

**567—49.23(455B) Ground heat exchange (GHEX) closed-loop borehole systems.** In addition to the other provisions of this chapter, the following provisions apply to the construction of GHEX loop systems 20 feet or greater in depth.

**49.23(1)** Piping shall be a minimum of 160 psi pressure-rated HDPE and be pressure-tested with air or potable water for 15 minutes at a pressure of 1.5 times the system operating pressure, after installation in the borehole.

**49.23(2)** Connection to piping shall use socket fusion or butt fusion joining methods.

**49.23(3)** Only potable water, or food-grade or USP-grade propylene glycol or calcium chloride, may be used as heat transfer fluid.

*a.* Heat transfer fluids containing additives shall be NSF certified as HT1 in the NSF White Book.

*b.* Any other materials or additives shall be NSF 60 certified.

*c.* Additives shall be mixed only in concentrations recommended by the manufacturer.

*d.* A permanent sign shall be attached to the heat pump specifying the exact mixture of heat transfer fluid contained and stating that only approved heat transfer fluids may be used.

**49.23(4)** A flow measurement device shall be installed on each system.

**49.23(5)** Water make-up lines to the vertical heat exchanger shall be protected with a backflow prevention device.

**49.23(6)** Grouting shall be performed for the full length of the borehole via tremie pipe from the bottom upwards with the tremie submerged in grout during the entire process. The grout shall be checked for subsidence at least 24 hours after the initial grouting. If subsidence has occurred, the grouting process shall be repeated and rechecked until the borehole is fully grouted and subsidence has stopped.

**49.23(7)** All buried piping, including the top of vertical boreholes and the full length of horizontal piping, shall be permanently marked with magnetic tape, magnetic wire, or survey pins to allow for underground detection or utility location at the ground surface.

**49.23(8)** Within 30 days of GHEX borehole system installation, an as-built aerial map or engineering document shall be submitted to the permitting authority with the well record form showing the location and GPS coordinates of each vertical and horizontal borehole and all horizontal piping from the borehole into the building and vault. The permitting authority shall upload the document to the department's private well database.

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