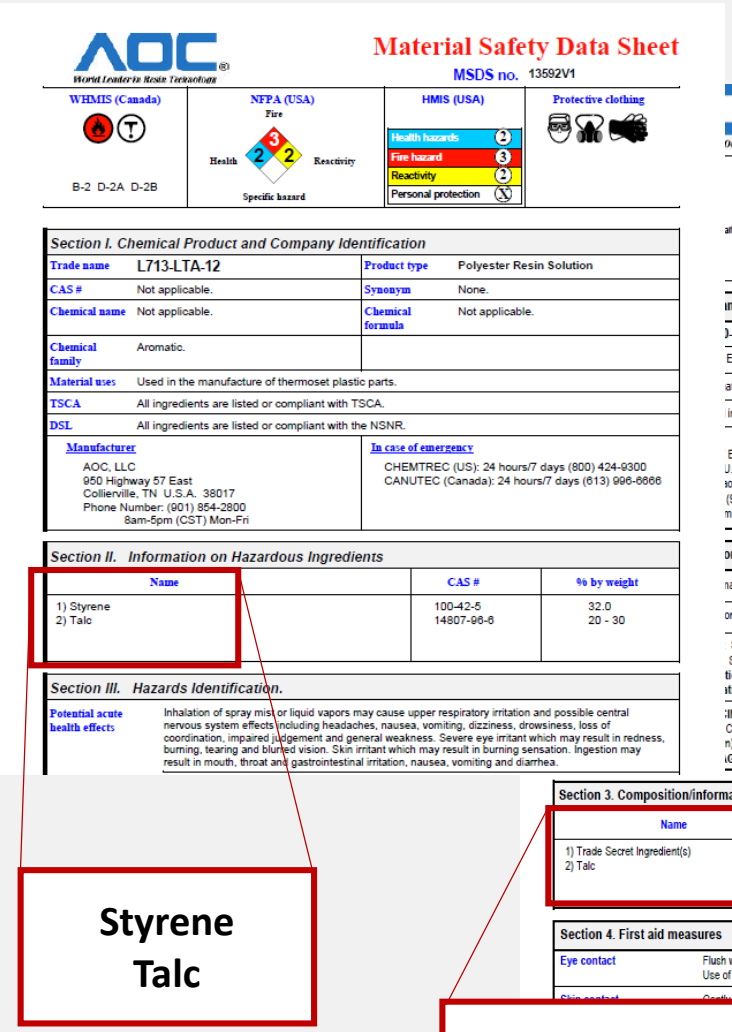
WHAT chemicals are listed in Material Safety Data Sheets (MSDS)?

MSDS of the Resin for CIPP manufacturing in California site

MSDS of the Resin for storm water culvert repair in New York site



AOC
World Leaders in Resin Technology

Material Safety Data Sheet
MSDS no. 13592V1

WHMIS (Canada)	NFPA (USA)	HMIS (USA)	Protective clothing
B-2 D-2A D-2B	Fire 3, Health 2, Reactivity 2, Specific hazard	Health hazards 2, Fire hazard 3, Reactivity 2, Personal protection X	

Section I. Chemical Product and Company Identification

Trade name	L713-LTA-12	Product type	Polyester Resin Solution
CAS #	Not applicable.	Synonym	None.
Chemical name	Not applicable.	Chemical formula	Not applicable.
Chemical family	Aromatic.		
Material uses	Used in the manufacture of thermoset plastic parts.		
TSCA	All ingredients are listed or compliant with TSCA.		
DSL	All ingredients are listed or compliant with the NSNR.		

Manufacturer
AOC, LLC
950 Highway 57 East
Collierville, TN U.S.A. 38017
Phone Number: (901) 854-2800
8am-5pm (CST) Mon-Fri

In case of emergency
CHEMTREC (US): 24 hours/7 days (800) 424-9300
CANUTEC (Canada): 24 hours/7 days (613) 996-6666

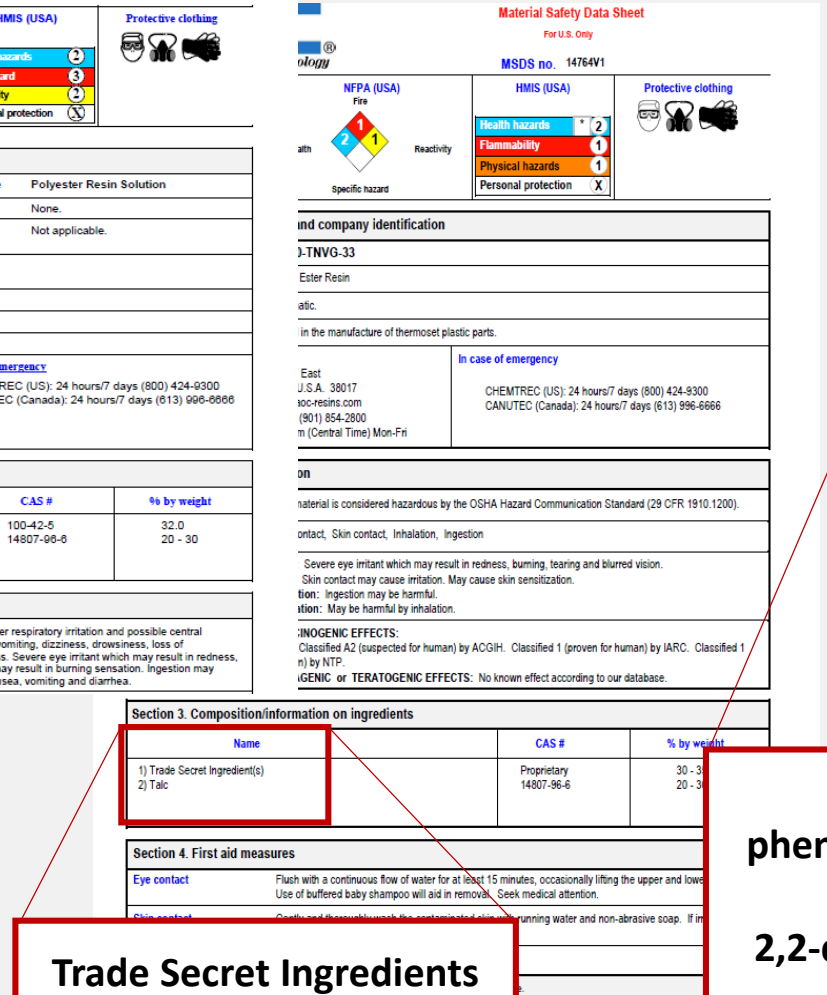
Section II. Information on Hazardous Ingredients

Name	CAS #	% by weight
1) Styrene	100-42-5	32.0
2) Talc	14807-96-6	20 - 30

Section III. Hazards Identification.

Potential acute health effects: Inhalation of spray mist or liquid vapors 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. Severe eye irritant which may result in redness, burning, tearing and blurred vision. Skin irritant which may result in burning sensation. Ingestion may result in mouth, throat and gastrointestinal irritation, nausea, vomiting and diarrhea.

Styrene
Talc



Material Safety Data Sheet
For U.S. Only
MSDS no. 14764V1

NFPA (USA)	HMIS (USA)	Protective clothing
Fire 2, Health 1, Reactivity 1, Specific hazard	Health hazards *2, Flammability 1, Physical hazards 1, Personal protection X	

nd company identification

-TNVG-33
Ester Resin
atic.
in the manufacture of thermoset plastic parts.

East
U.S.A. 38017
oc-resins.com
(901) 854-2800
m (Central Time) Mon-Fri

In case of emergency
CHEMTREC (US): 24 hours/7 days (800) 424-9300
CANUTEC (Canada): 24 hours/7 days (613) 996-6666

on

material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
ontact, Skin contact, Inhalation, Ingestion
Severe eye irritant which may result in redness, burning, tearing and blurred vision.
Skin contact may cause irritation. May cause skin sensitization.
tion: Ingestion may be harmful.
tion: May be harmful by inhalation.
INOGENIC EFFECTS:
Classified A2 (suspected for human) by ACGIH. Classified 1 (proven for human) by IARC. Classified 1
n) by NTP.
GENIC or TERATOGENIC EFFECTS: No known effect according to our database.

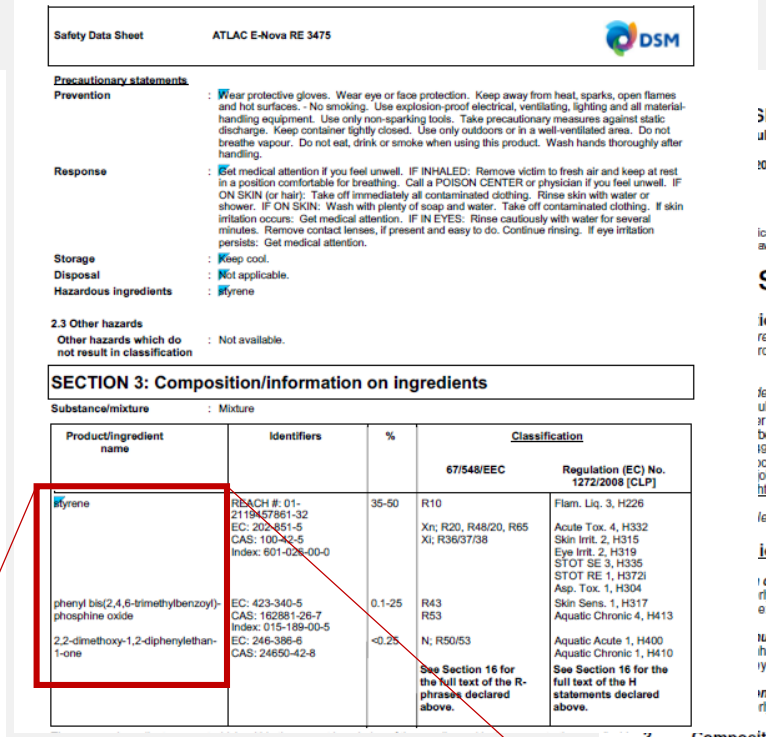
Section 3. Composition/information on ingredients

Name	CAS #	% by weight
1) Trade Secret Ingredient(s)	Proprietary	30 - 3
2) Talc	14807-96-6	20 - 3

Section 4. First aid measures

Eye contact: Flush with a continuous flow of water for at least 15 minutes, occasionally lifting the upper and lowe
Use of buffered baby shampoo will aid in removal. Seek medical attention.

Trade Secret Ingredients
Talc



Safety Data Sheet ATLAC E-Nova RE 3475 — DSM

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Do not breathe vapour. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : Get medical attention if you feel unwell. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Keep cool.

Disposal : Not applicable.

Hazardous ingredients : Styrene

2.3 Other hazards

Other hazards which do not result in classification : Not available.

SECTION 3: Composition/information on ingredients

Substance/mixture : Mixture

Product/ingredient name	Identifiers	%	Classification 67/548/EEC	Classification Regulation (EC) No. 1272/2008 [CLP]
Styrene	REACH #: 01-2119457861-32 EC: 202-851-5 CAS: 100-42-5 Index: 601-026-00-0	35-50	R10 Xn; R20, R48/20, R65 Xi; R36/37/38	Flam. Liq. 3, H226 Acute Tox. 4, H332 Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335 STOT RE 1, H372i Asp. Tox. 1, H304
phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide	EC: 423-340-5 CAS: 162881-26-7 Index: 015-189-00-5	0.1-25	R43 R53	Skin Sens. 1, H317 Aquatic Chronic 4, H413
2,2-dimethoxy-1,2-diphenylethan-1-one	EC: 246-386-6 CAS: 24650-42-8	<0.25	N; R50/53 See Section 16 for the full text of the R-phrases declared above.	Aquatic Acute 1, H400 Aquatic Chronic 1, H410 See Section 16 for the full text of the H statements declared above.

Styrene
phenyl bis(2,4,6-trimethylbenzoyl)-phosphine oxide
2,2-dimethoxy-1,2-diphenylethan-1-one

Sheet
ulation (EC) No. 1907/2006
009

SAERTEX multiCom

Page 1 of 7

icable
available

SAERTEX® MULTICOM GMBH

ion of the substance / preparation and company/undertaking

reparation
roduct name SAERTEX-S-LINER, SAERTEX-M-LINER
Fibre glass liner, sewer pipe used for renovation of sewage system.

dertaking
ultiCom GmbH
r Damm 52
beck
9 (0) 2574 / 902502, Fax: +49 (0) 2574 / 902409
ccupied station: +49 (0) 25 74 / 902-143 (office times)
ohann
htjohann@saertex.com

lephone: +49 (0) 25 74 / 902-502

identification

of hazards
rly used, no hazards exist.
explosion in machining operations without adequate ventilation or exhaust.

uman health
halation of dust can irritate the respiratory system. (For limits, see point 8.1).
ye or skin irritation of sensitive persons.

nvironment
rly used, no hazards exist.

3. Composition/information on ingredients

Chemical Characterisation (mixture)
CAS Registry No.: no indication

Ingredients	EG-Nr.	CAS-Nr.	Reg. Nr.	Mass %	R-phrase	Symbol
Fibre glass scrim	266-046-0	65997-17-3	dna	app. 50	n.a.	n.a.
Polyester resin	dna	dna	dna	app. 50	n.a.	n.a.

3.1 ***Hazardous constituents subject to the regulation 67/548/ECC***
No hazardous substances.

3.2 ***Substances for which there are Community workplace exposure limits, which are not already included in point 3.1 (see also point 8)***
None, if not listed in point 8 .

Fibre glass scrim
Polyester resin

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WHAT chemicals are detected actually?

California site

- Acetone
- Acetophenone
- Benzaldehyde
- Benzene
- Benzoic acid
- BHT
- tert-Butyl alcohol
- tert-Butyl benzene
- 4-*tert*-Butylcyclohexanone
- 4-tert-Butylcyclohexanol
- Chloroform
- o-Chlorotoluene
- Diallyl phthalate (DAP)
- Dibutyl phthalate (DBP)
- Diethyl phthalate (DEP)
- Di(2-ethylhexyl) phthalate (DEHP)
- 4-(1,1-Dimethyl) cyclohexanol
- 4-(1,1-Dimethyl) cyclohexanone
- 1-Dodecanol
- Ethylbenzene
- 3-Heptanol
- Isopropylbenzene
- *p*-Isopropyltoluene
- Methylene chloride
- *N*-Propylbenzene
- Styrene
- Phenol
- 1-Tetradecanol
- Toluene
- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- Xylene (total)
- And more…

New York site

- BADGE
- Benzaldehyde
- BHT
- Dibutyl phthalate (DBP)
- Decane
- 1-Dodecanol
- Ethylbenzene
- Irgacure ® 184
- Isopropylbenzene
- Maleic anhydride
- Phthalic anhydride
- *N*-Propylbenzene
- Styrene oxide
- Styrene
- 1-Tetradecanol
- 1,2,3-Trimethylbenzene (1,2,3-TMB)
- 1,2,4-Trimethylbenzene (1,2,4-TMB)
- 1,3,5-Trimethylbenzene (1,3,5-TMB)
- Xylenes

Not all chemicals onsite listed on MSDS,
yet some have environmental and human health risks

Li et al., 2019. Outdoor manufacture of UV-Cured plastic linings for storm water culvert repair: Chemical emissions and residual. *Env. Pollution*. https://doi.org/10.1016/j.envpol.2018.10.080

Teimouri et al. 2017. Worksite Chemical Air Emissions and Worker Exposure during Sanitary Sewer and Stormwater Pipe Rehabilitation Using Cured-in-Place-Pipe (CIPP). OPEN ACCESS. *Env. Sci. Technol. Letters*. https://doi.org/10.1021/acs.estlett.7b00237

Ra et al. 2018. Critical Review: Surface Water & Stormwater Quality Impacts of Cured-In-Place-Pipe Repairs. *J. Am. Water Works Assoc*. OPEN ACCESS. https://doi.org/10.1002/awwa.1042

PURDUE UNIVERSITY

Product Data Sheets of Resins

EcoTek™
GREEN TECHNOLOGIES

EcoTek™
L040-TNVG-33
Vinyl Ester Resin

Product Information

EcoTek Ultra Low VOC Resin for Underground Sewer Pipe Liners

TYPICAL LIQUID RESIN PROPERTIES* (1) see back page

	Nominal
Viscosity @ 77°F/25°C, RVF Brookfield Spindle #4 @ 20 RPM, cps.	6,500
Thix Index 2/20	>2
Color	Light brown
Specific Gravity @ 77°F/25°C	1.28
Gel Time @ 140°F, minutes	33
Pot Life @ 77°F/25°C	48

TYPICAL 6mm PET FELT MECHANICAL PROPERTIES* (2) see back page

		Test Method
Tensile Strength,psi/MPa	3,800/26	ASTM D 638
Tensile Modulus,psi/GPa	570,000/3.9	ASTM D 638
Tensile Elongation, %	0.84	ASTM D 638
Flexural Strength,psi/MPa	7,400/51	ASTM D 790
Flexural Modulus,psi/GPa	550,000/3.8	ASTM D 790
Barcol Hardness	>40	ASTM D 2583

*Typical properties are not to be construed as specifications.

DESCRIPTION
The EcoTek L040-TNVG-33 is an enhanced, Ultra Low VOC resin designed for CIPP applications. L040-TNVG-33 does not contain any styrene monomers or hazardous air pollutants.

FEATURES
- Excellent catalyzed pot life
- Superior mechanical properties
- Contains no styrene

BENEFITS
Adaptability
The EcoTek L040-TNVG-33 molecular architecture provides an excellent balance of corrosion and physical properties.

www.green-resins.com
green-resins@aoc-resins.com

PRODUCT DATA SHEET

DATE OF ISSUE: SEPTEMBER 2017 VERSION: 021635/12

ATLAC® E-NOVA RE 3475 X

CHEMICAL/PHYSICAL NATURE

Atlac® E-Nova is an evolutionary development building on 40 years of unsaturated polyester and epoxy vinyl ester (urethane) technology.
Atlac E-Nova results in resin systems tailored to the needs of customer and end-users, offering enhanced properties over currently available vinyl ester resins.
Atlac® E-Nova RE 3475 X is an epoxy Bisphenol A vinylester urethane resin especially modified for thickening with Magnesium oxide, dissolved in styrene.

MAJOR APPLICATIONS

Atlac® E-Nova RE 3475 X has been specifically developed for UV-curable pipe rehabilitation systems.
Atlac® E-Nova RE 3475 X has high reactivity, medium viscosity and can be readily thickened with Magnesium oxide.
Atlac® E-Nova RE 3475 X can be cured with both, conventional curing agents and with low energy UV-light (365-420 nm), yielding pipes with very good mechanical properties, high heat resistance and excellent resistance against a variety of chemicals.

APPROVALS

Cured Atlac® E-Nova RE 3475 X (non reinforced) conforms to type 1310 according DIN 16946/2 and group 5 according former DIN 18 820/1.

PRODUCT SPECIFICATIONS UPON DELIVERY

Property	Range	Unit	TM
Appearance	Clear - hazy	-	2265
Viscosity	600 – 700	mPa.s	2013
Solids content, IR	50.0 – 53.0	%	2033
Water content	0.1 – 0.25	%	2350
Peak time	8 – 11	Minute	2500

PROPERTIES OF CAST UNFILLED RESIN (TYPICAL VALUES)

Property	Value	Unit	TM
Tensile strength	81	MPa	ISO 527-2
Tensile E-modulus	3.6	GPa	ISO 527-2
Elongation at break	3.5	%	ISO 527-2
Flexural strength	155	MPa	ISO 178
Flexural E-Modulus	3.7	GPa	ISO 178
Heat Deflection Temp. (HDT)	145	°C	ISO 75-A

CURING CONDITIONS

Cured with 1.0% Butanox M-50 and 0.3 % Accelerator NL-51.
After 24h at RT post curing for 3 h at 100°C and 1 h at 150 °C.

GUI

Atlac® E-Nova RE 3475 X can be cured with low energy UV-light (365-420 nm) or with conventional curing agents.
If the resin is not exposed to direct day light processing time may be extenuated to several hours.
Curing in places that are not directly exposed to day- or UV-light can be assisted by adding e.g. 0,5 % tert. Butyl-peroxy-2-ethyl-hexanoate (Trigonox 21, AkZO Nobel).
Addition of small amounts of peroxide is recommended for all applications that require low residual styrene content.
Post curing at elevated temperatures for several hours will only enhance curing level if small amounts of peroxide have been added to the resin before.

GUIDELINES BEFORE USE

Before use, the resin should be conditioned at a well defined application dependent temperature.

SAERTEX® multiFlex System

Never miss a connection again – thanks to the first invertible GRP-Liner worldwide for the trenchless rehabilitation of house-connections.

SAERTEX multiCom

DIBt-approval Z-42.3-518 DIBt-approval

PROCESS

Safety and quality are, of course, the priorities when it comes to an on-site impregnation. We can guarantee this by connecting the SAERTEX® multiFlex GRP-House-Connection-Liner with the easy to process two-component EP resin SAERTEX® multiFlex EP 80.

Impregnated SAERTEX® multiFlex

The process is easy and fast: The two-component epoxy resin SAERTEX® multiFlex EP 80 is mixed at the job-site, introduced to the vacuumed GRP-House-Connection-Liner, and then evenly distributed by a calibrating-roll. The SAERTEX® multiFlex GRP-Liner impregnated with epoxy resin is turned inside out in the old pipe (inversion process) by air or water pressure so that the impregnated side is pressed onto the wall of the old pipe. The house connection is immediately ready for use once the impregnated GRP-Liner has cured.

EXPANDED APPLICATIONS

The SAERTEX® multiFlex Cap-Liner offers an additional application of the system where a pre-installed end-cap allows an open-end installation with a closed-end. In addition to the optimal results, the application also delivers savings in time and materials that make it significantly more economical than conventional open-end installations.

PROPERTIES

- DIBt-approval Z-42.3-518
- Invertible ECR-Glass-Liner (DN 100 to DN 300)
- Optimal wall thickness stability (including after expansion)
- Bendability 90°
- Reduced wrinkling in inner bend area
- High mechanical properties
- No longitudinal strain
- Maximum lateral strain 35% (change from DN 150 to DN 200 possible)
- High temperature resistance (steam curing possible)
- Open-End-Installation with closed-end optional possible - (SAERTEX® multiFlex CAP-Liner with a pre-installed stabilizing end-cap, patent no. 10 2010 002960, IPC F16L55/1645)

SCOPE OF DELIVERY

Delivery of the SAERTEX® mulitFlex System includes the GRP-House-Connection-Liner made of ECR-glassfibre-cord matched to your project as well as the bundle of SAERTEX® multiFlex EP 80 two-component epoxy resin for impregnating the SAERTEX® multiFlex on-site.

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