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3745-9-05 **Well construction.**

Applicability. This rule applies to nonpotable wells, public water system wells and radial collector wells, all of which are defined in rule 3745-9-01 of the Administrative Code. Paragraph (A) of this rule applies to both public water system and nonpotable wells, and excludes montoring wells described in rule 3745-9-03 of the Administrative Code. A nonpotable well shall be constructed in accordance with this rule and the "Ohio EPA Nonpotable Well Standard Guidance." Paragraph (B) of this rule only applies to public water system wells. Paragraph (C) of this rule applies only to radial collector wells.

[Comment: "Lead free" is defined in section 6109.10 of the Revised Code.]

(A) Public water system wells and nonpotable wells. Material used in the drilling process or well construction shall meet the following:

(1) All material used in the construction of the well shall be free of contaminants.

(2) All drilling mud, additives and lubricants shall have either standard ANSI/NSF 60 or 61 certification. Drilling fluid or additives that contain guar gum, or other such biodegradable organic material, shall not be used during the drilling of a well.

(3) Potable water shall be used for drilling purposes. Surface water shall not be used for drilling purposes. If necessary, the potable water shall be treated for drilling purposes in accordance with the drilling mud manufacturer recommendations.

(4) Well casing, other than in a point well or radial collector well, shall meet the following:

(a) Nominal pipe size of permanent casing shall be a minimum of five inches and sized to allow the well to produce water that is adequate for the intended use, and to allow for the installation and maintenance of the well and related pumping equipment.

(b) Steel pipe or tubing used as permanent well casing or liners shall conform to the following:

(i) Be new pipe or tubing that has a minimum wall thickness in accordance with the following table:

Steel Well Casing

Nominal Pipe Size (inch)	Minimum Wall Thickness (inch)
< 8	0.280
8	0.322

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10	0.365
12	0.375
14	0.375
16	0.375
18	0.375
20	0.375
> 20	0.500

(ii) Be manufactured in compliance with one of the following standards or specifications:

(a) ASTM A53/A53M-01, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless" (2001).

(b) ASTM A589-96, "Standard Specification for Seamless and Welded Carbon Steel Water-Well Pipe" (1996).

(c) ASTM A106-99el, "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service" (1999), excluding pipe marked with "NH", which is pipe with neither a hydrostatic test nor a nondestructive electric test.

(d) API 5L, "Specification for Line Pipe, forty-second edition, effective date July 1, 2000, Product Number G05L42, Document Number API SPEC 5L."

(e) ASTM A500-01a, "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes" (2001), except this tubing shall not be used in a public water system well.

(iii) Have standard ANSI/NSF 61 certification for use in a public water system well.

(iv) Be greater than minimum wall thickness and weight when required either to withstand the stresses of installation, grouting and operation, or corrosion.

(v) Be equipped with a drive shoe when driven.

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(vi) Be legibly marked on each length, by the manufacturer, with all of the following information:

(a) Name of the manufacturer.

(b) Kind of pipe (continuous welded, electric resistance welded or seamless).

(c) Weight or schedule.

(d) Nominal or outside diameter.

(e) Specification number.

(f) Heat or lot number.

(g) A certification mark that verifies compliance with standard ANSI/NSF 61 certification.

(vii) Be structurally sound, watertight throughout its length, and shall have threaded and coupled or welded joints that meet the following:

(a) Well couplings shall have a design, taper, and type of thread that is consistent with the thread of the pipe. No more than three threads shall be exposed on fourteen thread pipe and no more than two threads shall be exposed on eight thread pipe. Threaded pipe and couplings shall meet one of these standards: ASTM A53/A53M-01, ASTM A589-96, or "API RP 5B1, Gauging and Inspection of Casing, Tubing, and Line Pipe Threads," fifth edition, August 1999, Product Number G05B15, Document Number API RP 5B1.

(b) Welded joints shall form a structurally sound and watertight joint. Welded joints may include butt-welds, band rings, flared joints or welding collars. Butt-welds shall be made using a guide. Steel pipe that is equal to or less than eight inches in diameter shall have a minimum of two weld passes. Steel pipe that is greater than eight inches in diameter shall have a minimum of three weld passes. Acceptable welding procedures are as follows:

(i) Plain end well casing pipe that is eight inches nominal pipe size or less, and with wall thickness up to 0.5 inch shall be in accordance with specifications in the "American Welding Society" manual, "AWS

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D10.12M/D10.12:2000, Guide for Welding Mild Steel Pipe."

(ii) Be in accordance with specifications in standard "AWWA C206-97, Field Welding of Steel Water Pipe", December 1, 1997, catalog number 43206.

(c) Thermoplastic pipe that is used as permanent well casing, liners, well screen risers, blanks or tail pipes shall meet the following:

(i) Be new pipe that is manufactured in compliance with the standards of ASTM F480-00, "Standard Specification For Thermoplastic Well Casing Pipe And Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80" (2000), and ANSI/NSF 14, "Plastics Piping System Components and Related Materials", January 14, 2002, document number NSF/ANSI 14-2002. (See the appendix to this rule for the diameter and wall thickness of thermoplastic well casing for standard ASTM F480.)

(ii) Be standard dimension ratio (SDR) 21 or thicker pipe wall, for casings with diameters of five to eight inches.

(iii) Be SDR 17 or thicker pipe wall, for casings that are either larger than eight inches in diameter or installed at two hundred feet or greater below ground surface.

(iv) Be SDR 13.5 or thicker pipe wall, for casings that are installed at five hundred feet or greater below ground surface.

(v) Have greater than minimum wall thickness and weight when required either to withstand stresses of installation, or grouting, or operation, or because of collapse considerations.

(vi) Be legibly marked, by the manufacturer, with the following information:

(a) Nominal pipe size.

(b) Standard dimension ratio or schedule.

(c) Type of plastic.

(d) Words "well casing."

(e) Impact classification (IC).

(f) Specification number.

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(g) Manufacturer's name or trademark.

(h) Lot number and date of manufacture.

(i) A certification mark that verifies compliance with standard.

(vii) Be structurally sound and watertight throughout its length with casing joints or couplings meeting the following:

(a) Thermoplastic casing joints and couplings shall meet standards ASTM F480-00 and ANSI/NSF 14.

(b) Thermoplastic spline lock joints may be installed and need not meet standards ASTM F480-00 or ANSI/NSF 14. For purpose of this rule, a spline lock joint is a nonmetallic, watertight coupling designed for thermoplastic pipe which incorporates the use of a bell or coupling with machined grooves on the interior of the bell or coupling, and is joined by inserting thermoplastic pipe with an elastomeric sealing gasket which seats into the machined grooves, and is locked in place by insertion of a high-strength flexible thermoplastic spline to provide full three hundred sixty degree restraint with evenly distributed loading on the joint.

(c) Thermoplastic couplings shall be legibly marked as applicable with the nominal well casing pipe coupling size, type of plastic, designation of compliance with standards ASTM F480-00 and ANSI/NSF 14, and the manufacturer's name or trademark.

(viii) Not be installed where potential or known contaminants may degrade or permeate plastic.

(ix) Not be driven.

(5) Defective, visibly damaged or reject pipe shall not be used as casing or liner pipe for wells.

(6) Casing shall extend continuously either to the top of the aquifer, or to the top of the non-water bearing consolidated formations above an aquifer.

(7) Casing and borehole shall be sufficiently straight and vertical to allow for normal installation and operation of the pump and uniform placement of grout.

(8) A pitless adapter or pitless unit may be installed when piping from the casing is

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below ground surface. The pitless adapter or pitless unit and installation procedures in above and below ground surface installations shall adequately prevent the entrance of surface water, dirt, animals, insects or other foreign matter.

(9) A pitless adapter or pitless unit connection to a well casing that is made either below ground surface or less than twelve inches above ground surface shall be installed through the following methods:

(a) The pitless adapter or pitless unit shall be connected by welding or threading as required by the type of unit and the manufacturer. A pitless adapter may be attached by clamping. Any hole penetrating the side of the casing for access by the pitless adapter or pitless unit shall be of the size and dimension as required by the manufacturer, and shall be made using a hole saw or other tool capable of making a clean and uniform hole to allow proper sealing. A cutting torch shall not be used to install a pitless adapter except for a non-circular hole in the casing where the manufacturer's recommended guide is used and all edges and the exterior casing surface are ground or filed to a smooth and uniform surface.

(b) The inside diameter of the pitless unit shall not be smaller than the inside diameter of the casing. No part of a pitless adapter or pitless unit shall extend into the inside diameter of a well casing so that setting or removal of the pump, pump piping or drop pipe, or the use of tools for well rehabilitation or disinfection is impeded.

(c) Upon installation of the pitless adapter or pitless unit below ground surface, the annular space that is required in accordance to paragraph (A)(17) of this rule surrounding the casing and pitless adapter or pitless unit shall be filled with either re-compacted clean cohesive native soil or grout.

(d) A pitless unit may be attached using a structural or mechanical joint that shall do the following:

(i) Provide for the well casing to extend at least 2.5 inches into the throat of the pitless unit.

(ii) Be composed of a cast steel unit with the collar held in place with a minimum of four corrosion-resistant bolts, nuts and washers spaced uniformly around the circumference of the coupling.

(iii) Have a collar with the same or better strength and rigidity as the well casing.

(iv) Use a ramped compression gasket seal that fits between the upper

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and lower portions of the coupling to ensure a watertight seal.

(v) Ensure that the coupling is centered over the joint.

(vi) Conform to ANSI/AWWA C219-11, "Bolted, Sleeve-Type Couplings for Straight-End Pipe" January 23, 2011, catalog number 43219.

(e) Pitless adapter or pitless unit connections to thermoplastic pipe shall meet the following:

(i) Where a pitless adapter is installed by clamping on thermoplastic casing, a backing plate, wide steel strap or casting shall be installed to protect the integrity of the thermoplastic casing at the point of the pitless adapter connection.

(ii) Steel well casing pipe extension, pitless unit and pitless adapter shall not be welded after they are attached to thermoplastic well casing. Thermoplastic coupling shall be threaded onto the pitless unit before it is solvent cemented to the top of the casing.

(iii) Threaded connections shall only be installed on a pitless unit or pitless adapters after attachment to the well casing pipe.

(f) When steel well casing pipe is not terminated at the desired depth for the installation of a pitless unit, the well casing pipe shall be cut off at the desired height, and the pitless unit may be welded or threaded and coupled to the top of the well casing pipe by one of the following methods:

(i) Cutting of the well casing pipe squarely, providing a bevel for the top of the well casing pipe and welding the beveled end of the unit to the beveled end of the well casing pipe.

(ii) Welding a pipe nipple, having threads at one end and beveled on the other end, to the cut off top beveled end of the well casing pipe and threading a full length standard recessed coupling watertight to the threaded end of the unit and to the nipple. The top of the well casing pipe and the bottom of the pipe nipple to be welded shall both have beveled ends. If the pitless unit has female threads, the unit may be threaded watertight to the threaded end of the pipe nipple.

(iii) Reaming out the threads of a full standard recessed coupling at least one-third the length of the coupling, and welding the coupling to the top of the cut off well casing pipe.

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(10) A connection to a well casing that is made above ground shall be installed through the following methods:

(a) Threaded connection.

(b) Welded connection.

(c) Bolted flanges with rubber gaskets at twelve inches or greater above ground surface.

(d) Extension of the casing at least 0.5 inch into the base of a pump mounted on and sealed to a concrete pedestal.

(11) Well casing height above finished grade shall be at least twelve inches, and at least twelve inches above the well house floor or concrete apron surface, per the following:

(a) Where a well house is constructed, the floor surface shall be at least six inches above the finished grade.

(b) The finished grade shall be sloped for surface water runoff away from the well.

(12) A well shall have a well cap or seal to prevent the entrance of water, dirt, animals, insects or other foreign matter. The top of the casing at its finished height shall be cut so that the surface will fit flush with the well cap and provide a tight seal. The well cap or seal shall fit securely to the top of the well casing, be secured with screws or other appropriate connections, and vent to the atmosphere. A point well that is not a public water system well may have a watertight well cap that does not vent to the atmosphere. Electrical conduit connections on the well cap or seal shall be threaded and sealed to prevent the entrance of insects and water.

(13) A room housing pumping equipment, well house or pumphouse, shall conform to the following:

(a) Allow access for maintenance, alteration, removal and repair of the public water system components.

(b) Be constructed above ground surface.

(14) Pump construction, installation, design and maintenance shall comply with the following:

(a) A pump shall be constructed so that there are no unprotected openings into the interior of the pump or well casing.

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(b) If an above ground pump or line shaft pump are used, it shall be attached to the casing, or suction or discharge line by a watertight connection, or shall have a base plate that conforms to paragraph (A)(10) of this rule.

(c) A submersible pump motor shall not have a mercury seal.

(d) Below ground water service pipe shall be maintained under system pressure at all times. A check valve shall not be installed between a pitless adapter or pitless unit and the pressure tank.

(e) To prevent contaminants from entering the well, a temporary watertight well cap or seal shall be provided until the pumping equipment is installed.

(15) A vent shall be provided on all well caps and seals except for those used on deep well single pipe packer jet installations, or flowing wells where the flow rate is greater than the pumping rate of the permanent pump. A well vent shall be self-draining, screened with a noncorroding mesh screen of fifteen to thirty mesh, pointed downward at or above the top of the casing or pitless unit. A vent shall terminate not less than twelve inches above ground surface, and at least twelve inches above the well house floor or concrete apron surface. The well vent shall extend a minimum of three feet above the one hundred year floodplain elevation, or highest known flood elevation, whichever is higher.

(16) Maintenance, modification and alteration of a well shall comply with the following:

(a) Casing and top of well shall be protected against contamination or inadvertent damage.

(b) A well shall be altered, modified or repaired in accordance with this chapter, or a well shall be sealed in accordance with rule 3745-9-10 of the Administrative Code, if one or more of the following situations exist:

(i) The pump or any part of a well malfunctions or is defective.

(ii) The top of the casing is buried below ground surface.

(iii) Potential or actual risk of contamination of ground water exists due to casing deterioration or the condition of the well.

(17) If the casing is not driven and the drilling method requires the drilling of an oversized borehole, the annular space shall be a minimum of 1.5 inches for a well less than or equal to fourteen inches in diameter, and a minimum of two

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inches for a well greater than fourteen inches in diameter.

(18) A casing may be extended to meet the requirements in paragraph (A)(11) of this rule using a structural or mechanical joint that shall do all of the following:

(a) Provide for the well casing to extend at least 2.5 inches into the throat of the pitless unit.

(b) Be composed of a cast steel unit with the collar held in place with a minimum of four corrosion-resistant bolts, nuts and washers spaced uniformly around the circumference of the coupling.

(c) Have a collar with the same or better strength and rigidity as the well casing.

(d) Ensure that the coupling is centered over the joint.

(e) Conform to ANSI/AWWA C219-11, "Bolted, Sleeve-Type Couplings for Straight-End Pipe" January 23, 2011, catalog number 43219.

(19) Shall be constructed in accordance with the requirements in rule 3745-9-06 of the Administrative Code.

(B) Public water system wells. In addition to the requirements of paragraph (A) of this rule, the material used in the drilling process or the construction of a public water system well shall meet the following:

(1) Unless otherwise noted in this chapter, all chemicals, substances, and materials added to or brought in contact with water in a public water system well shall have either standard ANSI/NSF 60 or 61 certification in accordance with rule 3745-83-01 of the Administrative Code.

(2) Tubing per ASTM A500-01a, "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes" (2001), shall not be used in a public water system well.

(3) Well casings shall extend at least twenty-five feet below ground surface. If nonpotable water is encountered, one of the following must be completed:

(a) Above an aquifer containing potable water, the casing shall extend to the bottom of the aquifer containing the nonpotable water and shall be grouted as deep as necessary to prevent the nonpotable water from entering the aquifer containing potable water.

(b) Below an aquifer containing potable water, the lower portion of the well shall be filled with cement grout or bentonite grout, to a height

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sufficient to prevent entrance of nonpotable water into the aquifer containing potable water.

(4) For a public water system well with vertical turbine or line shaft pumps, the well shall be tested for plumbness and alignment in accordance with appendix D of standard "AWWA A100-97, Water Wells", February 1, 1998, catalog number 41100, or alternative procedures acceptable to the director.

(5) The maximum allowable horizontal deviation from vertical shall not exceed two thirds of the smallest inside diameter of that part of the well being tested per one hundred feet of depth.

(6) Well screens shall be installed in a public water system well in unconsolidated or incompetent geologic formations per the following:

(a) Screen shall be constructed of steel, stainless steel, thermoplastic or lead free brass. A lead free brass screen shall have a dielectric connection to the casing to reduce corrosion.

(b) Thermoplastic screens shall have standard ANSI/NSF 61 certification.

(c) Lead free brass screens shall meet a director approved standard, including but not limited to ANSI/NSF 61 certification.

(d) For a well with a design pumping rate greater than three hundred fifty gallons per minute, the screen shall have size of openings determined upon sieve analysis of the aquifer formation a or filter pack in accordance with standard AWWA A100-97, "Water Wells", and the screen shall have uniform openings and a maximum entrance velocity of 0.1 feet per second.

(e) The screen shall provide sufficient column and collapse strength to withstand installation and borehole pressures.

(f) Screen joints between screen sections and blank casing shall be welded, or threaded and coupled.

(g) Screen installation using telescoping methods shall be attached either directly to the bottom of the casing or to a packer.

(h) Screens shall be installed that minimize corrosion caused by contact with dissimilar steel casing. Thermoplastic screen may be attached to steel casing with the use of an appropriate coupler.

(i) Screen shall be provided with a bottom plate or washdown bottom fitting of the same material as the screen. Neither lead shot nor lead wool shall be installed to seal the screen bottom.

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(j) Where filter pack or formation stabilizer is installed, the screen shall have centralizers outside the top and bottom of the screen to ensure an even filter pack.

(7) Filter pack or formation stabilizer for a public water system well shall consist of well-rounded particles that conform to the following:

(a) Ninety-five per cent siliceous in composition.

(b) Smooth, uniform and free of foreign matter.

(c) Properly sized, washed and disinfected prior to installation in the well.

(8) Filter pack shall be installed in a well where the formation is nonhomogeneous, the uniformity coefficient of the aquifer formation is less than 3.0, and the effective grain size is less than 0.01 inches. Filter pack or formation stabilizer installed in unconsolidated or incompetent formations shall be placed in accordance with the following specifications:

(a) Filter pack or formation stabilizer shall extend a minimum of two feet above the screen for a well less than or equal to six inches in diameter, or a minimum of four feet above the screen for a well greater than six inches in diameter. Filter pack or formation stabilizer shall be at least twenty-five feet below ground surface.

(b) Filter pack or formation stabilizer shall be no less than three inches thick and no more than eight inches thick, to facilitate proper well development.

(c) Filter pack effective grain size shall be determined by a sieve analysis of the aquifer formation. The seventy per cent retained size of the filter pack shall be four to six times greater than seventy per cent retained size of the aquifer formation. The uniformity coefficient of the filter pack shall not exceed 2.5.

(d) If installed, filter pack refill pipes shall be standard weight steel or plastic pipe incorporated within the pump foundation and terminate with screwed or welded caps at least twelve inches above the pumphouse floor or concrete apron. Filter pack refill pipes shall pass through the grouted annular space where they shall be surrounded by a minimum of 1.5 inches of grout.

(9) Packers and shale traps shall be constructed of materials that have standard ANSI/NSF 61 certification. Lead packers shall not be used.

(10) The pitless adapter or pitless unit shall meet the following:

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(a) Be lead free.

(b) Conform with "Water System Council Pitless Adapter Standard PAS-97, Performance Standards For Sanitary Water Well Pitless Adapters, Pitless Units, and Watertight Well Caps," (2012) or with an alternative standard acceptable to the director.

(c) If welded, have connections to steel well casing made watertight in accordance with welding procedures in the "American Welding Society Structural Welding Code, AWS D1.1/D1.M:2002" (2002).

(11) The well cap shall conform with "Water System Council Pitless Adapter Standard PAS-97, Performance Standards for Sanitary Water Well Pitless Adapters, Pitless Units, and Watertight Well Caps" (2012), or with an alternative standard acceptable to the director.

(12) A well located in a floodplain shall comply with the following:

(a) The casing, well cap, well vent and pumphouse floor shall extend a minimum of three feet above the one hundred year floodplain elevation or highest known flood elevation, whichever is higher. With prior acceptance of the director, in lieu of extending the casing a minimum of three feet above the one hundred year floodplain, a noncommunity public water system well may have both a watertight well cap and a well vent extending a minimum of three feet above the one hundred year floodplain elevation or highest known flood elevation, whichever is higher.

(b) The one hundred year flood elevation shall be determined by reference to the FEMA flood map for the well location. The director may require the wellhead and floodplain elevations to be determined by a professional surveyor or professional engineer. For purposes of this rule, professional surveyor and professional engineer shall have the same meanings as defined in section 4733.01 of the Revised Code.

(C) Radial collector wells. A radial collector well shall comply with the following:

(1) The caisson shall be constructed of watertight reinforced portland cement concrete with watertight joints.

(2) The caisson wall shall be reinforced to withstand the forces to which it will be subjected.

(3) Lateral collectors shall be in areas and at depths accepted by the director. The area around the laterals shall be under the control of the public water system for a distance of three hundred feet beyond the laterals.

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(4) Provisions shall be made to assure that collectors are essentially horizontal.

(5) The top of the caisson shall be covered with a watertight floor.

(6) All openings in the floor shall be curbed and protected from entrance of foreign material.

(7) The pump discharge piping shall not be placed through caisson walls.

[Comment: This rule incoporates the "Ohio EPA Nonpotable Well Standard Guidance," published in 2015. The rule incorporates this guidance by reference. At the effective date of this rule, a copy may be obtained from "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215," (614) 644-2752, www.epa.ohio.gov. The document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard ANSI/NSF 60, Drinking Water Treatment Chemicals - Health Effects", December 11, 2009, Document Number NSF/ANSI 60-2009a; and "Standard ANSI/NSF 61, Drinking Water System Components - Health Effects", February 15, 2010, Document Number NSF/ANSI 61-2010; and, "Standard ANSI/NSF 14, Plastics Piping System Components and Related Materials", January 14, 2002, Document Number NSF/ANSI 14-2002. This rule incorporates these standards or specifications by reference. A copy may be obtained from "NSF International, 789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48113-0140," (734) 769-8010, www.nsf.org. The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard API 5L, Specification for Line Pipe", forty-second edition, effective date July 1, 2000, Product Number G05L42, Document Number API SPEC 5L; and "Standard API RP 5B1, Gauging and Inspection of Casing, Tubing, and Line Pipe Threads", fifth edition, August 1999, Product Number G05B15, Document Number API RP 5B1. This rule incorporates these standards or specifications by reference. A copy may be obtained from "API, 1220 L Street NW, Washington, DC 20005-4070," (202) 682-8000, www.api.org. The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard ASTM A53/A53M-01, Standard Specification For Pipe, Steel, Black And Hot-Dipped, Zinc-Coated, Welded And Seamless", and "ASTM A589-96, Standard Specification For Seamless And Welded Carbon Steel Water-Well Pipe"; and "ASTM A106-99e1, Standard Specification For Seamless Carbon Steel Pipe For High-Temperature Service"; and "ASTM F480-00, Standard Specification For Thermoplastic Well Casing Pipe And Couplings Made in Standard Dimension Ratios (SDR), SCH 40 And SCH 80"; and "ASTM A500-01a,

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Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes". This rule incorporates these standards or specifications by reference. A copy may be obtained from "ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959," (610) 832-9500, www.astm.org. The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "AWS D10.12M/D10.12:2000, Guide for Welding Mild Steel Pipe;" and "AWS D1.1/D1.M:2002, American Welding Society Structural Welding Code Steel." This rule incorporates these standards or specifications by reference. A copy may be obtained from "American Welding Society, 8669 Northwest 36 Street, #130, Miami, FL, 33166-6672," (305) 443-9353, www.aws.org. The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "ANSI/AWWA C219-11, Bolted, Sleeve-Type Couplings for Plain-End Pipe" January 23, 2011, catalog number 43219. This rule incorporates these standards or specifications by reference. A copy may be obtained from "AWWA Bookstore, 6666 W. Quincy Avenue, Denver, CO, 80235," (303) 794-7711, www.awwa.org. The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "Standard AWWA C206-97, Field Welding of Steel Water Pipe", effective date December 1, 1997, catalog number 43206; and "AWWA A100-97, Water Wells", effective date February 1, 1998, catalog number 41100. This rule incorporates these standards or specifications by reference. A copy may be obtained from "AWWA Bookstore, 6666 W. Quincy Avenue, Denver, CO, 80235," (303) 794-7711, www.awwa.org. The standards are available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

[Comment: "The Water System Council Pitless Adapter Standard PAS-97, Performance Standards For Sanitary Water Well Pitless Adapters, Pitless Units, and Well Caps". This rule incorporates this standard or specification by reference. A copy may be obtained from "Water Systems Council, 1101 30th Street NW, Suite 500, Washington, DC, 20007-3772," (202) 625-4387, www.watersystemscouncil.org. This document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215."]

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Table 1: Diameter and Wall Thickness of Thermoplastic Well Casing for Standard ASTM F480

Nominal Pipe Size (inch)	Outside Diameter (inch)	Wall Thickness SDR 21 (inch)	Wall Thickness SDR 17 (inch)	Wall Thickness SDR 13.5 (inch)	Wall Thickness SCH 80 (inch)
5	5.563	0.265	0.327	0.412	0.375
6	6.625	0.316	0.390	0.491	0.432
8	8.625	0.410	0.508	--	0.500
10	10.750	--	0.632	--	--
12	12.750	--	0.750	--	--
14	14.000	--	--	--	0.750
16	16.000	--	--	--	0.843

Where schedule 80 pipe is used, the wall thickness shall be at least as thick as required in accordance with paragraph (A)(4)(c) of this rule.