New Pipe Coupling System Debuts at MayTech 2000

Robert Jones

What do you think about when you hear the word “threads”? To most people, threads are what they don’t want to see hanging off their clothes. And if you grew up in America in the Seventies, the word “threads” used with the word “man” could describe an entire outfit. “Check out the new threads, man!”

But if you work in the geothermal heat pump industry, you know what threads are. They’re those little grooves on pipes and fittings that are good for joining pipes and creating leaks.

Leaks are always a concern, especially when dealing with the pipes inside a customer’s house, connected to that geothermal heat pump you installed. Over the years, you may have tried everything from pipe dope to teflon tape to a bigger wrench in your efforts to minimize leaks. All that may be coming to an end.

Geo-Flo, makers of loop pump modules for geothermal systems, is in the final development stages of a new coupling system for HDPE pipe, tentatively dubbed “Flo-Link.”

The Flo-Link system makes use of dual O-ring seals attached to a fitting that is pushed into a larger-diameter pipe and held in place by a retaining nut. The O-rings on the fitting form a simple and effective seal against water and antifreeze without the use of chemicals, tape, or oversized tools. The threaded retaining nut requires only hand tightening and exists solely to hold the Flo-Link fitting in place.

Geo-Flo’s Tom Miller explains the Flo-Link system to conference attendee Greg Mazurkiewicz.

O-ring seals have already proven their usefulness to the geothermal industry in products like Phillips Driscopipe’s I.D. Seal stab fitting. So the concept of the O-ring is not new, but Geo-Flo has taken this concept one step further. The Flo-Link series of products will use O-ring seals to further simplify installation of geothermal loop systems and help reduce first costs.

A typical loop pump module from Geo-Flo contains several components joined together with bolts and sealed with gaskets. Using Flo-Link technology, Geo-Flo anticipates greatly reduced labor costs in assembly, which translates into lower prices for the consumer. Add to that easier on-site installation, and the potential for cost reduction jumps again.

Geo-Flo plans to begin limited production of Flo-Link connectors this summer, with full production beginning in the fall.

For more information, contact Geo-Flo Products Corporation, 2101 S. Yost Ave., Bloomington, IN 47403; or call their Customer Service department at 1-800-784-8069.
IGSHPA Advisory Council Summary

Dr. Bose reported to the Council during the May 14 meeting that IGSHPA had the following accomplishments in the past year:

- Hosted international delegates from Canada, France, Japan, and Sweden.
- Represented the industry in China.
- Represented the industry at 10 trade shows and conferences.
- Established the CGD training program.
- Increased attendance at Installation Workshops by 20%.
- Responded to over 900 inquiries for information.
- Averaged 80 visits to the web site per day.
- Reduced attrition of members by 40%.
- Increased new members by 19%.

The Advisory Council took the following business actions:

- Unanimous vote to raise membership dues for all categories (except individual) by 15% for 2001.
- IGSHPA has not had a membership increase in five years.
- IGSHPA will expand its membership directory into a full industry directory.
- Continuing education credits approved for installer accreditation.
- Continuing education credits approved for Installation Trainers.
- Course approval for one-day Training Course.

The complete minutes of the Advisory Council and its subcommittees will be posted on the IGSHPA web site.

Correction

In the March/April 2000 issue of The Source, the article titled “Geothermal: An Investment, Not an Expense” contained the following statement: “The resale value increase is the result of $400 lower annual heating and cooling costs, times 20 (years of savings), as reported in a recent study…”

The statement should read, “The resale value increase is the result of $400 lower annual heating and cooling costs, times 20, the savings multiplier arising from two independent home energy studies. One study was…”

Grouting Manuals

The new Grouting Manuals will be available August 1, 2000. The price for members is $25.00; non-members $35.00. Please call 1-800-626-4747 to reserve your copy.
Several recent articles in The Source have discussed the need for accurate soil conductivity data in order to improve heat exchanger design (e.g. Skouby 1998). Unlike other parameters influencing the design of the heat exchanger (such as the length and diameter of the ground loop), soil conductivity is not usually known with a degree of accuracy which allows for optimal design. Better estimates of soil conductivity lead to improved ground loop heat exchanger design, and hence, the economic viability of GSHP systems. The role that in-situ thermal conductivity testing can play in obtaining this information has also been discussed, along with some of the issues related to the accuracy, sensitivity, and precision of these tests, such as data analysis methodology and required test duration (e.g. Smith 1999, Spitler et al 1999). These articles have focused on work that is being carried out in the United States. In this article we describe some of the in-situ thermal conductivity measurement work that is being carried out on the other side of the Atlantic, including the test equipment being utilized.

Thermal response tests, based on measuring the temperature response to heat injection in a borehole, have been developed at several places, including the United States (Austin 1998) and Sweden (Gehlin 1998). The systems used in these tests have been shown to accurately estimate the specific thermal capacity of the ground (Smith 1999). They are less suited for actual design verification of heating/cooling applications, however, as they operate solely on the basis of injecting energy into the ground. For example, when the GSHP system is used for heating during winter, design temperatures of the circulating medium will be between -5 and 5°C (25 - 40°F). No measurement of thermal response at these temperatures (where phase changes in both the circulating medium and the soil may take place) can be performed with these test setups. Furthermore, when the GSHP system is utilized for heating, an antifreeze mixture is normally used, the thermal properties of which are also temperature dependent. Another issue which has been noted with respect to thermal response tests based on heat injection is that concerned with heat convection within the borehole, particularly when there is groundwater in the borehole (Eskilson 1987).

(continued on page 5)
Scratching more than the earth's surface.

Geothermal Technology. It's a simple, yet brilliant concept - use the natural energy qualities of the earth to heat your home in the winter and cool it in the summer. And that's exactly what a geothermal heat pump system from Trane does. It's a perfect solution. And it's been right under foot.

A Trane geothermal unit can fit just about anywhere - in an attic, a basement or tucked away in a closet. Trane offers a variety of configurations, both horizontal and vertical, to fit the specific design of your home.

For additional information on the Trane geothermal heat pump system, contact your local Trane dealer or visit our web site at www.trane.com.
In an effort to address these issues, the Dutch companies Groenholland B.V. and IF Technology B.V. have developed a thermal response test rig which can operate in both heating (energy extraction) and cooling (energy injection) modes. (See Figure 1.) Using a reversible heat pump, the rig operates by generating a supply of relatively cold or warm fluid with respect to the ground temperature. This supply is used to maintain a certain difference between the fluid temperature entering and returning from the ground ($\Delta T$). By selecting an appropriate $\Delta T$ and flow rate (between 0.5 and 3.0 m$^3$/hr$^{-1}$), any energy load between 50 and 2000 Watts can be applied. Experiments using realistic energy profiles and fluid properties are therefore possible.

After a period of initial testing and calibration of the equipment, Groenholland has now carried out a number of “real life” experiments with the test rig. The latest of these was a thermal response test (utilizing both energy extraction and injection modes) completed for the St. Luke’s Church site in central London (Figure 2). The site is presently being redeveloped as an education and performance venue for the London Symphony Orchestra, and the intention is to make use of a GSHP system in various sections of the new building for both heating and cooling requirements. The consulting engineers on the project are Max Fordham & Partners, London.

The second part of this article will present some test results from this project, along with the method of calculating conductivity values from these results. (See the upcoming issue of The Source for Part II.)
A MayTech to Remember

If you missed MayTech 2000, you missed something special. With over 220 attendees and a number of new features, this year’s conference may have been IGSHPA’s best ever.

During Monday’s opening ceremonies, Jack DiEnna of the Geothermal Heat Pump Consortium received the Innovations in Training award for his efforts in creating the partnership among IGSHPA, GHPC, and AEE that resulted in the new Certified GeoExchange Designer (CGD) certification and training program.

Also during the opening session, there was a panel discussion regarding this year’s featured research project, the shallow heat exchanger installation at Joseppi’s restaurant. The panel included Stan Clark, owner of Joseppi’s; Lynn Vick, Air-O Heating and Air Conditioning; Mike Herron, Stillwater Power; and Phil Schoen, Geo-Enterprises. Each panel member had had some level of involvement with this project and was able to offer his own unique perspective into the design and implementation of the new shallow heat exchanger concept.

After that, it was time to get down to business. Forty attendees signed up for an IGSHPA Certified Installer course that — for the first time ever — was held concurrently with the conference. As a natural extension of the mission of MayTech, the course was a runaway success.

Steve White of Phillips Driscopipe conducted pipe fusion training and was enthusiastic about the program, as was FHP Manufacturing’s Larry Eitelman, who taught the “Introduction to GHP Systems” class.

Everyone seemed to agree that it made sense to hold a training session in conjunction with a conference where the focus has always been on geothermal technology.

As an added benefit of the Installers Course, MayTech attracted over 40 first-time attendees, as well as 12 international visitors. MayTech exhibitors enjoyed networking with plenty of new faces this year, gaining greater exposure for their products and services as they helped educate a new batch of geothermal installers.

Another new feature of this year’s MayTech was an extension of the popular demonstration day activities. On Tuesday afternoon, participants gathered to watch OSU Geothermal Research staff install a copper pond loop at the Smart Bridge test site. The 5-ton-capacity loop will provide climate control for an on-site building, as well as performance data for comparison with an HDPE loop to be installed later.

Tuesday evening at the traditional MayTech Barbecue, former Oklahoma Governor Henry Bellmon presented an award to Ditch Witch President Ed Malzahn for his longtime support of the geothermal industry.
Fred’s FAQs
by Fred Jones

One of the most often asked questions last week at the MayTech was “Where is Fred?” I am sorry that I missed one of the best MayTechs in recent years. But, I found myself with my family in Galveston, Texas, attending a wedding. A very special wedding it was; we married off the youngest son! Two down – one to go !!! Hope to see everyone at next year’s MayTech.

Dear Fred,

Q: I have a brand new A/C unit that is operated with a cap tube. I have been told that it would not work with a closed loop system. Is this true? I think that it would work if I used copper pipe instead of walled plastic.

A: It will work, but not well. The type of system you describe is designed for buildings where a cooling tower and boiler are utilized. These heat pumps have a narrow operating entering water temperature (EWT) (i.e., 75 to 95 degrees). Therefore, it would not operate well in a region with large temperature swings in the ground heat exchanger. A geothermal heat pump system GHP system is designed for a much wider variance EWT.

The improvement in heat pump performance using copper pipe in the earth instead of plastic would be negligible. It is important to remember that with a GHP system, the earth controls the heat transfer process.

If you have a question about the ground source heat pump industry for Fred, email him at jfred@okstate.edu

Geothermal research workers install a copper pond loop at the Smart Bridge site.

Rounding out the conference were Wednesday’s demonstrations, which included horizontal boring by Ditch Witch, small residential drilling by TEI Rock Drills, software demos, and loop installation and grouting using Geo-Clips by Geothermal Bore Technologies, Inc.

IGSHPA would like to offer special thanks to the many people — too numerous to mention here — who helped make this year’s conference such a success. We could not have done it without you.