



## Ohio Administrative Code

### Rule 3701-28-10 Well construction, alteration and maintenance.

Effective: January 1, 2020

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Wells used as private water systems shall be constructed to comply with the requirements of this rule.

(A) During the construction, alteration or maintenance of a well, steps must be taken by the owner and the private water systems contractor to minimize the entrance of contaminants into the well.

(1) If construction of the private water system is not complete and the private water systems contractor must leave the well site while the equipment is still on site, the contractor shall ensure that the annular space or borehole is securely covered to prevent the entrance of contaminants, and prevent a safety hazard for animals and people.

(2) If the drilling rig is to be removed from the site before the installation of casing and grout, the borehole shall be secured to prevent collapse or shall be sealed.

(3) Open boreholes without casing, grouting and a proper cap installed shall not be left open for more than ten days unless the private water systems contractor documents to the local health district that extenuating circumstances including, but not limited to, equipment repair delays or illness are preventing the completion of the well.

(B) Drive points shall only be used to construct a well when geologic conditions or site conditions preclude the use of or access by conventional drilling equipment and methods, such as cable tool, driven casing hammer, and air and mud rotary.

(1) Additional plans shall be submitted for drive point well construction indicating justification for the installation of a drive point well in accordance with paragraph (G)(6) of rule 3701-28-03 of the Administrative Code.

(2) The local board of health shall review the site prior to construction to confirm that a drive point is the only possible method for use on the site.



(3) For purposes of this rule drive point means a small diameter well less than three inches in diameter that is installed by manually or mechanically driving the casing into the ground.

(4) Drive points shall not be constructed on an emergency basis.

(5) The user shall have test strips or test kits to prescreen for nitrates and chlorides.

(6) The private water system shall have a legible label placed on the pressure tank or near the system which contains language provided by the department describing the process of and providing recommendations regarding prescreening and testing for nitrates and chlorides. It shall be the responsibility of the installing private water system contractor to ensure that the tanks and components are properly labeled.

(C) A well shall contain permanent primary casing, and secondary permanent casing, if necessary, that meets the requirements of rule 3701-28-09 of the Administrative Code.

(1) Except when drive points are used in accordance with paragraph (B) of this rule and as provided in this paragraph, the nominal pipe size of permanent primary 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.

(2) The casing shall be installed sufficiently straight and vertical and centered within the borehole.

(3) All primary and secondary casing and casing joints shall be watertight.

(4) Except when geologic or hydrogeologic conditions require additional casing construction requirements, casing shall extend continuously to the top of the aquifer being used for water supply or be firmly seated or extend into the competent solid, non-weathered, non-water bearing bedrock formation above the uppermost aquifer being used for water supply.

(5) Primary casing installed into consolidated formations shall be adequately seated in a competent geologic formation.



(6) Casing shall not extend less than twenty-five feet below the natural or original ground surface except for where geologic and hydrogeologic conditions indicate potable water is not present at depths greater than twenty-five feet.

(a) Private water systems contractors shall notify the local board of health within ten business days when less than twenty-five feet of casing has been installed in a well.

(b) Under no conditions shall casing for a well extend to a depth of less than ten feet.

(c) Except for drive points, wells with less than twenty-five feet of casing and no less than fifteen feet of casing shall require continuous disinfection in accordance with rule 3701-28-15 of the Administrative Code.

(d) Wells with less than fifteen feet of casing shall require continuous disinfection and cyst reduction in accordance with rule 3701-28-15 of the Administrative Code. A variance to this rule by the board of health shall not be permitted.

(D) In addition to the requirements of paragraph (C) of this rule, if non-potable water is encountered:

(1) Above an aquifer containing potable water, the casing shall extend to the bottom of the aquifer containing the non-potable water, or as deep as necessary to prevent the non-potable water from entering the aquifer containing potable water;

(2) Below an aquifer containing potable water, the lower portion of the well shall be filled with cement grout or bentonite grout, to a height sufficient to prevent entrance of non-potable water into the aquifer containing potable water.

(E) In addition to the requirements of paragraph (C) of this rule, wells completed where multiple aquifers are present shall have the casing extend through aquifers that are not contributing to the water supply of the well. The annular space contiguous to aquifers that are not contributing to the water supply of the well shall be grouted in accordance with rule 3701-28-10 of the Administrative



Code.

(F) Except for flowing wells meeting the conditions of paragraph (P) of this rule, in addition to the requirements of paragraph (C) of this rule, wells completed in confined aquifers shall meet one of the following:

(1) Aquifers confined by an unconsolidated confining layer shall have the casing extend through the confining layer to the top of the aquifer. The annular space contiguous to the confining formation shall be filled with cement grout or bentonite grout by pressure grouting, dry driving, or dry pouring. Filter packs and formation stabilizers shall not extend significantly into a confining formation or allow interconnection of two separate aquifers along the annular space.

(2) Aquifers confined by a consolidated confining layer shall have the casing extend a sufficient depth into the confining layer to retain and maintain the natural ability of the confining layer to protect the confined aquifer from contamination and prevent the loss of hydraulic head. The annular space contiguous to the confining formation shall be filled with cement grout or bentonite grout by pressure grouting, dry driving, or dry pouring. An under reaming tool shall not be used with the dry driven grout method.

(G) Except for very soft, friable or weathered shales or sandstones, where consolidated formations are encountered within twenty-five feet of the ground surface, an oversized borehole shall be drilled and the annular space shall be filled with cement grout or bentonite grout.

(H) Liner pipe may be installed, or shall be installed if the consolidated formation is determined to be prone to collapse, incompetent, or weathered, within and below permanent primary and secondary casing and must meet the requirements of paragraph (B) of rule 3701-28-09 of the Administrative Code and the following requirements:

(1) The top of the liner pipe must terminate no deeper than twenty-one feet or above the static water level, whichever is less, but no less than five feet below the ground surface, must have a threaded connection to facilitate removal of the liner, and must be able to be removed from the well to allow for well cleaning, inspection and maintenance.



(2) Liner pipe with slots, drill holes or other perforations may only be installed adjacent to consolidated geologic formations to help prevent borehole collapse or protect the pumping equipment. Liner pipe with slots, drill holes or other perforations may not be used as well screens in unconsolidated geologic formation.

(I) All annular spaces shall be grouted in accordance with the following requirements:

(1) Except as otherwise provided in paragraphs (D) and (M) of this rule, the annular space in all wells shall be filled with grout from the bottom of the annular space or top of the filter pack or formation stabilizer upward to the ground surface. The annular space must be uniform and borehole stability must be maintained to ensure relatively even placement of the grout seal.

(2) Except for flowing artesian conditions, all drilling fluids shall be flushed from the annular space prior to grouting.

(3) Except as otherwise provided in paragraph (D) of this rule and where multiple screens are present in the well, grout shall extend continuously along the length of the permanent primary or secondary casing.

(4) The annular space between a permanent casing and temporary casing shall be filled with grout during temporary casing removal.

(5) If the primary casing is not driven and the drilling method requires the drilling of an oversized borehole:

(a) The total annular space shall be a minimum of 1.5 inches per side for wells less than or equal to fourteen inches in diameter as measured from the outside of the casing, or a minimum of one inch per side if measured from the outside of the casing coupling,

(b) A minimum of two inches per side for wells greater than fourteen inches in diameter, and a minimum of one inch per side from the outside diameter of secondary casing.

(c) For wells exceeding twenty inches in diameter, the annular space shall be no greater than six



inches per side or twelve inches total for wells less than or equal to thirty feet in depth, and shall be no greater than four inches per side or eight inches total for wells greater than thirty feet in depth.

(d) For purposes of this rule, the annular space is the distance between the side of the borehole excavation and the outside of the casing or joint coupling or the outside diameter of the casing where no coupling is used.

(6) Except for the dry driven grout method, the total volume of sealing materials used must not be less than eighty per cent of the total volume of the annular space. If settling of the grout occurs, then additional grout shall be placed into the remaining void space.

(7) Small diameter casing extensions for large diameter wells using fiberglass casing with a buried seal shall not be required to be grouted along the length of the smaller diameter casing. Grout shall be placed from six inches above to six inches below the joint between the smaller and larger diameter casing. The annular space adjacent to the small diameter casing shall be filled with clean clay.

(8) Where the annular space in a borehole is consistently dry, consideration must be given to the appropriate type of grout materials used.

(J) Pressure grouting using bentonite or cement grout slurries approved for use under rule 3701-28-09 of the Administrative Code shall be placed into the annular space in accordance with the following requirements:

(1) When grouting with the same materials, the grout shall be placed in the annular space in a continuous operation without interruption until the cement or bentonite grout of approximately the same density as the grout being placed into the borehole is coming out of the annular space.

(2) When a tremie or conductor pipe is used in pressure grouting operations it shall be of sufficient diameter, strength and pressure rating to transport the density of grout being pumped to the depth needed to ensure complete grouting of the annular space, and minimize damage to the borehole walls and casing. For wells with grouting placed less than one-hundred feet in depth, the tremie pipe may be left in place during the grouting process and after grouting has been completed, provided the



tremie pipe is also filled with grout. Except when grouting flowing wells, for wells with grouting placed greater than one-hundred feet in depth, the tremie pipe shall be raised with each successive batch of grout placement with the tremie pipe kept submerged a minimum of ten feet beneath the grouting surface in the annular space at all times.

(3) Except when a gravel pack is to be placed next to a well screen, a minimum of two shale traps shall be installed prior to installation of the casing and pressure grouting for installation of casing up to two hundred feet in depth. One additional shale trap shall be installed for each additional one hundred feet, or part thereof, of casing installed.

(a) The shale traps shall be placed such that the bottom of the first shale trap is no more than twelve inches from the bottom of the casing and that the bottom of the subsequent shale traps are no more than twelve inches above the shale trap below it.

(b) Shale traps may be filled with granular or coarse grade bentonite prior to placement in the borehole.

(c) Alternatively, casing may be placed directly into a two-inch annular space per side without a shale trap if the casing is resting on a consolidated formation ledge, and a minimum of ten feet of coarse grade bentonite is placed using the dry pouring method of placement described in paragraph (H) of rule 3701-28-09 of the Administrative Code from the bottom of the casing upward in the borehole, with any approved grouting method used to fill the remainder of the annular space.

(4) Acid soluble cellulose fiber or other similar additives approved by the department may be added to the grout slurry to minimize fluid loss in the borehole.

(K) The conductor pipe gravity method may be used for cement grouts in accordance with the following requirements:

(1) Cement grout may be placed into the annular space of a well using the conductor pipe gravity method where the annular space is greater than or equal to two inches per side, no greater than one hundred feet in depth, and where there is a minimal amount of water in the borehole. For purposes of this rule, the "conductor pipe gravity" method means allowing cement to flow by gravity through a



funnel or hopper connected to a conductor pipe.

(2) The conductor pipe shall be lowered to the bottom of the annular space to be grouted and the grout placed from the bottom up with the conductor pipe submerged at all times.

(L) Dry pouring of bentonite into the annular space shall be used in accordance with the following requirements:

(1) Dry pouring of coarse grade or pelletized bentonite grout must be placed using the pouring and screening methods described in paragraph (H) of rule 3701-28-09 of the Administrative Code.

(2) Bentonite shall only be dry poured into an annular space that is greater than or equal to two inches per side as measured from the outside of the casing or joint coupling or the outside diameter of the casing where no coupling is used.

(3) Coarse grade bentonite may be poured into an annular space, no greater than two-hundred feet in depth.

(4) Coarse grade bentonite shall be dry poured into the annular space between a permanent casing and temporary casing during temporary casing removal.

(5) Granular and pelletized bentonite shall not be dry poured greater than twenty-five feet in depth in a dry annular space.

(6) Coarse grade, pelletized or granular bentonite shall not be poured through drilling fluids in the annular space.

(M) The dry driven grout method shall be used for grouting the annular space in accordance with the following requirements where the well is constructed using a cable tool, driven casing hammer or any other method where permanent steel casing is driven:

(1) Where temporary outer casing or an oversized borehole is not used, a collar flared joint or weld bead shall extend beyond the outside diameter of the permanent casing and dry granular bentonite





shall be poured around the permanent casing as it is being driven.

(2) A drive shoe shall be connected to the lower end of the casing to be driven.

(3) A starter hole that is larger in diameter than the driven casing must be constructed to a depth no greater than five feet before casing is set in place for driving. If the enlarged borehole extends beyond five feet, than a two inch annular space is required.

(4) Granular bentonite shall be mounded above or below grade around the exterior of the casing as it is driven. Grout around the annular space must be kept dry as the casing is being driven.

(N) Except in naturally developed wells, filter packs or formation stabilizers used in wells completed in unconsolidated or incompetent formations shall meet the requirements of paragraph (L) of rule 3701-28-09 of the Administrative Code and be placed in accordance with the following specifications:

(1) Filter pack or formation stabilizer material shall be placed adjacent to the well screen and extend above the screen for a sufficient distance to prevent grout from being drawn into the screen by the pump. Filter pack or formation stabilizer shall not be placed in a manner which will interconnect zones of significantly different hydraulic conductivity. Filter pack or formation stabilizer shall not extend to less than ten feet from the natural ground surface.

(2) For wells exceeding twenty inches in diameter, the filter pack or formation stabilizer shall be no greater than six inches per side or twelve inches total for wells less than or equal to thirty feet in depth, and shall be no greater than four inches per side or eight inches total for wells greater than thirty feet in depth to facilitate proper well development.

(3) Filter packs and formation stabilizers shall not be placed inside of casing or liner pipe.

(4) Except for flowing well conditions described in paragraph (P) of this rule, all drilling fluids shall be flushed from the annular space prior to placement of the filter pack or formation stabilizer.

(O) Well screens that meet the specifications described in paragraph (K) of rule 3701-28-09 of the



Administrative Code shall be installed in wells completed in unconsolidated or incompetent formations, unless geologic formation conditions prevent their use. Screens shall be attached either directly to the bottom of the casing, or if installed using telescoping methods to a K-packer that meets the specification described in paragraph (L) of rule 3701-28-09 of the Administrative Code. Shale traps shall not be used in place of a K-packer. Well screens shall not be installed less than ten feet from the natural ground surface nor shall they be driven.

(P) Wells completed in aquifers constructed using drilling methods except for cable tool drilling, with hydrostatic heads greater than the land surface elevation shall have casing and grout installed to protect the aquifer, prevent erosion of the overlying geologic materials, and prevent flow in the annular space, and shall be constructed according to the following procedures, as applicable:

(1) If the anticipated flow at the ground surface is not excessive, after the borehole is drilled, and the casing set, the water in the casing may be pumped to lower the water level in the casing and the annular space. The annular space shall then be filled with cement grout by pressure grouting. However, the density of the cement grout may be greater than that required under paragraph (F) of rule 3701-28-09 of the Administrative Code to control flow in the annular space.

(2) If the water flow at the ground surface is designated by the department, the Ohio department of natural resources division of geological survey, or otherwise known to the contractor to exceed five gallons per minute or where conditions exist where a loss of borehole control may occur at the time the permit is issued, an upper enlarged borehole shall be drilled partially into the confining formation, or to a minimum of twenty-five feet, whichever is necessary. The upper enlarged borehole shall be at least four inches in diameter larger than the nominal diameter of the outer well casing. The annular space between the upper enlarged borehole and outer well casing shall be filled with cement grout by pressure grouting. The outer casing shall be left as permanent casing once the well is completed.

(a) If the confined aquifer is consolidated, a smaller diameter borehole shall be drilled through the upper enlarged borehole, the well shall be double cased, the inner casing shall be firmly seated into the bedrock, and the remaining annular space shall be filled with cement grout by pressure grouting. However, the density of the cement grout may be greater than that required under paragraph (F) of rule 3701-28-09 of the Administrative Code to control flow in the annular space.



(b) If the confined aquifer is unconsolidated, a smaller diameter borehole shall be drilled through the upper enlarged borehole, with casing and a screen installed into the confined aquifer. The well shall be double cased, and the remaining annular space filled with cement grout by pressure grouting. However, the density of the cement grout may be greater than that required under paragraph (F) of rule 3701-17-09 of the Administrative Code to control flow in the annular space.

(3) Flowing wells shall be completed at the surface to ensure water does not flow from under the well cap.

(4) Flowing well discharge control shall be provided to conserve ground water and to prevent the loss of artesian head by preventing or reducing continuous discharges. Flow control shall consist of one of the following methods;

(a) The extension of the well casing to an altitude corresponding to that of the artesian head.

(b) Installation of a vermin proof cap, well pitless adapter or wire spud, or to a discharge point that complies with paragraph (P)(5) of this rule.

(c) Installation of flowing well or spool type pitless unit, when installed within the manufacturer's specification for rated pressure.

(d) Other methods as approved by the department.

(5) After all uses for the private water systems owner are met, flowing wells may discharge up to ten gallons per minute when the private water system's owner demonstrates that a suitable discharge point exists on the owner's property, that the flow control discharge line can be adequately protected from any possible cross connection, and when one of the following conditions exist:

(a) Control of the flow is not practical due to excessive hydrostatic pressure.

(b) Control of the flow will likely result in the production of sand or turbidity in the water.



(c) The discharge will not adversely affect surrounding users of ground water or impact surface water drainage.

(d) The discharge line from the well shall either be protected by an air gap with an animal guard or a backflow prevention device.

(Q) Wells completed in cavernous, highly fractured formations, or mine shafts shall be constructed according to the following, as applicable:

(1) Any cavernous, highly fractured formations or mine shafts that are not being used as a source of water shall have casing installed through the cavernous, highly fractured formations or mine shafts and comply with the following, as applicable:

(a) If cavernous, highly fractured formations or mine shafts are greater than twenty-five feet from the ground surface, then one of the following methods of construction shall be used:

(i) The formation or shaft shall be filled with cuttings, clean gravel or grout, or packers or shale baskets shall be installed at the top and bottom of the formation or shaft and the fracture or void is not filled with grout material. The annular space above and below the void or fracture shall then be filled with cement grout or bentonite grout.

(ii) A primary casing shall be set to the top of the void and grouted in place. A secondary casing may be set inside the primary casing and the secondary casing extended through the void into the borehole below the void and grouted in place.

(b) If cavernous, highly fractured formations or mine shafts are less than twenty-five feet from the ground surface, casing shall be installed in an enlarged borehole and the annular space shall be filled with a cement grout containing additives that promote bridging of the cavernous, highly fractured formations or mine shafts by pressure grouting or by dry pouring coarse grade or pelletized bentonite to a depth of at least five feet beyond the cavernous, fractured formation or mine shaft.

(2) If the cavernous, highly fractured formation or mine shaft is to be used as the source of water supply, then a packer or shale trap or cement basket shall be installed at the top of the formation or



shaft and the annular space shall be filled with cement grout or bentonite grout by pressure grouting or dry pouring of coarse grade bentonite.

(R) Wells completed in geologic formations that produce saline water at a concentration exceeding three thousand milligrams per liter shall be constructed according to the following procedures:

(1) Any saline producing formations that are encountered during drilling shall have casing installed through the saline producing formation and the annular space contiguous to the saline producing formation shall be filled with cement grout by pressure grouting or the well shall be sealed to an elevation higher than the top of the saline producing formation. Grouts that are not adversely affected by the saline water shall be used for sealing the well or annular space.

(2) Upon identification of the occurrence of a saline producing well by the board of health or the department, actions to mitigate the production of saline water in the well must be initiated within ninety days.

(3) If the saline producing formation cannot be successfully isolated from the water source, then the entire well shall be sealed in accordance with rule 3701-28-17 of the Administrative Code or the system owner shall apply for a variance for continued use of the water. In no case shall a variance allow the well producing saline water to mix with another aquifer producing fresh water and contaminate the aquifer or another private water system.

(S) Wells that produce dissolved methane gas greater than or equal to ten milligrams per liter, or methane production in the borehole shall be vented to the atmosphere to prevent explosive conditions and minimize human exposure using one of the following methods:

(1) Venting the well through the use of vented well cap where the vent diameter is no less than one inch in diameter, and the vent opening is screened in accordance with paragraph (U)(5) of this rule and extended to a height to prevent combustion from normal activities around the home.

(2) Use of a vented tank equipped with a spray bar or nozzle to disperse the water, a vent pipe with screen and flap valve to allow escape of the gas to the atmosphere to an elevation greater than the roof of the house, or vented discharge no less than ten feet from the foundation using a smaller



diameter screened and downturned pipe to promote air flow, and a check valve after the tank and prior to an additional pump to pressurize the distribution system. Manufactured venting systems shall be installed in accordance with the manufacturers requirements.

(3) Wells located in basements, well houses, offsets or other structures shall be vented to the outside of the structure with a minimum three inch vent pipe extending ten feet from the foundation of the house, installed no less than eighteen inches from the ground surface, and the end of the vent pipe downturned and properly screened to prevent the entrance of insects and animals.

(4) Other methods of methane gas venting as approved by the department.

(T) Except when a hand pump has been installed in accordance with paragraph (P) of rule 3701-28-08 of the Administrative Code, all wells shall be equipped with a pitless adapter or pitless unit that meets the current water systems council pitless adapter standard and provides for the prevention of the entrance of surface water, dirt, animals, insects, or other foreign matter. The department shall approve all pitless adapters and pitless units and installation procedures for use in above and below ground installations if the department determines that the pitless adapter or pitless unit and installation procedures adequately prevent the entrance of surface water, dirt, animals, insects, or other foreign matter.

(1) Pitless units that connect to a well casing must extend at least twelve inches above the ground surface and be connected to the casing through one of the following methods:

(a) A threaded connection;

(b) A welded or solvent cemented connection;

(c) Bolted flanges with rubber gaskets;

(d) Extension of the casing at least one inch into the base of a power pump mounted on and sealed to a concrete pedestal; or

(e) When the steel well casing pipe is not terminated at the desired depth for the installation of an



approved 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 in accordance with the manufacturer's requirements.

(f) The inside diameter of the pitless unit shall not be smaller than the inside diameter of the casing.

(2) Pitless adapters that connect to a well casing must be installed below the local frost line and be connected to the casing using one of the following methods:

(a) Approved pitless adapters shall be connected by welding, bolting or clamping as required by the type and the manufacturer. Any hole constructed into the side of the casing for access by the pitless adapter shall be of the size and dimension as required by the manufacturer, and shall be made using a hole saw or a cutting torch. The use of a cutting guide is required.

(b) No part of a pitless adapter may 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 for wells greater than or equal to a nominal pipe size of five inches. All parts of the pitless adapter within the interior of the casing shall be removable through the top of the well casing and shall provide complete clearance within the internal diameter of the well casing for wells equal to or less than four inches in diameter.

(c) Upon installation of the pitless adapter, the excavation surrounding the casing and pitless adapter shall be backfilled with clean clay or native soils. Voids present below the pitless adapter shall be filled with bentonite grout.

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

(a) Steel well casing pipe extensions, pitless units or pitless adapters shall not be welded after they are attached to thermoplastic well casing. The thermoplastic coupling shall be threaded onto the pitless unit before it is solvent cemented to the top of the casing.

(b) Threaded connections or flanges shall only be used on pitless units or pitless adapters after



attachment to the well casing pipe.

(c) Where approved pitless adapters are installed by clamping on thermoplastic casing they shall be installed as per the manufacturer's specifications with deep pump installations of one hundred feet or more and low static water levels, 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.

(4) Except as provided in paragraph (S) of this rule and paragraphs (E) and (G) of rule 3701-28-02 of the Administrative Code the well casing height above finished grade shall be a minimum of twelve inches.

(5) 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.

(U) All well caps and seals shall meet the current water systems council well cap standard and meet the following requirements:

(1) All well caps and seals shall fit securely to the top of the well casing to provide a weather tight seal to prevent the entrance of insects, be secured with screws or other appropriate connections, and vented to the atmosphere.

(2) Electrical conduit connections on well caps or seals shall be threaded and the space between the wire and conduit must be sealed to prevent the entrance of insects and water.

(3) Wells where the pitless adapter or distribution lines have not been installed shall have an approved cap placed on the well at all times.

(4) Except for venting in a floodplain or methane gas control, holes for any purpose shall not be installed in a well cap.

(5) Except for drive point wells, the installation of vents shall comply with the following requirements:





- (a) A casing vent shall be provided on all well caps and seals except for those used on deep well single pipe packer jet installations or on flowing wells where the flow rate is greater than the pumping rate of the permanent pump.
- (b) A vent shall be self-draining, screened with a non-corroding mesh screen of adequate dimensions to prevent the entrance of insects, pointed downward, and terminate not less than twelve inches above the ground surface or above the floor of a basement, basement offset, pump room, or at a point not less than three feet above the elevation of a one-hundred year flood plain. The vent shall provide for adequate air flow.
- (c) For casing with inside diameters equal to or less than six inches, the total vent surface area shall be no less than three quarters of an inch in diameter. For casing with inside diameters greater than six inches. The total vent surface area shall be no less than one inch in diameter.
- (6) Wells located in a one-hundred year flood plain shall have watertight caps with either the casing extending a minimum of three feet above the one-hundred year flood elevation or the vent, or shall be equipped with self-sealing type vents that seal upon inundation by water.
- (V) The maintenance and modification of wells shall comply with the following:
- (1) Casings and tops of wells shall be protected against contamination at all times.
  - (2) If a casing deteriorates to such an extent that contamination may occur and the well cannot be repaired, new casing that meets the requirements of paragraph (B) of this rule shall be installed, or the well shall be sealed in accordance with rule 3701-28-17 of the Administrative Code.
  - (3) If any part of the pump, distribution system or any connection malfunctions or becomes defective in such a fashion that contamination may occur, the pump or connection or part of the distribution system shall be promptly repaired or replaced as necessary to prevent contamination.
  - (4) A well shall be disinfected in accordance with rule 3701-28-11 of the Administrative Code after maintenance or repair of the well.