Deliverable D3.2

Development of a high pressure injection nozzle for water and inert inorganic fluids

WP3

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Project acronym	Cheap-GSHPs
Project full title	**Ch**eap and **E**fficient **Ap**plication of reliable **G**round **S**ource **H**eat Exchangers and **P**ump**s**
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Dissemination Level

PU	Public	
CO	Confidential, only for members of the consortium (including the Commission Services)	**X**
CI	Classified, as referred to in Commission Decision 2001/844/EC	

Publishable summary

This deliverable covers the development by partner Hydra of a high pressure fluid injection system. The fluid, mainly water, is being injected through a nozzle located in the tip of the coaxial GSHE. It is generally known that using a fluid, mainly water, facilitates drilling operations and is often necessary in conventional drilling. When using the piling methodology to introduce coaxial Ground Source Heat Exchangers into the ground, the use of water is less common. However, this technique brings improvements either in a reduction of installation time and cost or by widening the application of the piling methodology in different soils. In an installation of Coaxial GSHE's in Venice in 2008, this water injection technique during piling was first tried out. The time of installation was halved when compared to the piling without water injection. Some water injection tests have also already been done during the first field tests in the project. These tests have proven the benefits of water injection during piling and the reduction of friction on the drilling rods. The 'old' Vibrasond technique did not use a high pressure water injection system. With the design of special water nozzles water is injected during the piling operation. After the insertion of the GSHE's the nozzle assembly is sealed.

The deliverable describes several types of water nozzles, each with different working principles. The nozzles and the high pressure injection system will be tested in the field and based on the results of the field tests, a final nozzle design will be selected for the demonstration cases later on in the project.