

GEOHERMAL CLOSED-LOOP PIPING SYSTEM (GROUND HEAT EXCHANGER)

IN ORDER TO BALANCE THE NEED FOR CLEAN, RENEWABLE ENERGY RESOURCES AND THE NECESSITY TO PROTECT THE PUBLIC HEALTH, SAFETY AND WELFARE OF THE COMMUNITY, THE CITY OF URBANA FINDS THESE REGULATIONS ARE NECESSARY TO ENSURE THAT ALTERNATIVE ENERGY SYSTEMS ARE APPROPRIATELY DESIGNED AND SAFELY SITED AND INSTALLED.

1. ONLY GEOHERMAL CLOSED-LOOP SYSTEMS SHALL BE INSTALLED. A CLOSED-LOOP SYSTEM IS DEFINED AS A PIPE AND HEAT EXCHANGER NETWORK SEALED FROM ITS SURROUNDING ENVIRONMENT. NO OPEN-LOOP SYSTEMS WILL BE PERMITTED. AN OVERALL ISOLATION RADIUS OF 300' AWAY FROM ANY PUBLIC WATER SUPPLY WELLS AND 25' AWAY FROM ANY PRIVATE WATER SUPPLY WELLS SHALL BE MAINTAINED.

2. INSTALLER CERTIFICATION

a) ALL GEOHERMAL SYSTEM INSTALLERS SHALL BE IGSHA (INTERNATIONAL GROUND SOURCE HEAT PUMP ASSOCIATION) CERTIFIED.

3. PIPE MATERIAL AND SIZE REQUIREMENTS

a) POLYETHYLENE:

i. THE MATERIAL SHALL MAINTAIN A 1600 PSI HYDROSTATIC DESIGN BASIS AT 73.4°F PER ASTM D-2837 AND SHALL BE LISTED IN PPI TR4 AS A PE3408 PIPING FORMULATION. THE MATERIAL SHALL BE A HIGH DENSITY, POLYETHYLENE EXTRUSION COMPOUND HAVING A CELL CLASSIFICATION OF PE345434C OR PE355434C WITH A UV STABILIZER OF C, D OR E AS SPECIFIED IN ASTM D-3350 WITH THE FOLLOWING EXCEPTION: THIS MATERIAL SHALL EXHIBIT ZERO FAILURES (FO) WHEN TESTED FOR 192 OR MORE HOURS UNDER ASTM D-1693, CONDITION C, AS REQUIRED IN ASTM D-3350.

ii. PIPE WITH A DIAMETER LESS THAN 1 1/4" (NOMINAL) SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM D-3035 WITH A DIMENSION RATIO OF 11 (FOR THERMAL AND PERFORMANCE REASONS).

iii. PIPE MANUFACTURED WITH A DIAMETER GREATER THAN 1 1/4" (NOMINAL) AND LARGER SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM D-3035 (MINIMUM DIMENSION RATIO OF 13.5) OR ASTM D-2447 (SCHEDULE 40). IF THE PIPE IS USED IN A VERTICAL BORE APPLICATION OF OVER 200 FT, IT SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM D-3035 WITH A DIMENSION RATIO OF 11 (FOR THERMAL AND PERFORMANCE REASONS).

iv. PIPE 3" (NOMINAL) AND LARGER SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM D-3035, D-2447 OR F-714 WITH A MINIMUM DIMENSION RATIO OF 17.

4. PIPE JOINING METHODS

a) THE ONLY ACCEPTABLE METHOD FOR JOINING BURIED PIPE SYSTEMS IS BY A HEAT FUSION PROCESS. POLYETHYLENE PIPE SHALL BE BUTT OR SOCKET FUSED IN ACCORDANCE WITH PIPE MANUFACTURER'S PROCEDURES.

5. PRESSURE AND FLOW TESTING

a) ALL FUSION JOINTS AND LOOP LENGTHS SHALL BE CHECKED TO VERIFY THAT NO LEAKS HAVE OCCURRED DUE TO FUSION JOINING OR SHIPPING DAMAGE.

b) ALL LOOPS WILL BE PRESSURE TESTED BEFORE INSTALLATION, AND ALL HORIZONTAL COMPONENTS OF THE GROUND HEAT EXCHANGER WILL BE PRESSURE TESTED PRIOR TO BACKFILLING.

c) A MINIMUM VELOCITY OF 2 FT/SEC IN EACH PIPING SECTION MUST BE MAINTAINED FOR A MINIMUM OF 15 MINUTES TO FLUSH THE SYSTEM AND REMOVE ALL AIR. A CHANGE OF MORE THAN ONE INCH IN THE LEVEL OF FLUID IN THE PURGE PUMP TANK DURING PRESSURIZATION INDICATES AIR STILL TRAPPED IN THE SYSTEM. **A WATER PRESSURE OF AT LEAST 100 psi SHALL BE MAINTAINED OVER A 30 MINUTE PERIOD WITH NO OBSERVED LEAKS.**

6. PIPE AND UNIT PLACEMENT

a) THE LOCATION OF ALL UNITS AND PIPING LOOPS SHALL BE A MINIMUM OF FIVE FEET (5') FROM ALL SIDE AND REAR PROPERTY LINES AND BE NO CLOSER TO THE STREET THAN THE FRONT OF THE PRINCIPAL STRUCTURE, UNLESS APPROVED BY THE ENGINEERING DEPARTMENT. NO UNIT OR LOOP SHALL BE LOCATED IN ANY LEGAL EASEMENT.

b) WHITE TRACER WIRE SHALL BE USED ON ALL HORIZONTAL COMPONENTS OF THE SYSTEM WITH LEADS EXITING THE GROUND AT THE BUILDING ABOVE THE SUPPLY AND RETURN LINES.

c) SUPPLY AND RETURN LINES SHALL BE FULLY SLEEVED THROUGH ENTRY AND EXIT POINTS AND ANY BUILDING WALL; SLEEVES SHALL EXTEND AT LEAST 12" BEYOND THE PERIMETER. THERE SHALL BE A 2' MINIMUM SEPARATION BETWEEN SUPPLY/RETURN LINES AND WATER/SEWER LINES.

d) ALL BURIED GEOHERMAL PIPES IN SYSTEMS CONTAINING ANTIFREEZE PASSING PARALLEL WITHIN 5 FEET OF ANY WALL, STRUCTURE OR WATER PIPE SHALL BE INSULATED WITH R2 MINIMUM CLOSED CELL INSULATION.

7. BACKFILLING PROCEDURES

a) BACKFILLING IN HORIZONTAL SECTIONS OF THE PIPING SYSTEM MUST BE DONE ASSURING THE PIPE IS NOT STRESSED BY UNNECESSARY BENDS, NOT IN CONTACT WITH SHARP-EDGED ROCKS AND NOT IN CONTACT WITH ANY LARGE AIR POCKETS. IT IS RECOMMENDED THE LINES REMAIN PRESSURIZED DURING BACKFILLING OPERATIONS TO HELP PRESERVE THE INTEGRITY OF THE PIPES.

b) BACKFILLING IN VERTICAL SECTIONS (BOREHOLES) MUST BE DONE FROM THE BOTTOM UP WITH BENTONITE-BASED GROUT TO ENSURE SURFACE WATER WILL NOT PENETRATE AND CONTAMINATE GROUNDWATER. ASSURE GROUTING MATERIALS AND PROCEDURES MEET THE REQUIREMENTS OF CHAPTER 3701-28 AND 3745-9 OF THE OHIO ADMINISTRATIVE CODE.

8. FLUID COMPOSITION

a) THE FLUID CONTAINED WITHIN THE GEOHERMAL CLOSED-LOOP SYSTEM SHALL USE A BIODEGRADABLE, "FOOD-GRADE" ANTIFREEZE COMPONENT. PROPYLENE GLYCOL OR AN EQUIVALENT SHALL BE USED.

9. MUD CONTAINMENT

a) THE CONTRACTOR SHALL NOT TRACK OR ALLOW MUD TO FLOW ONTO CITY STREETS OR ADJACENT PROPERTIES.

10. RECORDS

a) THE LAYOUT OF THE PIPING NETWORK SHALL BE DIMENSIONED RELATIVE TO A PERMANENT STRUCTURE. A COPY OF THE RECORD SHALL BE PROVIDED TO THE PROPERTY OWNER AND CITY BY THE CONTRACTOR INSTALLING THE GEOHERMAL SYSTEM.

b) FOR VERTICAL LOOP SYSTEMS, SUBMIT ALL BORE LOGS TO ODNR-DSWR.

11. PERMITTING AND INSPECTION

a) A NOMINAL PERMIT FEE WILL BE CHARGED FOR ANY GEOHERMAL INSTALLATION WITHIN THE CITY OF URBANA. THE FEE COVERS AN INITIAL INSPECTION (BEFORE THE LOOP INSTALLATION WHILE THE PRESSURE TESTING IS BEING PERFORMED) AND A FINAL INSPECTION (TO MAKE SURE GROUTING AND BACKFILLING PROCEDURES ARE FOLLOWED) BY THE CITY ENGINEERING DEPARTMENT. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING CONTACT WITH THE CITY ENGINEERING DEPARTMENT WHILE THE TESTING AND INSTALLATION IS BEING PERFORMED. TWO WORKING DAYS NOTICE SHALL BE GIVEN PRIOR TO WORK BEGINNING.