Insituform
An Aegion Company

Worldwide Pipeline Rehabilitation

17999 Edison Ave.
Chesterfield, MO 63005

Tel: (636) 530-8000
Fax: (636) 530-8744

102T Series
Polyester Resin
June 2014

Polyester Resin for Gravity CIPP Applications

Insituform's 102T Series is a family of polyester resins for gravity sanitary and storm sewer applications. Resins currently approved for the 102T Series include:

AOC L758
Interplastic COR78-AT-559/5XX
AOC L721
Insituform 102T

Typical Resin/Felt Properties

Flexural Strength, psi/MPa	4,500/31.5	ASTM D 790
Flexural Modulus, psi/MPa	400,000/2,760	ASTM D 790

Description

Insituform's 102T Series resins are comprised of filled, thixotropic polyester resins and are excellent applications for sanitary and storm sewers. These resins can also be used in some industrial applications. Polyester resins provide the corrosion resistance required for sanitary sewer applications and also provide the durability needed for long-term applications.

Features

Good physical properties, corrosion resistant, durable, good long-term properties, excellent catalyzed pot life, high heat distortion temperature and high molecular weight.

Safety

Safety guidelines are available in the appropriate Material Safety Data Sheet.

Detailed Information

Detailed information for any of the approved resins in the 102T Series can be provided upon request.

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Corrosion Testing for Gravity CIPP Applications

Insituform's 102T Series is a family of polyester resins for gravity sanitary and storm sewer applications. Resins currently approved for the 102T Series include:

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Chemical Resistance Testing

CIPP laminates made from each of Insituform's 102T Series resins are tested for chemical resistance in accordance with ASTM F1216 for one month exposure and ASTM D5813 for one year exposure.

Test Results

The results of the ASTM F 1216 and D 5813 chemical corrosion testing are shown in the attached data sheets ASTM F 1216 CORROSION TESTING RESULTS and ASTM D 5813 CORROSION TESTING RESULTS, respectively.

Detailed Information

Detailed information for any of the approved resins in the 102T Series can be provided upon request.

INSITUFORM TECHNOLOGIES
102T SERIES POLYESTER RESIN
ASTM D 5813 CORROSION TESTING RESULTS

	AOC L721-LTA		AOC L758-LTI		COR 78-AT-559/5XX		INSITUFORM 102T	
	RETENTION VALUE	REQUIREMENT 80%		REQUIREMENT 80%	RETENTION VALUE	REQUIREMENT 80%	RETENTION VALUE	REQUIREMENT 80%
CONTROL SAMPLE								
Flexural Modulus, psi	619,000		668,000		666,000		742,000	
1% NITRIC ACID								
Flexural Modulus, psi	533,000		561,000		620,000		700,000	
% Retention	86%	PASSED	84%	PASSED	93%	PASSED	94%	PASSED
5% SULFURIC ACID								
Flexural Modulus, psi	562,000		572,000		637,000		728,000	
% Retention	91%	PASSED	86%	PASSED	96%	PASSED	98%	PASSED
100% ASTM FUEL C								
FLEXURAL MODULUS, psi	587,000		666,000		595,000		744,000	
% Retention	95%	PASSED	100%	PASSED	89%	PASSED	100%	PASSED
100% VEGETABLE OIL								
FLEXURAL MODULUS, psi	634,000		665,000		674,000		753,000	
% Retention	102%	PASSED	100%	PASSED	101%	PASSED	101%	PASSED
0.10% DETERGENT								
Flexural Modulus, psi	550,000		591,000		638,000		633,000	
% Retention	89%	PASSED	89%	PASSED	96%	PASSED	85%	PASSED
0.10% SOAP								
Flexural Modulus, psi	553,000		651,000		645,000		654,000	
% Retention	89%	PASSED	98%	PASSED	97%	PASSED	88%	PASSED

June 2014

INSITUFORM TECHNOLOGIES
102T SERIES PLOYESTER RESIN
ASTM F 1216 CORROSION TESTING RESULTS

	AOC L721-LTA		AOC L758-LTI		COR 78-AT-559/5XX		INSITUFORM 102T	
	RETENTION VALUE	REQUIREMENT 80%	RETENTION VALUE	REQUIREMENT 80%	RETENTION VALUE	REQUIREMENT 80%	RETENTION VALUE	REQUIREMENT 80%
CONTROL SAMPLE								
FLEXURAL STRENGTH, psi	6,650		6,048		8180		6,896	
FLEXURAL MODULUS, psi	590,000		722,710		665887		750,666	
TAP WATER								
FLEXURAL STRENGTH, psi	7,602		6,353		7896		6,703	
% RETENTION	114%	PASSED	100%	PASSED	97%	PASSED	97%	PASSED
FLEXURAL MODULUS, psi	551,706		632,142		648714		730,936	
% RETENTION	94%	PASSED	88%	PASSED	97%	PASSED	97%	PASSED
5% NITRIC ACID								
FLEXURAL STRENGTH, psi	7,464		5,924		7858		6,281	
% RETENTION	112%	PASSED	98%	PASSED	96%	PASSED	91%	PASSED
FLEXURAL MODULUS, psi	568,565		616,116		640045		755,552	
% RETENTION	96%	PASSED	85%	PASSED	96%	PASSED	101%	PASSED
10% PHOSPHORIC ACID								
FLEXURAL STRENGTH, psi	7,623		6,291		7709		7,177	
% RETENTION	115%	PASSED	100%	PASSED	94%	PASSED	104%	PASSED
FLEXURAL MODULUS, psi	544,623		678,126		663334		757,194	
% RETENTION	92%	PASSED	94%	PASSED	100%	PASSED	101%	PASSED
10% SULFURIC ACID								
FLEXURAL STRENGTH, psi	7,557		6,236		7774		6,989	
% RETENTION	114%	PASSED	100%	PASSED	95%	PASSED	101%	PASSED
FLEXURAL MODULUS, psi	575,028		646,307		667650		745,008	
% RETENTION	97%	PASSED	90%	PASSED	100%	PASSED	99%	PASSED
100% GASOLINE								
FLEXURAL STRENGTH, psi	8,397		6,576		8527		7,639	
% RETENTION	126%	PASSED	100%	PASSED	104%	PASSED	111%	PASSED
FLEXURAL MODULUS, psi	599,527		695,498		656421		765,138	
% RETENTION	102%	PASSED	96%	PASSED	99%	PASSED	102%	PASSED
100% VEGETABLE OIL								
FLEXURAL STRENGTH, psi	7,852		6,460		8039		6,772	
% RETENTION	118%	PASSED	100%	PASSED	98%	PASSED	98%	PASSED
FLEXURAL MODULUS, psi	624,613		685,065		675249		759,969	
% RETENTION	106%	PASSED	95%	PASSED	101%	PASSED	101%	PASSED
0.1% DETERGENT								
FLEXURAL STRENGTH, psi	7,125		6,396		7697		6,712	
% RETENTION	107%	PASSED	100%	PASSED	94%	PASSED	97%	PASSED
FLEXURAL MODULUS, psi	548,941		682,070		638719		737,963	
% RETENTION	93%	PASSED	94%	PASSED	96%	PASSED	98%	PASSED
0.1% SOAP								
FLEXURAL STRENGTH, psi	6,771		5,906		7778		7,164	
% RETENTION	101%	PASSED	98%	PASSED	95%	PASSED	104%	PASSED
FLEXURAL MODULUS, psi	562,800		649,337		644970		767,237	
% RETENTION	95%	PASSED	90%	PASSED	97%	PASSED	102%	PASSED

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Flexural Creep Testing for Gravity CIPP Applications

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AOC L721
Insituform 102T

Typical Resin/Felt Properties

Flexural Strength, psi/MPa	4,500/31.5	ASTM D 790
Flexural Modulus, psi/MPa	400,000/2,760	ASTM D 790

Flexural Creep Testing

CIPP laminates made from each of Insituform's 102T Series resins were tested for flexural creep in accordance with ASTM D2990 for 10,000 hours.

Test Results

The results of tests for each group of laminates were plotted from 100 hours to 10,000 hours on a log/log graph, and a linear trend line was created. The 50 year flexural creep modulus was estimated by extending the linear regression to 50 years.

Safety

Safety guidelines are available in the appropriate Material Safety Data Sheet.

Detailed Information

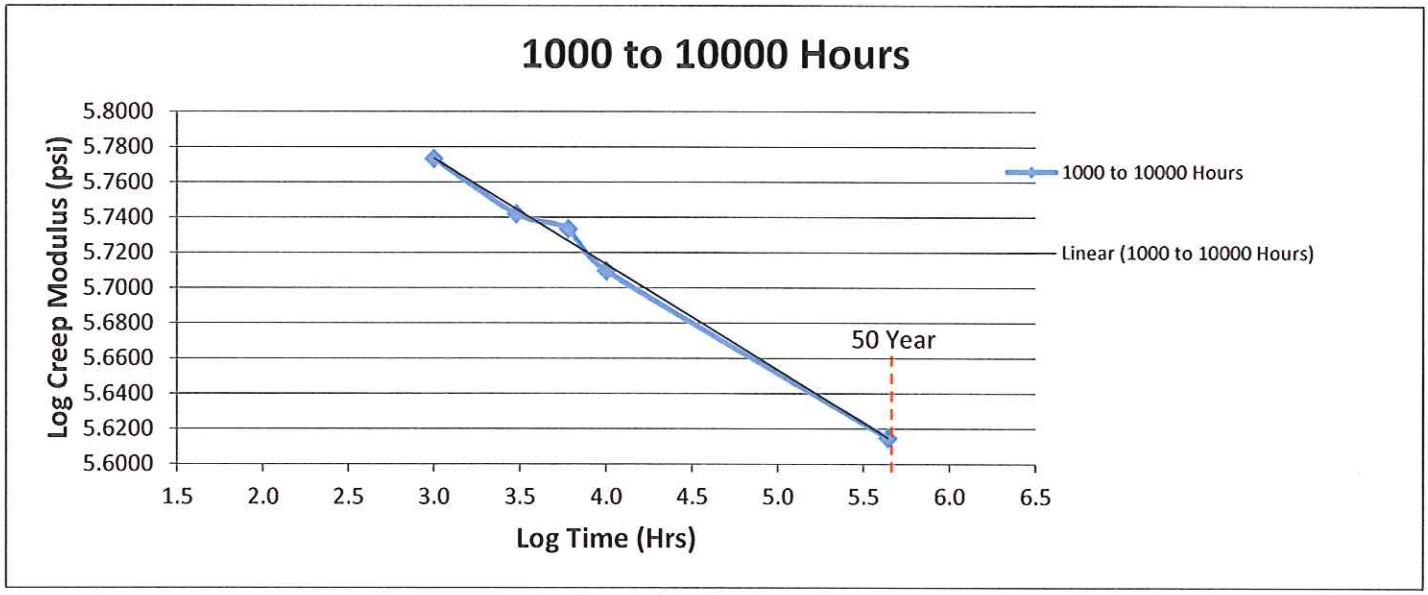
Detailed information for any of the approved resins in the 102T Series can be provided upon request.

ASTM D 2990 Creep Modulus Data
Insituform 102 T/TA Polyester Resin
Insituform-102 Series Resin
CENTRE for ADVANCEMENT of TRENCHLESS TECHNOLOGIES

Test Reporting Date May 1, 2005

Elapsed Time (hours)	Flex Displ Avg (in)	Flex Creep Mod Avg (psi)	Log Values	
			Time	Modulus
1000	0.7240	593614	3.0000	5.7735
3000	0.7767	552208	3.4771	5.7421
6000	0.7920	541394	3.7782	5.7335
10000	0.8350	512511	4.0000	5.7097
438000		412000	5.6415	5.6149

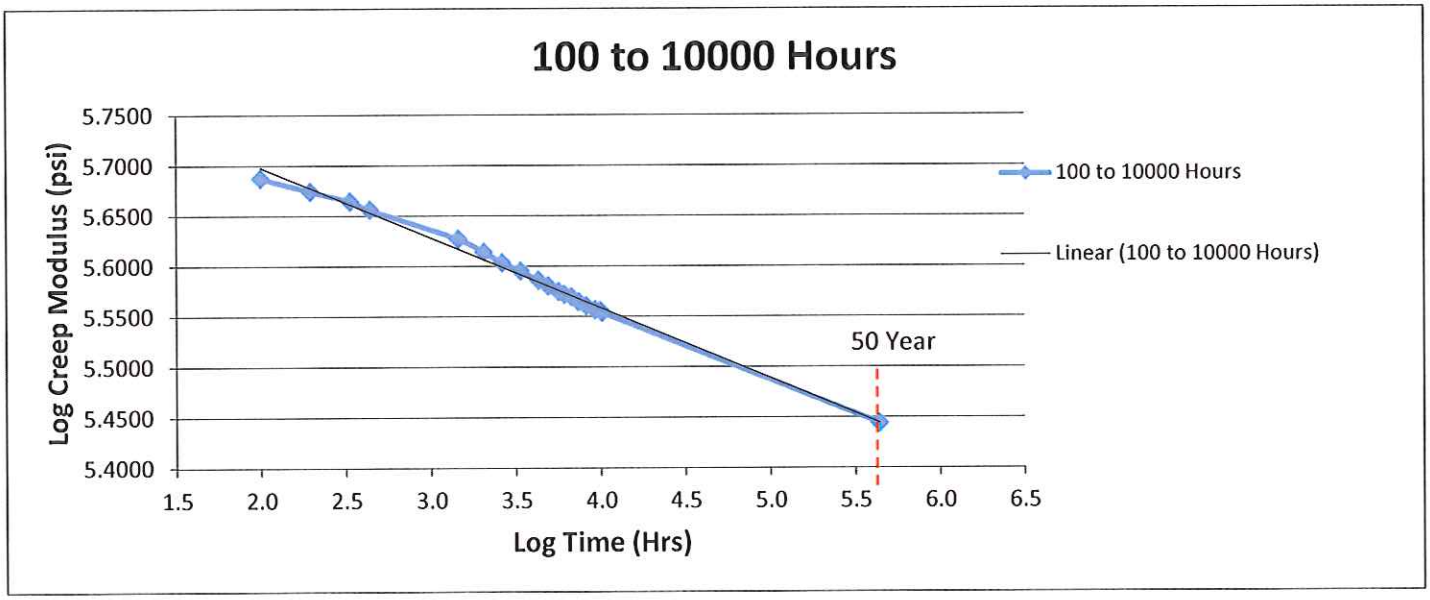
50-year projected creep modulus = 412,000 psi
Note: Data available in full report



ASTM D 2990 Creep Modulus Data
AOC L721-LT Polyester Resin
Insituform 102 Series Resin
Microbac
Test Reporting Date December 13, 2011

Elapsed Time (hours)	Flex Displ Avg (in)	Flex Creep Mod Avg (psi)	Log Values	
			Time	Modulus
100	0.4277	486685	2.0004	5.6872
196	0.4268	472531	2.2911	5.6744
335	0.4260	461658	2.5244	5.6643
437	0.4254	453185	2.6404	5.6563
1441	0.4231	423727	3.1586	5.6271
2043	0.4220	411252	3.3102	5.6141
2620	0.4211	401484	3.4183	5.6037
3362	0.4203	393836	3.5266	5.5953
4293	0.4195	385482	3.6328	5.5860
4892	0.4190	380492	3.6895	5.5803
5640	0.4185	375809	3.7513	5.5750
6122	0.4182	373235	3.7869	5.5720
6718	0.4180	371235	3.8272	5.5696
7415	0.4175	367127	3.8701	5.5648
8230	0.4171	363806	3.9154	5.5609
9270	0.4168	360535	3.9671	5.5569
9913	0.4166	359357	3.9962	5.5555
10179	0.4165	358178	4.0077	5.5541
438000		278,100	5.6415	5.4442

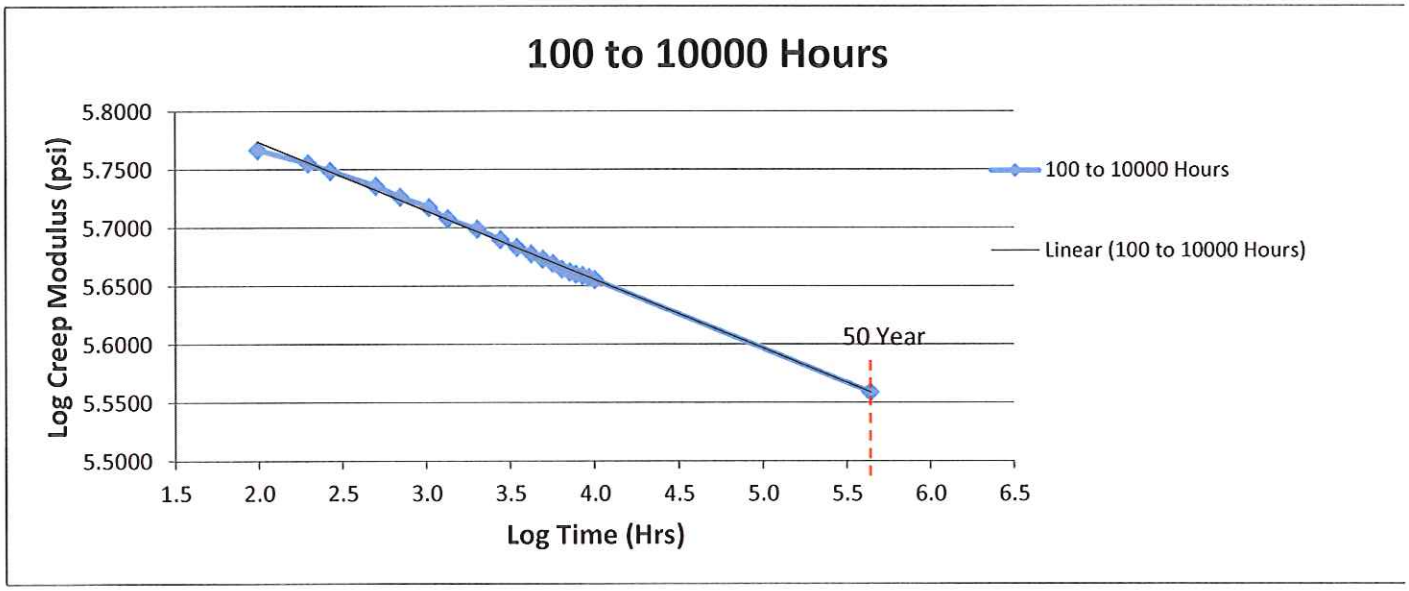
50-year projected creep modulus = 278,100 psi



ASTM D 2990 Creep Modulus Data
AOC L758-LTI Polyester Resin
Insituform 102 Series Resin
Hauser Laboratories Boulder, CO
Test Reporting Date August 17, 2005

Elapsed Time (hours)	Displacement Avg (in)	Creep Modulus Avg (psi)	Log Values	
			Time	Modulus
99	0.0290	584660	1.9948	5.7669
197	0.0298	569260	2.2953	5.7553
268	0.0303	560940	2.4285	5.7489
500	0.0312	544620	2.6993	5.7361
698	0.0318	533000	2.8440	5.7267
1037	0.0325	522140	3.0157	5.7178
1343	0.0932	510740	3.1281	5.7082
2014	0.0339	500180	3.3040	5.6991
2758	0.0346	489720	3.4406	5.6899
3458	0.0352	482240	3.5388	5.6833
4200	0.0356	476220	3.6233	5.6778
4925	0.0360	471140	3.6924	5.6731
5637	0.0363	467240	3.7510	5.6695
6381	0.0367	462120	3.8049	5.6648
7102	0.0369	459640	3.8514	5.6624
7751	0.0371	457380	3.8894	5.6603
8493	0.0372	456440	3.9291	5.6594
9262	0.0373	454440	3.9667	5.6575
10011	0.0375	452500	4.0005	5.6556
438000		362300	5.6415	5.5591

50-year projected creep modulus = 362,300 psi



ASTM D 2990 Creep Modulus Data
Interplastic COR 78-AT-559/5XX Polyester Resin
Insituform-102 Series Resin
Interplastic Corporation Thermoset Resins Division
Test Reporting Date September 18, 2012

Elapsed Time (hours)	Displacement Avg (in)	Creep Modulus Avg (psi)	Log Values	
			Time	Modulus
100	no data	527400	2.0000	5.7221
196	available	516500	2.2923	5.7131
500		486900	2.6990	5.6874
700		474600	2.8451	5.6763
1004		463100	3.0017	5.6657
2012		443300	3.3036	5.6467
3019		433900	3.4799	5.6374
4028		424900	3.6051	5.6283
5036		422000	3.7021	5.6253
6044		420400	3.7813	5.6237
7052		414400	3.8483	5.6174
8059		409400	3.9063	5.6121
9000		402700	3.9542	5.6050
10003		397800	4.0001	5.5997
438000		320200	5.6415	5.5054

50-year projected creep modulus = 359,200 320,200