**Section 604.240 General Well Construction**

a) Drilling fluids and additives must not impart any toxic substance to the water or promote bacterial contamination.

b) Minimum protected depths of drilled wells must provide watertight construction to exclude contamination and seal off formations that are, or may be, contaminated or yield undesirable water.

c) Surface or temporary steel casing used for construction must be capable of withstanding the structural load imposed during its installation and removal. Surface or temporary casing must be removed during or prior to grouting or it must be grouted in place when set according to subsection (i).

d) The well casing material must be steel. Permanent steel casing pipe must:

1) be new single steel casing pipe meeting AWWA A100, incorporated by reference in 35 Ill. Adm. Code 601.115, for water well construction;

2) have a minimum weight and thickness indicated in Table A;

3) be equipped with a drive shoe when driven; and

4) have full circumferential welds or threaded coupling joints.

e) All wells during construction must be protected against the entrance of water, contaminants and tampering. Methods for capping a well include a welded metal plate and a threaded cap.

f) Packers must be of material that will not impart taste, odor, toxic substances or bacterial contamination to the well water. Lead packers must not be used.

g) Screens must:

1) be constructed of materials resistant to damage by chemical action of groundwater or cleaning operations;

2) have size of openings based on sieve analysis of formation and/or gravel pack materials;

3) have sufficient length and diameter to provide adequate specific capacity and low aperture entrance velocity;

4) be installed so that pumping water level remains above the screen under all operating conditions; and

5) be provided with a bottom plate or washdown bottom fitting of the same material as the screen.

h) Grouting Requirements. The annulus of all permanent well casings must be grouted from the original ground surface or pitless unit to a minimum depth of 10 feet utilizing a minimum thickness of 1½ inches of grout.

1) Neat Cement Grout. Cement conforming to AWWA A100 and water, with not more than six gallons of water per 94 pounds of cement, must be used for 1½ inch openings.

2) Concrete Grout. Equal parts of cement conforming to AWWA A100 and sand, with not more than six gallons of water per 94 pounds of cement, may be used for annular openings larger than 1½ inches. For annular openings greater than four inches, gravel added to the concrete must not exceed ½ inch.

3) Application

A) A minimum thickness of 1½ inches of grout around permanent casings, including couplings, must be provided.

B) Prior to grouting through creviced or fractured formations, bentonite or similar materials may be added to the annular opening, in the manner indicated for grouting.

C) When the annular opening is less than four inches, grout must be installed under pressure by means of a grout pump from the bottom of the annular opening upward in one continuous operation until the annular opening is filled.

D) When the annular opening is four inches or greater and extends less than 100 feet, and concrete grout is used, it may be placed by gravity through a grout pipe installed to the bottom of the annular opening in one continuous operation until the annular opening is filled.

E) Grout must be allowed to overflow from the annular opening until the proper density or percent solids has been achieved.

F) Standby grouting equipment for grouting annular openings, including a backup grout pump and tremie pipe, must be on site during the grouting of all wells.

G) The conductor pipe must be completely withdrawn from the well prior to flushing excess grout from the conductor pipe when grouting down the annular space or must be disconnected from the grout shoe or street elbow prior to flushing excess grout when grouting within the casing.

H) After cement grouting is applied, work on the well must be discontinued until the cement or concrete grout has properly set.

I) Grout placement must be sufficient to achieve proper density or percent solids throughout the annular space.

4) Guides. The casing must be provided with sufficient guides welded to the casing to center the casing in the drill hole, prevent displacement of the casing and still permit unobstructed flow and uniform thickness of grout.

i) Upper Terminal Well Construction

1) Permanent casing for all groundwater sources must project at least 12 inches above the pumphouse, well platform floor or concrete apron surface and at least 18 inches above final ground surface.

2) Where a well house is constructed, the floor surface must be at least six inches above the final ground elevation.

3) Protection from physical damage must be provided.

4) The upper terminal must be constructed to prevent contamination from entering the well.

5) Where well appurtenances protrude through the upper terminal, the connections to the upper terminus must be mechanical or welded connections that are watertight.

j) Upper Terminal Well Construction in the Flood Plain of a 100-year Flood or Flood of Record

1) Sites subject to flooding must be provided with an earth mound to raise the well house floor to an elevation at least two feet above the highest known flood elevation, or other suitable protection as determined by the Agency. A 15-foot horizontal distance must be maintained.

2) The top of the well casing at sites subject to flooding must terminate at least three feet above the 100-year flood level or the highest known flood elevation, whichever is higher, or as otherwise approved by the Agency under Section 604.145(b).

3) Wells must have a six-inch concrete envelope completely surrounding the regular casing and extending at least 10 feet below original ground surface.

k) Development

1) Every well must be developed to remove the native silts and clays, drilling mud or finer fraction of the gravel pack.

2) Development must continue until the maximum specific capacity is obtained from the completed well.

3) Where chemical conditioning is required, specifications submitted to the Agency under 35 Ill. Adm. Code 602 must include provisions for the method, equipment, chemicals, testing for residual chemicals, and disposal of waste.

4) Where blasting procedures are used, specifications submitted to the Agency under 35 Ill. Adm. Code 602 must include the provisions for blasting and cleaning. The grouting and casing must not be damaged by the blasting.

l) When an operating permit is not required under 35 Ill. Adm. Code 602, disinfection of modified or reconditioned wells must be provided, and a record of microbiological sample results must be maintained for five years.

m) Test wells and groundwater sources that are not in use must be sealed in accordance with 77 Ill. Adm. Code 920.120. The sealing form specified in 77 Ill. Adm. Code 920.120(e)(2) must be submitted to the Agency not more than 30 days after the well is sealed.