

# AQUA LOC RESIN LV-GEL

(The Gelacryl product by the Grace-DeNeef Co.)



# TECHNICAL DATA SHEET

## TECHNICAL DATA SHEET (TDS)

### AQUA LOC RESIN LV – GEL

#### PRODUCT NAME

AQUA LOC RESIN LV - GEL

#### MANUFACTURER

Grace-DeNeef

DE NEEF CONSTRUCTION CHEMICALS

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BELGIUM

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#### MANUFACTURER'S REPRESENTATIVE

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#### DESCRIPTION

Aqua Loc Resin LV is a methacrylate based hydrophilic chemical sealant designed to stop water intrusion through cracks in concrete by forming a gel within the depth of the crack. The Aqua Loc Resin LV sealant is a two part chemical formulation. This resin material is manufactured by Grace-DeNeef, as their Gelacryl product. CGI International utilizes this product with a TE 300 accelerator and an SP 200 catalyst. The two liquid components combined are near the viscosity of water. In addition, the tools, equipment and methodologies that are implemented by CGI International for the purpose of injection waterproofing, are not similar to DeNeef's. CGI utilizes tools that are inserted in bored holes, where the two liquid components (water-like viscosity) are injected separately and combine throughout and inside the crack. Whereas, with DeNeef, packers or ports are inserted into bored holes and the two components are first mixed and combined, then injected under pressure through these ports and through the holes.

Therefore, as the liquid components and the methodologies of injection are unlike, Grace-DeNeef has given the right to CGI International, LLC to redistribute this resin as Aqua Loc Resin LV. Thus the labels that are adhered to the resin drums, after the resin is manufactured by Grace-DeNeef, indicate the name Aqua Loc Resin LV, and are shipped to CGI International's facilities.

**Part A** is 2-(Dimethylamino) ethyl methacrylate or DMAEMA (synonym). The DMAEMA is manufactured for distribution by CGI International, LLC in the USA. The Pure DMAEMA contains a very small fraction (about 0.5%) by volume of MEHQ which acts as a stabilizer. The stabilized DMAEMA is diluted by 52% volume in water. The time for initial polymerization can be adjusted from 5 seconds to 5 minutes.

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Part A of the injected liquid is the stabilized DMAEMA with about one table spoon per liter of an accelerator TE 300 additive to control the start of polymerization (setting time). The actual amount of accelerator added is determined by CGI Northeast's experience base, to enable the solid gel (jello like highly flexible solid material) to form deep inside the crack.

**Part B** of the two part liquid injection chemicals is mostly water, with a small amount of catalyst or hardener SP 200 amounting to about one tablespoon per liter of water, to act as an initiator of polymerization process instantly. When Part A above is joined (touched in any way) by the Part B water with catalyst, the gel will form with a controllable gel formation time.

Part A and B are always kept seperately, with individual containers and mixing tools, and never meet (touch) while being pumped and injected, until they come together deep inside the crack, cold joint, fissure, or void to form the solid gel. Pumping is accomplished utilizing a positive displacement pump delivering 3500 psi of discharge pressure. The injection tools are all stainless steel and specially designed utilizing years of experience and numerous applications. No packers, dams, coverings, or other supporting materials are used. The injection process is straight forward, but the selection of where to inject, how to inject, how much to inject, and how long to make the setting time for the particular application is entirely dependent upon CGI's broad experience.

Please watch the video at [www.cginortheast.com](http://www.cginortheast.com) to help understand the Aqua Loc Resin LV process.

### ADVANTAGES

- No acrylamides.
- Mixes with water and converts it to a solid gel in a controlled time period ranging from 5 seconds to 5 minutes.
- Operates in most 1:1 ratio liquid injection equipment. Inject at atmospheric pressure or with high pressure (up to 3500 psi).
- Resin with water like viscosity that due to forces of gravity or applied pressure, flows deep into concrete fissures and cracks where full polymerization occurs to form a solid gel.
- Flexible, elastic, with little odor.
- Prevents further rebar spalling and arrests rust.
- Non Flammable, non-toxic and non-explosive.
- Will not deteriorate in salt or wastewater.
- Environmentally safe. Will not promote growth of fungi, mold, or bacteria.
- Will not effect Marine Life

### APPLICATIONS

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Stops water leaks in concrete regardless of the amount of the leaking water. Dams, tunnels, sewers, manholes, foundations, bridges, roadways, ceilings; virtually any water leak in any concrete structure can be stopped.

#### MIXING PROCEDURES

In pure form resin, catalyst and accelerator are toxic. However, these chemicals are heavily diluted in water. The catalyst essentially assumes the properties of water when mixed properly. However, the use of rubber gloves, eye protection, and appropriate protective footwear is required at all times. The setting time of the gel is based on the amount of accelerator added. In order to achieve the optimum mixture, a ratio of 86 ml of accelerator is mixed with one gallon of Aqua Loc Resin LV. This is performed in one container (Container A). Similarly, in a separate container (Container B), a ratio of 140 grams of catalyst is mixed with one gallon of water. The contents of Container A should never come into contact with the contents of Container B so that polymerization does not occur prior to the injection. In particular, separate mixing utensils should be used for each container.

The setting time for the gel is directly related to the amount of accelerator added. The amount of the catalyst is kept constant. If the air temperature is 65°F, the contents of Container A (resin & accelerator) will react with the contents of Container B (Water and Catalyst), to form a gel in approximately 40 seconds inside the crack. This setting time is typical for most applications. If the air temperature is 86°F the above-mentioned content quantities will react in approximately 23 seconds. Consequently, the setting time decreases as the temperature increases. If additional accelerator is added at any given temperature the setting time can further decrease.

#### PHYSICAL PROPERTIES

Uncured

#### RESIN: 2- (Dimethylamino) ethyl methacrylate

Appearance	Slightly syrupy aqueous solution
Color	Amber or Green
Density	1.17 kg/l
Viscosity	Pure/ready to inject 15 cps/1.2 cps
Active/Solids	48%
Specific Gravity	0.93g/cm <sup>3</sup>
Freezing Point	-22°F
Vapor Density	5.4 pure (air = 1)
Corrosiveness	Non-corrosive
Solubility in water	100%
Boiling Point	374°F in pure form

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#### CATALYST

SP 200

About 1 tablespoon added to 1 liter of water

#### ACCELERATOR

TE 300

About 1 tablespoon added to 1 liter of 52% water diluted 2- (Dimethylamino) ethyl methacrylate

#### SAFETY INFORMATION

Care must be taken when handling and mixing the chemicals, Aqua Loc Resin LV, accelerator and catalyst in their pure forms. Workers handling these chemicals must wear eye protection, rubber gloves, and protective footwear. If any of these chemicals comes in contact with the skin, it should be washed off immediately. Should any of these chemicals come in contact with the eyes immediately flush eyes generously with water and seek medical attention.

#### CONFINED SPACE SAFETY

Avoid prolonged breathing of the vapor (gas) that is released when the gel is formed. The smell has a distinct odor of ammonia as it is ammonium gas. A small amount of this vapor is released when the chemicals in the two containers are combined to form the gel. Vapors can accumulate in a confined space. Ensure proper ventilation.

Use a blower and flexible duct to ventilate the bottom of manholes and all confined spaces. The gel is formed by an exothermic reaction when the chemicals from the two containers are mixed together. The heat produced by this chemical reaction is sufficient to burn the skin upon contact. Always wear gloves!

In the event of an EMERGENCY call: CHEMTREC: 800-424-9300

#### WARRANTY

Upon the completion of the work and the successful elimination of water intrusion at the designated work areas, **CGI Northeast Inc.** will guarantee the injection waterproofing at the designated work areas for **five (5) years**. During this period, if water intrusion emerges within the designated work locations of injection, our crew will re-mobilize on site and perform additional Concrete Gel Injection, as required, to eliminate the water leakage. The labor and material involved during this **five (5) year warranty** period shall be at no additional expense to the owner. **CGI Northeast Inc.** is not responsible for any water damage to interior finishes, equipment, furniture, cars, or any other items within these designated areas, after their crew has completed the work and demobilized from the site.

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#### MATERIAL SAFETY DATA SHEETS

MSDS sheets can be downloaded from the  
CGI Northeast Inc. web site: [www.cginortheast.com](http://www.cginortheast.com)  
Aqua Loc LV Resin: CAS# 2807-47-2

#### CHEMICAL STABILITY (Aqua Loc Resin LV - Gel)

**Test Method:** A test sample of approximately 50 cm<sup>3</sup> of Aqua Loc Resin LV was completely polymerized. Each test sample was kept at room temperature in each of the one liter test liquids for a period of 42 days. The degree of discoloring, consistency, and dissolution were determined. The test piece was characterized as “stable” or “unstable”. The results are presented below.

Test Liquid	Chemicals Used for Immersion Test	Evaluation
Gasoline, unleaded	Normal Vehicle Fuel	Stable
Diesel	Diesel and heavy heating oil	Stable
Toluol	Aromatic solvent	Stable
Xylol	Aromatic solvent	Stable
Methanol, 50% in water	Alcohols	Stable
Isopropanol, 50% in water	Alcohols	Stable
N-Methyl pyrrolidone	Nitrogen containing solvent	Stable
Ethyl acetate	Aliphatic esters	Stable
Methyl isobutyl ketone	Aliphatic ketones	Stable
Formaldehyde, 35% in water	Aldehydes	Stable
Acetic acid, 10% in water	Organic acids up to 10%	Stable
Sulfuric acid, 20% in water	Mineral acids up to 20%	Stable
Sodium Hydroxide, pH 11-12	Same as pH in concrete	Stable
Common salt 20% in water	Salt solutions up to 20%	Stable
Freeze and Thaw Cycles	12 hour cycles	Stable

#### AQUA LOC RESIN LV (Stabilized and prepared for injection)

##### PHYSICAL PROPERTIES

##### DESCRIPTION

Appearance	Slightly syrupy aqueous solution
Color	Amber or Green —slightly opalescent
Odor	Slightly ester-like
pH	6,5 - 7
Active/Solid Matter -	Percentage 48%
Density:	0.044 lbs per cubic inch at 68° F
Pure, form and undiluted in water, viscosity:	15 +/- cps
Ready to Inject	1-2 (Water is 1 cps) cps
Corrosiveness	Non-Corrosive
Flash Point	Non Applicable (an aqueous liquid)
Combustible Properties	Non-Combustible
Solubility in Water	Miscible in all applications
Stability	Stable under all conditions tested

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##### PHYSICAL PROPERTIES

##### DESCRIPTION

Appearance	Translucent and sticky to the touch
Consistency	Firm and rubbery
Adherence	Very good adherent strength on hydraulic, metallic and plastic bases
Swelling in Water	150% to 200%
Desiccation in Air	Shrinking & hardening without water contact
Swelling/Desiccation Cycle	100 %Reversible
Corrosiveness	Non-Corrosive
Solubility	Insoluble in water, kerosene, gasoline
Permeability	Impermeable to water/stable in 100% humidity
Tensile Strength	100 psi to 150 psi
Elongation	250% to 300%
Cohesive Rupture	Over 150 psi
Chemical Resistance	Resistant to bacteria, fungi, and all chemicals found in sewer systems for example
Expulsion Back Pressure	- Depends on crack/hole size- Example 80 bar in 1 inch diameter by 1 inch deep concrete hole

##### POLYMERIZATION

The polymerization of the Aqua Loc Resin LV takes place through a free radical exchange process. The following tests have been conducted:

##### Radiation Test:

The conditions of the experiment were defined in order to reproduce the possible degradation of Aqua Loc Resin LV. The resin was injected into cracks on the walls of concrete tanks to a depth ranging from 42.5 cm to 80 cm. The tanks are one meter thick and store radioactive wastes. The injected gel must have a lifespan of at least 50 years. The test samples were exposed to radiation of up to 2000 hours. Lily University (France ) testing concluded that radiation does not appear to cause significant damage to the resin, for the levels of radiation tested.

##### Application Tests:

Various tests were completed by the Lily University that would be of interest or importance to the waterproofing industry. Some of these are listed below:

- Complete polymerization occurred when seawater or brackish water were mixed with the Aqua Loc Resin LV to form the gel.
- Various shaped containers were used, and the gel completely filled all sizes and shapes tested. This confirms that the gel can fill all concrete void volumes

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regardless of their shape and/or size. Therefore, the gel will fill any space (volume) just like water would fill it.

- The gel withstood expulsion in a test tube diameter hole where over 80 bars of applied pressure were exerted to the backside of the gel.
- Aqua Loc Gel has a great dimensional stability in temperature ranges to  $-22^{\circ}\text{F}$ . During the period of one year, the Lily University conducted the following experiment on a monthly basis. A sample stored at  $-22^{\circ}\text{F}$  was gradually brought to room temperature, then cooled again to  $-22^{\circ}\text{F}$  and restored in the freezer. No reduction in gel flexibility was observed upon each return to room temperature. Additionally, the gel sample did not exhibit any visible cracks or deformations.
- The recorded volume stability illustrates that there is no risk of concrete displacement either during the polymerization phase or during the freeze-thaw cycles.
- Dehydration is not very likely in the case of underground construction. The amount of water in the gel is regulated by the moisture content of the exterior environment. Also, the dehydration rate is directly proportional to the amount of moisture in ground. This phenomenon is limited, since the evaporation surface is the exposed top surface area of the crack, not the total surface area of the crack walls. Also, as soon as water (or water vapor) is reintroduced, 100% re-hydration occurs and the gel swells back to its original size and shape thus re-establishing all of its initial properties. This is independent of the number of dehydration and re-hydration cycles.
- The gel was elongated up to 60% of its original size with no signs of tearing.
- A gel sample in a closed container has retained its original shape over a seven-year period (this test is ongoing-yearly). It has been tested every year since 2006.
- Time to full polymerization (setting time) was tested within a time frame ranging from 5 seconds to one hour with optimal results.
- An eight-inch thick concrete test sample was cut in two pieces. The small internal cracks showed the Aqua Loc Gel traveled within the full depth of all the cracks.

#### OTHER INFORMATION

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