Bureau of Engineering
Special Order

April 19, 1995

To All: Deputy City Engineers
Division/District Engineers
Division Heads

Subject: PROCEDURE FOR EVALUATING SEWER REHABILITATION PRODUCTS

This special order standardizes the procedure to evaluate plastic products for sewer use. This procedure ensures that products installed in City sewers are adequately reviewed and demonstrate stability under service conditions for a minimum life of fifty (50) years. Plastic is defined as thermoplastics (PVC, ABS, HDPE, FRP, etc) or thermosetting resins (epoxy, polyester, vinylester, etc).

Since plastics are susceptible to plastic flow and relaxation, long term property losses of at least 50 percent are expected. The goal of this product review effort is to systematically examine new products, assess product specific losses and recommend specifications for each product with equivalent long term engineering properties.

When new products become commercially available and are considered by the Bureau, this Special Order establishes uniform product review and a data clearinghouse by the Engineer of Design.

The procedure to introduce new sewer products (Attachment "A") applies to all products not currently approved. The latest approved sewer maintenance hole (vertical shaft) products are listed in Notice No. 085, issued November 12, 1993. The latest approved sewer conduit (horizontal) products are listed in the 1994 Edition Greenbook. A summary of sewer conduit (horizontal) rehabilitation products is also shown as Attachment "B".

(CWR JMF WRH RKH RHK)

Attachments
cc: Bureau of Contract Administration (Mail Stop 480)
Bureau of Sanitation (Mail Stop 520)
Department of General Services-Standards (Mail Stop 540)

CWR/HL

Approved By:

Robert S. Horii, City Engineer

SO005.av
PROCEDURE TO INTRODUCE NEW SEWER PRODUCTS FOR CITY OF LOS ANGELES
PUBLIC WORKS APPROVAL

Step 1. The Division/District and proponent expresses a mutual interest.

Step 2. The proponent submits product data, joint details, material safety data sheets, a general description of the product, sample calculation to determine the required thickness of applied material, along with a history of past municipal applications.

Step 3. If the Division/District has a continuing interest, contact the Engineer of Design at SED and the Division Engineer at CSED to arrange a test program. To reimburse the City for engineering evaluation and testing, the proponent shall fund and obtain a B-Permit. As appropriate, the proponent shall also engage an engineering consultant to develop and propose additional tests to verify unique, specific properties claimed by the proponent.

<table>
<thead>
<tr>
<th>Standard tests</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Book 210-2.3.3</td>
<td>Accelerated Chemical Resistance</td>
</tr>
<tr>
<td>Green Book 210-2.3.4</td>
<td>Accelerated Constant Deflection</td>
</tr>
<tr>
<td>ASTM D 790</td>
<td>Flexural strength and modulus</td>
</tr>
<tr>
<td>ASTM F 894</td>
<td>Ring Stiffness Constant</td>
</tr>
<tr>
<td>ASTM D 1242</td>
<td>Abrasion Resistance</td>
</tr>
<tr>
<td>ASTM D 1693</td>
<td>Environmental Stress Cracking of Ethylene Plastic</td>
</tr>
<tr>
<td>ASTM D 1784,D 3262</td>
<td>Material Identification</td>
</tr>
<tr>
<td>or D 3350</td>
<td></td>
</tr>
<tr>
<td>ASTM D 2412</td>
<td>Parallel Plate Test</td>
</tr>
<tr>
<td>ASTM D 2837 or D 2992</td>
<td>Hydrostatic Design Basis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other tests</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taber abrasion, S-17</td>
<td>Wear resistance</td>
</tr>
<tr>
<td>ASTM C 234 or C 882</td>
<td>Adhesive Strength</td>
</tr>
<tr>
<td>ASTM D 903</td>
<td>Tear and peel strength</td>
</tr>
</tbody>
</table>

Step 4. After the Engineer of Design concurs with the proposed testing criteria and methods, General Services will proceed with laboratory testing.

Step 5. After completion of the tests, the proponent's engineer shall compile the data and submit a report with conclusions and recommendations.

Step 6. The Engineer of Design will review the report and decide to either require additional testing, schedule an experimental installation or reject the product.
Step 7. Experimental installation costs are generally provided by the proponent because the data will further the product's research, development and marketability. The City participates in the experiment by providing a site and by accepting the risk associated with a new product failure (a blocked sewer, product decomposition, pipe collapse, etcetera).

Step 8. After a successful experiment, the product is eligible for inclusion on the Approved List of materials suitable for sewer use. The Engineer of Design will prepare a report with recommendations to the City Engineer. The Engineer of Design will also consider sponsoring the product for Green Book acceptance. With a Green Book listing, the product is generally accepted nationally, increasing its sales and lowering the future cost to the City.
<table>
<thead>
<tr>
<th>BRAND NAME(S) OF SEWER REHAB</th>
<th>SSPWC SPEC REF</th>
<th>APVRVD CELL CLASS.</th>
<th>WATERWAY MIN. WALL THICKNESS</th>
<th>INTENDED APPLICATION</th>
<th>FIRST APPROVED LA CITY USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nu Pipe (Folded/Reformed PVC)</td>
<td>500-1.10A</td>
<td>12344B</td>
<td>SDR 50^1</td>
<td>No 4&quot;-15&quot;</td>
<td>Minimal No None Full Fully blocked</td>
</tr>
<tr>
<td>Am-Liner (Deformed/Reformed PVC)</td>
<td>500-1.10B</td>
<td>12111C</td>
<td>SDR 50^1</td>
<td>No 4&quot;-18&quot;</td>
<td>Minimal No None Full Fully blocked</td>
</tr>
<tr>
<td>U-Liner (Deformed/Reformed HDPE)</td>
<td>500-1.7</td>
<td>345434 C, D or E</td>
<td>SDR 32.5^1</td>
<td>No 4&quot;-18&quot;</td>
<td>Minimal No None Full Fully blocked</td>
</tr>
<tr>
<td>Danby (Spiral wound PVC)</td>
<td>500-1.5</td>
<td>12343B</td>
<td>63 mls</td>
<td>8&quot;-36&quot;</td>
<td>2&quot; Min Yes 3&quot; Lateral Partial/Full Minimal</td>
</tr>
<tr>
<td>Driscopipe (Solid wall HDPE)</td>
<td>500-1.3</td>
<td>PE3408 or 345434 C, D or E</td>
<td>SDR 32.5^1</td>
<td>No 4&quot;-63&quot;</td>
<td>4&quot; Min Yes (w/o tight fit) Access pits &amp; laterals None/Partial Minimal</td>
</tr>
<tr>
<td>Plexco (Solid wall HDPE)</td>
<td>500-1.4</td>
<td>12343B</td>
<td>63 mls</td>
<td>8&quot;-36&quot;</td>
<td>2&quot; Min Yes Access pits &amp; laterals None/Partial Minimal</td>
</tr>
<tr>
<td>Inliner (Cured in place epoxy vinyl ester w/ polyurethane liner)</td>
<td>None</td>
<td>Epoxy vinyl ester resin</td>
<td>Calculated^2</td>
<td>No 4&quot;-96&quot;</td>
<td>4&quot; Min Yes MH access or access pits Partial/Full Fully blocked</td>
</tr>
<tr>
<td>Instiform (Cured in place epoxy with polyurethane liner)</td>
<td>500-1.4</td>
<td>Epoxy resin</td>
<td>(Liner: 10 mls)</td>
<td>Yes 4&quot;-96&quot;</td>
<td>Minimal No MH access or access pits Partial/Full Fully blocked</td>
</tr>
<tr>
<td>InstiformX (Cured in place vinyl ester w/ polyurethane liner)</td>
<td>None</td>
<td>Vinyl ester resin</td>
<td>Calculated^2</td>
<td>No 4&quot;-96&quot;</td>
<td>4&quot; Min Yes MH access or access pits Partial/Full Fully blocked</td>
</tr>
<tr>
<td>Hobas (Segmented CCFPM)</td>
<td>500-1.8</td>
<td>Type 1, Liner 2, Grade 3</td>
<td>Calculated^2</td>
<td>No 12&quot;-104&quot;</td>
<td>4&quot; Min Yes Access pits or laterals None/Partial Minimal</td>
</tr>
<tr>
<td>Spirolite (Segmented Profile HDPE)</td>
<td>500-1.11</td>
<td>335434 C</td>
<td>Calculated^2</td>
<td>No 18&quot;-120&quot;</td>
<td>4&quot; Min Yes Access pits or laterals None/Partial Minimal</td>
</tr>
<tr>
<td>Danby (Person entry PVC composite)</td>
<td>500-1.5</td>
<td>24545B or 133545R</td>
<td>63 mls</td>
<td>Yes 42&quot;-144&quot;</td>
<td>Minimal Yes None Partial/Full Minimal None</td>
</tr>
<tr>
<td>RibLoc^2 (Wound PVC)</td>
<td>None</td>
<td>13454C</td>
<td>80 mls^1</td>
<td>No 6&quot;-30&quot;</td>
<td>2&quot; Min No Access pits Partial/Full Minimal None</td>
</tr>
<tr>
<td>Vylon^1 (Segmented closed profile PVC)</td>
<td>None</td>
<td>12364B</td>
<td>PS 46</td>
<td>No 21&quot;-48&quot;</td>
<td>4&quot; Min Yes Access pits or laterals None/Partial Minimal None</td>
</tr>
<tr>
<td>Polycrate^2 (Solid wall polyester or vinyl ester concrete)</td>
<td>None</td>
<td>Unspecified</td>
<td>SDR 8^1</td>
<td>No 8&quot;-12&quot;</td>
<td>4&quot; Min Yes Access pits or laterals None/Partial Minimal None</td>
</tr>
<tr>
<td>ConPlast (Cast-in-place rigid PVC liner)</td>
<td>210-2; Std Plan S-121</td>
<td>Unspecified</td>
<td>65 mls</td>
<td>Yes No limit</td>
<td>None NA NA NA NA None</td>
</tr>
<tr>
<td>T-Lock (Cast-in-place PVC liner)</td>
<td>None</td>
<td>Plan S-121</td>
<td>65 mls</td>
<td>Yes No limit</td>
<td>None NA NA NA NA None</td>
</tr>
</tbody>
</table>

**NOTE TO DESIGNER:** Specify: "ALL RESINS, COMPOUNDS AND PIPE MATERIALS SHALL BE CITY OF LA APPROVED" and the wall thickness when applicable (see Note 1).

**Note 1:** These systems require the designer to specify wall thickness (use terms such as: wall thickness, pipe stiffness, short-term stiffness factor, or long-term stiffness factor).

**Note 2:** Trial installations: The, Instiform Vinylester-Agile HDPE Cast-in-Place Liner, Laramon Sessions Vylon, Meyer Polycrate Slipline Pipe and PipeTec RibLoc products are not on the approved list and require project-by-project approval by the CSFD Division Engineer.

**Note 3:** These products are currently under testing: None.
Date: May 30, 2003

To: Design & Research Staff

From: Hugh S. Lee, Group Manager and Engineer of Design
Design Standards & Investigations Group

Subject: B-PERMIT DEPOSIT AMOUNTS FOR CHEMICAL RESISTANCE TESTING

The estimated reimbursement costs previously described in a June 2001 EoD Memo has been revised to reflect current costs. These fees are for SSPWC 210-2.3.3 Chemical Resistance Testing of sewer products (weight change, tensile strength, hardness and elongation) with samples prepared by the proponent. These figures include Department of General Services lab personnel costs, overhead, equipment depreciation and Bureau engineering oversight costs.

I. TESTING AT CITY LABS
   DGS Laboratory fee for Chemical Resistance Testing (lump sum) $8,000
   BOE oversight and review (estimated) 2,500

   Permit Deposit Amount: $10,500

   Note 1: For each additional test of a similar product concurrently placed into chemical solution, add $8,000 each.

   Note 2: For an early test termination due to a product failure through the 56th day interval, we will refund 25% of the lab fee. Product failures after the 56th day interval receive no refund.

II. TESTING AT A COMMERCIAL LAB
    Laboratory fee: To be independently arranged by the proponent
    BOE oversight and review (estimated) $2,500
    BOE unannounced inspection of outside lab facilities (estimated) 1,000

   Permit Deposit Amount: $3,500

If you have any questions, please me at x78776.

HL:hl:pickcos2.wp6

cc: K. Ning, General Services - M/S 540
CITY OF LOS ANGELES
INTER-D/EPARTMENTAL CORRESPONDENCE

Date: June 28, 2001
To: Design & Research Staff
From: Hugh Lee, Engineer of Design
A/E Consulting Services
Subject: CHEMICAL RESISTANCE TEST SAMPLE PREPARATION (SSPWC SECTIONS 207-15.3, 207-20, 210-2.3.3) - FOR IMMEDIATE USE W.O. E2000184

(Replaces earlier memos dated January 7, 1999 and April 8, 1997)

Sanitary sewer products must pass the Chemical Resistance Tests (Pickle Jar Test) as described in the Greenbook. The testing procedures are similar to ASTM's D543 and D638 with the exception being additional chemical solutions and varying chemical strengths. Materials that are exempt from Pickle Jar Test Qualification are Type III temporary coatings, Type 316 stainless steel, vitrified clay pipe and cast iron products described by Standard Plan.

The Pickle Jar Test is a battery of four tests measuring changes in weight, impact/hardness, elongation and tensile strength before and after exposure. Generally, the minimum number of samples required for testing is as follows. Sample preparation that does not conform to these descriptions below will generate a nonstandard Pickle Jar Test.

Homogeneous Products

- 55–ASTM D638 "Dogbones" (all edges exposed; one face may be sheathed with the same material and in the same manner as supplied in the field); and,
- 164-1"(+1/32", -1/16") x 3"(+1/32", -1/16") x 0.125"(+/-0.015") ASTM D543 Coupons (up to two consecutive edges may be seal coated with material of similar density as the coupon; one face may be sheathed with the same material and in the same manner as supplied in the field).

Built-up Products (Resin saturated fabrics, fiberglass, etc.)

- 164-1"(+1/32", -1/16") x 3"(+1/32", -1/16") x 0.125"(+/-0.015") ASTM D543 Coupons Neat resin samples (up to two consecutive edges may be seal coated using the same neat resin from the coupon; one face may be sheathed with the same material and in the same manner as supplied in the field); and,
- 55–ASTM D638 "Dogbones" Composite samples (all edges exposed; one face may be sheathed with the same material and in the same manner as supplied in the field); and,
- 164-1"(+1/32", -1/16") x 3"(+1/32", -1/16") x 0.250"(+/-0.030") ASTM D543 Coupons Composite samples (up to two consecutive edges may be seal coated using the same neat resin from the coupon; one face may be sheathed with the same material and in the same manner as supplied in the field).

The control and each of the ten solutions receive five "dogbones" and sixteen coupons. Tensile strength, impact/hardness and elongation readings are taken at 0 and 112 days; with weight measurements taken at 0, 28, 56, 84 and 112 days.

HL:\hl\picksam3.wp6

cc: K. Ning, Gen'l Services Lab - M/S 540
CITY OF LOS ANGELES - DEPARTMENT OF PUBLIC WORKS
SGED/ ENGINEER OF DESIGN

BUREAU OF ENGINEERING

OBSERVATIONS AT THIRD-PARTY LABORATORIES

Test Intended to Be Performed: **SEWER CHEMICAL RESISTANCE**
(Reference: SSFWC 210-2.3, EOD 01-07-99, EOD 03-03-99 and ASTM D 543.)

Observer: ____________________________
(Name, division and phone number)

Laboratory: ___________________________
(Name of company and person contacted)

Was this visit (check one): SCHEDULED UNANNOUNCED

Date of visit: _____________, 199__ from __:__am/pm to __:__am/pm.

1. General appearance of the laboratory ___________________________

2. General appearance of the area where this test is conducted ___________________________

3. Are copies of the approved Lab Procedure, SSFWC and other applicable ASTM Standards immediately available to lab technicians? ___________________________

4. Are the data collection sheets correctly used and up-to-date? ___________________________

5. Verify the calibration of all measuring devices used/ necessary for tests.
   Device/instrument: ____________________________ Calib. Current/ Expired
   Device/instrument: ____________________________ Calib. Current/ Expired
   Device/instrument: ____________________________ Calib. Current/ Expired

6. Is the volume of solution in each jar adequate? (40 ml per in² of total specimen surface area) ___________________________

7. Do specimens appear to have the correct dimensions and edge coatings? ___________________________

8. Are specimens fully exposed to the chemicals? (Describe the devices used for buoyant specimens and to separate the specimens) ___________________________

9. Is there evidence that the chemicals are thoroughly mixed every 24 hours? (Describe device. Is the device effective for the volume?) ___________________________

10. Draw approx. 300 ml samples of the solutions for chemical analysis (sodium hydroxide, ammonium hydroxide or BOD are often found to be depleted and out of specification).
    Jar No. _____ Chemical _________ Date Mixed by Pvt. Lab _________
    Jar No. _____ Chemical _________ Date Mixed by Pvt. Lab _________
    Jar No. _____ Chemical _________ Date Mixed by Pvt. Lab _________

11. Other comments: Put on back of this sheet. (Number of added sheets: ___)

Distribution: □ EOD □ Project Engineer □ File ____________________

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