



Bell
Communications
Research

435 South Street
Morristown, New Jersey 07960-1961
(201) 829-2000

Technical Analysis Report
AR-TSY-000332 Issue 1
Manhole Extension Ring, CA07235
Service Order BSU850183

May 9, 1986

Mr. Frank Tedeschi
Bell South Services
Southern Bell Center, RM 25J59
675 West Peachtree Street, N.E.
Atlanta, GA 30375

Dear Mr. Tedeschi,

Attached is a copy of Technical Analysis Report AR-TSY-000332, Issue 1, on the Manhole Extension Rings, CA07235, manufactured by Accurate Plastics. The report includes the requirements used in the analysis and the comparison of the product's test results with those requirements. A copy of this report was sent to Accurate Plastics with a cover letter dated April 17, 1986.

If you have any questions, please contact Mr. C. T. Avant (201) 829-4641.

This letter, along with the attached report, closes Service Order BSU850183.

R. Catini

R. Catini
District Manager
Mechanical Requirements
and Analysis

CTA/jlb (4-4)

Attachment

Copy (w/Att.) to
Quality Assurance Panel
National Construction User Group
A. W. Bacheider - Southern N. E. Telephone
L. W. Barnhardt
S. W. Burson
John M. Clark
C. W. Ford
K. H. Kurth
A. E. Lindstedt
R. Maier
L. R. Mayer
I. S. Ochrymowych
H. M. Peeno, Jr., Cincinnati Bell
K. Sugum

ANALYSIS OF THE MANHOLE
EXTENSION RING

FROM

ACCURATE PLASTICS

CONTENTS

1.0	Introduction.....	1-1
1.1	Purpose and Scope of Document.....	1-1
1.1.1	Referenced Document.....	1-1
1.1.2	Analysis Request Reference.....	1-1
1.2	Definition of Product.....	1-1
1.2.1	Name of Supplier.....	1-1
1.2.2	Product Description.....	1-1
1.2.3	Product Availability Status.....	1-1
1.3	The Analysis Process.....	1-1
1.3.1	Type of Analysis.....	1-1
1.3.2	Bellcore Organizations Participating.....	1-1
2.0	Technical Analysis - Criteria.....	2-1
2.1	Dimensional.....	2-1
2.2	Mechanical.....	2-1
2.2.1	Material.....	2-1
2.2.2	Mechanical Fit.....	2-1
2.2.3	Workmanship.....	2-1
2.2.4	Adhesive Compatibility.....	2-1
2.2.5	Abrasiveness and Toughness.....	2-1
2.2.6	Chemicals.....	2-1
2.2.7	Ultra-violet.....	2-2
2.2.8	Waste Absorbtion.....	2-2
3.0	Technical Analysis - Results.....	3-1
3.1	Dimensional.....	3-1
3.2	Mechanical.....	3-1
3.2.1	Material.....	3-1
3.2.2	Mechanical Fit.....	3-1
3.2.3	Workmanship.....	3-1
3.2.4	Adhesive Compatibility.....	3-1
3.2.5	Abrasiveness and Toughness.....	3-1
3.2.6	Chemicals.....	3-2
3.2.7	Ultra-violet.....	3-2
3.2.8	Water Absorbtion.....	3-2

1.0 Introduction

1.1 Purpose and Scope of Document

This Technical Analysis Report sets forth the results of an analysis of the manhole extension ring against criteria derived from BOC Specification CA07235 and other BOC requirements.

1.1.1 Referenced Document

The product submitted for analysis was tested to determine how it met the criteria of the Bell Operating Company Specification CA07235 and other BOC requirements. The results of those tests are described in Section 3 of this report.

1.1.2 Analysis Request Reference

The analysis request for manhole extension ring came from Service Order No. BSU850183.

1.2 Definition of Product

1.2.1 Name of Supplier

If additional information is needed about the product, write or telephone:

Accurate Plastics
13911 Distribution Way
Farmers Branch, TX 75234
(214) 247-6653.

1.2.2 Product Description

The manhole frame extension ring is used to raise the manhole frame and cover to the new level of the road surface due to re-surfacing. The extension ring is made of a polypropylene-fiberglass mixture injected into a mold under high pressure.

1.2.3 Product Availability Status

The supplier states that the samples submitted for analysis are representative of his standard product.

1.3 The Analysis Process

1.3.1 Type of Analysis

Testing of the product consisted of mechanical and dimensional analysis against the criteria set forth in Section 2.

1.3.2 Bellcore Organizations Participating

The tests were conducted by members of Organization 23351, Technology Systems - Distribution.

2.0 Technical Analysis - Criteria

The criteria used to analyze the manhole extension ring was primarily that agreed on by Bellcore and BellSouth, since the extension ring was made of polypropylene-fiberglass mixture injected into a mold under high pressure, instead of the gray-iron casting required by Specification CA07235. The dimensions were analyzed per specification CA07235 except the extension ring height which was one inch instead of the two and three inch heights in the specification. Figure 1 shows a cross section of the manhole extension ring for the one inch height.

2.1 Dimensional

The dimensions of the manhole extension ring shall be per Figure 1, and drawing 47-M-825 of Specification CA07235.

2.2 Mechanical

2.2.1 Material

The material shall be a polypropylene-fiberglass mixture injected into a mold under high pressure.

2.2.2 Mechanical Fit

The extension ring shall conform to and snugly fit the manhole ground flange and cover.

2.2.3 Workmanship

The finished product shall be free of cavities and surface defects which may effect its serviceability and extended use.

2.2.4 Adhesive Compatibility

The extension ring material shall be compatible with adhesives that are compatible with cast iron.

2.2.5 Abrasiveness and Toughness

The extension ring shall not sustain any serviceable damage when the manhole cover is installed or removed, and under normal roadway use.

2.2.6 Chemicals

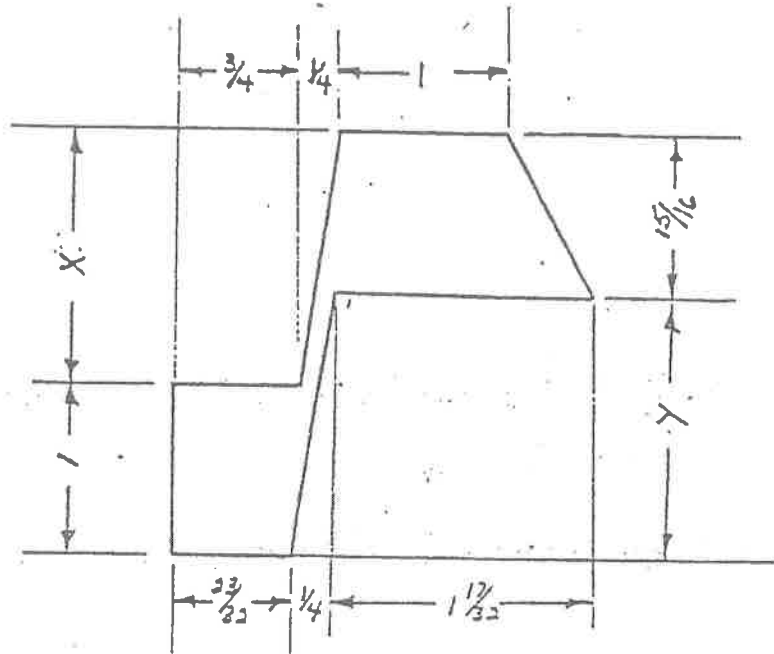
The extension ring shall not deteriorate when subjected to the acids, road salts, and petroleum products that may be used or occur on road surfaces.

2.2.7 Ultra-violet

The extension ring shall not deteriorate when exposed to ultra-violet radiation.

2.2.8 Waste Absorbtion

The extension ring when submerged in water for a period of 30 days shall not absorb more than 1 percent of water by weight.



DIM.	RINGS	
	A	B
X	1 1/2	1 3/8
Y	1 9/16	1 7/16

MANHOLE EXTENSION RING

CROSS SECTION

Figure 1

RESTRICTED-LIMITED DISTRIBUTION-BELLCORE
AND AUTHORIZED CLIENTS ONLY
See proprietary restrictions on title page.

3.0 Technical Analysis - Results

3.1 Dimensional

The dimension of the extension ring was checked in accordance with Figure 1 and Specification CA07235. All dimensions were found to be within the limits specified on the drawing.

3.2 Mechanical

3.2.1 Material

The material for the extension ring is an injected mold ring made of fiberglass reinforced polypropylene.

3.2.2 Mechanical Fit

The mechanical fit between the extension ring and the manhole frame and cover was (very) good.

3.2.3 Workmanship

The extension ring was free of cavities and the surfaces were smooth.

3.2.4 Adhesive Compatibility

No tests were performed with reference to adhesive compatibility.

3.2.5 Abrasiveness and Toughness

An extension ring was placed in an existing frame and the cover was installed and removed several times to test for abrasion. After 12 cycles, the extension ring split. The split in the ring occurred in the thin section of the ring (See Figure 1). There was no noticeable significant abrasion that would effect serviceability; there was some slight surface chipping.

A second extension ring was tested and the results were similar to the test mentioned above, except the ring split after 20 cycles.

Loading of the extension ring to simulate road condition was done using a 30 inch manhole frame and cover. Since the road level is not always parallel to the manhole frame and cover, shims were used to simulate leveling the extension ring and manhole cover to the road surface. Shims of 1/4 inch, 3/8 inch, and 1/2 inch were used to level the extension ring.

In the first test to simulate road conditions, no shims were used, only the extension ring. The manhole cover was loaded to 40,000 pounds. There was no change in the condition of the extension ring.

Test 2 involved using 1/4 inch shims at one location on the extension ring. The ring did not make contact with the frame within 45 inches on the circumference on each side of the shim. The manhole cover was loaded to 40,000 pounds without any breakage or change in the

RESTRICTED-LIMITED DISTRIBUTION-BELLCORE
AND AUTHORIZED CLIENTS ONLY
See proprietary restrictions on title page.

extension ring. After the load was removed the setup was checked for wobble when loaded slightly off center. This setup required 1/8 inch shims added at approximately 22 inches on the circumference on each side of the 1/4 inch shims to eliminate wobble.

Test 3 involved using a 1/4 inch shim on the top surface only. The manhole cover was loaded to 10,000 pounds when the extension ring split and separated about 6 inches on each side of the shim in the thin section of the extension ring. This type of break would be considered a failure of the extension ring.

Test 4 involved using 1/2 inch shims similar to Test 2. The manhole cover was loaded to 40,000 pounds without any damage or breakage to the extension ring. This setup also wobbled similar to Test 2, and required 1/4 inch shims at approximately 22 inches to eliminate the wobble.

Test 5 involved using 1/2 inch shims at one location, and 1/4 inch shims at approximately 22 inches along the circumference on each side of the 1/2 inch shims. This was also tested to 40,000 pounds without damage or breakage to the extension ring. There was no wobble in this setup.

Test 6 involved using 3/4 inch shims at one location similar to Test 2. The manhole cover was loaded to 40,000 pounds without damage or breakage to the extension ring. This setup also wobbled similar to Test 2.

Test 7 involved using 3/4 inch shims at one location, and 3/8 inch shims at approximately 22 inches to eliminate the wobble. The manhole cover was loaded to 40,000 pounds without damage or breakage to the extension ring.

Test 8 involved using 1/2 inch shims at four locations, 90 degrees apart. This setup is used to raise the cover when the surface of the road is raised one and a fraction of an inch, and parallel with the top of the manhole. The manhole cover was loaded in the center and off center to 40,000 pounds. There was no damage or breakage to the extension ring. No wobble occurred during these tests.

3.2.6 Chemicals

The extension ring, by the nature of the manufacturing material, will not deteriorate when subjected to acids, road salts, and petroleum products that may be used or occur on road surfaces.

3.2.7 Ultra-violet

Parts of the extension ring material was exposed to ultra-violet radiation in accordance with ASTM 653-83. The ultra-violet radiation did not deteriorate the material.

3.2.8 Water Absorbtion

Samples of the extension ring material were submerged in water for a period of 30 days with no absorbtion of water.

4.0 Comments

Extension rings made from a polypropylene-fiberglass mixture is relatively new. Bellcore was requested by BellSouth to analyze the new type of extension ring to possibly replace the cast iron extension ring in Specification CA07235. This would reduce extension ring cost, reduce labor to install, and reduce handling problems with heavy rings. As seen from the test results above, the polypropylene-fiberglass extension rings passed most of the tests. As noted in Paragraph 3.2.5, during the installation and removal of the manhole cover, the extension ring split in the thin section. This split did not affect the serviceability of the extension ring. During tests 1 through 9 when the shims were used to level the manhole cover and extension ring with a non-parallel road surface, if additional shims were added at approximately 22 inches on each side of the primary shims to prevent wobble, the extension rings met the loading requirements without damage or breakage.

F.J. TURNER COMPANY, INC.

P.O. Box 20741 • RALEIGH, NORTH CAROLINA 27619 • (919) 752-8124

Product References

City of Atlanta
Alberta Bishop
404-853-3223
20 years of usage

City of Los Angeles
Lionel Citizen
213-485-3427
16 years of usage

City of San Diego
Art Hernandez
858-587-3600
14 years of usage

Southwestern Bell Telephone
John Schneiders
214-858-1322
14 years of usage

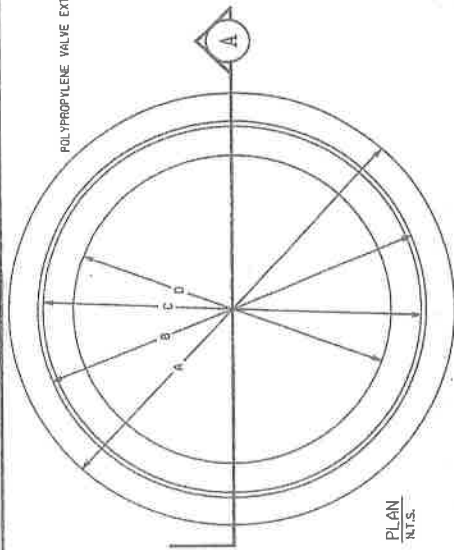
Bell Atlantic
Scott Baiter
610-666-4906
14 years of usage

City of Honolulu
Charles Pignataro
808-527-6282
6 years of usage

City of Vancouver
Doug Gerling
604-323-7651
5 years of usage

Others: City of Buffalo, New Orleans,
BellSouth, U.S. West, Con
Edison, Toronto and many
others. Contacts available.

POLYPROPYLENE VALVE EXTENSION RING



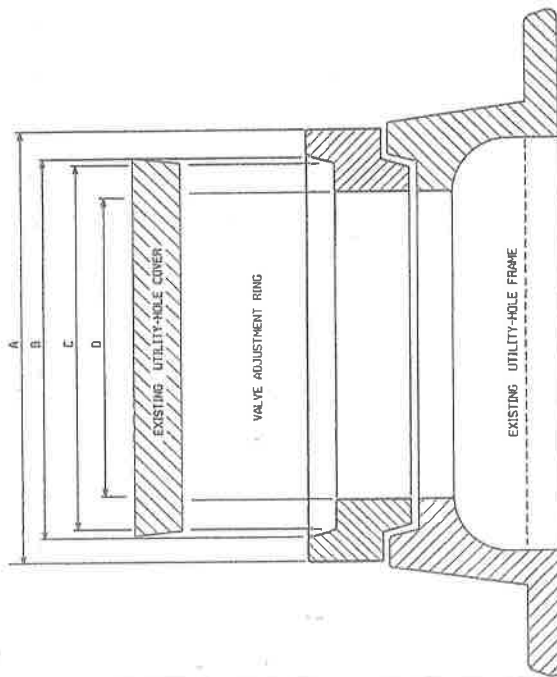
PLAN
N.T.S.

SCHEDULE

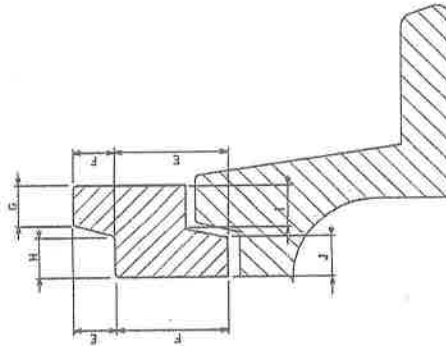
A	B	C	D	E	F	G	H	I	J
8%	7%	6 1/4	6 1/4	5 1/2	5 1/2	5 1/4	5 1/4	5 1/2	5 1/2

SIZES ARE IN INCHES

NOTE: TABLE ABOVE REPRESENTS THE COMMON SIZE RINGS ARE AVAILABLE IN OTHER CIRCUMFERENCES. OVERLAY AND COVER THICKNESSES AS REQUIRED. CONSULT MANUFACTURER FOR ADDITIONAL SPECIFICATIONS.



A SECTION THRU ADJUSTMENT RING & EXISTING FRAME
N.T.S.



SECTION
B
N.T.S.

NOTES:

A. MATERIALS

1) RING NAME: EG. POLYPROPYLENE - FIBERGLASS RING

TABLE - TECH DATA

TECHNICAL PROPERTY DATA	RANGE OF VALUES	ASTM METHOD
FIBERGLASS CONTENT, %	13-17	D1238
MELT FLOW, g/10 min.	2-4	D792
SPECIFIC GRAVITY,	.99-1.02	D538
TENSILE STRENGTH, psi @ 73°F (23°C)	3,000-4,000	D790
FLEXURAL MODULUS, (Tangent) psi	375,000-425,000	D255
IZOD IMPACT, ft.-lb/in. @ 73°F (23°C)	1.3-1.7	D3829
GARDNER IMPACT, in.-lb	8-12	
HEAT DEFLECTION, °F	250-270	D648
	270-290	D648
HARDNESS SHORE "D"	64-69	D2240

B. GENERAL

1) DIMENSIONS MAY VARY TO MEET EXISTING FIELD CONDITIONS, ANY CHANGE IN DIMENSIONS SHALL BE APPROVED BY THE DIRECTOR, MATERIALS BUREAU.

2) MAXIMUM ADJUSTMENT HEIGHT = 3"

3) FABRICATION TOLERANCES $\pm 1/16$ "

C. INSTALLATION INSTRUCTIONS

- 1) REMOVE COVER FROM VALVE BOX
- 2) CLEAN VALVE BOX WITH BRUSH SO THAT THE ADHESIVE WILL BOND
- 3) PLACE RING INTO VALVE BOX TO INSURE THAT BOTH FLAT SURFACES OF EXTENSION ARE IN CONTACT WITH VALVE BOX. EXTENSION CAN BE CUT TO ALLOW SEATING.
- 4) INSTALL EXTENSION INTO VALVE BOX
- 5) PLACE COVER INTO EXTENSION
- 6) READY FOR RESURFACING

ITEM - VALVE ADJUSTMENT RING

TURNER COMPANY

P.O. BOX 20741
RALEIGH, NC 27619
phone (919) 782-9114

DATE	REV	BY	CHK	APP	DATE
PROJECT NO. 131-TC-VTL-ITZ-001			REV. NO. 01-08-02		
SHEET NO. 1			OF 1		

NOTES:
 A. MATERIALS
 1) RING INNER: Eg. POLYPROPYLENE - FIBERGLASS RING
 2) ADHESIVE - 3M 4633 ADHESIVE OR EQUAL AS APPROVED BY THE MATERIALS BUREAU.

TABLE - TECH DATA

TECHNICAL PROPERTY DATA	RANGE OF VALUES	ASTM METHOD
FIBERGLASS CONTENT, %	19-17	
MELT FLOW, g/10 min.	2-4	D1238
SPECIFIC GRAVITY	.99-1.02	D752
TENSILE STRENGTH, psi @ 73°F (21°C)	1,000-1,000	D639
FLEXURAL MODULUS, (Tension) psi	375,000-425,000	D790
IZOD IMPACT, ft-lb/in @ 73°F (21°C) Notched $\frac{1}{2} \times \frac{1}{8}$	1.3-1.7	D256
GARDNER IMPACT, in-lb	8-12	D3829
HEAT DEFLECTION, °F @ 66psi & 68psi	250-270 270-290	D648 D548
HARDNESS SHORE 'D'	64-68	D2240

B. GENERAL.

- 1) DIMENSIONS MAY VARY TO MEET EXISTING FIELD CONDITIONS. ANY CHANGE IN DIMENSIONS SHALL BE APPROVED BY THE DIRECTOR, MATERIALS BUREAU.
- 2) MAXIMUM ADJUSTMENT HEIGHT = 3"
- 3) FABRICATION TOLERANCES = $\frac{1}{16}$ "

C. INSTALLATION INSTRUCTIONS

- 1) REMOVE COVER FROM MANHOLE FRAME
- 2) CLEAN FRAME WITH WIRE BRUSH SO THAT ADHESIVE WILL BOND
- 3) SELECT RING TO MATCH OVERLAY OF ASPHALT
- 4) PLACE RING INTO FRAME TO INSURE THAT BOTH FLAT SURFACES OF THE RING ARE SUPPORTED BY THE MANHOLE FRAME
- 5) REMOVE RING FROM FRAME AND APPLY ADHESIVE TO BOTH SURFACES OF THE FRAME AND RING THAT CONTACT EACH OTHER
- 6) ALLOW ADHESIVE TO TACK FOR TWO MINUTES
- 7) INSTALL RING INTO FRAME
- 8) SLIDE COVER INTO EXTENSION RING
- 9) READY FOR RESURFACING

ITEM - MANHOLE ADJUSTMENT RING
 TURNER COMPANY
 P.O. BOX 20743
 RALEIGH, NC 27619
 phone (919) 782-8114

POLYPROPYLENE MANHOLE EXTENSION RING

REMOVE 1/4" INSERTION
 (4 PLACES)

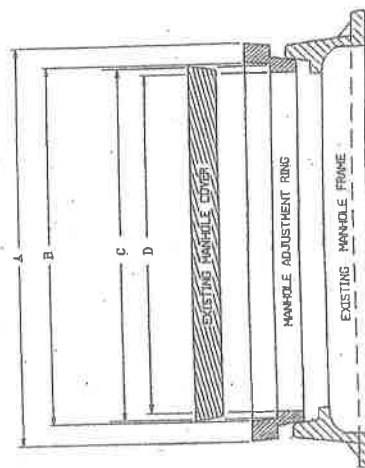
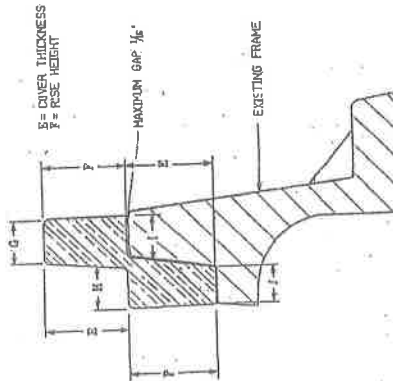
SCHEDULE

A	B	C	D	E	F*	G	H	I	J
36	33 1/2	33	31	1 1/4	1	1 1/4	1 1/4	1 1/4	1 1/4
35	33 1/2	33	31	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
34	32	31 1/2	30	1 1/4	1	1 1/4	1 1/4	1 1/4	1 1/4
34	32	31 1/2	30	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
34	32	31 1/2	30	1 1/4	2	1 1/4	1 1/4	1 1/4	1 1/4
31	29	28 1/2	27	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
31	29	28 1/2	27	1 1/4	2	1 1/4	1 1/4	1 1/4	1 1/4
31	29	28 1/2	27	1 1/4	2	3	1 1/4	1 1/4	1 1/4
MIN	22	20	19 1/2	17 1/2	7	7	7	7	7

(SIZES ARE IN INCHES) *F = DIMENSION TO BE IN INCREMENTS OF 1/8"

NOTE:

THE TABLE ABOVE REPRESENTS THE MOST COMMONLY AVAILABLE SIZES. IN ADDITION, RINGS ARE AVAILABLE IN OTHER CIRCUMFERENCES AND OTHER THICKNESSES AS REQUESTED. FOR THE ABOVE MAXIMUM AND MINIMUM DIMENSIONS, CONSULT MANUFACTURER FOR ADDITIONAL SPECIFICATIONS.



A SECTION THRU ADJUSTMENT RING & EXISTING FRAME
 N.T.S.