AP SOIL 600

HYCHEM
Infrastructure

MOISTURE ACTIVATED POLYURETHANE SOIL STABILIZATION RESIN

Description

AP SOIL 600 is a phthalate free, water reactive, hydrophobic, one component low viscosity polyurethane injection resin designed for soil stabilisation.

Benefits

- One component
- Very low viscosity for good soil penetration
- No catalyst required. Although different reaction times are possible by adding and adjusting the percentage of AP Geo Acc accelerator
- Encapsulates and strengthens loose soil
- Injections in compact soil layers up to coefficient 10-6 m/s are possible
- Cured polyurethane chemically anchored with substrate exhibits high strength and good chemical resistance (contact our Technical Service department for more information)
- Watertight
- Phthalate free (more environmentally friendly)

Field of Application

- Permeation grouting
- Loose sand, soil and gravel layer stabilisation
- Pre- and post-injections in mines, tunnels, pipe jacking, drill & blast and TBM applications
- Injections in combination with cement and micro fine cement
- Anchoring and micropiles
- Stabilisation of quay walls, floor slabs, roads, slopes and sewers
- Curtain grouting
- Damming of chemically contaminated soil
- Sinkhole remediation

Application

Note : The following is a typical application description. In case of other jobsite parameters, please contact our technical department.

PRELIMINARY ANALYSES

For slab lifting, soil stabilization, consolidation grouting, and all other forms of geotechnical grouting, it is advised to review soil reports from the job site. Take note of all structural elements and considerations and consult with geotechnical or structural engineers as needed. Check if the soil is porous enough to allow the resin to flow. Clay soils can not be injected.
Check the depth of the eventual water table. Locate all utilities prior to drilling or driving pipes into the ground.

REQUIRED TOOLS

- Appropriate injection pipes or soil probes of the correct length.
- Appropriate machinery to install the injection pipes into the soil substrate.
- Single component pump; manual, pneumatic or electric.

PREPARATION OF THE SUBSTRATE

Injection can be done via strainer pipes or Manchette pipes (TAM pipes)/Sleeve pipes. The exact position, spacing and matrix layout of the injection pipes has to be determined by the consulting engineer. Soil probe spacing is most commonly 1 to 1,5 m on center and as needed across the surface of the substrate. Depths will vary from job to job but must be established before work is to begin.

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PREPARATION OF THE PRODUCT

Read the technical and safety data sheets prior to commencement of the injection works.

Vigorously shake the AP Geo Acc before use and pour the required quantity (0.5-2%) into the AP SOIL 600 resin.
Mix the accelerator homogeneously into the resin and protect against moisture and rain to prevent premature reaction.

PREPARATION OF THE EQUIPMENT

Injection Technician should always confirm clearances and paths to injection sites for large equipment. Install the appropriate injection devices at the right position. Depending on the application, injection can be carried out using a hand pump, pneumatic pump or electric pump.

Preferably use a separate pump for injection of water and polyurethane resin. Prior to injection, the pump must be flushed with AP FLUSH 121 to ensure that there is no moisture in the pump and that the pump is primed.

INJECTION

Pipe spacing

- Create a matrix, depending on the type of application.
- For excavation wall injection, pipes are driven every 45 cm apart in different rows. Each row is staggered so the pipes in the next row are right in the middle of the pipes on the first row.
- For soil grouting where connection between the grout balls is not required a 1 to 1.5 m spacing is often acceptable.

In case of Strainer pipes

- Typically, use 13 mm steel tubing end drill small diameter holes on the last 15–20 cm of the pipe to create the strainer pipe. Pipe diameter and wall thickness requirement is only a function of strength. If you are driving deeper or through tighter soil or rocky soil, the pipes need to be larger diameter so that they can withstand the driving forces without bending.
- Drive the strainer pipes to the lowest point to be injected with a hammer drill that has a ground rod driver attachment on it. You can also use a pneumatic hammer.
- Start the injection at the first injection pipe. Start the pump. Inject at the pressure where the resin begins to flow. Do not over pressurise during injection. For permeation grouting, lower pressure, longer duration injection is preferred. High pressure, high volume injection can cause the soil to fracture and the resin to shoot off into “lenses” of grout that travel away from the area you are trying to solidify. Permeation is done slowly.
- Measure the amount of resin being pumped into the strainer pipe and stop when the required quantity has been injected. Jack the pipe up for approx. 30 cm, and restart the injection. Repeat until you are approx. 1m from the surface. At this point, resin will probably start pushing to the surface. It also pushes to the surface if you inject too fast. After this, move to the next strainer pipe. Continue until the whole matrix has been injected.

In case of Manchette pipes

- Put the inflatable packer at the lowest point of the TAM pipe and start the pump. Inject at the pressure where the sleeve opens and the resins starts to flow into the soil.
- Measure the amount of resin being pumped. Stop after the predetermined quantity of resin has been injected.
- Move the inflatable packer up to the next sleeve and repeat the injection procedure. Continue till you reach the last upper sleeve of the TAM pipe.
- Repeat the procedure for every TAM pipe in the matrix.

APPLICATION CONDITIONS

Standard applicable between 1°C and 35°C. For applications outside these conditions, please contact our technical service.
It is recommended to warm up the resin and accelerator in extremely cold conditions. Do not inject into substrates or sub-soils with freezing conditions where there is no liquid water for the resin.

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CLEANING AND MAINTENANCE

After the injection at the end of the day, flush the pump with AP Flush 121. If the pump will not be used for several days, flush the AP Flush 121 out of the pump with lightweight motor oil or hydraulic fluid and leave it there until the next usage. Never rinse the pump with water.

COMPLIMENTARY PRODUCTS

AP FLUSH 121
AP Geo Acc.

ADVICE/FOCAL POINTS

Water must always be present during the injection of AP SOIL 600 as it is a water-reactive resin.
Avoid injecting at shallow depths; this can result in distorting the cohesion of the upper soil layer.

Technical Data

APPEARANCE

AP SOIL 600, uncured, (appearance: brown liquid)		
Viscosity at 25°C	Brookfield SP3 – 200 rpm	±100 mPa.s
Density	EN ISO 2811-1	±1.09 kg/dm^3

AP Geo Acc, Accelerator for AP SOIL 600, (appearance: black liquid)		
Viscosity at 25°C	Brookfield SP3 – 200 rpm	± 84 mPa.s
Flash point		224°C
Density	EN ISO 2811-1	± 0.95 kg/dm^3

REACTION TIMES

AP Geo Acc	**5°C**		**15°C**		**25°C**	
%	**Start**	**End**	**Start**	**End**	**Start**	**End**
0	3600’	6000’	44’	480’	4’	100’
0,5	11’	31’	5’	45’	1’	38’
1	4’	22’	4’	13’	1’	9’
2	2,5’	10’	<1’	8’	<1’	8’

CONSUMPTION

Consumption has to be assessed by the consulting engineer. Consumption has to be assessed on site and is influenced by the specific AP product used, soil type, load to be lifted, amount of water in the substrate, soil compaction, and possible presence of voids.

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TECHNICAL DATA

AP SOIL 600 + quarts 0.2-0.8 mm (cured)		
Compressive strength according to EN ISO 844 after 7 days	0% Geo Acc 0.5% Geo Acc 1% Geo Acc	13.4 MPa 10.3 MPa 7.5 MPa
Compressive strength according to EN ISO 844 (Final strength)	0% Geo Acc 0.5% Geo Acc 1% Geo Acc	>20 MPa 12 MPa 7.5 MPa

CHEMICAL RESISTANCES

Cured polyurethane exhibits good chemical resistance, is harmless for the environment and resistant to biological attack (contact our Technical Service for more information).

REFERENCE DOCUMENTS

bsi. ISO 9001:2015 Quality Management FM 78518

bsi. ISO 14001:2015 Environmental Management EMS 716699

REACH COMPLIANT

Packaging

AP SOIL 600	20 kg	Pails	24 pails/pallet
	200 kg	Steel drums	4 drums/pallet

AP Geo Acc	2 kg	Plastic Bottles	4 bottles/box 44 boxes/pallet
	20 kg	Metal Cans	24 pails/pallet

Storage and shelf life

AP SOIL 600 is moisture sensitive and should be stored in a dry area between +5°C and +30°C.
Shelf life of the resin: 24 months in original packaging
Shelf life of the accelerator: 12 months in original packaging
Once opened, containers should be used as soon as possible.

Safety precautions

Avoid contact with eyes and skin, always use personal protective equipment in compliance with local regulations.
Read the relevant Material Safety Data Sheet before use. Material Safety Data Sheets are available on www.spetec.com
When in doubt contact SPETEC® Technical Service.

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Warranties and Disclaimers

Hychem warrants that this product shall conform to the technical specifications published in the product literature. The quality and fitness of the product is dependent upon the proper use and application of the product by the applicator. Hychem has no role in the application of the finished polymer other than to manufacture and supply its components. It is vital that the person applying this product understands the product and is fully trained and certified in the use of spray equipment and application of sol-gel materials. There are no warranties that extend beyond the description on the face of this instrument, except when provided in writing, directly by Hychem and executed under seal by a company officer.

Field Support

Field support where provided, does not constitute supervisory responsibility. Suggestions made by HYCHEM either verbally or in writing may be followed, modified or rejected by the owner, engineer or contractor since they and not HYCHEM are responsible for carrying out procedures appropriate to a specific application.

Customer Responsibility

The technical information and application advice given in this publication is based on the best information available at the time of print.
As the information herein is of a general nature, no assumption can be made as to the product suitability for a particular use or application and no warranty as to its accuracy, reliability or completeness either expressed or implied is given other than those required by Commonwealth or State Legislation. The owner, his representative or the contractor is responsible for checking the suitability of products for their intended use.

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