CO₂を用いる高効率地中熱回収システム -第1報:浅層地中熱利用と冷房運転-Geothermal Recovery System Using CO₂ as A Heat Transfer Fluid -1st Report: Using Shallow Soil and for The Purpose of Cooling

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Summary

In the conventional system, heat is recovered as sensible heat through liquid anti-freezer circulating in a piping laid underground, but if CO_2 is used as a heat transfer fluid, heat is recovered as latent heat which increases the capacity and enables to promote downsize of the equipment and reduction of the electric consumption. Our last report showed that the CO_2 -system exerted the same heating ability with the propylene-glycol system with a half length of heat recovery piping and a half electric consumption of the propylene-glycol system. And the reduction in the diameter of the CO_2 recovery piping was possible to 50 mm at most to gain more than adequate heating effect. In this study, CO_2 spiral recovery piping was installed in shallow soil of 4 m depth for the further cost reduction. And latent heat of CO_2 was utilized for cooling. As a result, adequate heating ability was derived from shallow soil of 4 m depth. And cooling operation, which need CO_2 forced circulating with in-line pump, was competitive in ability and electric consumption.

Key words: Heat pump, Air conditioning system, Geothermal recovery system, Heat transfer fluid, CO₂, Latent heat, Downsizing, Saving of energy

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