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November 17, 1999
Test Report No. E9-0544

CLIENT: Insituform Technologies, Inc.
17999 Edison Avenue
Chesterfield, MO 63005-3700
Attn: Greg Hunt

RE: PO R-05508

MATERIAL: Thirty-five individual composite specimens approximately 8 inches x ½ inch x 0.235 inches were submitted and identified as Insituform® 102TA Composite Samples.

TESTING: Chemical Resistance testing was conducted in accordance with ASTM D5813-95, paragraph 6.4.1. The specimens were immersed in the solutions shown in the table below for 368 days. At the end of the exposure, the specimens were removed and tested for flexural properties in accordance with ASTM D790-98, Procedure A using a span to depth ratio of at least 16:1. In addition, one set of "Control" specimens were exposed to approximately 50% Relative Humidity and 23°C for the 368 day period.

Chemical Solution	Concentration
Nitric acid	1
Sulfuric acid	5
ASTM Fuel C	100
Vegetable oil	100
Detergent	0.1
Soap	0.1

RESULTS: The results are summarized in Table 1 as the percentage retention of flexural modulus and flexural strength after the one-year immersion. All values exceeded the ASTM D5813 requirements of at least 80% retention of flexural modulus after one-year immersion in all solutions. Detailed values are presented in Table 2.

TESTING SUPERVISED BY:

Julie Krause-Singh
Section Manager

TESTING CONDUCTED BY:

Dale J. Beasley
Technician II

TABLE 1
SUMMARY OF FLEXURAL TEST RESULTS

Solution	Average Retention of Flexural Strength	Average Retention of Flexural Modulus
	%	%
Nitric acid	87	94
Sulfuric acid	87	98
ASTM Fuel C	90	100
Vegetable oil	87	101
Detergent	85	85
Soap	88	88
ASTM D5813 Requirement		80 minimum

TABLE 2
DETAILED FLEXURAL PROPERTIES

Specimen No.	Maximum Flexural Strength		Flexural Modulus (Tangent)	
	Value	% Retention	Value	% Retention
	psi	%	psi	%
Control				
1	6860		746000	
2	6970		722000	
3	7450		718000	
4	8630		733000	
5	8560		792000	
Average	7690	100	742000	100
Std. Dev.	850		29700	
Nitric Acid Exposure				
1	6610		676000	
2	6810		721000	
3	6670		725000	
4	6650		660000	
5	6620		716000	
Average	6670	87	700000	94
Std. Dev.	80		29600	
Sulfuric Acid Exposure				
1	6710		672000	
2	6540		711000	
3	6530		768000	
4	6400		730000	
5	7140		758000	
Average	6670	87	728000	98
Std. Dev.	290		38500	
ASTM Fuel C Exposure				
1	6650		734000	
2	6450		751000	
3	7310		701000	
4	7000		790000	
5	7300		-----	
Average	6940	90	744000	100
Std. Dev.	390		37000	

TABLE 2 CONTINUED

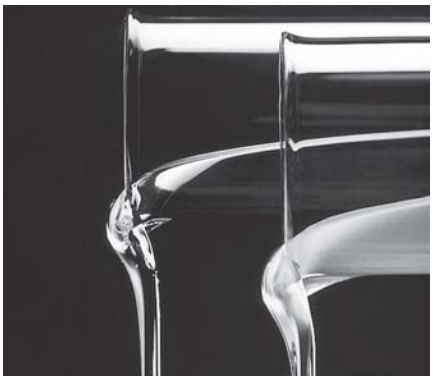
Specimen No.	Maximum Flexural Strength		Flexural Modulus (Tangent)	
	Value	% Retention	Value	% Retention
	psi	%	psi	%
Vegetable Oil Exposure				
1	7320		726000	
2	6230		748000	
3	6760		769000	
4	6420		735000	
5	6560		787000	
Average	6660	87	753000	101
Std. Dev.	420		24900	
Detergent Exposure				
1	7110		605000	
2	6160		634000	
3	6630		650000	
4	5760		623000	
5	7030		652000	
Average	6540	85	633000	85
Std. Dev.	570		19400	
Soap Exposure				
1	6110		618000	
2	6860		647000	
3	6930		688000	
4	6780		658000	
5	7270		657000	
Average	6790	88	654000	88
Std. Dev.	420		25000	

AOC
World Leader in Resin Technology

102 TA Filled
Polyester Resin

Product Information

Isophthalic Based Resin for Underground Sewer Pipe Liners



TYPICAL LIQUID RESIN PROPERTIES

	Nominal	Test Method
Flexural Strength, psi/MPa	4,500/31.5	ASTM D 790
Flexural Modulus, psi/GPa	400,000/2.7	ASTM D 790

***Typical properties are not to be construed as specifications.**

DESCRIPTION

AOC's 102 TA Filled is a high molecular weight isophthalic unsaturated polyester resin that was developed for Insituform Technologies, Inc. and their licensees. 102 TA Filled provides the corrosion resistance, durability and toughness that is required in this demanding application. Using recommended catalyst systems and temperatures, up to 50 hours of catalyzed pot life may be obtained. 102TA Filled thixotropic properties reduce resin pooling while providing superior PET felt wet-out.

FEATURES

- Excellent catalyzed pot life
- Superior mechanical properties
- High molecular weight
- High heat distortion tempature

APPLICATION

- Sewer pipe liners

PERFORMANCE GUIDELINES

Consistent shop conditions contribute to consistent gel times.

STORAGE STABILITY

Resins are stable for three months from date of production when stored in the original containers away from sunlight at no more than 70°F/21°C. After extended storage, some drift may occur in gel time. During the hot summer months, no more than two months stability at 86°F/30°C should be anticipated.

SAFETY

See appropriate Material Safety Data Sheet for guidelines.

ISO 9001:2000 CERTIFIED

The Quality Management Systems at every AOC manufacturing facility have been certified as meeting ISO 9001:2000 standards. This certification recognizes that each AOC facility has an internationally accepted model in place for managing and assuring quality. We follow the practices set forth in this model to add value to the resins we make for our customers.

MATERIAL SAFETY DATA SHEET (MSDS)

Section 1: Product and Company Information

Product: Impregnated Insitutube Product

Company:

Insituform Technologies Inc
17988 Edison Ave.
Chesterfield MO 63005

Emergency Contacts:

Insituform Emergency Contact (24 hours) 877-576-2653

Technical Contacts:

Technical Information (8am - 5pm CT): (636) 530-8000

Section 2: Composition and Ingredient Information

Name	C.A.S. #	% by Weight
Coated Polyester Felt, Article, not considered hazardous		10 ~ < 40
Polyester Resin	64386-66-9	30 ~ < 40
Styrene	100-42-5	15 ~ 30
Organic peroxide	Various	0.1 ~ < 1.0

Section 3: Hazards Identification

Appearance and Odor: Semi-solid / liquid with Characteristic Styrene Odor

Emergency Overview

No unusual emergency situations are expected from this product.

Primary Route (s) of Exposure: inhalation, skin, eye

Potential Health Effects:

ACUTE (short term): Uncured Product: Inhalation of vapors from uncured product may cause upper respiratory irritation and possible central nervous system effects including headaches, nausea, vomiting, dizziness, drowsiness, loss of coordination, impaired judgement, and general weakness. Direct contact may cause dryness, cracking, tenderness and irritation of the skin and may result in immediate irritation to the eyes with redness, burning, tearing and blurred vision. It may cause mouth, throat and gastrointestinal irritation, nausea, vomiting, and diarrhea if ingested.

Cured Product: Exposure to dusts and fibers generated from sawing, drilling or other forms of mechanical alteration of this product may result in itching and irritation of the mouth, nose, throat, skin or eyes. See Section 8 for exposure controls.

CHRONIC (long term): Uncured Product: Styrene is a possible cancer hazard (IARC Group2B). Prolonged exposure may result in nausea, loss of appetite, general weakness, changes in blood chemistry, and peripheral and central nervous system activity. Prolonged or repeated skin contact may result in irritation, dermatitis marked by rough, dry cracking skin.

Cured Product: There are no known chronic health effects associated with exposure to dusts and fibers generated from mechanical alteration of this product.

Section 4: First Aid Measures

General Information: Remove contaminated soaked clothing immediately and dispose of safely.

Inhalation: Insure supply of fresh air. In the event of symptoms refer to medical treatment.

Skin Contact: In case of contact with skin wash off immediately with soap and water for 15 minutes. Seek medical advice if skin irritation persists.

Eye Contact: In case of contact with eyes rinse thoroughly with plenty of water for 15 minutes. If irritation persists seek medical advice.

Ingestion: Seek Medical Attention

Section 5: Fire Fighting Measures

Flash Point and Method:	88°F (31°C) Method TCC
Flammability Limits (%):	LEL: 0.9 - Styrene UEL: 6.8 - Styrene
Auto Ignition Temperature:	914°F (490°C) - Styrene
Extinguishing Media:	Water spray, Foam, CO_2 or dry chemical.
Fire Fighting Instructions:	In a sustained fire wear self-contained breathing apparatus and full protective gear.
Hazardous Combustion Products:	Primary combustion products are carbon monoxide, carbon dioxide, and low molecular weight hydrocarbons. Other undetermined compounds could be released in small quantities.

Section 6: Accidental Release Measures

Release of this product to the land, water and air may require reporting to local, state and federal agencies.

Methods for Cleanup: Remove all sources of ignition (flames, hot surfaces, and electrical static or frictional sparks). Insure adequate ventilation in the area. Material is insoluble in water. Soak up any residues with absorbent material (e.g. sand, sawdust, general purpose binder). Dispose of absorbed materials in accordance with local, state and federal agencies.

Section 7: Handling and Storage

Safe Handling Procedures: Use only in well ventilated areas.

Fire & Explosion: Keep away from sources of ignition.

Storage Temperature: Store below 77°F (25°C)

Storage Pressure: Not applicable.

General: Product will cure if exposed to elevated temperatures.

Section 8: Exposure Controls and Personal Protection

Ingredients	OSHA PEL	ACGIH TLV
Styrene	100 ppm TWA 200 ppm Ceiling 600 ppm (5 minute max peak in any 3 hours)	50 ppm TWA 100 ppm STEL

Engineering Controls: General dilution ventilation and /or exhaust ventilation should be provided as necessary to maintain exposures below the regulatory limits and to control irritation.

Personal Protection:

Respiratory Protection: For uncured product: If irritation occurs, or if the TLVs or PELs are exceeded, used a NIOSH/MSHA approved air purifying respirator with organic vapor cartridges or canisters, or supplied air respirators.

Skin Protection: When skin contact is possible, protective clothing is recommended.

Eye Protection: Safety glasses, goggles or face shield.

Work / Hygienic Practices: Handle in accordance with good industrial hygiene and safety practices. These include avoiding unnecessary exposure and removal of the product from skin, eyes and clothing. Remove contaminated clothing immediately. Wash thoroughly after skin contact.

Section 9: Physical and Chemical Properties

Vapor Pressure: 4.5 Styrene(mm Hg @ 20°C)

Vapor Density (Air = 1): 4.5 Styrene

Freezing Point: Not Available

Specific Gravity (Water = 1): 1.2 - 2.0

Boiling Point: Not Determined

Solubility in Water: Insoluble

Viscosity: Not available

pH: N/A

Physical State: Semisolid/Liquid

Appearance: Putty-like

Odor Type: Aromatic

Evaporation Rate (n-Butyl Acetate: N/A

Lower Explosive Limit: 1.1%

Upper Explosive Limit: 6.0%

Section 10: Stability and Reactivity

General: Stable below 77°F (25°C)

Hazardous Decomposition Products: No hazardous decomposition products known.

Hazardous Polymerization: Ambient temperatures over 77°F (25°C) may cause product to cure. Avoid excessive heat and prolonged storage above 77°F (25°C). Violent polymerization is unlikely.

Section 11: Toxicological Information

Acute Oral Toxicity: Not Determined
Acute Dermal Toxicity: Not Determined
Acute Inhalation Toxicity: Not Determined
Eye Irritation: Not Determined
Skin Irritation: Not Determined
Respiratory Tract Irritation: Not Determined
Sensitization: Not Determined
Chronic Toxicity: Not Determined
Mutagenicity: Not Determined
Reproductive Toxicity: Not Determined
Carcinogenicity: Styrene Monomer has been classified by the International Agency for Research on Cancer (IARC) as a possible carcinogen to humans (Group 2B) due to "inadequate evidence in humans" and "limited evidence in animals."

Section 12: Disposal Considerations

RCRA Hazard Class: Not a RCRA hazardous waste. Prior to curing, this product may be considered a special waste by certain state and local disposal authorities.

Section 13: Transport Information

DOT Shipping Name: RQ, Resin Solution Flammable (contains styrene), 3 , UN1866, PG III.

Hazard Class or Division: 3

Secondary: None

Identification No.: UN 1866

Packing Group: III

Substances: Styrene **RQ:** 1000 lbs.

Transportation of Dangerous Goods – Canada

Proper Shipping Name: RQ, Resin Solution Flammable (contains styrene), 3 , UN1866, PG III.

TDG Hazard Classification: (Primary): 3 **(Secondary):** None

Product Identification No.: UN 1866

Packing Group: III

Schedule XII Quantity Restriction: None

Maximum Net Quantity per Package: Varies by project.

Section 14: Regulatory

TSCA Status: Each ingredient is on the Inventory. **NSR Status (Canada):** Each ingredient is on the DSL.

SARA Title III:

Hazard Categories:

Acute Health:	yes
Chronic Health:	yes
Fire Hazard:	yes
Pressure Hazard:	no
Reactivity Hazard:	yes

Report Ingredients:

Sec. 302 / 304:	Styrene
Sec. 313	Styrene

Clean Air Act: Styrene is listed as a hazardous air pollutant. **WHMIS (Canada):** Status: Controlled product **WHMIS Classification:** D2A - possible carcinogen

Section 15: Other Information

HMIS and NFPA Hazard Rating:

Category	HMIS	NFPA
Acute Health Flammability Reactivity	2 3 2	2 3 2