



TEST REPORT

**Biodegradable Ground Stakes
Pull and Bend Testing**

Prepared For:

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FILE NO.:	42682
P.O. NO.:	14-TP-001
DATE TESTING STARTED:	01/15/14
DATE TESTING COMPLETED:	01/20/14
SAMPLE SUBMISSION:	Twenty (20) Ground Stakes were submitted; Four each of EDS-4B, EDS-4D, EDS-6B, EDS-6D, and EDS-6B-V2.
REVISION DETAILS OF TEST REPORT (IF ANY):	R0

Approval:

PREPARED BY:	Erik Rohr – Test Technician
APPROVED BY:	Leo Bityou – Laboratory Manager

Unless otherwise stated herein, all equipment used to generate the test results contained herein meets the requirements of ANSI/NC SL Z540-1 and ISO/IEC 17025-2005 and is in calibration and traceable to NIST. As a mutual protection to clients, the public and Trace Laboratories-Central, this report is submitted for the exclusive use of the client to whom it is addressed. This report applies only to the sample(s) tested and is not necessarily indicative of the qualities of apparently similar or identical products. Use of this report, whether in whole or in part, or anything else connected therewith, in any advertising or publicity matter, without prior written authorization from Trace Laboratories-Central is prohibited.



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TEST RESULTS SUMMARY

Bend and Pull testing was conducted according to the requirements agreed upon by the Trace and the customer. Results can be found in the Test Data sections of this report.

Test Name	Test Dates	Test Summary	Test Result
Bend	01/15/14	The sample shall be placed on a 3-point bend fixture and bent until break	N/A
Pull Out	01/20/14	Determine the peak force to pull the sample out of a dirt compound.	N/A

ANY DEVIATION/EXCLUSION FROM AGREED TEST METHOD

None



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BEND TEST REPORT

TEST DATES

01/15/14

TEST SPECIMENS

- Two (2) Samples @ EDS-4B
- Two (2) Samples @ EDS-4D
- Two (2) Samples @ EDS-6B
- Two (2) Samples @ EDS-6D
- Two (2) Samples @ EDS-6B-V2

TEST SPECIFICATION

Per Customer Requirement

REQUIREMENTS

The peak force shall be determined, and the deflection and failure mode shall be noted.

PROCEDURE

Each sample was placed on a 3-point bend fixture. The bottom 2 points were spaced 2 inches apart and a bar was lowered down onto the top of the sample at a rate of 2 inches per minute. The peak force was recorded and the deflection of the sample at the peak force was recorded.

TEST RESULTS

Testing was conducted as outlined in the Procedure section above. Data can be found in the Test Data section of this report.

INSTRUMENTATION

EQUIPMENT	MANUFACTURER	MODEL#	LAB#	LAST CAL.	NEXT CAL.
Test Machine	United Cal. Corp.	STM-20-E	TL1082	08/29/13	08/29/14
20 K Load Cell	United Cal. Corp.	2450BXM-20K	TL1083	08/29/13	08/29/14



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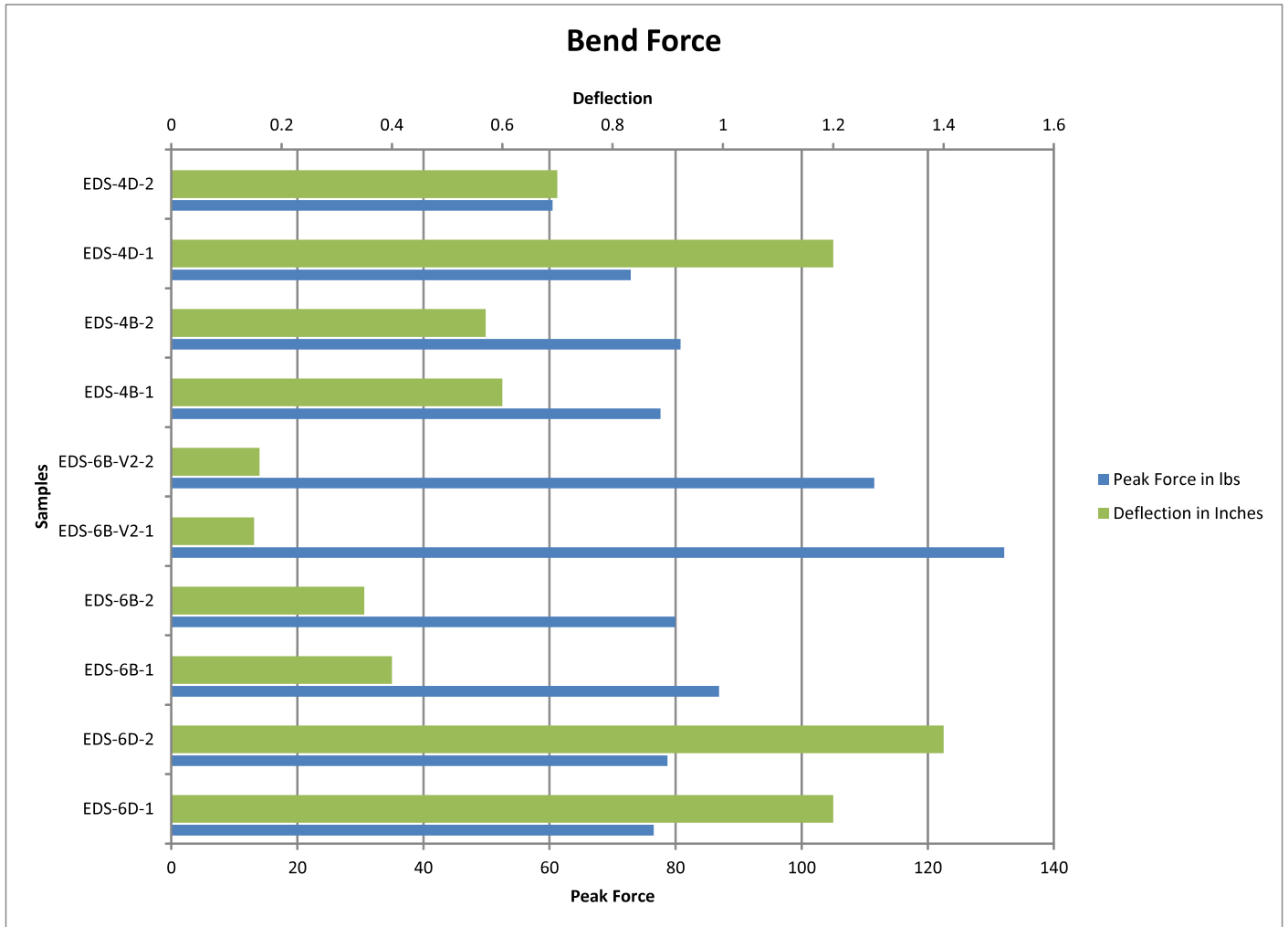
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TEST DATA

Bend Test:

Part Number	Number	Peak Force in lbs	Deflection in Inches	Cause of Failure
EDS-6D	1	76.53	1.2	Max Bend Reached
	2	78.72	1.4	Max Bend Reached
EDS-6B	1	86.9	0.4	Sample Cracked
	2	79.95	0.35	Sample Cracked
EDS-6B-V2	1	132.14	0.15	Broke in Two Pieces
	2	111.51	0.16	Broke in Two Pieces
EDS-4B	1	77.6	0.6	Sample Cracked
	2	80.78	0.57	Sample Cracked
EDS-4D	1	72.89	1.2	Max Bend Reached
	2	60.48	0.7	Broke in Two Pieces





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PHOTOS

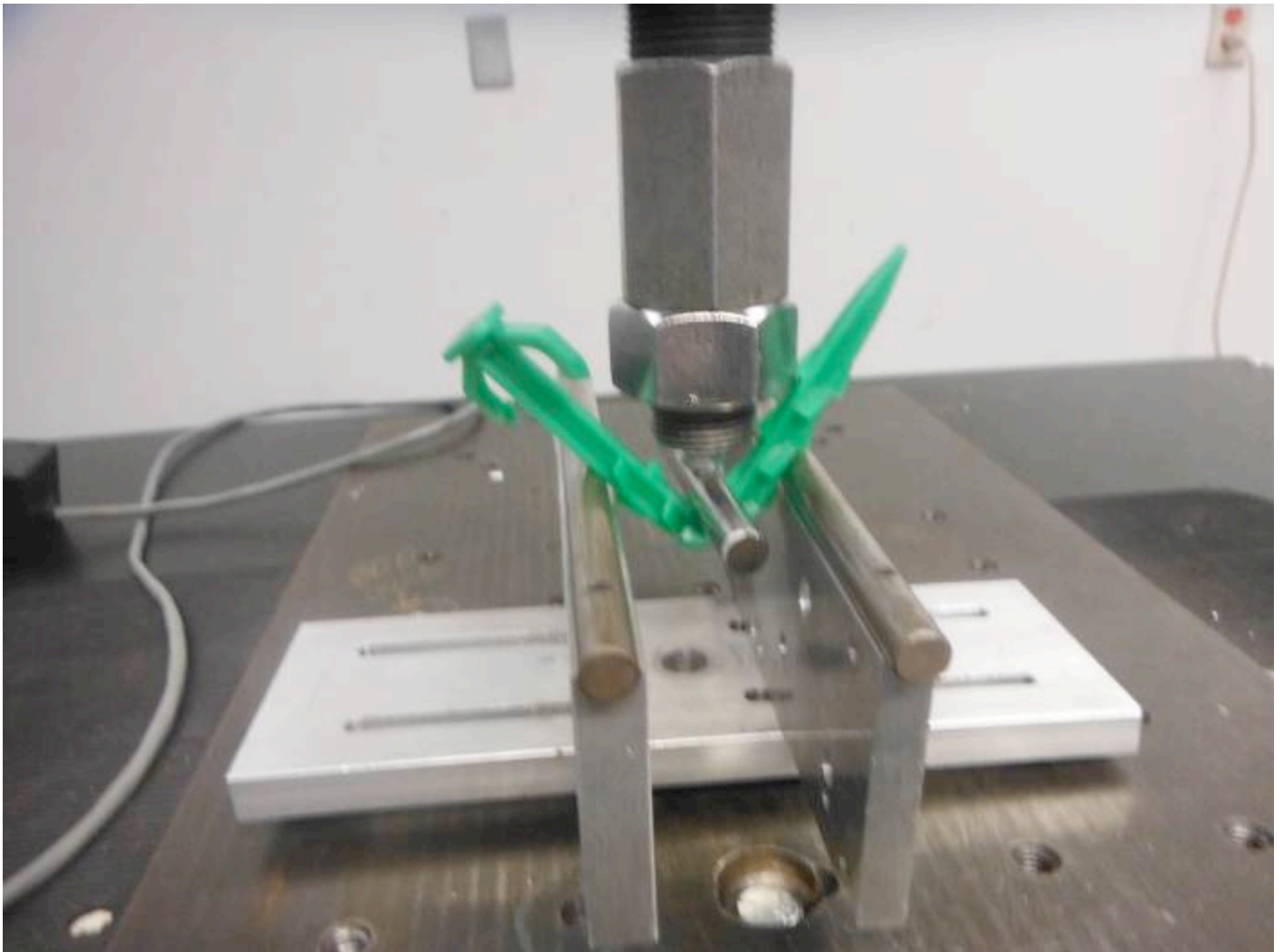


Bend Test Setup

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Bend – Sample Under Test



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PULL TEST REPORT

TEST DATES

01/20/14

TEST SPECIMENS

- Two (2) Samples @ EDS-4B
- Two (2) Samples @ EDS-4D
- Two (2) Samples @ EDS-6B
- Two (2) Samples @ EDS-6D
- Two (2) Samples @ EDS-6B-V2

TEST SPECIFICATION

Per Customer Requirement

REQUIREMENTS

The peak force to remove each sample from the ground shall be determined.

PROCEDURE

Natural ground soil was collected in a container and allowed to stabilize at room temperature. It was compacted as described in ASTM D698. Each sample was fully inserted into the dirt at a rate of 2 inches per minute, allowed to remain inserted for 1 minute, and then pulled straight out at a rate of 2 inches per minute. The peak force was recorded.

TEST RESULTS

Testing was conducted as outlined in the Procedure section above. Data can be found in the Test Data section of this report.

INSTRUMENTATION

EQUIPMENT	MANUFACTURER	MODEL#	LAB#	LAST CAL.	NEXT CAL.
Metric Steel Ruler	McMaster Cart.	6823A42	TLE900	06/13/13	06/13/14
Test Machine	United Cal. Corp.	STM-20-E	TL1082	08/29/13	08/29/14
20 K Load Cell	United Cal. Corp.	2450BXM-20K	TL1083	08/29/13	08/29/14



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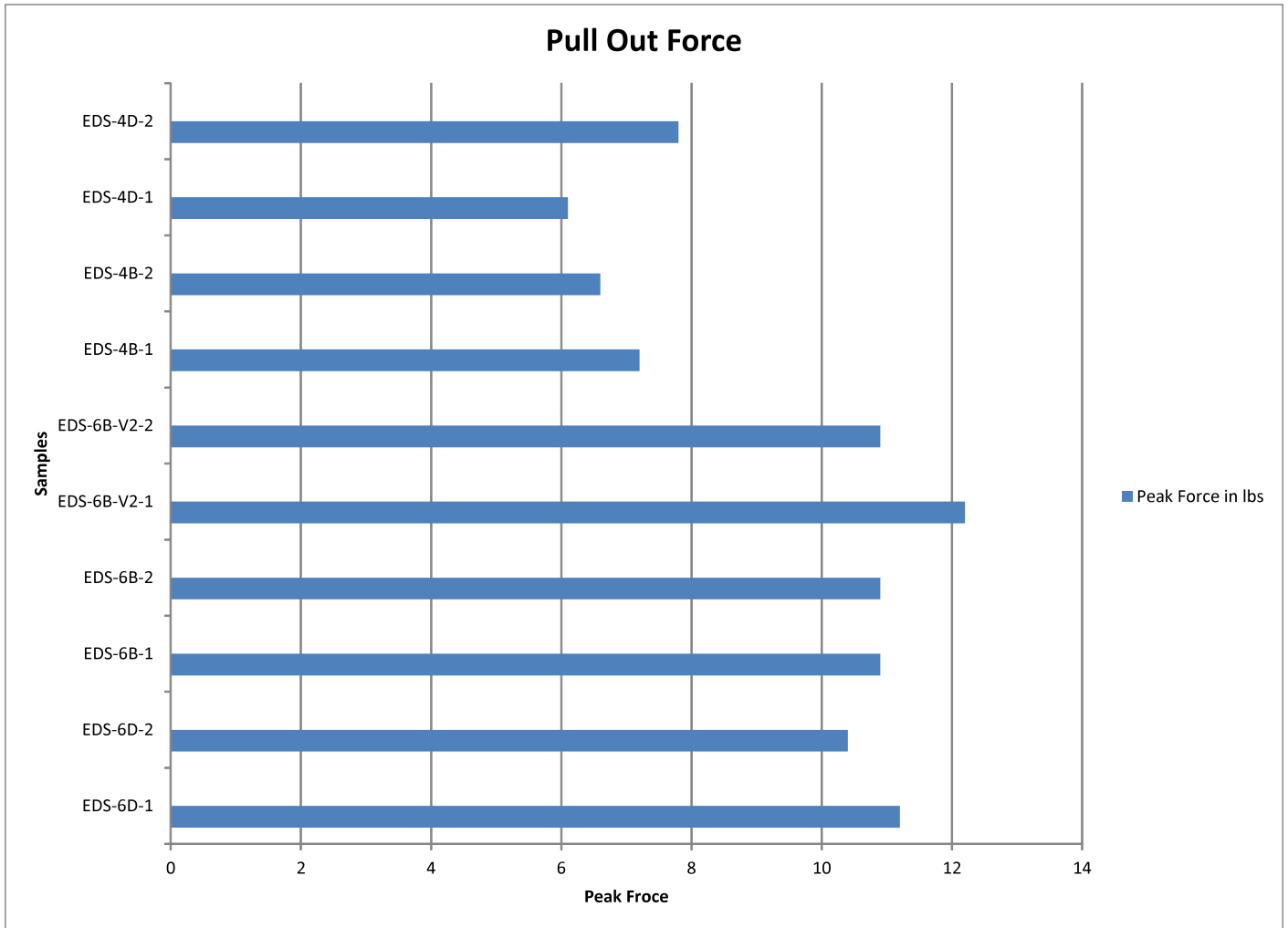
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TEST DATA

Pull Test:

Part Number	Number	Peak Force in lbs
EDS-6D	1	11.2
	2	10.4
EDS-6B	1	10.9
	2	10.9
EDS-6B-V2	1	12.2
	2	10.9
EDS-4B	1	7.2
	2	6.6
EDS-4D	1	6.1
	2	7.8





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PHOTOS



Pull Test – Sample Inserted



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Pull – Sample Under Test