



AMERICAN
ENGINEERING
TESTING, INC.

*GEOTECHNICAL
*MATERIALS
*ENVIRONMENTAL

REPORT OF HDPE ADJUSTING RING CYCLICAL TESTING

PROJECT:

HDPE ADJUSTING RINGS
CYCLICAL LOAD TESTING

JACOBSEN

**ART JOB NO: 05-00175
1999**

REPORTED TO:

LADTECH, INC.
244 WOODRIDGE LANE
LINO LAKES, MN 55014

ATTN: GALE

DATE: JANUARY 15,

INTRODUCTION

This report presents the results of testing performed on high-density polyethylene (HDPE) adjusting rings used in conjunction with concrete manhole structures. The scope of our work was limited to the following:

- Subject a stack of HDPE rings to 1,000,000 cycles of a simulated AASHTO HS-25 wheel load
- Measure the strain in the rings under load at selected locations and times
- Document the condition of the ring stack following completion of the test
- Prepare a report detailing the results of the testing

Our work was requested and authorized by Mr. Gale Jacobsen of LADTECH, Inc. on September 4, 1998, and performed in general accordance with AET Proposal No. 5-98-039, dated July 13, 1998.

BACKGROUND INFORMATION

The adjusting rings are manufactured from 100% recycled plastic. Per LADTECH, the predominant source product for the raw plastic is curbside collected, post-consumer, blow-molded

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milk and detergent bottles. The bottles are initially manufactured from high density polyethylene as identified by ASTM Standard D-4976. Following shredding and cleaning of the bottles, the rings are manufactured by injection molding techniques.

TEST PROCEDURES

The cyclic load testing was performed at the University of Minnesota Civil Engineering Structures Lab. The test apparatus consisted of an MTS Model 311 Material Test Frame with 600-kip servo controlled hydraulic actuator. An MTS Model 458 controller was used to control the actuator and generate the signal to continually load and unload the adjusting ring assembly. The load applied to the ring assembly was cycled with the load path following a 1 Hz sine wave.

The strain gages used for the test were Model FLA-3-23-3LT (3mm gage length) from Tokoyo Sokki Kenkyujo Co., Ltd and affixed with a cyanoacrylate adhesive. An additional strain gage was affixed to an unloaded adjusting ring for temperature correction. An OPTIM data acquisition system was used to collect the data. Data was collected at a rate of 50Hz. Readings were taken once or more each day, except on weekends.

The adjusting ring stack used for the test consisted of two (2)- 4" and one (1)- 2" rings with the 2" ring being the uppermost. A 54" diameter x 5" thick concrete manhole slab with a 24 1/4" diameter hole was used as the base of the test assembly. The slab was placed on the strong floor of the lab with the hole centered over the load frame, and was set on a mortar bed. The adjusting ring stack was placed on the slab followed by the manhole frame. A 1/4" bead of butyl caulk was placed between the slab and first ring, between each subsequent ring, and before placement of the manhole frame. The ten strain gages were mounted in various locations on the middle adjusting ring. The manhole cover, which was bolted to the hydraulic actuator, was then lowered in-place.



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RING CATALOG NUMBERS/WEIGHT/PALLET COUNTS

CATALOG NO Adj Ring	USE FOR MANHOLE SIZE	ADJUSTMENT HEIGHT	FINISHED PART WEIGHT	PALLET STACK WEIGHT	PALLET STACK COUNT
24R125	24"	1 1/4"	4 lb .02 oz (64.2 oz)	297#	69
24R150		1 1/2"	4 lb .45 oz (71.2 oz)	278 #	58
24R200		2"	5 lb .6 oz (89.6 oz)	261 #	43
24R400		4"	10 lb .19 oz (162.9 oz)	234 #	21
24S150		3/4" to 1 1/2"	4lb .20 oz (67.2 oz)	352 #	79
27R125	27"	1 1/4"	4 lb .39 oz (70.3 oz)	323 #	69
27R150		1 1/2"	4 lb .92 oz (78.6 oz)	305 #	58
27R200		2"	5 lb .77 oz (92.4 oz)	268 #	43
27R400		4"	10 lb .71 oz (171.3 oz)	245 #	21
27S150		3/4" to 1 1/2"	4 lb .60 oz (73.5 oz)	383 #	79
30F150	30"	1 1/2"	4 lb.81 oz (76.9 oz)	299 #	58
30F225		2 1/4"	6 lb .59 oz (105.3oz)	270 #	38
30F400		4"	11 lb .23 oz (179.6 oz)	256#	21
30S225		1 1/2" to 2 1/4"	5 lb .88 oz (94.1 oz)	296 #	47
32F200	32"	2"	6 lb .24 oz (99.7 oz)	288 #	43
32F300		3"	8 lb .49 oz (135.7 oz)	266 #	29
32S225		1 1/4" to 2 1/4"	6 lb .05 oz (96.8 oz)	329 #	51
34F200	34"	2"	6 lb .10 oz (97.5 oz)	282 #	43
34F300		3"	7 lb .69 oz (123.0 oz)	243 #	29
34S225		1 1/4" to 2 1/4"	5 lb .27 oz (84.3 oz)	289#	51
2424F150	24"X24"	1 1/2"	7 lb .47 oz (119.4 oz)	453 #	58
2424F200	24"X24"	2"	9 lb .79 oz (156.5 oz)	441#	43
2424F275		2 3/4"	11 lb .65 oz (186.4 oz)	393 #	32
2424S125		1 1/4" to 2 3/4"	6 lb .87 oz (109.8 oz)	418 #	44
2424S275		2" to 2 3/4"	9 lb .57 oz (153.12 oz)	385#	38
2436F150	24"X36"	1 1/2"	7 lb .15 oz (114.4 oz)	435 #	58
2436F200		2"	8 lb .89 oz (142.1 oz)	402 #	43
2436F275		2 3/4"	11 lb .15 oz (178.3 oz)	377 #	32
2436S175		1 1/4" to 1 3/4"	7 lb .8 oz (124.8 oz)	363 #	44
2436SX275	24"36"S	3" LEG	10lb 20 oz (166.4 oz)	477#	44
24S36X275	24"S36"	2" LEG	10 lb .8 oz (174.3 oz)	475#	44

SPACER RINGS

SP24FS-025	Final Grade	24" X 1/4"	56.0 oz (3 lbs 5 oz)		up to 100
SP27FS-025	Final Grade	27" X 1/4"	57.60 oz (3 lbs 6 oz)		up to 100
SP30FS-025	Final Grade	30" X 1/4"	60.80 oz (3 lbs 8 oz)		up to 100
SP32FS-025	Final Grade	32"X1/4"	73.6 oz (4 lbs 9.6 oz)		up to 100
SP34FS-025	Final Grade	34"X1/4"	67.20 oz (4 lbs 3.2 oz)		up to 100
SP2424FS-025	Final Grade	24"X24" 1/4" sq	83.20 oz (5 lbs 4 oz)		up to 100
SP2436FS-025	Final Grade	24"X36" 1/4 rect	100.80 oz (6 lbs 5 oz)		up to 100