

401 KAR 6:310. Water supply well construction practices and standards.

RELATES TO: KRS 223.400-223.460, 223.991, 224.01-010, 224.01-400, EO 2008-507, 2008-531

STATUTORY AUTHORITY: KRS 151.110, 223.420(1)(e), 223.435, 224.10-100, 224.70-100, 224.70-110

NECESSITY, FUNCTION AND CONFORMITY: KRS 224.10-100, 224.70-100, and 224.70-110 authorize the cabinet to establish administrative regulations to protect water quality. KRS 223.435 requires the cabinet to promulgate administrative regulations establishing standards of practice for water well construction. EO 2008-507 and 2008-531, effective June 16, 2008, abolish the Environmental and Public Protection Cabinet and establish the new Energy and Environment Cabinet. This administrative regulation provides minimum standards and requirements for construction, modification, and abandonment of water supply wells.

Section 1. General Requirements. (1) Certified water supply well driller requirement. Each water supply well subject to this administrative regulation shall be constructed, modified, or abandoned only by natural persons certified to drill water supply wells in accordance with KRS 223.425 and 401 KAR 6:320.

(2) Construction and well performance requirement. Permanent and temporary water supply wells shall be constructed, modified, and abandoned in such a manner as to prevent the introduction or migration of contamination to a water-bearing zone or aquifer through the casing, drill hole, or annular materials.

(3) Reporting requirement. Within sixty (60) days after a water supply well has been completed, modified, or abandoned the certified well driller shall submit a report of well construction, modification, or abandonment to the cabinet using the Uniform Kentucky Well Construction Record or the Uniform Kentucky Well Maintenance and Plugging Record, as appropriate.

(a) All information about the depth and the materials used in the water supply well construction, modification, or abandonment shall also be recorded.

(b) The certified water supply well driller shall complete the bacteriological section on the Uniform Kentucky Well Construction Record to report the results of the coliform sampling as required in Section 9(6) of this administrative regulation. The certified driller shall retain the results of the bacteriological sample analysis.

(4) Records to water supply well owner. Within sixty (60) days after the water supply well has been completed or modified, the certified well driller shall provide the following material to the well owner:

(a) A copy of the Uniform Kentucky Well Construction Record or the Uniform Kentucky Well Maintenance and Plugging Record, as appropriate;

(b) A copy of the results of bacteriological sample analysis collected in accordance with Section 9(6) of this administrative regulation;

(c) Water Well Owner's Guide; and

(d) A copy of analytical results if additional water quality analysis is conducted.

(5) The certified well driller shall tag each well constructed or modified with a well identification number tag provided by the cabinet.

(a) An existing well identification number shall be included on the Uniform Kentucky Well Maintenance and Plugging Record for any well being modified or abandoned.

(b) If a well identification number does not exist at the time of modification or abandonment, the certified driller shall tag the well, as appropriate, and include the well identification number assigned on the Uniform Kentucky Well Maintenance and Plugging Record.

(6) Variances. If conditions exist or are believed to exist that preclude compliance with the

requirements of this administrative regulation, the certified well driller may request a variance prior to well construction, modification, or abandonment. The variance request shall be submitted to the cabinet on the Kentucky Water Well Variance Request form.

(a) The variance request shall include the following:

1. A thorough description of the land use at the site and adjacent properties;
2. Distance between the proposed well location and existing water supply wells and monitoring wells on adjacent properties;
3. The distance between the proposed well location and potential pollution sources, both on site and on adjacent properties, including septic systems, sewers, and petroleum and chemical storage tanks;
4. A description of the geologic conditions at the site, including soil thickness, type of bedrock, perched water, confining zones, and the depth to groundwater
5. A summary of the provisions, including the section numbers of this administrative regulation, for which the variance is requested;
6. A justification for the variance; and
7. The proposed well construction procedures to be used in lieu of compliance with this administrative regulation and an explanation as to how the alternate well construction procedures ensure the protection of the quality of the groundwater and the protection of public health and safety.

(b) Written variance procedure. The driller shall request a variance and obtain cabinet approval before well construction begins.

1. The driller shall submit the Kentucky Water Well Variance Request form, signed by the certified driller and well owner, and obtain written cabinet approval before well construction begins.

2. The cabinet shall notify the applicant in writing within ten (10) days of its decision to either grant or deny the variance.

3. The cabinet shall not issue a variance if the proposed water supply well construction will not ensure the protection of groundwater quality and public health and safety.

(c) Verbal variance for an emergency.

1. A driller may request a verbal variance for an emergency if the delay incurred due to the written variance procedure in paragraph (b) of this subsection may result in:

a. Loss of access to potable water for the intended user;

b. Failure to address an existing or impending environmental emergency in accordance with KRS 224.01-400; or

c. A risk to public health or safety.

2. The cabinet shall not issue a variance if the proposed water supply well construction will not ensure the protection of groundwater quality and public health and safety.

3. Within fifteen (15) days of the date the cabinet approves the verbal variance for an emergency, the water well driller shall submit to Kentucky Water Well Variance Request form, signed by the certified driller and well owner, to the cabinet.

(d) The variance approval shall list the conditions of the variance, including:

1. The approved alternate well construction procedures;

2. The well sampling requirements; and

3. The requirement to notify surrounding property and well owners of the variance, if applicable.

(e) The certified well driller shall submit a copy of the Kentucky Water Well Variance Request form, signed by the certified driller and the well owner, to the cabinet within sixty (60) days after the well is completed.

(f)1. After a variance is issued regarding the location of a well with respect to various pollu-

tion sources in Section 5(1) of this administrative regulation, the certified well driller for which a variance has been issued shall collect water samples from the well and have these samples analyzed for the parameters as specified in the Kentucky Water Well Variance Request approval letter.

2. The certified well driller shall submit a copy of the analytical results to the well owner and the cabinet within ten (10) days of the receipt of the analytical results from the laboratory.

Section 2. Construction Materials and Requirements. (1) All materials to be used for the construction, modification, or abandonment of water supply wells shall be approved for use in water wells by one (1) or more of the following:

- (a) National Sanitation Foundation (NSF);
 - (b) American Society for Testing and Materials (ASTM); or
 - (c) American Petroleum Institute.
- (2) Permanent well casing and liners.

(a) Well casing and liners shall be able to withstand the physical forces acting upon them during and following their installation and during their use. This includes forces due to suspension in the borehole, grouting, development, purging, pumping, sampling, and forces exerted on the well casing and liners by the surrounding geologic materials.

(b) Steel or PVC well casing and liners shall have a minimum inside diameter of four (4) inches, except for driven point wells and jetted wells which are addressed in Section 8(3) of this administrative regulation.

(c) The certified well driller shall install well casing and liners in accordance with manufacturer specifications.

(d) The certified well driller shall not install used, damaged, or contaminated well casing or liner pipe.

(e) Steel well casing and liners.

1. Steel well casing and liners shall meet or exceed the minimum standards provided in Table A of this administrative regulation.

Table A: Casing and Liner Pipe Weights and Dimensions			
Size (inches)	External Diameter (inches)	Thickness (inches)	Weight (pounds per foot)
4	4.500	0.188	8.66
5	5.563	0.188	10.79
6	6.625	0.188	12.92
8	8.625	0.277	24.70
10	10.750	0.307	34.24
12	12.750	0.330	43.77
14	14.000	0.375	54.57
16	16.000	0.375	62.58
18	18.000	0.375	70.59
20	20.000	0.375	78.60

2. Joints and couplings shall be welded or threaded.

3. Joints shall be watertight.

(f) PVC well casing and liners.

1. PVC well casing and liners shall:

a. Meet or exceed the minimum standards provided in Table B of this administrative regulation;

Table B: PVC Casing and Liner Pipe Specifications				
Size (inches)	SDR	External Diameter (inches)	Di-	Minimum Wall (inches)
4	26	4.500		0.173
5	26	5.563		0.214
6	26	6.625		0.255
8	26	8.625		0.332
10	26	10.750		0.413
12	26	12.750		0.490
14	26	14.000		0.539
16	26	16.000		0.616

b. Have minimum Standard Dimension Ratio (SDR) 26;

c. Have a minimum Impact Classification of IC-1;

d. Meet or exceed American Society for Testing and Materials (ASTM) Specification D1784-07 or F480-066 found in American Society for Testing and Materials (A.S.T.M.) Specification D1784-07, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds and American Society for Testing and Materials (A.S.T.M.) Specification F480-06b, Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80;

e. Meet or exceed the National Sanitation Foundation (NSF) Standard 14 for potable water applications found in National Sanitation Foundation (N.S.F.) Standard 14, Plastics Piping System Components and Related Materials; and

f. Meet or exceed the NSF Standard 61 found in National Sanitation Foundation (N.S.F.) Standard 61, Drinking Water System Components Health Effects.

2. Joints and couplings shall be welded, cemented, or threaded.

3. Joints shall be watertight.

4. PVC casing shall not be driven or pushed by force of the rig, either by direct hydraulic force or by hammer.

(3)(a) Temporary outer casing. Temporary outer casing used during well construction shall be sufficiently strong to permit installation without distorting or rupturing, and shall be removed upon well completion.

(b) If the driller determines that temporary outer casing is to be used as permanent outer casing, the temporary outer casing shall be grouted in place.

(4) Well screens.

(a)1. Well screens shall be capable of withstanding the stress to which the pipe will be subjected and the corrosiveness of the water with which it comes in contact.

2. Used, damaged, or contaminated well screens shall not be installed.

(b) Steel or PVC well screens with a minimum inside diameter of four (4) inches shall be installed, except for bored, driven, or jetted wells.

(c) Well screens shall be installed in accordance with the manufacturer's specifications.

(d) Wells screens shall be centered in the borehole.

(e) Steel screens. Joints and couplings shall be welded or threaded.

(f) PVC screens shall:

1. Have minimum Standard Dimension Ratio (SDR) 26;

2. Have a minimum Impact Classification of IC-1;

3. Meet or exceed ASTM Specification D1784-07 or F480-066 found in American Society for Testing and Materials (A.S.T.M.) Specification D1784-07, Standard Specification for Rigid Poly

(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds and American Society for Testing and Materials (A.S.T.M.) Specification F480-06b, Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80;

4. Meet or exceed the NSF Standard 14 for potable water applications found in National Sanitation Foundation (N.S.F.) Standard 14, Plastics Piping System Components and Related Materials and rated potable water (PW) or well casing (WC); and

5. Joints and couplings shall be welded, cemented, or threaded.

(g) Screen slot size shall be selected to prevent the entry of sediment or other harmful material into the well.

(5) Air rotary drilling. Water shall be injected into the air stream at a rate sufficient to eliminate dust and to keep the borehole clean of cuttings.

(6) Mud rotary drilling method. Pits to contain or re-circulate drilling fluids shall be constructed in a manner as to isolate the drilling fluid from runoff to a stream or other waterway.

(7) Lead. Materials containing lead shall not be used in the construction of a water supply well.

Section 3. Sealing Materials. (1) Mixing. Sealing materials and additives that control or affect setting times or physical properties of the sealing materials shall be mixed in accordance with the manufacturer's specifications.

(2) Application. Grouting shall be performed using the grout-pipe method or a pressure grouting device to add the sealing materials and other materials used to seal the annulus from the bottom of the annulus upward in one (1) continuous operation until the annulus is filled to two (2) feet below the surface or to the point of pitless adapter attachment. If temporary or permanent outer casing is used, sealing materials may be added prior to installing the inner casing.

(a) Cement and concrete grout. The appropriate type of neat cement and concrete grout for the conditions present in the well shall be used in accordance with the manufacturer's guidelines.

(b) Neat cement-bentonite grout. Neat cement-bentonite grout shall set for a minimum of seventy two (72) hours prior to resuming drilling operations.

(c)1. Bentonite grout. Bentonite grout shall set until the slurry has hydrated according to the manufacturer's specifications.

2. Bentonite grout shall not be used if chlorides in groundwater exceed 1,000 parts per million (ppm).

(d) Reduced setting time. Setting time may be reduced with additives if used in accordance with the manufacturer's specifications.

(e) Bentonite in pellet, chip, or granular form. If bentonite pellets, chips, or granules are placed above the water table, the certified driller shall comply with the following:

1. Dry bentonite pellets, chips, or granules shall be placed in increments not greater than two (2) feet in thickness to provide proper hydration and prevent bridging;

2. Each increment shall be hydrated prior to the continued placement of dry bentonite pellets, chips, or granules; and

3. Bentonite pellets, chips, or granules shall not be used if chlorides in groundwater exceed 1,000 parts per million (ppm).

(f) Construction water. Water used in the drilling or decontamination process shall be potable.

(g)1. Drill cuttings. The certified well driller may use clay, shale, or limestone drill cuttings if cuttings are allowed to seal portions of the annulus.

2. Sandstone cuttings shall not be used.

Section 4. Design Factors. Each well shall be constructed to include the following: (1) Natural protection. The well shall be located to protect groundwater quality and public health and safety.

(2) Geologic formations.

(a) The well construction shall be adapted to the local or site-specific geologic formations and groundwater conditions.

(b) Undesirable groundwater shall be cased off or otherwise prevented from contributing to a well.

(3) Capacity. The well shall be constructed to optimize yield while maintaining the safe functioning and integrity of the aquifer.

(4) Pitless well adapters.

(a) A well casing shall not be cut off or cut into below finished ground surface except by a certified water supply well driller to install a pitless well adapter, a pitless well unit, or to make modifications.

(b) Construction or installation of pitless well adapters or pitless well units shall be done in such a manner as to provide a leak-proof seal. If a frost-free hydrant is installed, a Dual Check Valve Backflow Preventer that meets the specifications of American Society of Sanitary Engineering (A.S.S.E.) 1024 Performance Requirements for Dual Check Backflow Preventers shall be installed between the pitless adapter and the frost-free hydrant.

(5) Accessibility. The well shall be constructed to allow access for repairs, maintenance, treatment, and inspection.

Section 5. Setback requirements. (1) Wells shall be installed in accordance with the minimum lateral distances between the well and potential pollution sources in Table C of this administrative regulation.

Table C: Setback Requirements	
Lateral Sources of Contamination	Minimum Distances
Leaching Pit	100 Feet
Petroleum Storage Tank	100 Feet
Grave or Cemetery	75 Feet
Manure Pile, Animal Waste Storage, or Confined Animal Feeding Operation	75 Feet
Wastewater Treatment Disposal System	75 Feet
Side Wall of Lateral Trench, Bed, or Lagoon	70 Feet
Geothermal – Closed Loop, Ungrouted	70 Feet
Water Supply Well	50 Feet
Septic Tank or Sewer Line	50 Feet
Livestock Pen, Corral, or Stable	50 Feet
Surface Water Body	25 Feet
Geothermal – Closed Loop, Grouted; Abandoned Water Well Grouted	20 Feet

Table C: Setback Requirements	
Lateral Sources of Contamination	Minimum Distances
Property Lines, Utility Lines, or Roadway Right of Way	10 Feet

(2) The certified well driller shall evaluate land-use activities, both on the property on which the well is to be located and on adjacent properties, and identify other potential pollution sources not listed subsection (1) of this section.

(3) If the unconsolidated material is less than twenty (20) feet thick and composed of predominantly sand or gravel, the minimum lateral distances in subsection (1) of this section shall be doubled.

(4) Wells may be constructed in flood zones if an alternate site does not exist.

(5) The certified well driller shall terminate the casing a minimum of two (2) feet above the maximum known flood elevation, or any known conditions of flooding by drainage or run-off from the surrounding land.

(6) Buildings. The well extended vertically shall clear a projection from a building by a minimum of five (5) feet.

(7) Pits and basements. Wells shall not be constructed in pits or basements.

Section 6. Wells Drilled into Consolidated Formations Using the Cable Tool, Air Rotary, Mud Rotary, Reverse Rotary, or Sonic Methods. (1) Borehole construction.

(a) The diameter of the borehole shall be a minimum of 1.75 inches greater than the outer diameter of the casing.

(b) Steel casing may be driven or advanced through unconsolidated material without over-drilling using the dry-driven grout method in accordance with Section 8(2) of this administrative regulation.

(c) The borehole diameter of the open-hole portion of the well shall be smaller than the inside diameter of the lowermost permanent casing in order that the permanent casing can rest on the shoulder of the open borehole and in order that the lower portion of the permanent casing can be properly sealed.

(d) Plumbness and alignment. The borehole shall be sufficiently plumb and straight to receive well casing, liner, and screen without binding and shall not interfere with the installation and operation of the pump.

(2) Casing installation.

(a) Casing shall extend below the surface a minimum of twenty (20) feet.

(b) Single-cased wells.

1. Unconsolidated material thirty (30) feet thick or less. If unconsolidated material is thirty (30) feet thick or less, the certified well driller shall install casing extending a minimum of ten (10) feet into bedrock.

2. Unconsolidated material greater than thirty (30) feet thick. If unconsolidated material is greater than thirty (30) feet thick, the certified well driller shall install casing extending a minimum of two (2) feet into bedrock.

3. Fractures, crevices, voids, and undesirable geologic formations. Permanent casing shall be installed a minimum of two (2) feet below any fractures, crevices, voids, or undesirable geologic formations that may introduce harmful materials, pollutants, or undesirable groundwater to the well.

4. The certified driller shall case off undesirable water-bearing formations, leaving a minimum of two (2) feet below the bottom of the production zone.

(c) Multiple-cased wells.

1.a. Temporary outer casing. The inside diameter of temporary outer casing shall be a minimum of two (2) inches greater than the outside diameter of the inner casing.

b. Temporary outer casing shall be removed prior to well completion.

c. If the driller determines that temporary outer casing is to be used as permanent outer casing, the temporary outer casing shall be grouted in place.

2. Permanent outer casing. The inside diameter of permanent outer casing shall be a minimum of two (2) inches greater than the outside diameter of the inner casing.

3. Inner casing. The certified well driller shall install permanent inner casing in accordance with the requirements of subsection (2)(b) of this section.

(3) Screen and liner installation.

(a) If a screen or liner is installed, screen or liner slot size shall be selected to prevent the entry of fine-grained sediment and other anticipated harmful material into the well.

(b) Screens and liners shall conform to the requirements of Section 2 of this administrative regulation.

(4) Filter pack. If an artificial filter pack is installed, the filter pack shall meet the following criteria:

(a) Filter pack material size shall work in conjunction with the well screen to prevent the entry of fine material and sediment into the well;

(b) Filter pack material shall be disinfected prior to placement in the well or shall be disinfected in the well;

(c) The filter pack shall extend a minimum of two (2) feet above the screen; and

(d) Filter pack refill pipes may be installed if refill pipes terminate above finished ground surface, are provided with a watertight cap, and are sealed in the annulus.

(5) Annular seal.

(a) The certified well driller shall seal the annulus in a manner that prevents the migration of pollutants through the annulus. The certified well driller shall seal the annulus by one (1) of the following methods:

1. Sealing the entire annulus with sealing materials;

2. Sealing a minimum of the bottom two (2) feet of the annulus between the borehole and the permanent casing and sealing the remainder of the annulus with impervious drill cuttings, sealing materials, native clay, or a combination of these materials; or

3. The methods in subparagraphs 1 or 2 of this paragraph used in combination with a mechanical packer.

(b) Single-cased wells.

1. Open-hole construction. The certified well driller shall seal the bottom two (2) feet of the annulus with sealing materials and shall seal the remainder of the annulus with impervious drill cuttings, sealing materials, native clay, or a combination of these materials.

2. Screened construction. The certified well driller shall seal the bottom two (2) feet above the filter pack with sealing materials and shall seal the remainder of the annulus with impervious drill cuttings, sealing materials, native clay, or a combination of these materials.

(c) Multiple-cased wells.

1. Temporary outer casing.

a. The certified well driller shall seal the annulus below the temporary outer casing prior to removal of the temporary outer casing.

b. The certified well driller shall seal the remainder of the annulus in the zone where temporary outer casing was used upon removal of the temporary outer casing.

2. Permanent outer casing. The certified well driller shall seal the annulus between the borehole and permanent outer casing at the installation of the permanent outer casing. The certified well driller shall seal the bottom two (2) feet of the annulus between the bore hole and

the permanent outer casing with sealing materials and shall seal the remainder of the annulus with impervious drill cuttings, sealing materials, native clay, or a combination of these materials.

3. Inner casing. The certified well driller shall seal the entire annulus around the inner casing, including the annulus between the outer and inner casing. The certified well driller shall seal the bottom two (2) feet of the annulus between the outer casing and the inner casing with sealing materials and shall seal the remainder of the annulus with impervious drill cuttings, sealing materials, native clay, or a combination of these materials.

Section 7. Wells Drilled in Unconsolidated Formations. (1) Borehole construction.

(a) The borehole diameter shall be a minimum of four (4) inches greater than the outside diameter of the well casing and screen; or

(b) Steel casing may be driven or advanced without over-drilling using the dry-driven grout method in accordance with Section 8(2) of this administrative regulation.

(c) Plumbness and alignment. The borehole shall be sufficiently plumb and straight to receive well casing, liner, and screen without binding and shall not interfere with the installation and operation of the pump.

(2) Casing installation.

(a) Single-cased wells. A minimum of twenty (20) feet of permanent casing shall be installed below finished ground surface excluding the screened interval.

(b) Multiple-cased wells.

1. Temporary outer casing.

a. The inside diameter of temporary outer casing shall be a minimum of four (4) inches greater than the outside diameter of the inner casing.

b. Temporary outer casing shall be removed prior to well completion.

2. Permanent outer casing. The inside diameter of permanent outer casing shall be a minimum of four (4) inches greater than the outside diameter of the inner casing.

3. Inner casing. A minimum of twenty (20) feet of permanent inner casing shall be installed below finished ground surface excluding the screened interval.

(3) Screen installation. Screen slot size shall be selected to prevent the entry of fine sediment or other harmful material into the well.

(4) Filter pack. The natural formation may be developed to serve as a filter pack, or an artificial filter pack shall be installed. The artificial filter pack shall meet the following criteria:

(a) Filter pack material shall be sized to prevent the entry of fine sediment or other harmful material into the well;

(b) Filter pack material shall be disinfected prior to placement in the well, or disinfected in place;

(c) The filter pack shall extend a minimum of two (2) feet above the screen; and

(d) Filter pack refill pipes may be installed if they terminate above finished ground surface, are provided with a watertight cap, and are sealed in the annulus.

(5) Annular seal.

(a) The annulus shall be sealed in a manner that prevents the migration of groundwater and pollutants through the annulus. The certified well driller shall seal the annulus by one (1) of the following methods:

1. Sealing the entire annulus with sealing materials;

2. Sealing the two (2) feet of annulus directly above the filter pack with sealing materials and sealing the remainder of the annulus with drill cuttings, sealing materials, native clay, or a combination of these materials; or

3. Using the method outlined above in combination with a mechanical packer.

(b) Single-cased wells.

1. The certified well driller shall seal the annulus using one (1) of the following methods:

- a. Sealing the entire annulus with sealing materials; or
- b. Sealing the two (2) feet of annulus directly above the filter pack with sealing materials and sealing the remainder of the annulus with drill cuttings, sealing materials, native clay, or a combination of these materials.

2. The annular seal shall extend to a minimum depth of eighteen (18) feet below finished ground surface.

(c) Multiple-cased wells.

1. Temporary outer casing. The certified well driller shall seal the bottom two (2) feet of the annulus above the filter pack with sealing materials and the remainder of the annulus below the temporary outer casing with drill cuttings, sealing materials, native clay, or a combination of these materials prior to removal of the temporary outer casing.

2. Permanent outer casing. The certified well driller shall seal the bottom two (2) feet of the annulus between the borehole and permanent outer casing above the filter pack with sealing materials and the remainder of the annulus between the borehole and permanent outer casing with drill cuttings, sealing materials, native clay, or a combination of these materials at the installation of the permanent outer casing.

3. Inner casing. The certified well driller shall seal the bottom two (2) feet of the annulus between the inner casing and outer casing with sealing materials and the remainder of the annulus between the inner casing and outer casing shall be sealed with drill cuttings, sealing materials, native clay, or a combination of these materials.

Section 8. Special Well Types. Wells in this classification shall include bored, driven, and radial collector wells.

(1) Bored well construction. Bored wells shall be constructed using the concrete-collar or the buried-slab method.

(a) Borehole diameter. The borehole diameter shall be a minimum of four (4) inches greater than the outside diameter of the well casing or precast concrete tiles used below the buried-slab or concrete-collar method.

(b) Casing materials. Casing materials for bored wells shall consist of pre-cast concrete tiles or corrugated fiberglass casing that meet the material construction standards set out in Section 2 of this administrative regulation.

(c) Filter pack. The natural formation may serve as a filter pack, or an artificial filter pack may be installed in the annulus below the buried slab. The filter pack shall meet the following criteria:

1. The artificial filter pack material shall be sized to prevent the entry of fine-grained sediment and other material into the well, and shall be free from clay, silt, or other deleterious material;

2. Artificial filter pack material shall be disinfected prior to placement in the well;

3. The filter pack shall not extend above the buried slab or concrete collar; and

4. Filter pack refill pipes may be installed if they terminate above finished ground surface, are provided with a watertight cap, and are sealed in the annulus.

(d) Bored well construction using the buried-slab method.

1. The buried slab shall be a minimum of ten (10) feet below ground surface.

2. The slab shall consist of reinforced concrete constructed without joints.

3. The buried slab shall have a diameter sufficient to extend to the outer edge of the casing or tiles installed below the buried slab.

4. The top of the buried slab shall slope away from the center and shall provide a watertight

joint where the buried slab rests on the well casing.

5. A coupling shall be cast in the buried slab in which to install the upper well casing.

6. The joint between the well casing and coupling shall be water tight.

7. Bentonite seal.

a. The certified well driller shall install a bentonite seal above the buried slab that extends the entire diameter of the borehole.

b. The bentonite seal shall be a minimum of twelve (12) inches thick.

8. Upper well casing.

a. The certified well driller shall install well casing above the buried slab to extend a minimum of eight (8) inches above the ground surface.

b. The inside diameter of the casing shall be a minimum of four (4) inches.

c. The upper casing shall conform to the requirements of Section 2 of this administrative regulation and shall have only threaded or welded joints.

9. Pitless adapter. If a pitless adapter is installed, installation of the pitless adapters shall be done in such a manner as to provide a leak-proof seal. If a frost-free hydrant is installed, a Dual Check Valve Backflow Preventer that meets the specifications of American Society of Sanitary Engineering (A.S.S.E.) 1024 Performance Requirements for Dual Check Backflow Preventers shall be installed between the pitless adapter and the frost-free hydrant.

10. The annulus fill for the upper casing above the bentonite seal shall consist of sealing materials or clean, inert earth materials.

11. The certified well driller shall install a water-tight well cap at the top of casing.

(e) Bored well construction with concrete-collar method.

1. The upper ten (10) feet of the borehole diameter shall be a minimum of six (6) inches greater than the outside diameter of the well casing.

2. The annular space in the upper ten (10) feet of the borehole between the excavation and the installed concrete collar casing shall be sealed with concrete or sealing materials.

3. The diameter of the borehole below the grouting shall be a minimum of four (4) inches greater than the outside diameter of the well casing.

4. The casing shall extend a minimum of eight (8) inches above the finished ground surface.

5. The cover slab shall be a minimum of four (4) inches thick.

6. A pipe sleeve shall be cast in place in the slab to accommodate the type of pump or pump piping to be used for the well.

7. A watertight joint shall be made where the slab rests on the well casing.

(2) Dry-driven grout method.

(a) General.

1. Steel casing may be driven using the dry-driven grout method.

2. PVC casing shall not be driven or pushed by force of the rig, either by direct hydraulic force or by hammer.

(b) Pilot hole. A pilot hole shall be constructed a minimum of three (3) feet deep and a minimum of six (6) inches larger in diameter than the outside diameter of the casing to be driven.

(c) Casing installation.

1. Dry bentonite granules not smaller than fifty (50) mesh and not larger than eight (8) mesh shall be poured into the pilot hole prior to driving the casing.

2. Bentonite shall continue to be poured into the pilot hole as the casing is driven and bentonite is drawn into the annulus.

(3) Driven point wells and jetted wells. Driven point wells and jetted wells shall be used for temporary dewatering purposes only.

(a) The well point, drive pipe, and joints shall be structurally suitable to prevent rupture or distortion during driving.

- (b) Driven point wells and jetted wells shall not supply water for human consumption.
- (c) Driven point wells shall have a water-tight cap.
- (d) Driven point wells and jetted wells shall be abandoned in accordance with Section 11 of this administrative regulation.
- (4) Radial collector wells.
 - (a) The certified well driller shall submit plans for a proposed radial collector well to the cabinet and receive written approval prior to construction of a radial collector well.
 - (b) Factors that shall be considered for approval of a radial collector well include:
 - 1. Depth of the well;
 - 2. Types of formations;
 - 3. The location of the well;
 - 4. Sources of potential contamination in the area surrounding the well;
 - 5. Intended use of the well; and
 - 6. Planned or approved treatment schemes, if applicable.

Section 9. Well Finishing, Disinfection, and Testing. (1) Upper terminal. Upon well completion, the certified driller shall comply with the following:

- (a) The certified well driller shall terminate the casing a minimum of four (4) inches above finished ground surface and shall slope the ground surface away from the well.
- (b) Flood zones. The certified well driller shall terminate the casing a minimum of two (2) feet above the maximum known flood elevation.

(2) Well development. Newly installed water supply wells shall be developed until the column of water in the well is free of visible sediment.

(3) Disinfection. Wells shall be disinfected in accordance with the following procedures:

(a) Determine the feet of water in the well by subtracting the static water level from the total depth of the well;

(b) Determine the amount of chlorine disinfectant to use in order to provide a minimum chlorine concentration of 100 parts per million (ppm) in the well;

1. For a four (4) inch-diameter well, the certified well driller shall use a minimum of three (3) cups of chlorine bleach or two (2) ounces of hypochlorite granules per 150 feet of water in the well.

2. For a six (6) inch-diameter well, the certified well driller shall use a minimum of three (3) cups of chlorine bleach or two (2) ounces of hypochlorite granules per seventy-five (75) feet of water in the well.

3. For an eight (8) inch-diameter well, the certified well driller shall use a minimum of three (3) cups of chlorine bleach or two (2) ounces of hypochlorite granules per fifty (50) feet of water in the well.

4. For a twenty-four (24) inch-diameter well, the certified well driller shall use a minimum of eight (8) cups of chlorine bleach or five (5) ounces of hypochlorite granules per ten (10) feet of water in the well; and

(c) Chlorine disinfection procedure.

1. Introduce the chlorine or hypochlorite granules into the well.

2. Circulate the chlorine solution throughout the well for a minimum of thirty (30) minutes, ensuring that the chlorinated water contacts all parts of the well casing, borehole, discharge pipes, and all internal well components.

3. Allow chlorinated water to stand in the well for a minimum of thirty (30) minutes.

4. After the chlorinated water solution has stood in the well for a minimum of thirty (30) minutes, purge the well of all chlorinated water. Chlorinated water shall be discharged to the ground and shall not be discharged to a surface water body.

(4) Well cap.

(a) The certified well driller shall install a well cap or sanitary seal.

(b) The well cap shall be watertight.

(5) Vents. A vent shall consist of a pipe extending above the top of the well and above known flood elevations, with the open end turned down, and the open end shall be covered with twenty-four (24) mesh or finer screen of durable material. For wells with naturally occurring methane, a vent shall be installed.

(6) Fecal coliform sampling.

(a) If the well is for potable use, the certified well driller shall have the well analyzed for fecal coliform bacteria within thirty (30) days of the completion of the well.

(b) The sample shall not be collected until all residual chlorine has been purged from the well.

(c) Samples for fecal coliform bacteria shall be delivered to the laboratory within six (6) hours of the time they are collected.

(d) Samples shall be kept at four (4) degrees centigrade (forty (40) degrees Fahrenheit); during that time samples shall not be frozen.

(e) Sample containers shall be sterile glass or plastic.

(f) Fecal coliform analysis shall be conducted at a laboratory certified in accordance with 401 KAR 8:040.

Section 10. Well Modification. (1) General. If a water supply well is modified, the certified driller shall bring the well construction into compliance with this administrative regulation.

(2) Well pits.

(a) A new well pit shall not be constructed, and a person shall not modify an existing well pit.

(b) The certified well driller modifying a well shall eliminate an existing well pit and shall extend the casing a minimum of four (4) inches above the finished ground surface.

(c) Flooring and the walls of the pit shall be broken and removed, and the pit shall be filled with compacted earth.

(3) Finishing and testing. The certified well driller shall finish the well and have the well tested for fecal coliform bacteria in accordance with Section 9(6) of this administrative regulation.

(4) Reporting requirement. Within sixty (60) days of modification of a well, the certified well driller shall submit a Uniform Kentucky Well Maintenance and Plugging Record to the well owner and the cabinet in accordance with Section 1(3) and Section 1(4) of this administrative regulation.

Section 11. Well Abandonment. (1) Well unsuitable for its intended use. A water supply well that has been damaged, or is otherwise unsuitable for use as a water supply well, shall be abandoned within thirty (30) days from the date it is determined that the well is no longer suitable for its intended use.

(a) Water supply wells shall be abandoned in such a manner as to prevent the migration of surface water or contaminants to the subsurface and to prevent migration of contaminants among water bearing zones.

(b) A record of the abandonment of a water supply well shall be submitted by the certified driller on the Uniform Kentucky Well Maintenance and Plugging Record to the water well drillers program within sixty (60) days from the date abandoned.

(2) Well preparation for abandonment.

(a) Measurements. Prior to abandoning a water supply well, the certified driller shall:

1. Measure the well depth;

2. Measure the well diameter;

3. Measure the depth to static water level; and
4. Record the information in subparagraphs 1 through 3 of this paragraph on the Uniform Kentucky Well Maintenance and Plugging Record.

(b) Obstructions.

1. All obstructions shall be removed from the well prior to abandoning; or
2. If the pump or equipment is stuck in the well and cannot be removed, the certified driller shall push the material to the bottom of the well, as possible.

(c) Disinfection. The certified well driller shall disinfect the well in accordance with Section 9(3) of this administrative regulation.

(3) Drilled wells.

(a) Well casing, screen, and liner removal.

1.a. All well casing, screens, and liners shall be removed from the well prior to placing the sealing material by pulling or over-drilling.

b. Well casing, screens, and liners may be removed simultaneously with the introduction of sealing material if necessary to avoid borehole collapse.

2.a. If the well casing has been grouted in place and the driller is unable to remove the casing, the certified well driller may cut off the casing a minimum of five (5) feet below the ground surface.

b. The driller shall fill the well with sealing materials or inert earth materials from the bottom of the well to a minimum of twenty (20) feet below the ground surface.

c. The certified well driller shall fill the remainder of the well with sealing materials to a minimum of five (5) feet below the ground surface.

d. The uppermost five (5) feet of the well shall be filled with sealing materials or other inert earth material suitable to land use at the site.

(b) Sealing material placement.

1.a. The certified well driller shall fill the well or borehole with sealing materials or other inert materials from the bottom to a minimum of twenty (20) feet below the ground surface.

b. Filling the well or borehole with sealing materials or inert material shall be done in a manner so that all voids are completely filled and in a manner that prevents bridging across the well or well bore.

2. The certified well driller shall fill the well or borehole with sealing materials from a minimum of twenty (20) feet below ground surface to a minimum of five (5) feet below the ground surface, in a manner that prevents the migration of pollutants along the well or well bore.

3. The certified well driller shall use sealing materials, clay, or other inert material suitable to the proposed land use to fill the upper five (5) feet or less of a well being abandoned.

(4) Wells with multiple casing. The certified well driller shall remove the innermost well casing, screen, or liner first and fill the well up to the level of the bottom of the next outer casing before removing the next outer casing.

(a) Voids. The certified well driller shall fill the well or borehole with sealing materials or other inert materials from the bottom of the well to a minimum of five (5) feet below the bottom of a void.

1. A packer, expansion bridge, or other support shall be placed at the top of the void.

2. A permanent bridge consisting of a minimum of ten (10) feet of sealing materials shall be placed above the expansion bridge.

(b) The certified well driller shall plug the remainder of the well or borehole with sealing materials or other inert materials from the bottom to a minimum of twenty (20) feet below the ground surface. The certified well driller shall fill the well or borehole with sealing materials from a maximum of twenty (20) feet below the ground surface to a minimum of five (5) feet below the ground surface.

(c) The certified well driller shall use sealing materials, clay, or other inert material suitable to the proposed land use to fill the upper five (5) feet or less of a well being abandoned.

(5) Bored and hand dug wells.

(a) The certified well driller shall fill the well with sealing materials, dense grade aggregate, limestone sand, or native clay from the bottom of the well to a maximum of five (5) feet below finished ground surface.

(b) The certified well driller shall remove the upper five (five) feet of well casing, tiles, or other well-wall material and fill the uppermost five (5) feet of the bore-hole with clay or an impermeable material appropriate to the intended use of the land.

(6) Driven wells.

(a) The certified well driller shall remove well casing and screens, and sealing materials shall be introduced simultaneously from the bottom of the well to a maximum of five (5) feet below finished ground surface.

(b) The certified well driller shall use sealing materials, clay, or other inert material suitable to the proposed land use to fill the upper five (5) feet or less of a well being abandoned.

(7) Flowing artesian wells.

(a) The certified well driller shall plug flowing artesian wells or wells in which there is upward movement of water between aquifers with neat cement grout that is pumped under pressure and mixed with the minimum quantity of water that will permit handling.

(b) The driller may restrict artesian flow if necessary.

(c) The certified well driller shall place a well packer, cast-iron plug, or temporary bridge at the bottom of the confining formation immediately overlying the artesian water-bearing horizon to seal off the flow.

(8) Reporting requirement. Within sixty (60) days after a water well has been abandoned, the certified well driller shall complete and submit a Uniform Kentucky Well Maintenance and Plugging Record to the well owner, if known, and to the cabinet.

Section 12. Incorporation by Reference. (1) The following material is incorporated by reference:

(a) "Uniform Kentucky Well Construction Record", April 2008;

(b) "Water Well Owner's Guide", July 2008;

(c) "Kentucky Water Well Variance Request", July 2008;

(d) "Uniform Kentucky Well Maintenance and Plugging Record", April 2008;

(e) American Society for Testing and Materials (A.S.T.M.) Specification D1784-07, "Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds", November 2007;

(f) American Society for Testing and Materials (A.S.T.M.) Specification F480-06b, "Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80", August 2006;

(g) National Sanitation Foundation (N.S.F.) Standard 14, "Plastics Piping System Components and Related Materials", March 2007;

(h) National Sanitation Foundation (N.S.F.) Standard 61, "Drinking Water System Components Health Effects", May 2008; and

(i) American Society of Sanitary Engineering (A.S.S.E.) 1024, "Performance Requirements for Dual Check Backflow Preventers", 2004.

(2) This material may be inspected, copied, or obtained, subject to applicable copyright law, at the Division of Water, 300 Sower Boulevard, Frankfort, Kentucky 40601, Monday through Friday, 8 a.m. to 4:30 p.m. The material in subsection (1)(a) through (d) of this section is also available on the Division of Water Web site, www.water.ky.gov. (11 Ky.R. 1950; Am. 12 Ky.R.

144; eff. 8-13-1985; 17 Ky.R. 2762; 3142; eff. 5-22-91; TAm eff. 8-9-2007; 35 Ky.R. 587; 798; eff. 10-8-2008; TAm eff. 7-8-2016; Crt eff. 9-5-2018.)