

ICELOCK™

ICELOCK™, a soil freezing technique of Chemical Grouting CO., Ltd, creates blocks of frozen soil by installing pipes in the ground and freezing soil around the pipes.

ICELOCK™ is used in construction works for its high strength and water sealing capabilities. ICELOCK™ does not contaminate soil and ground water, and it is the most environment friendly soil improvement technique.



Features

- 1 **Friendly to environment** Not contaminate soil and ground water
- 2 **High strength** Used for stabilizing soil in large openings as the frozen soil has high strength and is reliable.
- 3 **Used for all types of soil** Strength is achievable in clayey, sandy, gravely, and humus soils
- 4 **Good adhesion** Frozen soil has good adhesion to steel and concrete
- 5 **High sealability** Frozen soil works as perfect cut-off walls
- 6 **Flexible arrangement** Freezing pipes are arranged vertically, horizontally, and radially to suit the shape of the objects

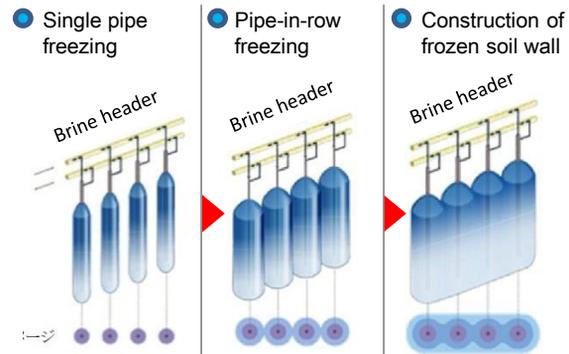
Improvement strength

Strength of frozen soil is depending on the soil type and freezing temperature.

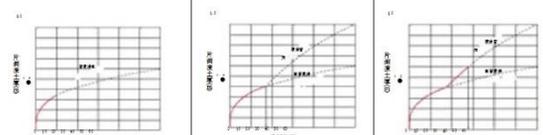
Soil type	Freezing temperature -10°C			Freezing temperature -20°C		
	UCS	Bending strength	Shear strength	UCS	Bending strength	Shear strength
Clayey soil	2~4	1.5~2	1.5~2	4.5~6	2~3	2~3
Sandy soil	4~7	2~3	2~3	6~10	3~4.5	3~5

Mpa

Growth of frozen soil



Conceptual schematic of cross-section



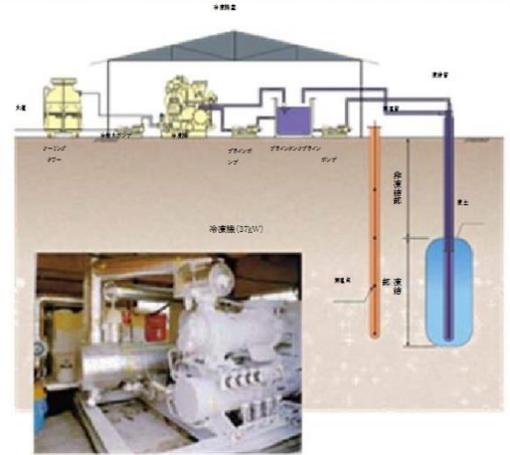
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Soil freezing mechanism

Brine which is cooled down to -20 to -45 degrees C is circulated in freezing pipe installed in the ground.

Heat for freezing is taken into the brine and brought with brine to surface and dumped into atmosphere

The brine is circulated again after it is cooled down. No risk for pollution as CaCl₂ solution is used for brine.



Case Study

- ➔ Project name: 台北地下鉄新莊線CK570CO8駅シールド発進部
- ➔ Site location: 台湾台北市
- ➔ Project owner: 台湾市交通局
- ➔ Work objective : Soil stabilization for shield machine departure
- ➔ Volume of soil freezing : 600m³
- ➔ Construction period : 1/2005 to 9/2005
- ➔ The reason for adoption : The adoption of soil freezing technique was decided with the safety and technical point of views, that the layer of high artesian pressure exists underneath shield tunnel, and high N values of clayey layer prohibit the use of jet/mechanical soil improvement techniques.



<Plant for soil freezing technique>



<Layout for piping>



<Sean of frozen soil>

