical Stiffness Comparison (k/in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel II Ropes (Precycled) | | | | | | | | | |
| | F (56 in.) | | G (44 in.) | | H (32 in.) | | I (20 in.) | | J (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 1.06 | 4.72 | 1.42 | 5.27 | 1.21 | 4.72 | 1.03 | 6.35 | 0.72 | 3.59 |
| 2 | 2.13 | 6.24 | 2.39 | 5.92 | 2.18 | 4.64 | 1.75 | 5.53 | 1.66 | 3.23 |
| 3 | 2.28 | 8.65 | 2.81 | 6.83 | 2.54 | 5.44 | 1.98 | 4.94 | 2.07 | 3.59 |
| 4 | 2.84 | 4.72 | 2.73 | 6.24 | 2.10 | 9.62 | 2.00 | 6.83 | 2.05 | 4.72 |
| 5 | 3.02 | 6.59 | 2.94 | 7.97 | 2.87 | 5.35 | 2.25 | 6.03 | 2.23 | 3.95 |
| 6 | 2.86 | 6.71 | 3.02 | 8.30 | 2.89 | 5.35 | 2.18 | 6.24 | 1.93 | 4.37 |
| 7 | 2.78 | 9.21 | 2.91 | 9.02 | 2.98 | 5.63 | 2.30 | 9.02 | 2.25 | 4.31 |
| 8 | 2.86 | 9.21 | 2.99 | 8.83 | 3.01 | 5.18 | 2.24 | 6.59 | 2.24 | 4.44 |
| 9 | 3.00 | 8.83 | 2.89 | 8.65 | 3.17 | 5.63 | 2.33 | 6.96 | 2.40 | 4.25 |
| 10 | 2.98 | 8.83 | 3.09 | 8.30 | 3.27 | 5.10 | 2.61 | 6.71 | 2.49 | 4.18 |
| 11 | 2.86 | 10.06 | 2.96 | 8.65 | 3.34 | 5.27 | 2.57 | 6.83 | 2.42 | 3.64 |
| 12 | 2.80 | 9.84 | 3.10 | 11.03 | 3.22 | 6.13 | 2.52 | 7.37 | 2.41 | 4.57 |
| 13 | 2.94 | 9.42 | 3.16 | 9.42 | 3.23 | 5.92 | 2.51 | 7.23 | 2.40 | 4.31 |
| 14 | 2.94 | 8.83 | 3.11 | 10.06 | 3.25 | 5.72 | 2.64 | 8.13 | 2.41 | 4.64 |
| 15 | 2.85 | 8.65 | 2.96 | 7.97 | 3.48 | 5.92 | 2.54 | 7.81 | 2.43 | 4.72 |
| 16 | 2.44 | 8.83 | 3.06 | 8.65 | 3.47 | 5.72 | 2.60 | 7.81 | 2.39 | 4.64 |
| 17 | 2.75 | 10.06 | 3.07 | 8.30 | 3.43 | 5.35 | 2.72 | 7.97 | 2.39 | 4.12 |
| 18 | 2.79 | 9.84 | 3.02 | 9.42 | 3.45 | 5.44 | 2.57 | 10.53 | 2.36 | 4.86 |
| 19 | 2.92 | 9.62 | 3.16 | 8.65 | 3.54 | 5.44 | 2.71 | 7.23 | 2.43 | 4.72 |
| 20 | 2.92 | 7.66 | 3.12 | 8.30 | 3.50 | 5.63 | 2.71 | 7.51 | 2.47 | 4.37 |

| Drop Test Number | Amsteel II Ropes (New) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FF (56 in.) | | GG (44 in.) | | HH (32 in.) | | II (20 in.) | | JJ (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | - | - | 0.86 | 5.44 | 2.03 | 5.35 | 0.73 | 3.27 | 0.72 | 3.00 |
| 2 | 1.58 | 7.37 | 2.56 | 5.92 | 2.49 | 5.53 | 1.74 | 3.84 | 1.75 | 4.12 |
| 3 | 2.42 | 6.47 | 3.11 | 6.13 | 2.86 | 5.10 | 2.02 | 3.50 | 2.73 | 5.02 |
| 4 | 3.13 | 8.13 | 2.97 | 7.51 | 2.82 | 5.53 | 2.19 | 3.90 | 2.89 | 5.72 |
| 5 | 3.26 | 6.83 | 3.26 | 7.23 | 2.93 | 5.10 | 2.37 | 3.95 | 2.35 | 4.18 |
| 6 | 3.04 | 8.47 | 3.30 | 7.37 | 3.04 | 6.13 | 2.43 | 4.07 | 2.89 | 4.64 |
| 7 | 3.19 | 7.37 | 3.34 | 6.59 | 3.05 | 5.72 | 2.63 | 4.12 | 2.81 | 4.79 |
| 8 | 3.28 | 9.02 | 3.30 | 7.37 | 3.29 | 5.44 | 2.58 | 6.03 | 2.55 | 5.18 |
| 9 | 3.28 | 9.62 | 3.39 | 7.37 | 3.22 | 5.63 | 2.53 | 6.47 | 2.76 | 4.79 |
| 10 | 3.35 | 9.62 | 3.58 | 6.47 | 3.20 | 5.53 | 2.60 | 6.35 | 2.60 | 5.02 |
| 11 | 3.19 | 10.53 | 3.47 | 6.96 | 3.15 | 5.44 | 2.62 | 6.59 | 2.90 | 5.53 |
| 12 | 3.48 | 8.65 | 3.50 | 7.09 | 2.89 | 6.83 | 2.62 | 5.72 | 2.59 | 6.71 |
| 13 | 3.35 | 10.29 | 3.56 | 7.23 | 3.17 | 5.27 | 2.60 | 6.71 | 2.66 | 6.03 |
| 14 | 3.31 | 7.23 | 3.51 | 6.71 | 3.17 | 5.44 | 2.64 | 6.24 | 2.85 | 5.27 |
| 15 | 3.29 | 7.23 | 3.46 | 7.23 | 3.24 | 5.92 | 2.68 | 6.35 | 2.86 | 5.10 |
| 16 | 3.34 | 6.83 | 3.58 | 7.81 | 3.09 | 5.63 | 2.72 | 6.35 | 2.72 | 5.27 |
| 17 | 3.36 | 7.97 | 3.53 | 8.13 | 3.13 | 6.35 | 2.78 | 6.59 | 2.50 | 6.35 |
| 18 | 3.12 | 9.84 | 3.55 | 8.65 | 3.16 | 5.63 | 2.67 | 6.24 | 2.88 | 5.10 |
| 19 | 3.42 | 8.65 | 3.52 | 6.96 | 3.27 | 5.35 | 2.70 | 7.37 | 2.74 | 5.10 |
| 20 | 3.44 | 9.42 | 3.54 | 7.23 | 3.18 | 6.03 | 2.75 | 7.09 | 2.75 | 5.63 |

Table B.21.2: Amsteel II Ropes – Recorded and Theoretical Stiffness Values

| Converging Static Slopes - Static Ropes Stiffnesses (k/in.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Amsteel Blue Ropes | | | | | Amsteel II Ropes | | | | |
| A | B | C | D | E | F | G | H | I | J |
| 0.341 | 0.378 | 0.399 | 0.402 | - | 0.633 | 0.717 | 0.684 | 0.735 | 0.673 |

Table B.21.3: Converging Static Slopes (Static Rope Stiffnesses)

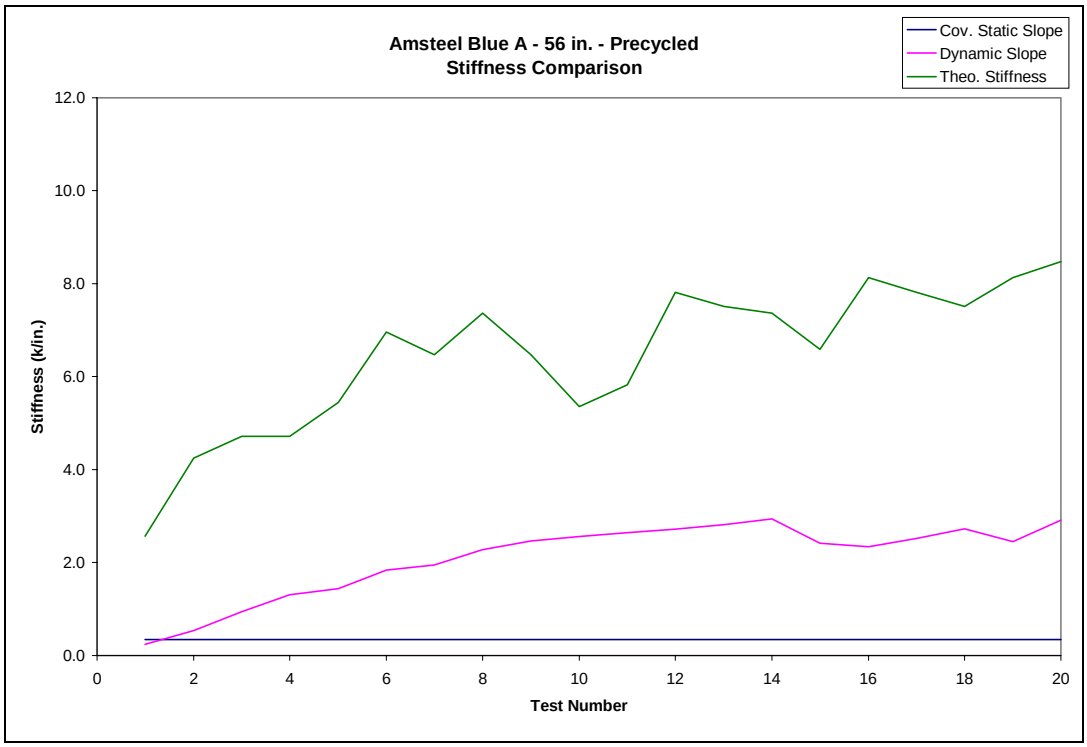


Figure B.21.1: Amsteel Blue A – Stiffness Comparison

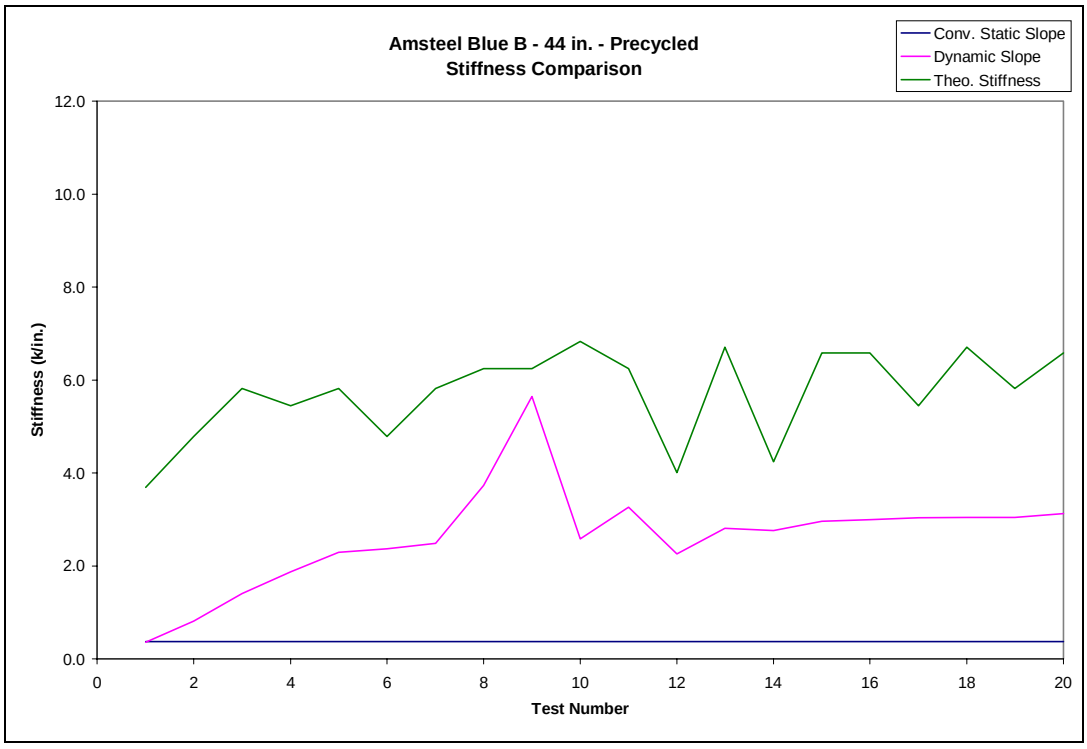


Figure B.21.2: Amsteel Blue B – Stiffness Comparison

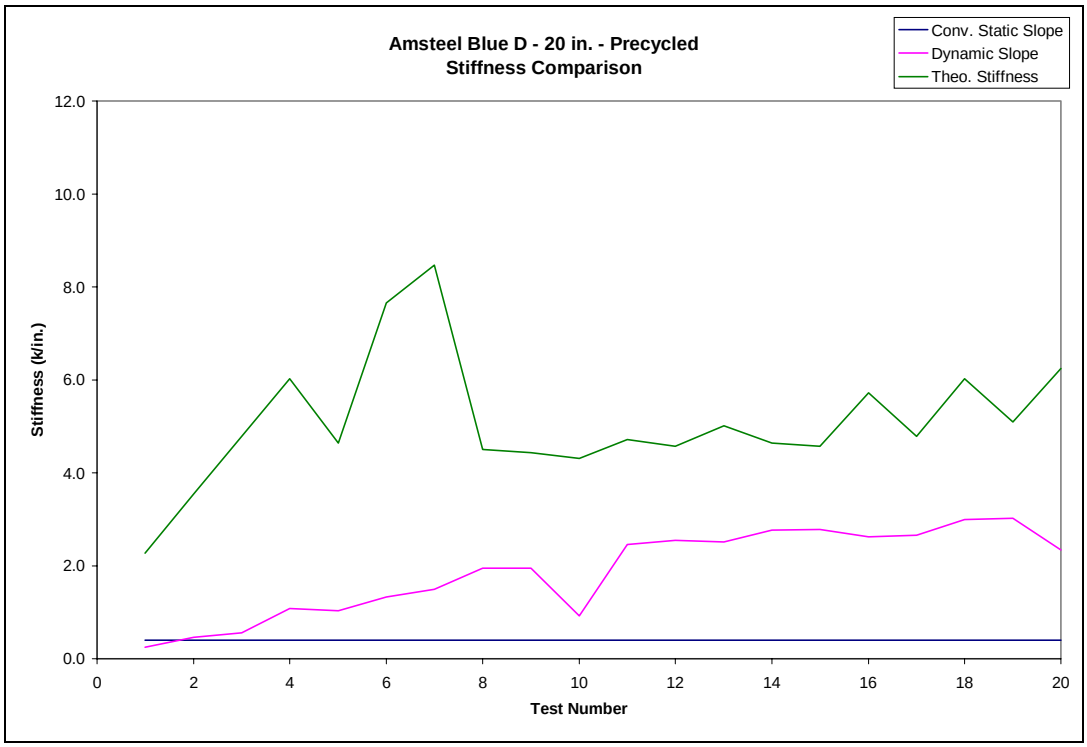


Figure B.21.3: Amsteel Blue D – Stiffness Comparison

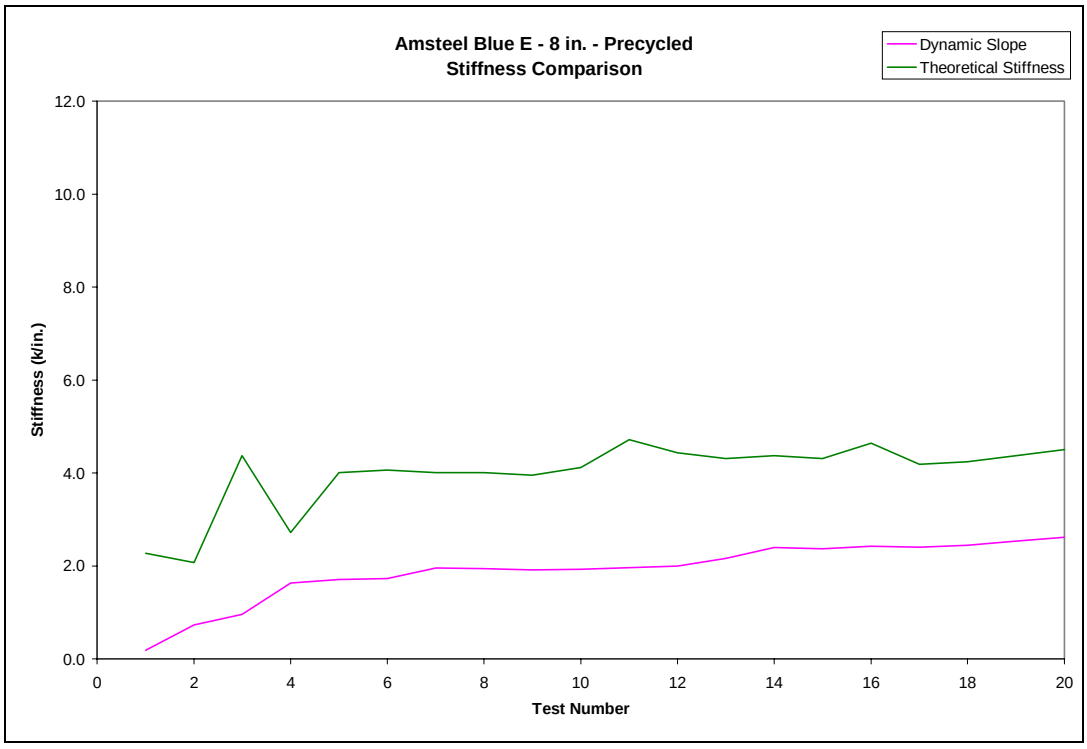


Figure B.21.4: Amsteel Blue E – Stiffness Comparison

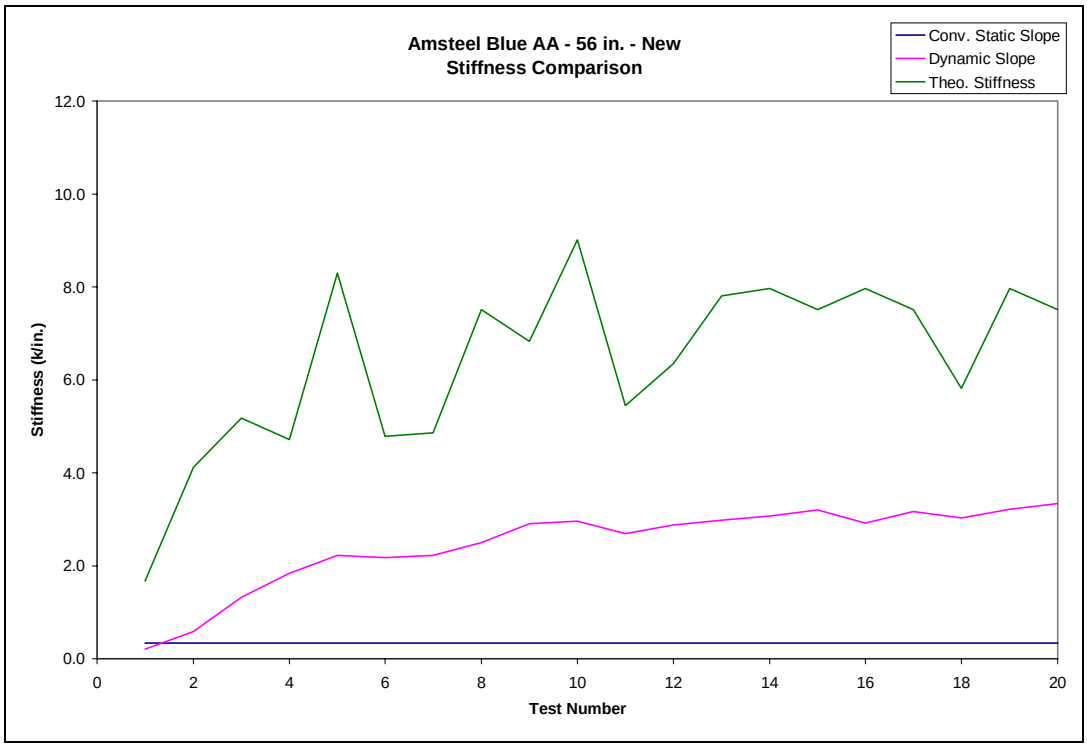


Figure B.21.5: Amsteel Blue AA – Stiffness Comparison

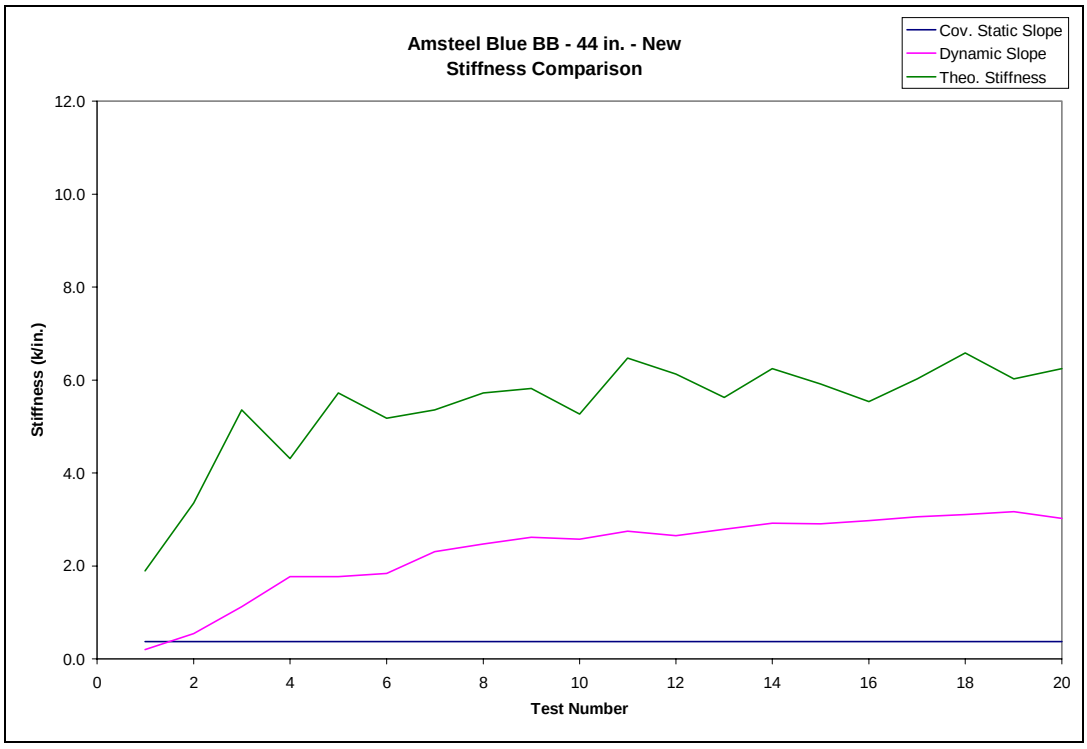


Figure B.21.6: Amsteel Blue BB – Stiffness Comparison

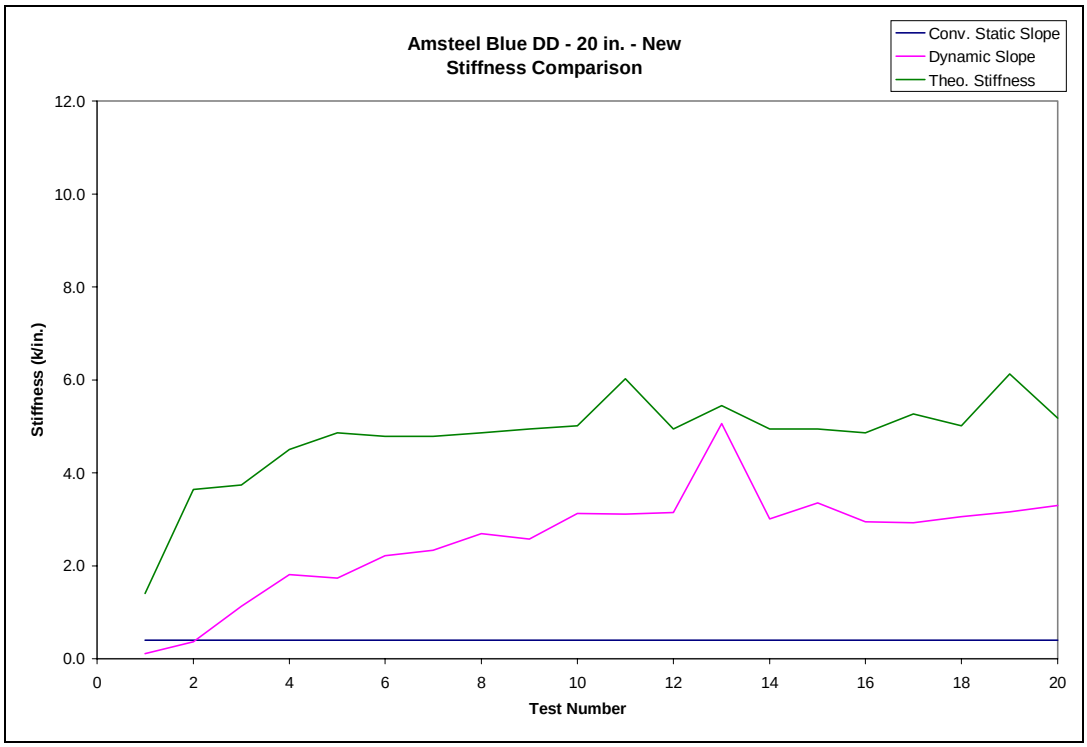


Figure B.21.7: Amsteel Blue DD – Stiffness Comparison

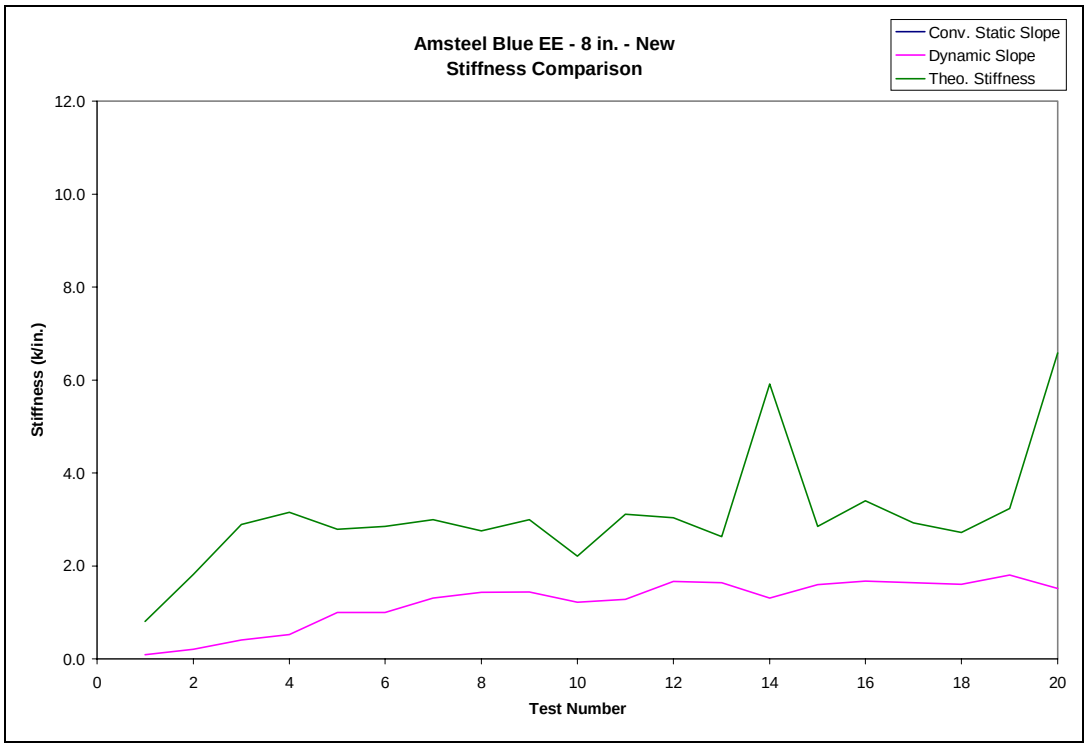


Figure B.21.8: Amsteel Blue EE – Stiffness Comparison

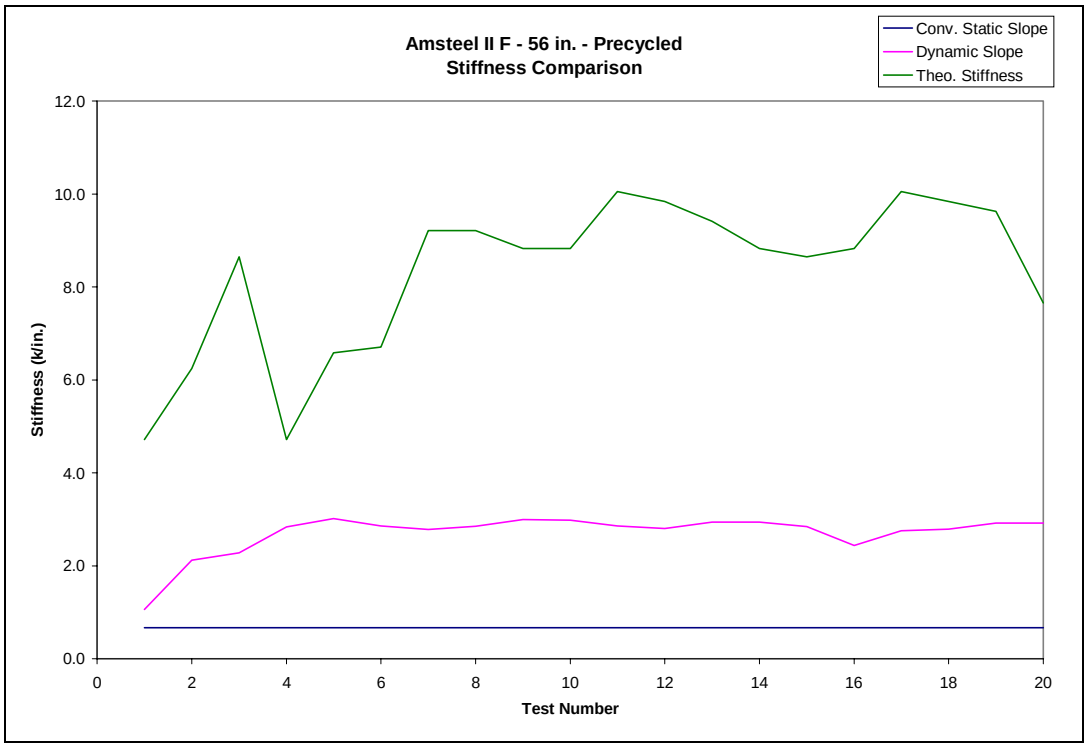


Figure B.21.9: Amsteel II F – Stiffness Comparison

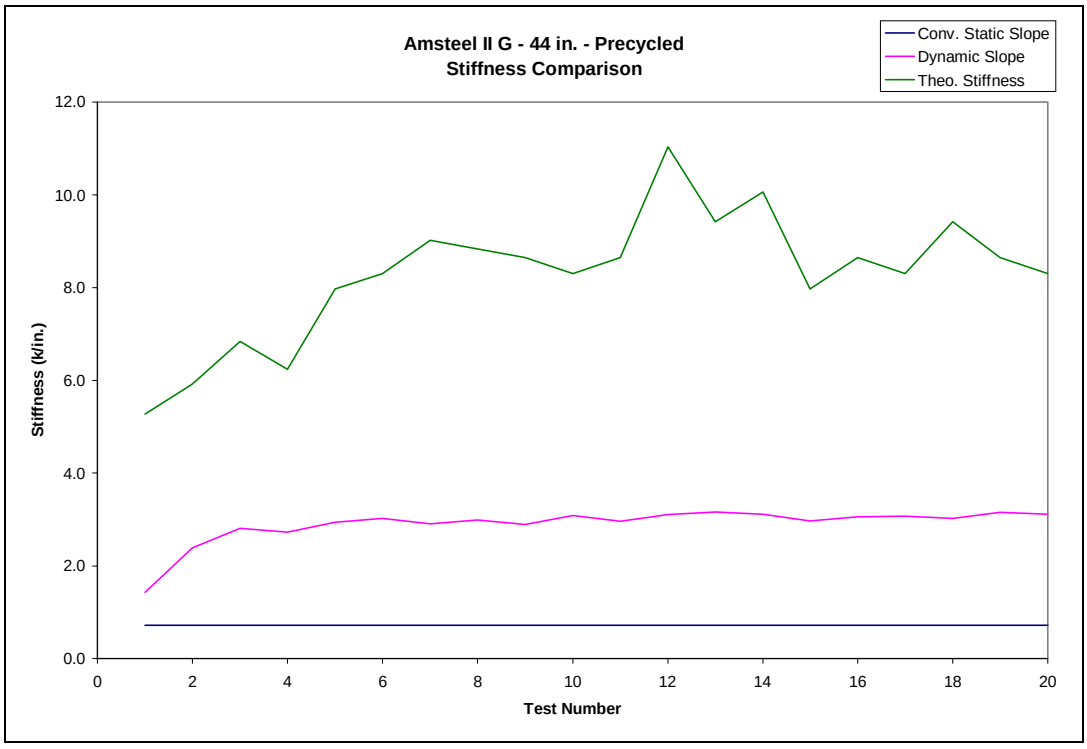


Figure B.21.10: Amsteel II G – Stiffness Comparison

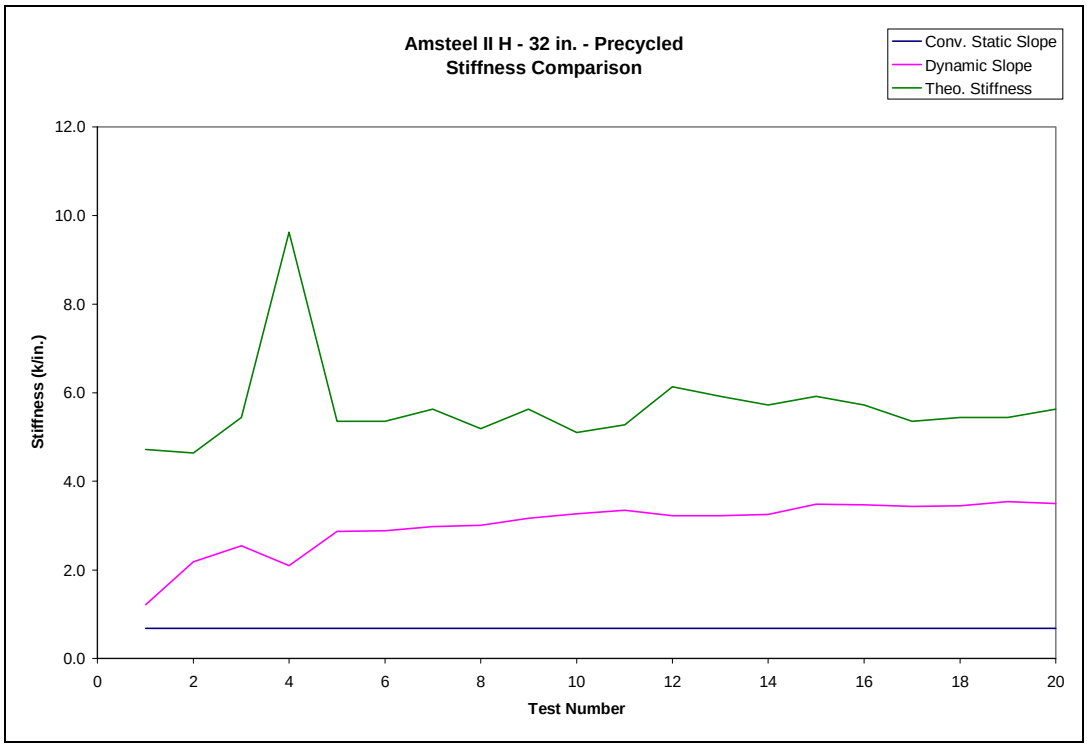


Figure B.21.11: Amsteel II H – Stiffness Comparison

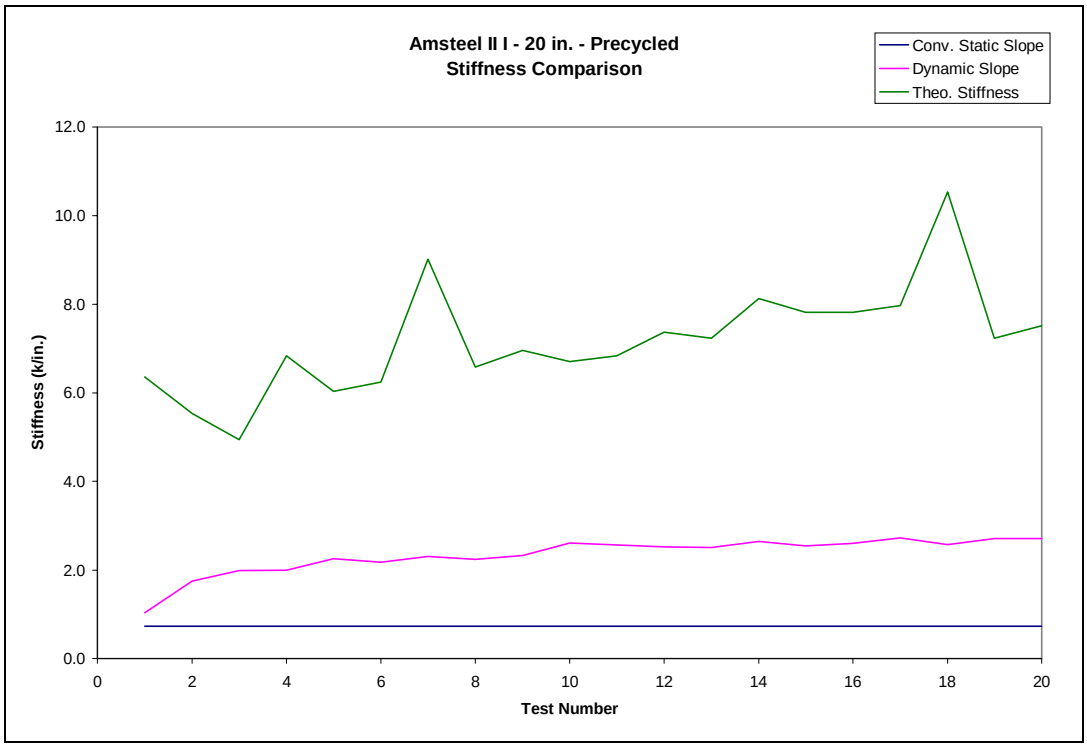


Figure B.21.12: Amsteel II I – Stiffness Comparison

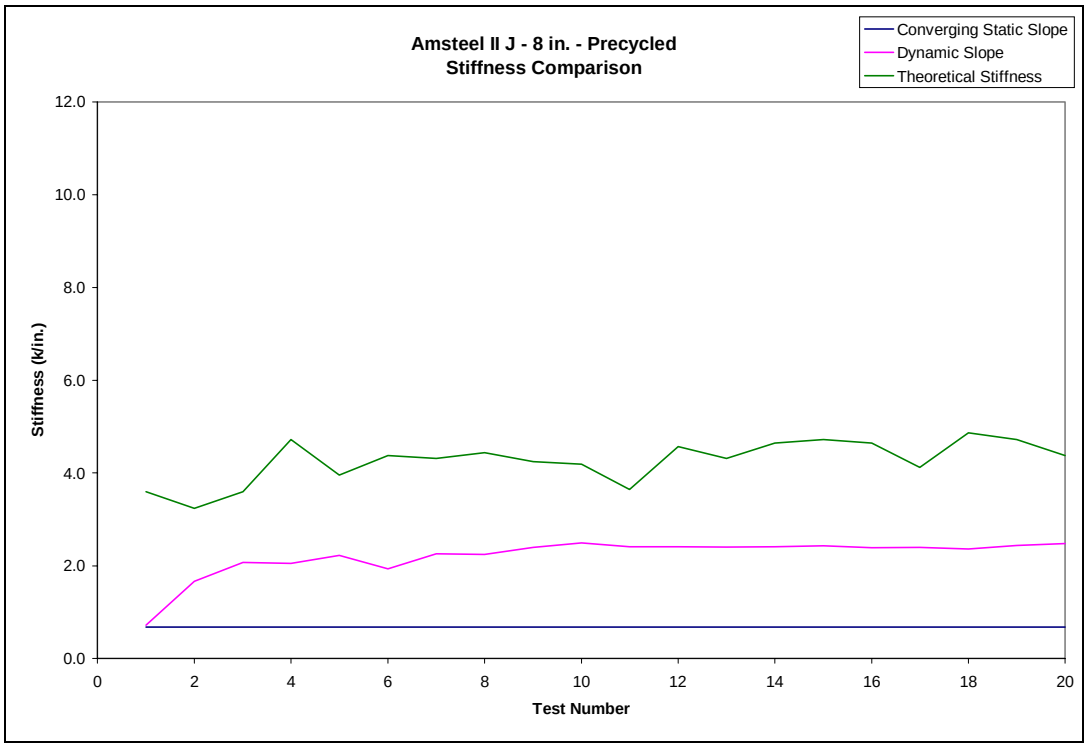


Figure B.21.13: Amsteel II J – Stiffness Comparison

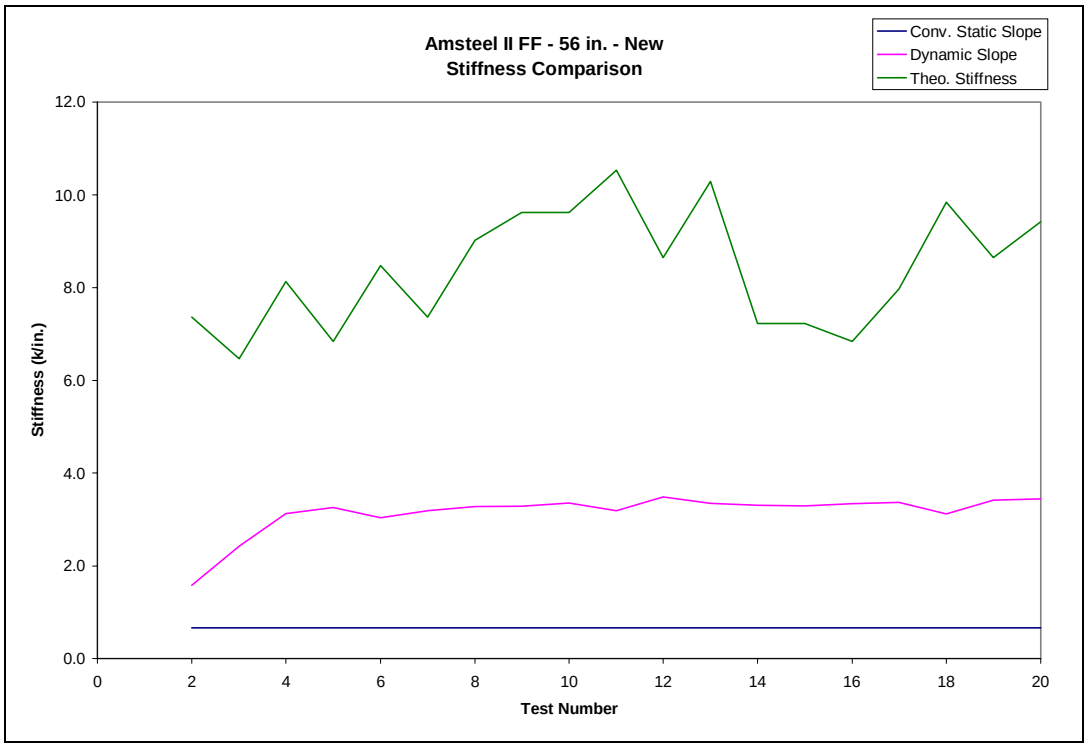


Figure B.21.14: Amsteel II FF – Stiffness Comparison

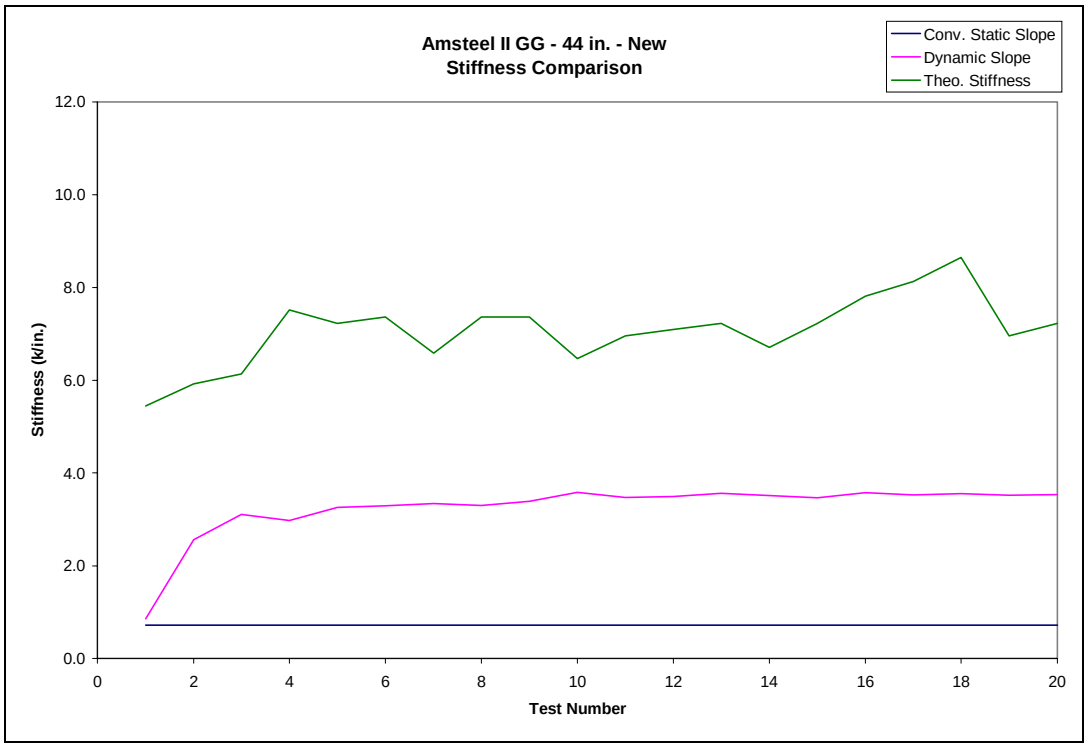


Figure B.21.15: Amsteel II GG – Stiffness Comparison

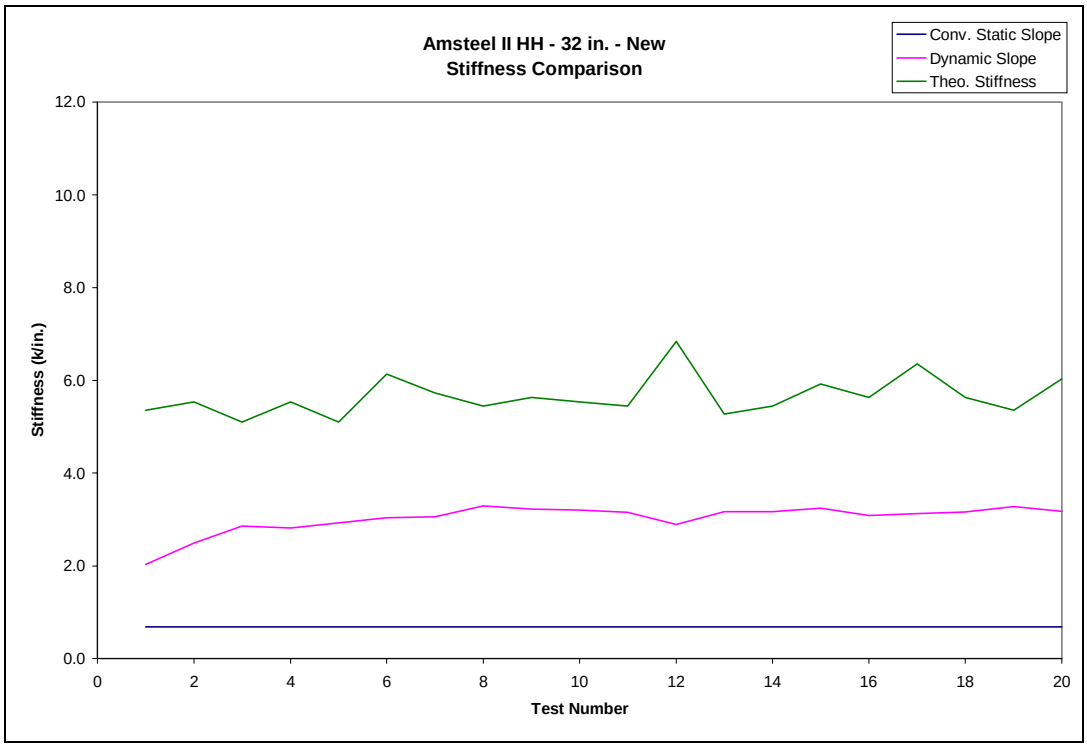


Figure B.21.16: Amsteel II HH – Stiffness Comparison

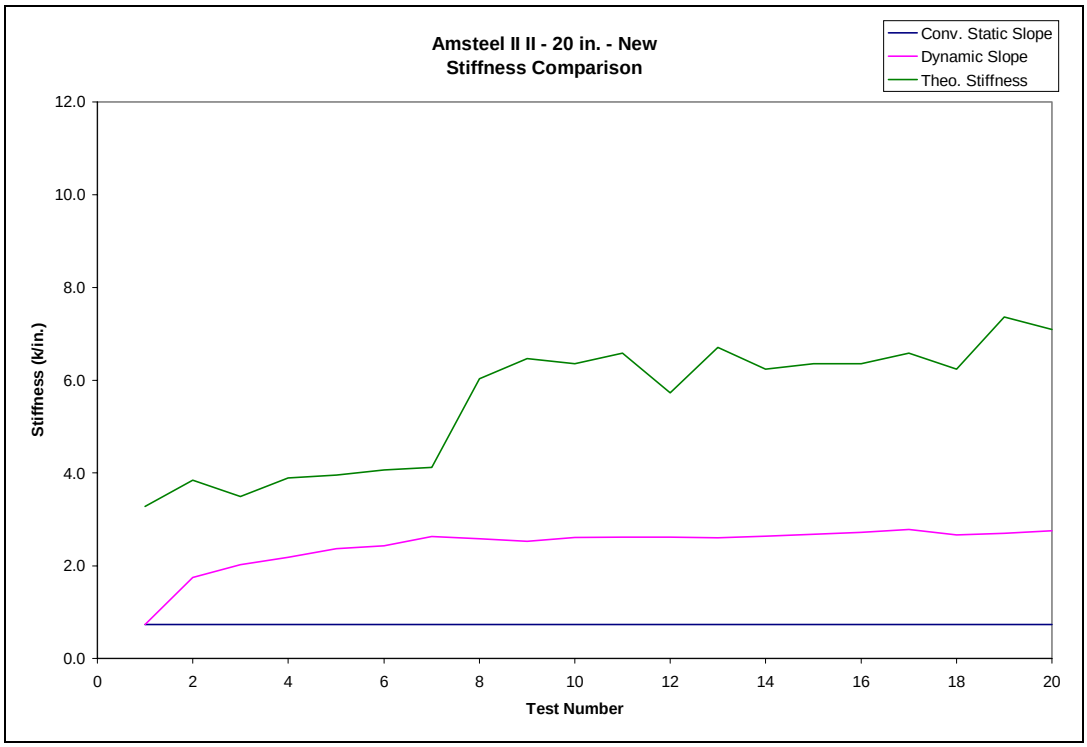


Figure B.21.17: Amsteel II II – Stiffness Comparison

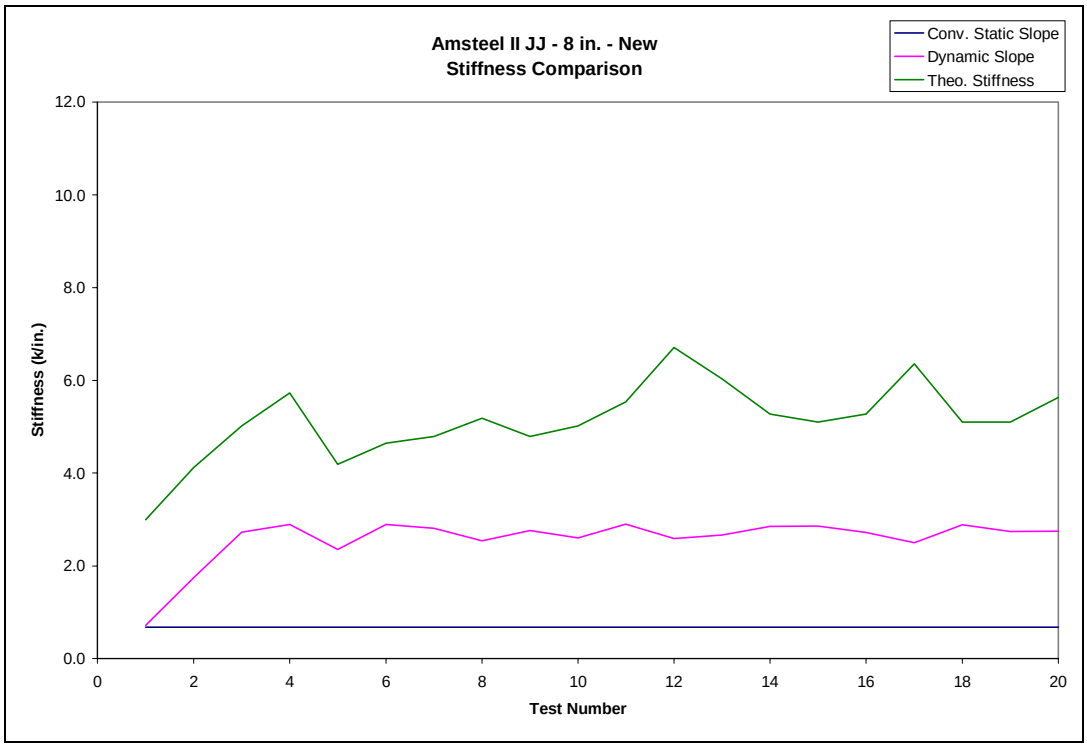


Figure B.21.18: Amsteel II JJ – Stiffness Comparison

## B.22 Recorded and Theoretical Maximum Displacement Comparison

| Recorded vs. Theoretical Maximum Displacement Comparison (in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes (Precycled) | | | | | | | | | |
| | A (56 in.) | | B (44 in.) | | C (32 in.) | | D (20 in.) | | E (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 9.81 | 16.23 | 6.09 | 9.40 | - | - | 6.15 | 8.74 | 4.55 | 7.08 |
| 2 | 8.39 | 10.66 | 6.01 | 6.92 | - | - | 4.88 | 6.85 | 3.65 | 3.89 |
| 3 | 7.93 | 8.15 | 5.17 | 5.15 | - | - | 4.93 | 6.38 | 3.55 | 3.44 |
| 4 | 7.69 | 7.06 | 5.08 | 4.40 | - | - | 4.13 | 4.86 | 3.42 | 2.67 |
| 5 | 7.60 | 6.73 | 4.92 | 4.06 | - | - | 4.23 | 4.92 | 3.45 | 2.64 |
| 6 | 6.80 | 5.97 | 6.18 | 4.02 | - | - | 3.85 | 4.30 | 3.43 | 2.67 |
| 7 | 6.99 | 5.86 | 4.91 | 3.83 | - | - | 3.86 | 4.13 | 3.28 | 2.46 |
| 8 | 6.76 | 5.47 | 3.23 | 2.34 | - | - | 4.38 | 3.57 | 3.45 | 2.56 |
| 9 | 7.57 | 5.24 | 2.15 | 1.39 | - | - | 4.52 | 3.60 | 3.36 | 2.49 |
| 10 | 7.34 | 5.18 | 5.25 | 4.18 | - | - | 4.65 | 5.13 | 3.37 | 2.60 |
| 11 | 7.06 | 5.00 | 4.33 | 3.14 | - | - | 4.17 | 3.09 | 3.27 | 2.54 |
| 12 | 6.85 | 5.07 | 7.01 | 5.31 | - | - | 4.18 | 3.03 | 3.29 | 2.55 |
| 13 | 6.65 | 4.95 | 5.33 | 3.99 | - | - | 4.30 | 3.14 | 3.37 | 2.48 |
| 14 | 6.63 | 4.76 | 7.11 | 4.00 | - | - | 4.11 | 2.87 | 3.22 | 2.27 |
| 15 | 6.74 | 5.28 | 5.64 | 3.80 | - | - | 4.37 | 2.99 | 3.25 | 2.29 |
| 16 | 6.73 | 5.55 | 5.69 | 3.87 | - | - | 4.16 | 3.02 | 3.17 | 2.25 |
| 17 | 6.69 | 5.26 | 6.29 | 3.85 | - | - | 4.29 | 3.09 | 3.49 | 2.35 |
| 18 | 6.81 | 5.12 | 5.77 | 3.85 | - | - | 4.16 | 2.94 | 3.38 | 2.30 |
| 19 | 6.49 | 5.30 | 6.16 | 3.83 | - | - | 4.09 | 2.93 | 3.41 | 2.29 |
| 20 | 6.42 | 4.86 | 5.65 | 3.83 | - | - | 4.05 | 3.25 | 3.12 | 2.20 |

| Drop Test Number | Amsteel Blue Ropes (New) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AA (56 in.) | | BB (44 in.) | | CC (32 in.) | | DD (20 in.) | | EE (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 11.66 | 16.78 | 9.08 | 13.94 | - | - | 7.35 | 11.41 | 5.13 | 6.72 |
| 2 | 7.89 | 10.51 | 6.99 | 8.68 | - | - | 4.70 | 7.12 | 3.60 | 5.80 |
| 3 | 7.03 | 7.17 | 5.38 | 6.21 | - | - | 4.33 | 4.25 | 3.13 | 4.38 |
| 4 | 8.51 | 5.83 | 6.60 | 4.87 | - | - | 3.94 | 3.31 | 3.07 | 3.99 |
| 5 | 5.93 | 5.62 | 5.73 | 5.05 | - | - | 4.04 | 3.50 | 3.23 | 3.08 |
| 6 | 8.70 | 5.51 | 5.99 | 4.79 | - | - | 4.06 | 3.13 | 3.11 | 3.04 |
| 7 | 8.41 | 5.38 | 5.91 | 4.40 | - | - | 3.96 | 3.05 | 3.12 | 2.70 |
| 8 | 6.20 | 5.21 | 6.11 | 4.22 | - | - | 3.50 | 2.71 | 3.22 | 2.65 |
| 9 | 6.60 | 4.82 | 6.12 | 4.13 | - | - | 3.80 | 2.87 | 3.46 | 2.80 |
| 10 | 5.55 | 4.82 | 6.72 | 4.17 | - | - | 3.39 | 2.43 | 4.14 | 3.50 |
| 11 | 7.90 | 5.03 | 5.72 | 3.99 | - | - | 3.59 | 2.60 | 3.33 | 2.87 |
| 12 | 7.25 | 4.85 | 5.97 | 4.14 | - | - | 3.62 | 2.51 | 3.02 | 2.45 |
| 13 | 6.48 | 4.83 | 6.01 | 3.98 | - | - | 2.10 | 1.34 | 3.32 | 2.52 |
| 14 | 6.41 | 4.76 | 6.16 | 4.02 | - | - | 3.85 | 2.73 | 3.13 | 2.93 |
| 15 | 6.30 | 4.60 | 5.81 | 3.97 | - | - | 3.32 | 2.34 | 3.22 | 2.62 |
| 16 | 6.23 | 4.81 | 5.89 | 3.87 | - | - | 3.87 | 2.75 | 3.30 | 2.56 |
| 17 | 6.55 | 4.56 | 5.94 | 3.88 | - | - | 3.92 | 2.85 | 3.11 | 2.57 |
| 18 | 7.70 | 4.67 | 5.70 | 3.77 | - | - | 3.81 | 2.69 | 3.25 | 2.55 |
| 19 | 6.58 | 4.62 | 5.80 | 3.73 | - | - | 3.77 | 2.69 | 3.17 | 2.43 |
| 20 | 6.13 | 4.41 | 5.94 | 3.89 | - | - | 3.70 | 2.59 | 3.09 | 2.75 |

Table B.22.1: Amsteel Blue Ropes - Recorded and Theoretical Max. Displacement Values

| Recorded vs. Theoretical Maximum Displacement Comparison (in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel II Ropes (Precycled) | | | | | | | | | |
| | F (56 in.) | | G (44 in.) | | H (32 in.) | | I (20 in.) | | J (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 7.57 | 7.13 | 5.97 | 5.57 | 5.25 | 5.00 | 3.26 | 4.35 | 2.23 | 2.75 |
| 2 | 6.14 | 5.24 | 5.36 | 4.32 | 5.31 | 3.73 | 3.46 | 3.20 | 2.62 | 1.83 |
| 3 | 5.13 | 5.13 | 5.12 | 3.97 | 4.62 | 3.52 | 3.70 | 3.08 | 2.44 | 1.66 |
| 4 | 7.84 | 4.51 | 5.31 | 4.26 | 3.70 | 3.96 | 3.58 | 3.15 | 2.38 | 1.72 |
| 5 | 6.15 | 4.39 | 4.87 | 3.96 | 4.77 | 3.31 | 3.55 | 2.85 | 2.53 | 1.56 |
| 6 | 5.90 | 4.41 | 4.93 | 4.00 | 4.71 | 3.24 | 3.31 | 2.95 | 2.34 | 1.78 |
| 7 | 5.02 | 4.65 | 5.21 | 4.26 | 4.57 | 3.21 | 3.07 | 2.94 | 2.56 | 1.61 |
| 8 | 5.03 | 4.61 | 5.05 | 3.99 | 4.76 | 3.24 | 3.74 | 2.98 | 2.46 | 1.58 |
| 9 | 4.89 | 4.41 | 5.09 | 4.15 | 4.65 | 3.15 | 3.50 | 2.92 | 2.61 | 1.57 |
| 10 | 5.07 | 4.42 | 5.15 | 3.96 | 4.50 | 3.02 | 3.46 | 2.53 | 2.48 | 1.44 |
| 11 | 4.91 | 4.54 | 4.87 | 3.94 | 4.63 | 2.96 | 3.50 | 2.69 | 2.83 | 1.48 |
| 12 | 5.00 | 4.64 | 4.20 | 3.90 | 4.50 | 3.12 | 3.53 | 2.79 | 2.55 | 1.57 |
| 13 | 5.21 | 4.53 | 4.41 | 3.80 | 4.72 | 3.18 | 3.39 | 2.73 | 2.61 | 1.53 |
| 14 | 5.09 | 4.51 | 4.34 | 3.88 | 4.58 | 3.17 | 3.01 | 2.56 | 2.56 | 1.59 |
| 15 | 5.47 | 4.60 | 5.18 | 4.07 | 4.32 | 2.83 | 3.31 | 2.65 | 2.57 | 1.57 |
| 16 | 5.63 | 4.92 | 5.20 | 3.95 | 4.51 | 2.92 | 3.03 | 2.49 | 2.63 | 1.60 |
| 17 | 4.97 | 4.76 | 4.82 | 3.93 | 4.69 | 3.01 | 3.17 | 2.49 | 2.80 | 1.55 |
| 18 | 4.90 | 4.65 | 5.05 | 4.08 | 4.60 | 3.00 | 2.61 | 2.71 | 2.55 | 1.60 |
| 19 | 4.86 | 4.45 | 4.97 | 3.86 | 4.48 | 2.86 | 3.57 | 2.61 | 2.57 | 1.58 |
| 20 | 5.58 | 4.31 | 5.06 | 3.90 | 4.29 | 2.94 | 3.43 | 2.55 | 2.69 | 1.54 |

| Drop Test Number | Amsteel II Ropes (New) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FF (56 in.) | | GG (44 in.) | | HH (32 in.) | | II (20 in.) | | JJ (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | - | - | 6.06 | 6.99 | 4.50 | 4.02 | 4.58 | 4.63 | 2.85 | 2.69 |
| 2 | 5.64 | 6.01 | 5.90 | 4.09 | 4.39 | 3.50 | 3.62 | 3.23 | 2.26 | 1.81 |
| 3 | 6.27 | 4.89 | 5.57 | 3.72 | 4.72 | 3.18 | 3.75 | 3.05 | 2.26 | 1.50 |
| 4 | 5.55 | 4.32 | 5.10 | 3.90 | 4.52 | 3.31 | 3.53 | 2.91 | 2.18 | 1.38 |
| 5 | 6.22 | 4.13 | 5.05 | 3.68 | 4.85 | 3.24 | 3.51 | 2.82 | 2.50 | 1.55 |
| 6 | 5.39 | 4.36 | 5.34 | 3.74 | 4.54 | 3.18 | 3.45 | 2.81 | 2.36 | 1.38 |
| 7 | 5.81 | 4.33 | 5.60 | 3.63 | 4.55 | 3.20 | 3.32 | 2.61 | 2.47 | 1.44 |
| 8 | 5.04 | 4.28 | 4.81 | 3.59 | 4.64 | 3.06 | 3.34 | 2.68 | 2.34 | 1.51 |
| 9 | 4.97 | 4.27 | 4.66 | 3.48 | 4.57 | 3.11 | 3.42 | 2.78 | 2.47 | 1.46 |
| 10 | 4.66 | 4.16 | 5.59 | 3.42 | 4.56 | 3.10 | 3.34 | 2.68 | 2.37 | 1.48 |
| 11 | 4.18 | 4.34 | 4.95 | 3.49 | 4.90 | 3.22 | 3.48 | 2.74 | 2.38 | 1.44 |
| 12 | 5.13 | 4.09 | 4.83 | 3.46 | 4.26 | 3.29 | 3.43 | 2.72 | 2.03 | 1.56 |
| 13 | 4.44 | 4.21 | 4.92 | 3.42 | 4.78 | 3.12 | 3.39 | 2.79 | 2.22 | 1.51 |
| 14 | 5.98 | 4.24 | 5.27 | 3.47 | 4.59 | 3.13 | 3.37 | 2.73 | 2.41 | 1.39 |
| 15 | 5.90 | 4.22 | 4.84 | 3.58 | 4.70 | 3.09 | 3.41 | 2.69 | 2.53 | 1.44 |
| 16 | 5.82 | 4.17 | 4.63 | 3.50 | 4.70 | 3.24 | 3.42 | 2.62 | 2.51 | 1.51 |
| 17 | 5.30 | 4.02 | 4.77 | 3.59 | 4.48 | 3.17 | 3.36 | 2.62 | 2.19 | 1.59 |
| 18 | 4.64 | 4.41 | 4.40 | 3.63 | 4.72 | 3.16 | 3.44 | 2.69 | 2.46 | 1.40 |
| 19 | 5.18 | 4.07 | 5.12 | 3.40 | 4.63 | 3.09 | 3.10 | 2.71 | 2.53 | 1.48 |
| 20 | 4.59 | 4.06 | 5.21 | 3.50 | 4.61 | 3.21 | 3.69 | 2.61 | 2.40 | 1.52 |

Table B.22.2: Amsteel II Ropes - Recorded and Theoretical Max. Displacement Values

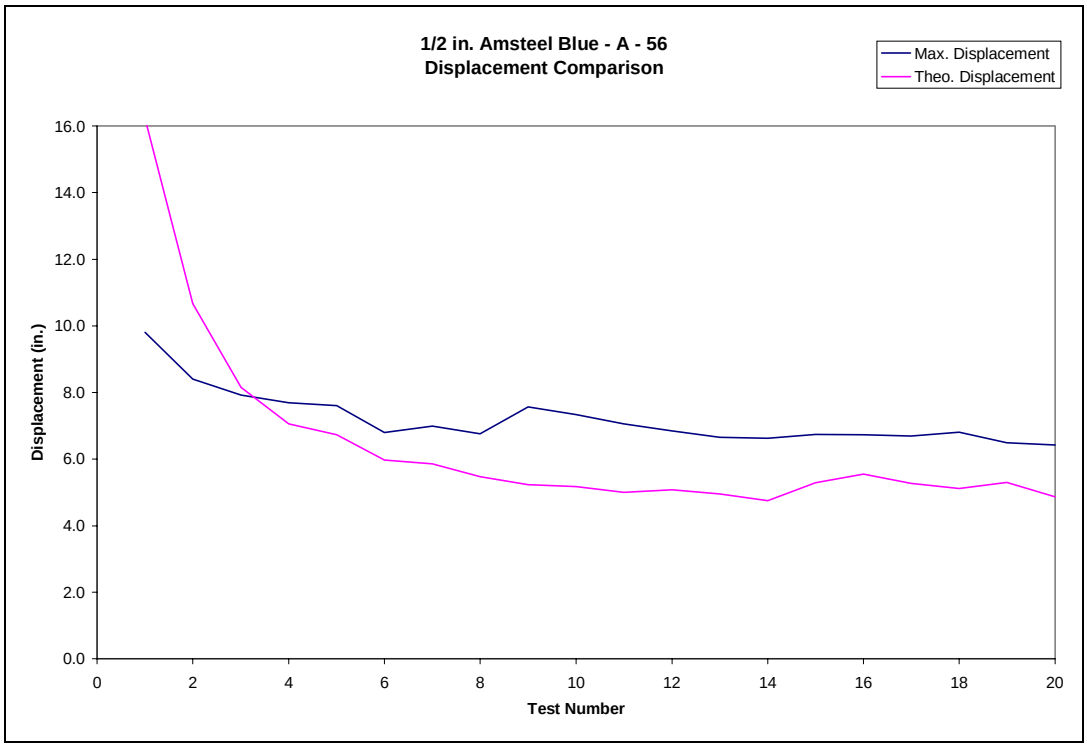


Figure B.22.1: Amsteel Blue A – Displacement Comparison

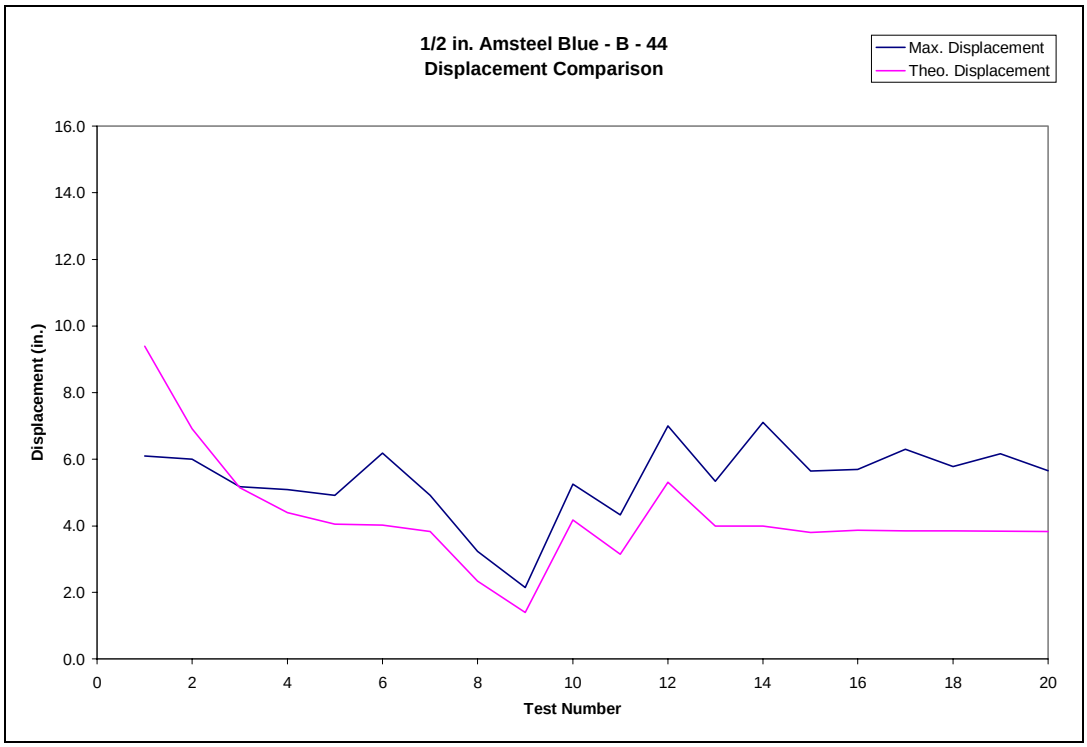


Figure B.22.2: Amsteel Blue B – Displacement Comparison

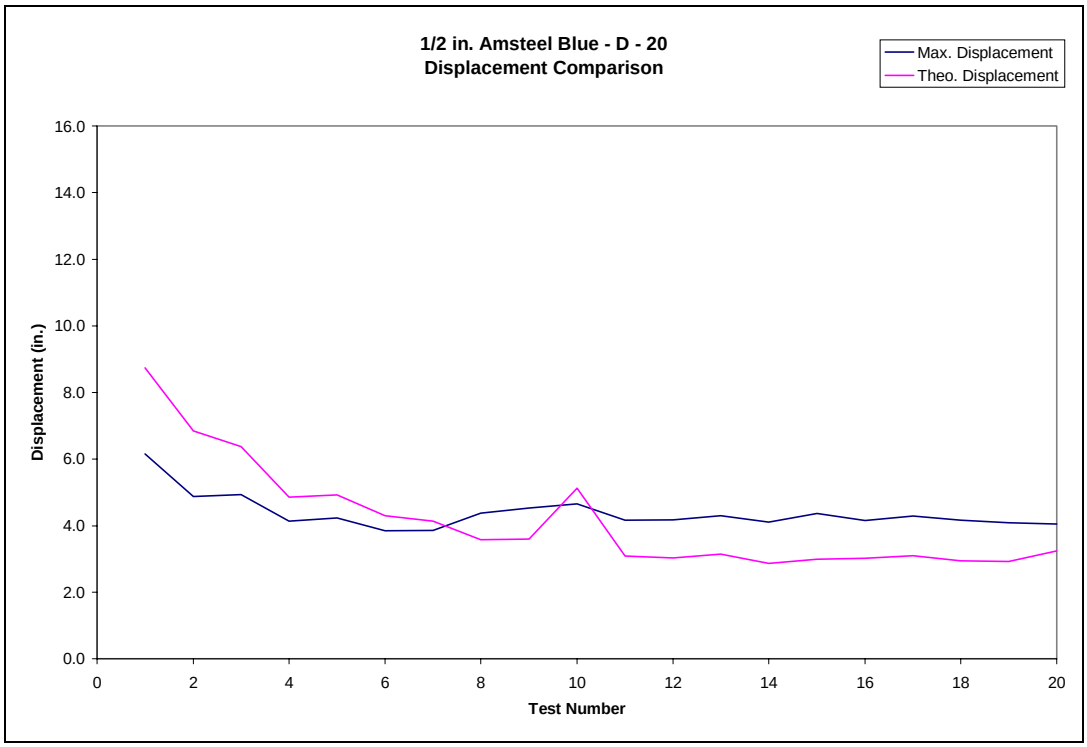


Figure B.22.3: Amsteel Blue D – Displacement Comparison

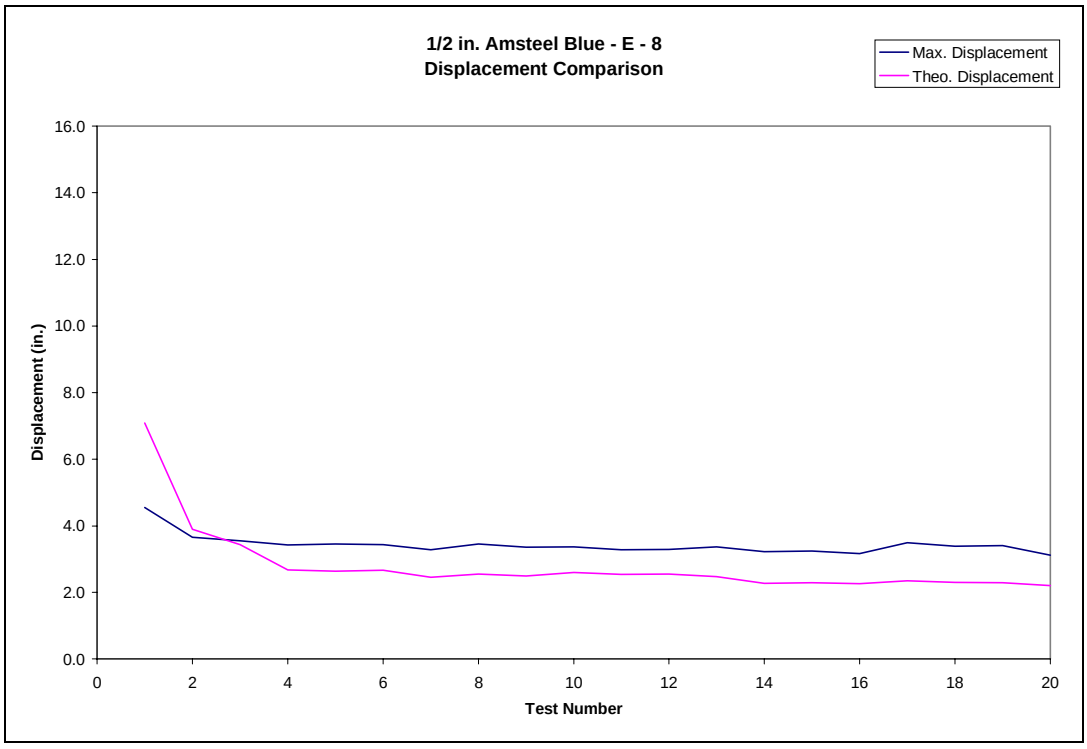


Figure B.22.4: Amsteel Blue E – Displacement Comparison

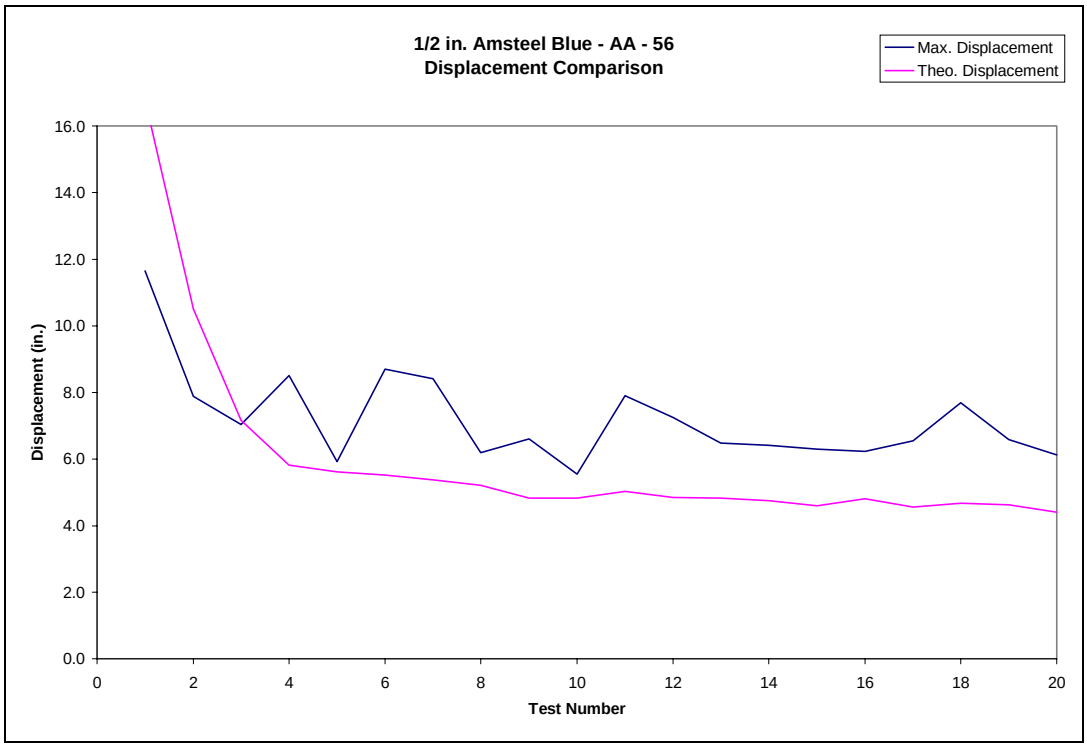


Figure B.22.5: Amsteel Blue AA – Displacement Comparison

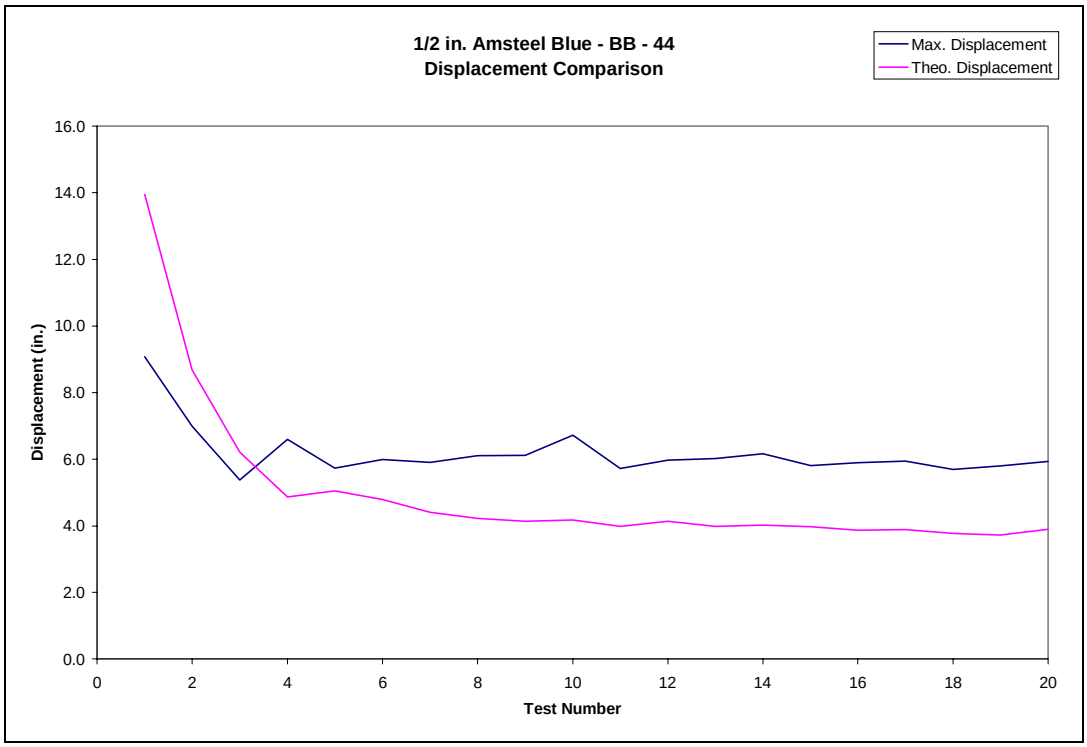


Figure B.22.6: Amsteel Blue BB – Displacement Comparison

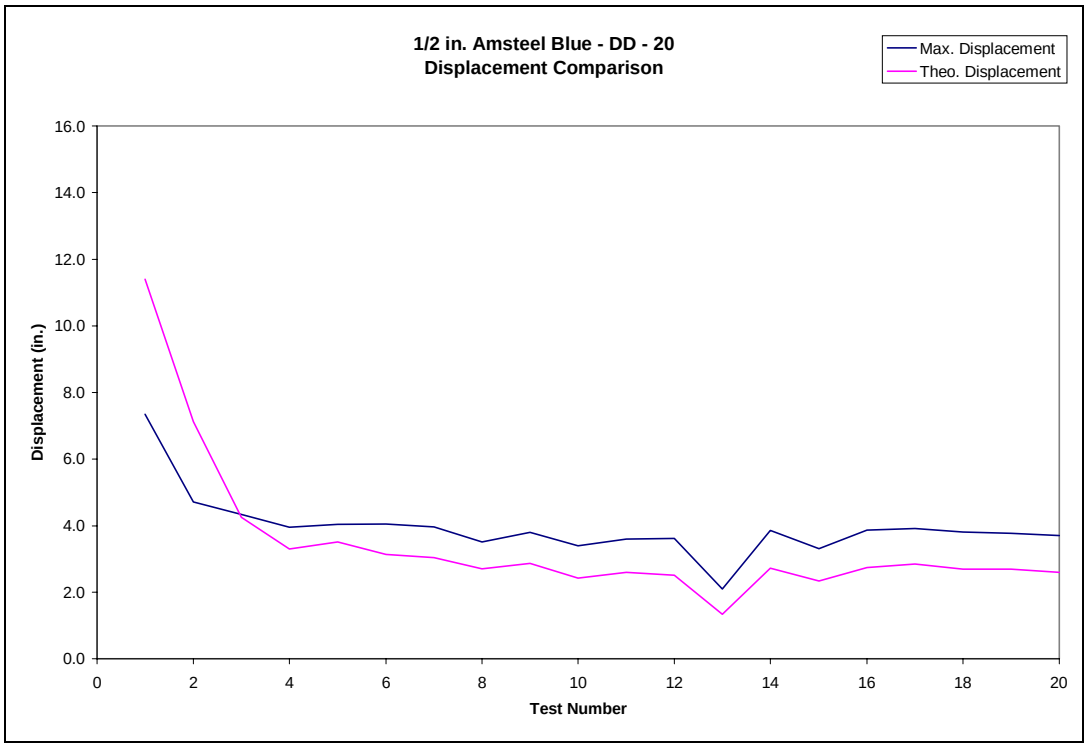


Figure B.22.7: Amsteel Blue DD – Displacement Comparison

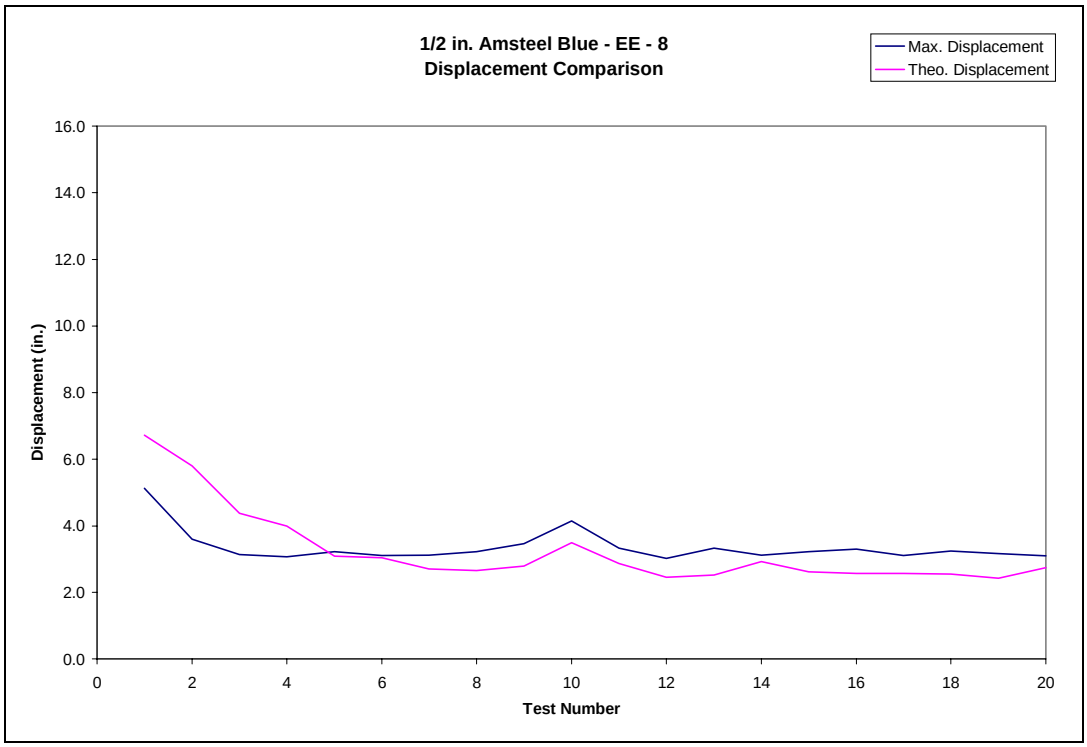


Figure B.22.8: Amsteel Blue EE – Displacement Comparison

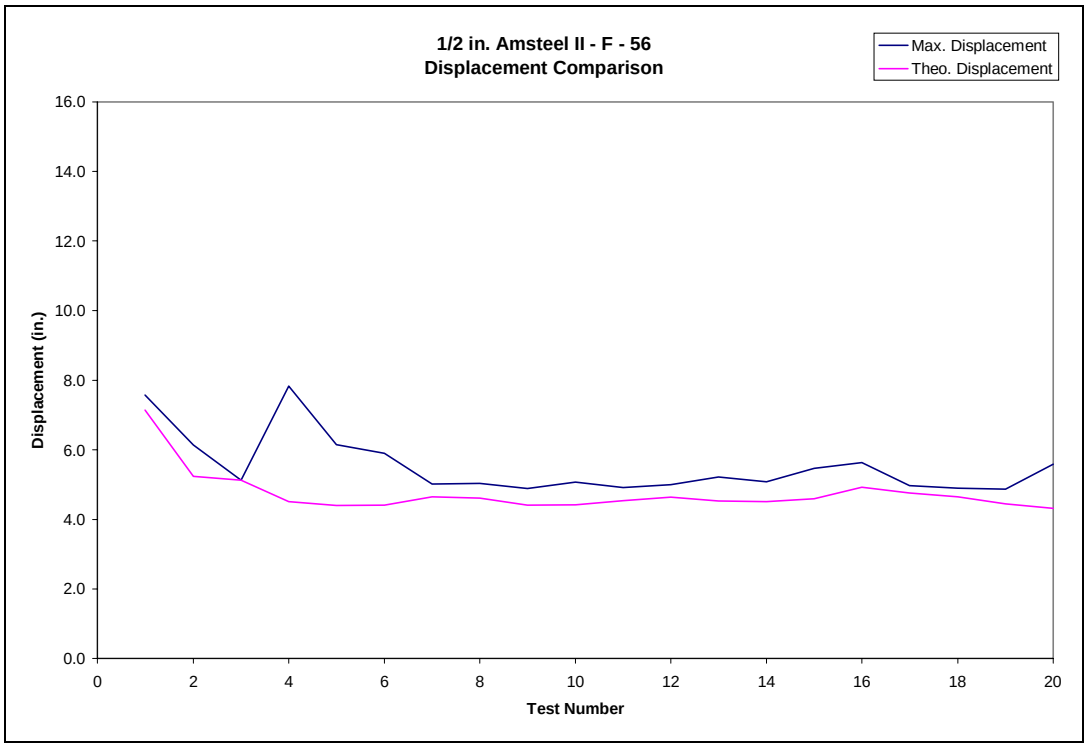


Figure B.22.9: Amsteel II F – Displacement Comparison

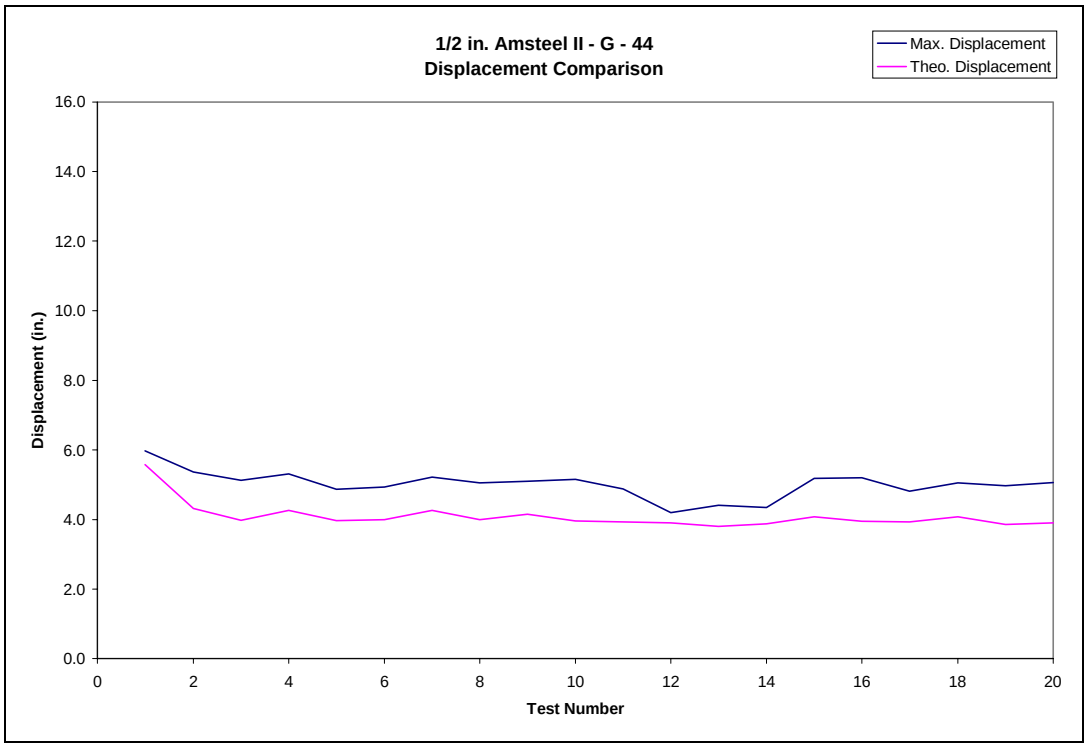


Figure B.22.10: Amsteel II G – Displacement Comparison

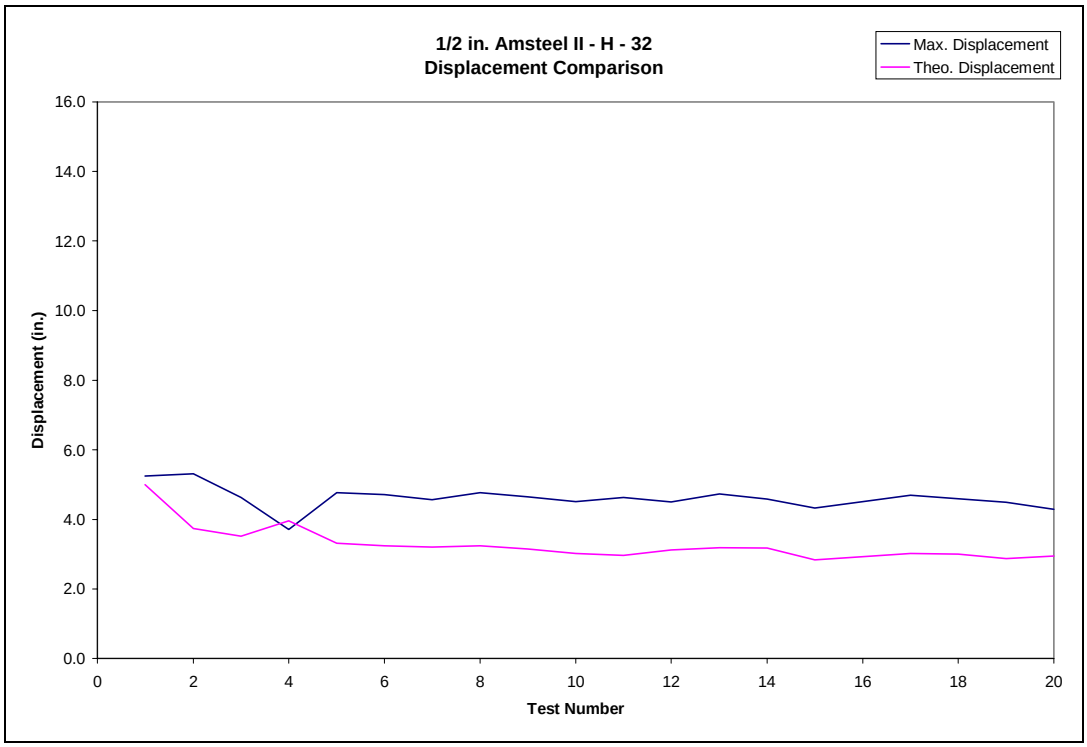


Figure B.22.11: Amsteel II H – Displacement Comparison

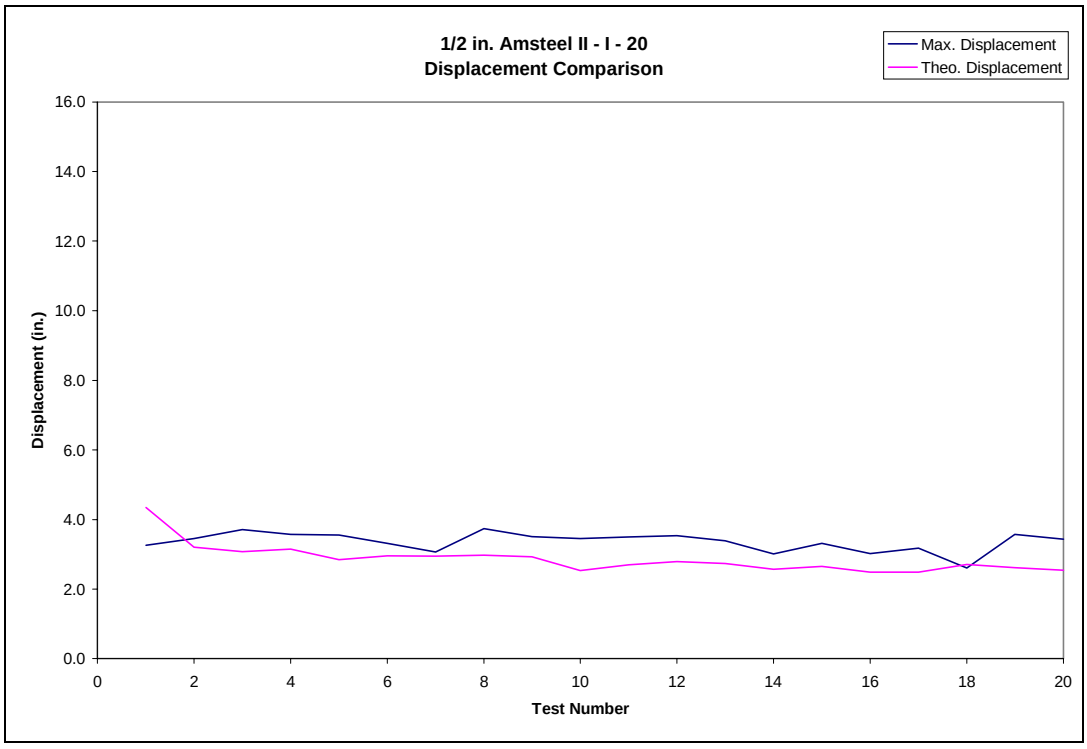


Figure B.22.12: Amsteel II I – Displacement Comparison

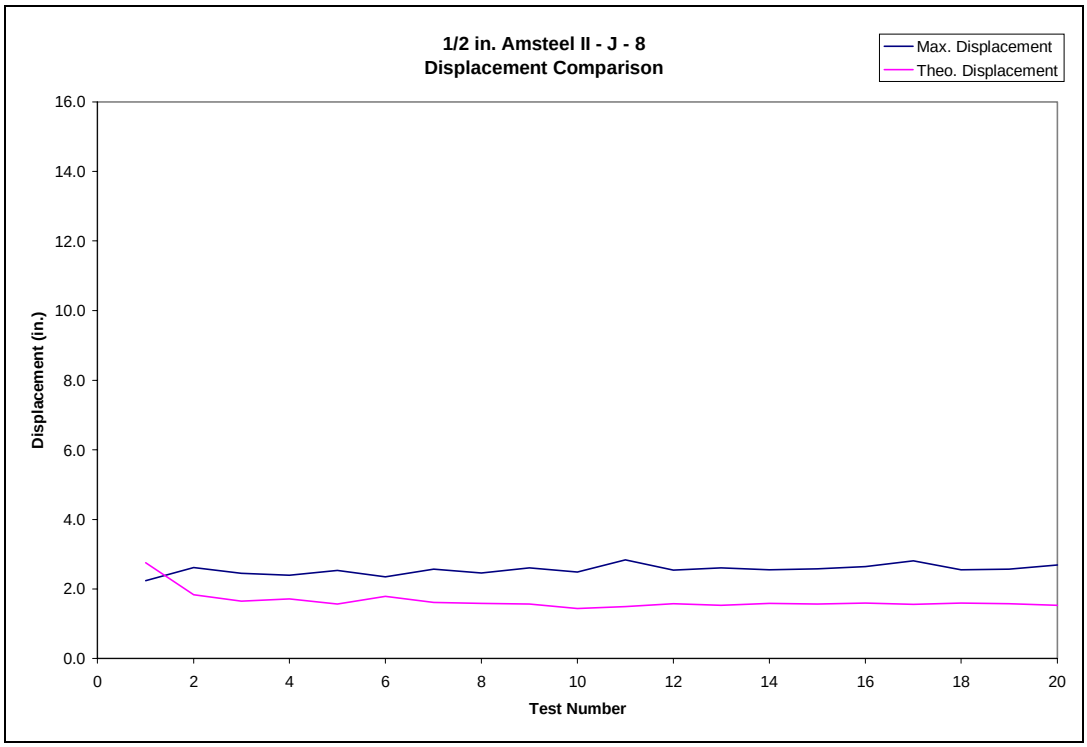


Figure B.22.13: Amsteel II J – Displacement Comparison

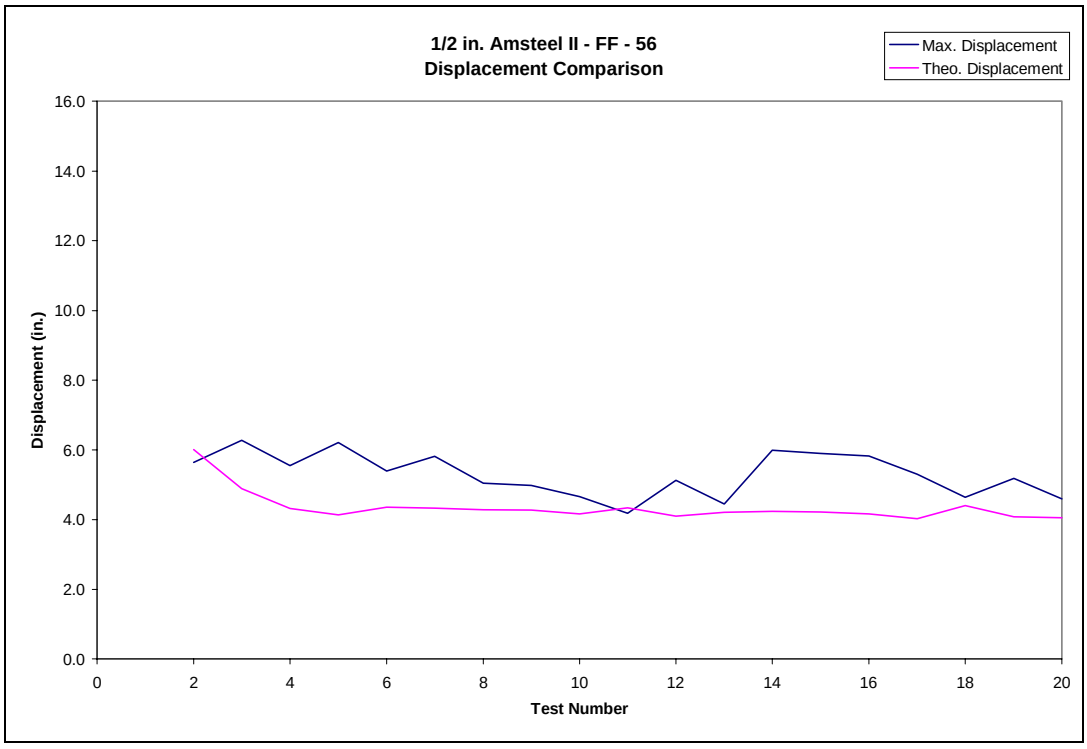


Figure B.22.14: Amsteel II FF – Displacement Comparison

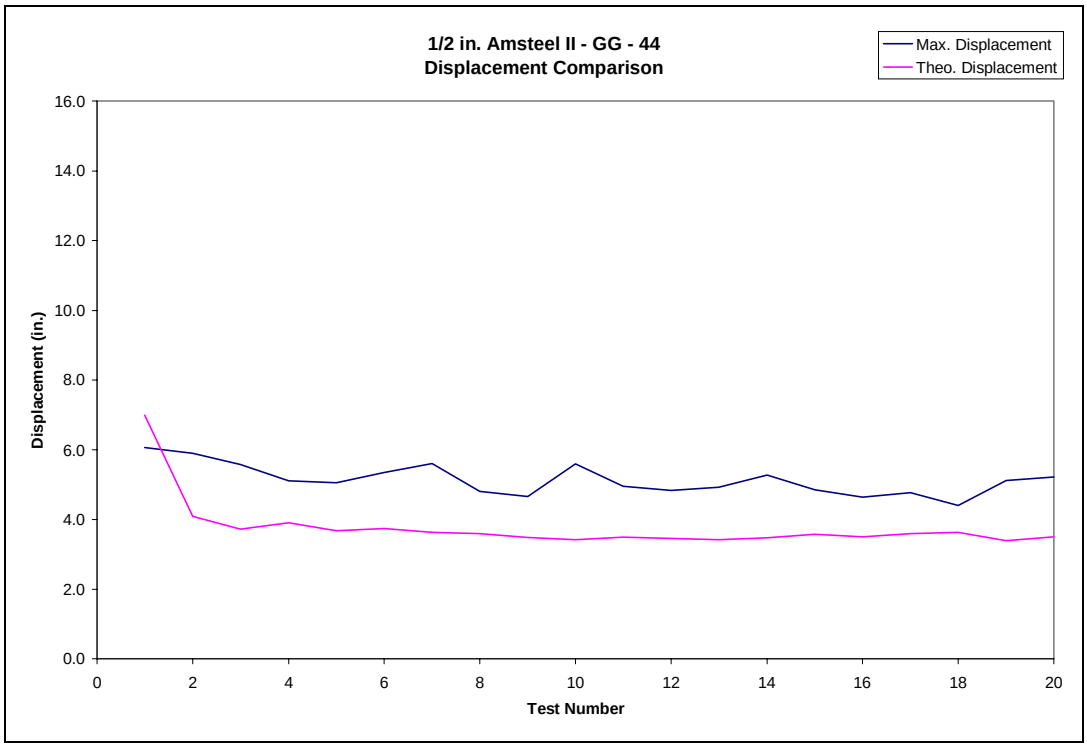


Figure B.22.15: Amsteel II GG – Displacement Comparison

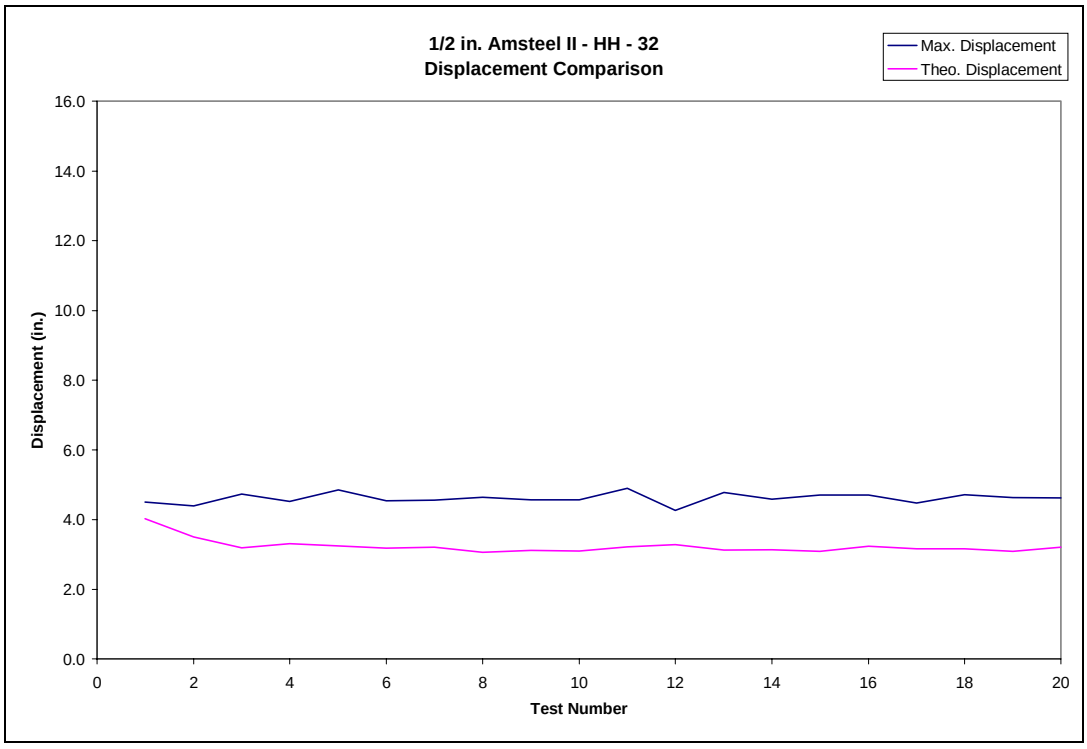


Figure B.22.16: Amsteel II HH – Displacement Comparison

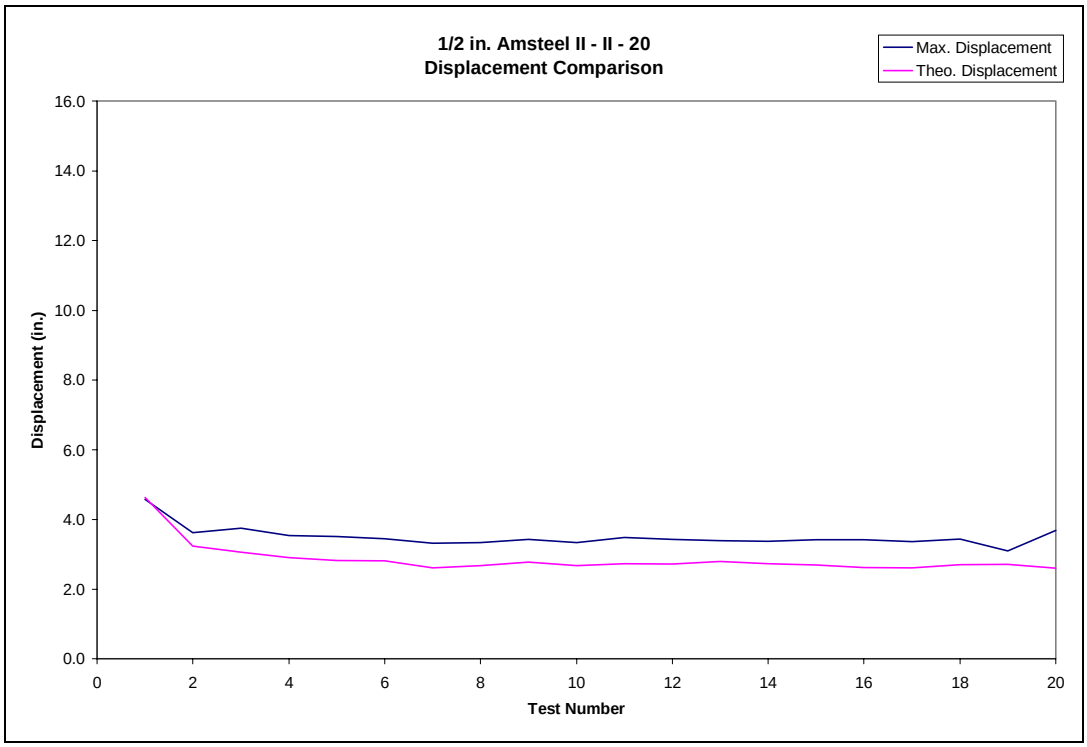


Figure B.22.17: Amsteel II II – Displacement Comparison

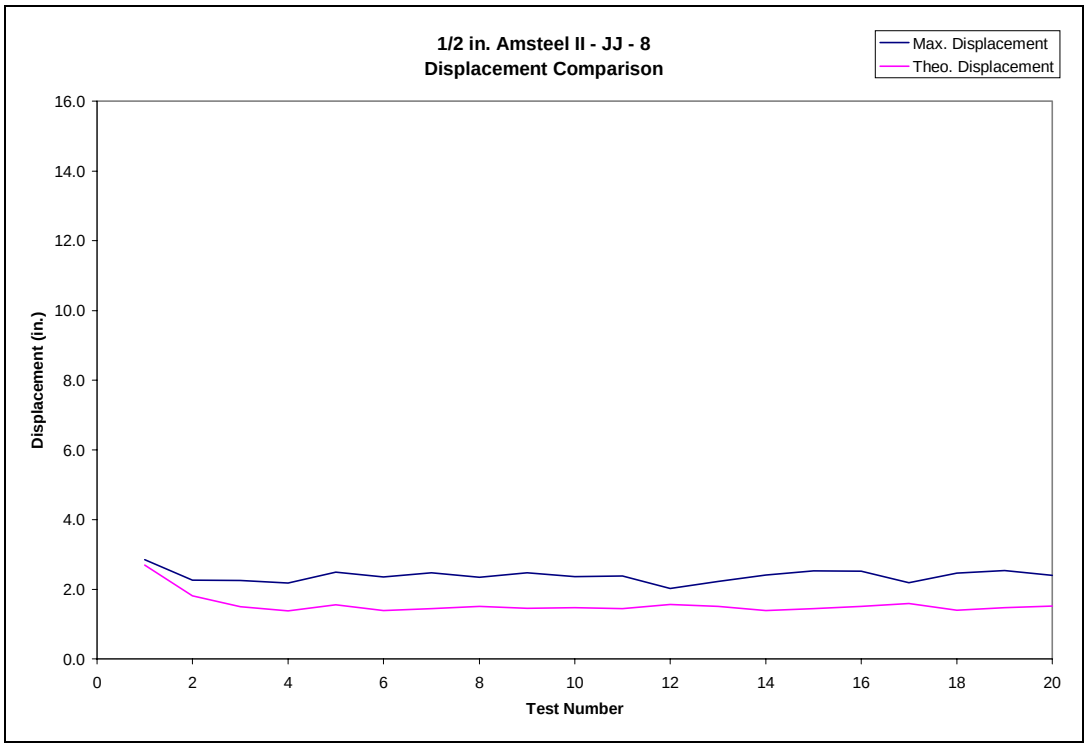


Figure B.22.18: Amsteel II JJ – Displacement Comparison

## B.23 Recorded and Theoretical Impact Velocity Comparison

| Recorded vs. Theoretical Impact Velocity Comparison (ft/sec) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel Blue Ropes (Precycled) | | | | | | | | | |
| | A (56 in.) | | B (44 in.) | | C (32 in.) | | D (20 in.) | | E (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 14.65 | 17.34 | 10.44 | 15.45 | - | - | 8.17 | 10.49 | 5.73 | 7.51 |
| 2 | 14.44 | 17.34 | 11.55 | 15.45 | - | - | 8.64 | 10.49 | 6.16 | 7.51 |
| 3 | 14.69 | 17.34 | 11.33 | 15.45 | - | - | 8.89 | 10.49 | 6.25 | 7.51 |
| 4 | 15.01 | 17.34 | 11.17 | 15.45 | - | - | 9.36 | 10.49 | 6.34 | 7.51 |
| 5 | 14.97 | 17.34 | 11.40 | 15.45 | - | - | 9.28 | 10.49 | 6.40 | 7.51 |
| 6 | 15.02 | 17.34 | 11.47 | 15.45 | - | - | 9.20 | 10.49 | 6.52 | 7.51 |
| 7 | 15.15 | 17.34 | 11.20 | 15.45 | - | - | 9.38 | 10.49 | 6.37 | 7.51 |
| 8 | 15.29 | 17.34 | 8.39 | 15.45 | - | - | 9.26 | 10.49 | 6.61 | 7.51 |
| 9 | 15.26 | 17.34 | 6.14 | 15.45 | - | - | 9.33 | 10.49 | 6.40 | 7.51 |
| 10 | 15.38 | 17.34 | 12.47 | 15.45 | - | - | 9.14 | 10.49 | 6.69 | 7.51 |
| 11 | 15.08 | 17.34 | 10.52 | 15.45 | - | - | 8.99 | 10.49 | 6.60 | 7.51 |
| 12 | 15.49 | 17.34 | 14.82 | 15.45 | - | - | 8.98 | 10.49 | 6.68 | 7.51 |
| 13 | 15.40 | 17.34 | 12.42 | 15.45 | - | - | 9.24 | 10.49 | 6.76 | 7.51 |
| 14 | 15.11 | 17.34 | 12.34 | 15.45 | - | - | 8.85 | 10.49 | 6.52 | 7.51 |
| 15 | 15.24 | 17.34 | 12.12 | 15.45 | - | - | 9.25 | 10.49 | 6.55 | 7.51 |
| 16 | 15.74 | 17.34 | 12.42 | 15.45 | - | - | 9.07 | 10.49 | 6.51 | 7.51 |
| 17 | 15.49 | 17.34 | 12.46 | 15.45 | - | - | 9.36 | 10.49 | 6.76 | 7.51 |
| 18 | 15.67 | 17.34 | 12.46 | 15.45 | - | - | 9.43 | 10.49 | 6.68 | 7.51 |
| 19 | 15.37 | 17.34 | 12.41 | 15.45 | - | - | 9.44 | 10.49 | 6.78 | 7.51 |
| 20 | 15.40 | 17.34 | 12.57 | 15.45 | - | - | 9.23 | 10.49 | 6.61 | 7.51 |

| Drop Test Number | Amsteel Blue Ropes (New) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AA (56 in.) | | BB (44 in.) | | CC (32 in.) | | DD (20 in.) | | EE (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 14.33 | 16.79 | 11.62 | 14.83 | - | - | 7.17 | 9.41 | 3.78 | 5.18 |
| 2 | 14.91 | 16.79 | 11.88 | 14.83 | - | - | 7.98 | 9.41 | 4.99 | 5.18 |
| 3 | 15.31 | 16.79 | 12.19 | 14.83 | - | - | 8.38 | 9.41 | 5.17 | 5.18 |
| 4 | 14.64 | 16.79 | 12.02 | 14.83 | - | - | 8.26 | 9.41 | 5.38 | 5.18 |
| 5 | 15.56 | 16.79 | 12.48 | 14.83 | - | - | 8.56 | 9.41 | 5.70 | 5.18 |
| 6 | 15.07 | 16.79 | 12.05 | 14.83 | - | - | 8.64 | 9.41 | 5.64 | 5.18 |
| 7 | 14.90 | 16.79 | 12.41 | 14.83 | - | - | 8.63 | 9.41 | 5.74 | 5.18 |
| 8 | 15.29 | 16.79 | 12.32 | 14.83 | - | - | 8.23 | 9.41 | 5.89 | 5.18 |
| 9 | 15.27 | 16.79 | 12.40 | 14.83 | - | - | 8.56 | 9.41 | 6.21 | 5.18 |
| 10 | 15.39 | 16.79 | 12.44 | 14.83 | - | - | 7.97 | 9.41 | 7.15 | 5.18 |
| 11 | 15.30 | 16.79 | 12.26 | 14.83 | - | - | 8.51 | 9.41 | 6.03 | 5.18 |
| 12 | 15.25 | 16.79 | 12.49 | 14.83 | - | - | 8.25 | 9.41 | 5.88 | 5.18 |
| 13 | 15.47 | 16.79 | 12.31 | 14.83 | - | - | 5.59 | 9.41 | 5.99 | 5.18 |
| 14 | 15.48 | 16.79 | 12.74 | 14.83 | - | - | 8.77 | 9.41 | 6.22 | 5.18 |
| 15 | 15.26 | 16.79 | 12.55 | 14.83 | - | - | 7.94 | 9.41 | 6.16 | 5.18 |
| 16 | 15.25 | 16.79 | 12.38 | 14.83 | - | - | 8.75 | 9.41 | 6.15 | 5.18 |
| 17 | 15.06 | 16.79 | 12.57 | 14.83 | - | - | 9.05 | 9.41 | 6.11 | 5.18 |
| 18 | 15.09 | 16.79 | 12.32 | 14.83 | - | - | 8.73 | 9.41 | 6.01 | 5.18 |
| 19 | 15.40 | 16.79 | 12.31 | 14.83 | - | - | 8.88 | 9.41 | 6.06 | 5.18 |
| 20 | 14.94 | 16.79 | 12.56 | 14.83 | - | - | 8.74 | 9.41 | 6.28 | 5.18 |

Table B.23.1: Amsteel Blue Ropes – Impact Velocity Comparisons

| Recorded vs. Theoretical Impact Velocity Comparison (ft/sec) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Amsteel II Ropes (Precycled) | | | | | | | | | |
| | F (56 in.) | | G (44 in.) | | H (32 in.) | | I (20 in.) | | J (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | 13.63 | 17.18 | 12.33 | 15.19 | 10.20 | 12.69 | 8.19 | 9.96 | 4.33 | 5.91 |
| 2 | 14.17 | 17.18 | 12.37 | 15.19 | 10.22 | 12.69 | 7.86 | 9.96 | 4.38 | 5.91 |
| 3 | 14.36 | 17.18 | 12.34 | 15.19 | 10.39 | 12.69 | 8.03 | 9.96 | 4.41 | 5.91 |
| 4 | 14.08 | 17.18 | 13.05 | 15.19 | 10.62 | 12.69 | 8.25 | 9.96 | 4.56 | 5.91 |
| 5 | 14.15 | 17.18 | 12.59 | 15.19 | 10.41 | 12.69 | 7.93 | 9.96 | 4.32 | 5.91 |
| 6 | 13.83 | 17.18 | 12.88 | 15.19 | 10.20 | 12.69 | 8.07 | 9.96 | 4.58 | 5.91 |
| 7 | 14.38 | 17.18 | 13.46 | 15.19 | 10.26 | 12.69 | 8.27 | 9.96 | 4.48 | 5.91 |
| 8 | 14.44 | 17.18 | 12.80 | 15.19 | 10.41 | 12.69 | 8.28 | 9.96 | 4.40 | 5.91 |
| 9 | 14.17 | 17.18 | 13.08 | 15.19 | 10.39 | 12.69 | 8.28 | 9.96 | 4.51 | 5.91 |
| 10 | 14.15 | 17.18 | 12.90 | 15.19 | 10.11 | 12.69 | 7.57 | 9.96 | 4.21 | 5.91 |
| 11 | 14.25 | 17.18 | 12.56 | 15.19 | 10.04 | 12.69 | 8.00 | 9.96 | 4.28 | 5.91 |
| 12 | 14.40 | 17.18 | 12.73 | 15.19 | 10.38 | 12.69 | 8.22 | 9.96 | 4.53 | 5.91 |
| 13 | 14.42 | 17.18 | 12.54 | 15.19 | 10.61 | 12.69 | 8.03 | 9.96 | 4.41 | 5.91 |
| 14 | 14.34 | 17.18 | 12.70 | 15.19 | 10.61 | 12.69 | 7.71 | 9.96 | 4.57 | 5.91 |
| 15 | 14.39 | 17.18 | 12.99 | 15.19 | 9.81 | 12.69 | 7.84 | 9.96 | 4.52 | 5.91 |
| 16 | 14.26 | 17.18 | 12.79 | 15.19 | 10.10 | 12.69 | 7.46 | 9.96 | 4.58 | 5.91 |
| 17 | 14.64 | 17.18 | 12.78 | 15.19 | 10.35 | 12.69 | 7.62 | 9.96 | 4.44 | 5.91 |
| 18 | 14.41 | 17.18 | 13.14 | 15.19 | 10.33 | 12.69 | 8.05 | 9.96 | 4.56 | 5.91 |
| 19 | 14.08 | 17.18 | 12.72 | 15.19 | 9.99 | 12.69 | 7.98 | 9.96 | 4.56 | 5.91 |
| 20 | 13.67 | 17.18 | 12.75 | 15.19 | 10.20 | 12.69 | 7.77 | 9.96 | 4.48 | 5.91 |

| Drop Test Number | Amsteel II Ropes (New) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | FF (56 in.) | | GG (44 in.) | | HH (32 in.) | | II (20 in.) | | JJ (8 in.) | |
| | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. | Record. | Theo. |
| 1 | - | - | 11.99 | 14.92 | 10.61 | 12.48 | 7.35 | 9.41 | 4.24 | 5.43 |
| 2 | 14.02 | 17.02 | 12.12 | 14.92 | 10.24 | 12.48 | 7.91 | 9.41 | 4.43 | 5.43 |
| 3 | 14.10 | 17.02 | 12.14 | 14.92 | 9.98 | 12.48 | 8.04 | 9.41 | 4.60 | 5.43 |
| 4 | 14.17 | 17.02 | 12.47 | 14.92 | 10.31 | 12.48 | 7.97 | 9.41 | 4.34 | 5.43 |
| 5 | 13.84 | 17.02 | 12.31 | 14.92 | 10.29 | 12.48 | 8.05 | 9.41 | 4.40 | 5.43 |
| 6 | 14.09 | 17.02 | 12.58 | 14.92 | 10.28 | 12.48 | 8.12 | 9.41 | 4.36 | 5.43 |
| 7 | 14.32 | 17.02 | 12.30 | 14.92 | 10.38 | 12.48 | 7.86 | 9.41 | 4.48 | 5.43 |
| 8 | 14.38 | 17.02 | 12.09 | 14.92 | 10.29 | 12.48 | 7.99 | 9.41 | 4.47 | 5.43 |
| 9 | 14.35 | 17.02 | 11.90 | 14.92 | 10.36 | 12.48 | 8.19 | 9.41 | 4.49 | 5.43 |
| 10 | 14.14 | 17.02 | 11.99 | 14.92 | 10.27 | 12.48 | 8.02 | 9.41 | 4.42 | 5.43 |
| 11 | 14.38 | 17.02 | 12.07 | 14.92 | 10.60 | 12.48 | 8.21 | 9.41 | 4.55 | 5.43 |
| 12 | 14.17 | 17.02 | 12.01 | 14.92 | 10.38 | 12.48 | 8.17 | 9.41 | 4.67 | 5.43 |
| 13 | 14.30 | 17.02 | 11.96 | 14.92 | 10.31 | 12.48 | 8.35 | 9.41 | 4.56 | 5.43 |
| 14 | 14.31 | 17.02 | 12.06 | 14.92 | 10.35 | 12.48 | 8.22 | 9.41 | 4.36 | 5.43 |
| 15 | 14.20 | 17.02 | 12.35 | 14.92 | 10.32 | 12.48 | 8.17 | 9.41 | 4.51 | 5.43 |
| 16 | 14.13 | 17.02 | 12.28 | 14.92 | 10.55 | 12.48 | 8.01 | 9.41 | 4.61 | 5.43 |
| 17 | 13.67 | 17.02 | 12.52 | 14.92 | 10.40 | 12.48 | 8.09 | 9.41 | 4.67 | 5.43 |
| 18 | 14.43 | 17.02 | 12.67 | 14.92 | 10.44 | 12.48 | 8.16 | 9.41 | 4.42 | 5.43 |
| 19 | 13.97 | 17.02 | 11.83 | 14.92 | 10.35 | 12.48 | 8.25 | 9.41 | 4.53 | 5.43 |
| 20 | 13.97 | 17.02 | 12.22 | 14.92 | 10.61 | 12.48 | 8.02 | 9.41 | 4.67 | 5.43 |

Table B.23.2: Amsteel II Ropes – Impact Velocity Comparisons

| Percent Loss of Velocity Due to Friction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Amsteel Blue Ropes | | | | | | | | | |
| Drop Test Number | Precycled Ropes | | | | | New Ropes | | | | |
| | A (56 in.) | B (44 in.) | C (32 in.) | D (20 in.) | E (8 in.) | AA (56 in.) | BB (44 in.) | CC (32 in.) | DD (20 in.) | EE (8 in.) |
| 1 | 15.47 | 32.43 | - | 22.11 | 23.73 | 14.63 | 21.65 | - | 23.76 | 26.99 |
| 2 | 16.71 | 25.25 | - | 17.60 | 17.90 | 11.19 | 19.91 | - | 15.20 | 3.74 |
| 3 | 15.24 | 26.66 | - | 15.26 | 16.75 | 8.79 | 17.80 | - | 10.95 | 0.21 |
| 4 | 13.41 | 27.71 | - | 10.73 | 15.52 | 12.81 | 18.98 | - | 12.20 | -3.91 |
| 5 | 13.66 | 26.26 | - | 11.49 | 14.81 | 7.31 | 15.84 | - | 9.01 | -10.10 |
| 6 | 13.33 | 25.75 | - | 12.27 | 13.08 | 10.20 | 18.79 | - | 8.14 | -8.92 |
| 7 | 12.63 | 27.50 | - | 10.60 | 15.08 | 11.22 | 16.36 | - | 8.28 | -10.89 |
| 8 | 11.80 | 45.68 | - | 11.74 | 11.91 | 8.91 | 16.95 | - | 12.49 | -13.69 |
| 9 | 12.00 | 60.26 | - | 11.08 | 14.69 | 9.00 | 16.43 | - | 9.04 | -19.96 |
| 10 | 11.29 | 19.33 | - | 12.87 | 10.90 | 8.34 | 16.16 | - | 15.32 | -38.07 |
| 11 | 13.01 | 31.90 | - | 14.26 | 12.02 | 8.87 | 17.35 | - | 9.62 | -16.49 |
| 12 | 10.62 | 4.11 | - | 14.37 | 10.97 | 9.18 | 15.83 | - | 12.38 | -13.52 |
| 13 | 11.16 | 19.64 | - | 11.94 | 9.96 | 7.85 | 16.98 | - | 40.58 | -15.60 |
| 14 | 12.85 | 20.17 | - | 15.66 | 13.21 | 7.80 | 14.14 | - | 6.79 | -20.12 |
| 15 | 12.10 | 21.59 | - | 11.84 | 12.73 | 9.09 | 15.37 | - | 15.59 | -18.92 |
| 16 | 9.21 | 19.61 | - | 13.57 | 13.26 | 9.13 | 16.56 | - | 6.96 | -18.70 |
| 17 | 10.66 | 19.40 | - | 10.75 | 9.99 | 10.27 | 15.26 | - | 3.82 | -17.86 |
| 18 | 9.59 | 19.38 | - | 10.08 | 10.98 | 10.12 | 16.94 | - | 7.23 | -15.97 |
| 19 | 11.33 | 19.70 | - | 9.98 | 9.75 | 8.27 | 17.01 | - | 5.61 | -16.96 |
| 20 | 11.16 | 18.69 | - | 12.05 | 11.93 | 10.97 | 15.34 | - | 7.09 | -21.17 |

| | Amsteel II Ropes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Drop Test Number | Precycled Ropes | | | | | New Ropes | | | | |
| | F (56 in.) | G (44 in.) | H (32 in.) | I (20 in.) | J (8 in.) | FF (56 in.) | GG (44 in.) | HH (32 in.) | II (20 in.) | JJ (8 in.) |
| 1 | 20.66 | 18.82 | 19.64 | 17.77 | 26.76 | - | 19.66 | 14.94 | 21.91 | 22.03 |
| 2 | 17.54 | 18.58 | 19.42 | 21.08 | 25.89 | 17.65 | 18.76 | 17.89 | 15.93 | 18.55 |
| 3 | 16.42 | 18.78 | 18.09 | 19.36 | 25.25 | 17.15 | 18.64 | 19.99 | 14.53 | 15.34 |
| 4 | 18.03 | 14.11 | 16.28 | 17.19 | 22.73 | 16.76 | 16.43 | 17.37 | 15.34 | 20.10 |
| 5 | 17.62 | 17.10 | 17.97 | 20.44 | 26.94 | 18.71 | 17.49 | 17.54 | 14.46 | 19.01 |
| 6 | 19.49 | 15.18 | 19.58 | 18.96 | 22.48 | 17.24 | 15.68 | 17.61 | 13.66 | 19.70 |
| 7 | 16.28 | 11.41 | 19.10 | 17.03 | 24.22 | 15.89 | 17.55 | 16.78 | 16.47 | 17.52 |
| 8 | 15.92 | 15.71 | 17.98 | 16.93 | 25.57 | 15.50 | 18.98 | 17.51 | 15.11 | 17.81 |
| 9 | 17.50 | 13.89 | 18.11 | 16.93 | 23.72 | 15.70 | 20.28 | 16.98 | 12.96 | 17.41 |
| 10 | 17.62 | 15.11 | 20.30 | 24.06 | 28.69 | 16.96 | 19.63 | 17.70 | 14.82 | 18.69 |
| 11 | 17.06 | 17.35 | 20.86 | 19.67 | 27.59 | 15.56 | 19.15 | 15.04 | 12.77 | 16.34 |
| 12 | 16.18 | 16.20 | 18.19 | 17.47 | 23.37 | 16.77 | 19.49 | 16.81 | 13.20 | 14.13 |
| 13 | 16.05 | 17.46 | 16.39 | 19.37 | 25.30 | 16.00 | 19.85 | 17.37 | 11.27 | 16.07 |
| 14 | 16.53 | 16.38 | 16.40 | 22.63 | 22.61 | 15.92 | 19.19 | 17.07 | 12.59 | 19.75 |
| 15 | 16.27 | 14.47 | 22.71 | 21.28 | 23.42 | 16.60 | 17.27 | 17.31 | 13.13 | 17.04 |
| 16 | 16.97 | 15.78 | 20.41 | 25.15 | 22.42 | 16.99 | 17.74 | 15.44 | 14.84 | 15.21 |
| 17 | 14.79 | 15.84 | 18.40 | 23.56 | 24.79 | 19.68 | 16.10 | 16.67 | 14.04 | 14.08 |
| 18 | 16.11 | 13.47 | 18.58 | 19.17 | 22.71 | 15.23 | 15.07 | 16.35 | 13.25 | 18.66 |
| 19 | 18.03 | 16.29 | 21.30 | 19.93 | 22.76 | 17.93 | 20.76 | 17.02 | 12.29 | 16.63 |
| 20 | 20.44 | 16.06 | 19.62 | 22.02 | 24.17 | 17.92 | 18.13 | 14.99 | 14.81 | 14.07 |

| Precycled Ropes | | |
|---|---|---|
| Rope | Average % Vel. Loss | Standard Deviation |
| A | 12.4 | 1.93 |
| B | 25.6 | 11.42 |
| D | 13.0 | 2.95 |
| E | 13.5 | 3.33 |
| F | 17.3 | 1.51 |
| G | 15.9 | 1.88 |
| H | 19.0 | 1.68 |
| I | 20.0 | 2.51 |
| J | 24.6 | 1.88 |

| New Ropes | | |
|---|---|---|
| Rope | Average % Vel. Loss | Standard Deviation |
| AA | 9.7 | 1.79 |
| BB | 17.0 | 1.76 |
| DD | 12.0 | 8.11 |
| EE | -12.5 | 12.75 |
| FF | 16.9 | 1.17 |
| GG | 18.3 | 1.59 |
| HH | 16.9 | 1.18 |
| II | 14.4 | 2.20 |
| JJ | 17.4 | 2.20 |

| Test Group | Average % Vel. Loss |
|---|---|
| Precycled Amsteel Blue | 16.1 |
| Precycled Amsteel II | 19.3 |
| New Amsteel Blue | 12.9 |
| New Amsteel II | 16.8 |
| All Amsteel Blue | 14.7 |
| All Amsteel II | 18.1 |

Table B.23.3: Percent Loss of Velocity Due to Friction