

STATE OF KANSAS



ARTICLE 30 WATER WELL CONTRACTOR'S LICENSE; WATER WELL CONSTRUCTION

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**ARTICLE 30--WATER WELL CONTRACTOR'S LICENSE
WATER WELL CONSTRUCTION AND ABANDONMENT**

(Note that Article 30 regulations 28-30-2, 28-30-3, 28-30-4, 28-30-5 and 28-30-6 were amended and became effective on June 7, 2013. The changed regulations appear in smaller font and double columns as they appear in the Kansas Register.

This article regulates the construction, reconstruction, treatment and plugging of water wells and sets forth procedures for the licensing of water well contractors as required by K.S.A. 82a-1201 to 82a-1215 and amendments thereto.

28-30-1. (Authorized by K.S.A. 1979 Supp. 82a-1202, 82a-1205; effective E-74-34, July 02, 1974; modified, L. 1975, ch. 481, May 01, 1975; revoked May 01, 1980)

28-30-2. Definitions. In addition to the definitions in K.S.A. 82a-1203 and amendments thereto, each of the following terms shall have the meaning assigned in this regulation:

- (a) “Abandoned water well” means a water well determined by the department to meet at least one of the following conditions:
 - (1) Use of the water well has been permanently discontinued.
 - (2) Pumping equipment has been permanently removed from the water well.
 - (3) The water well either is in such disrepair that it cannot be used to supply water or has the potential for transmitting surface contaminants into the aquifer, or both.
 - (4) The water well poses potential health and safety hazards.
 - (5) The water well is in such a condition that it is not an active well or cannot be placed in inactive status.
- (b) “Above-grade surface completion” means the termination of a water well or boring if the casing being used is at least 12 inches above the surrounding ground surface.
- (c) “Active well” means a water well that is operating and is used to withdraw water or to monitor or observe groundwater conditions.

- (d) “Annulus” means the space between the casing and the boring or the space between two or more strings of casing.
- (e) “Aquifer” means an underground formation that contains and is capable of transmitting groundwater.
- (f) “At-grade surface completion” means the termination of a monitoring well or boring if the casing is at the surrounding ground surface.
- (g) “Cased test hole” means any test hole in which casing has been installed and grouted.
- (h) “Confined aquifer” means an aquifer overlain and underlain by impermeable layers. Groundwater in a confined aquifer is under pressure greater than atmospheric pressure and will rise in a water well above the point at which groundwater is first encountered.
- (i) “Department” means Kansas department of health and environment.
- (j) “Designated person” means the individual designated by a water well contractor who is the contact person for compliance issues and who is responsible for submitting water well records and for earning the units of approved continuing education credits required by K.A.R. 28-30-3. The designated person may be the water well contractor.
- (k) “Drill rig” means an apparatus operated to create a hole or shaft in the ground in which a water well is constructed.
- (l) “Drill rig license number” means the numbers and letters assigned by the department that are affixed to each drill rig operated by or for a water well contractor.
- (m) “Drilling fluid” means any fluid, including water, that is added during the drilling process to help increase the drilling efficiency.
- (n) “Fresh groundwater” means water containing not more than 1,000 milligrams of total dissolved solids per liter and 500 milligrams of chloride per liter.
- (o) “Groundwater” means the part of the subsurface water that is in the zone of saturation.
- (p) “Grout” means bentonite clay grout, cement grout, neat cement grout, or other material approved by the secretary used to create a permanent

impervious, watertight bond between the casing and the undisturbed formation surrounding the casing or between two or more strings of casing.

- (1) “Bentonite clay grout” means a mixture of water and either commercial grouting or plugging sodium Bentonite clay, including sodium bentonite clay manufactured under the trade name “volclay grout,” or an equivalent approved by the department according to the following:
 - (A) The mixture shall be prepared according to the manufacturer’s recommendations to achieve a weight of at least 9.4 pounds per gallon of mix. Weighting agents may be added according to the manufacturer’s recommendations.
 - (B) Sodium bentonite pellets, tablets, or granular sodium bentonite may also be used if these additives or materials meet the specifications listed in paragraph (p)(1).
 - (C) Sodium bentonite products that are designed for drilling purposes or contain organic polymers shall not be used.
- (2) “Cement grout” means a mixture of one 94-pound bag of portland cement, an equal volume of sand having a diameter no larger than two millimeters, and five to six gallons of clean water.
- (3) “Neat cement grout” means a mixture of one 94-pound bag of portland cement and five to six gallons of clean water.
- (q) “Grout tremie pipe” and “grout pipe” mean a steel or galvanized steel pipe or similar pipe having equivalent structural soundness that is used to pump grout to a point of selected emplacement during the grouting of a casing or plugging of an abandoned water well or test hole.
- (r) “Heat pump hole” means a hole drilled to install piping for an earth-coupled water source heat pump system, also known as a vertical closed-loop system.
- (s) “Inactive status” means a water well that is not presently operating but is maintained so that the water well can be put back in operation with minimum effort.
- (t) “Monitoring well” means a water well used to monitor, obtain, or collect hydrologic, geologic, geophysical, chemical, or other technical data pertaining to groundwater, surface water, or other hydrologic conditions. A monitoring well is also known as an “observation well.”

- (u) “Pitless well adapter or unit” means an assembly of parts installed below the frost line that permits pumped groundwater to pass through the wall of the casing or the extension of the casing and prevent the entrance of contaminants.
- (v) “Public water-supply well” means a water well that meets both of the following conditions:
 - (1) Provides groundwater to the public for human consumption; and
 - (2) has at least 10 service connections or serves an average of at least 25 individuals daily for at least 60 days during a calendar year.
- (w) “Pump pit” means a watertight structure that meets both of the following conditions:
 - (1) Is constructed as follows:
 - (A) At least two feet away from the water well; and
 - (B) below ground level to prevent the freezing of pumped groundwater; and
 - (2) houses the pump or pressure tank, distribution lines, electrical controls, or other appurtenances.
- (x) “Reconstructed water well” means an existing water well that has been deepened or has had the casing replaced, repaired, added to, or modified in any way for the purpose of obtaining groundwater.
- (y) “Sand point” has the meaning specified in K.S.A. 82a-1203, and amendments thereto.
- (z) “Sanitary well seal” means a manufactured seal installed at the top of the casing that, when installed, creates an airtight and watertight seal to prevent contaminated or polluted water from gaining access to the groundwater supply.
- (aa) “Static water level” means the highest point below or above ground level that the groundwater in the water well reaches naturally.
- (bb) “Test hole” and “hole” mean any excavation constructed for the purpose of determining the geologic, hydrologic, and water quality characteristics of underground formations.
- (cc) “Treatment” means the stimulation of the production of groundwater

from a water well through the use of hydrochloric acid, muratic acid, sulfamic acid, calcium or sodium hypochlorite, polyphosphates or other chemicals, and mechanical means, to reduce or remove iron and manganese hydroxide and oxide deposits, calcium and magnesium carbonate deposits, and slime deposits associated with iron or manganese bacterial growths that inhibit the movement of groundwater into the water well.

- (dd) “Uncased test hole” means any test hole from which casing has been removed or in which casing has not been installed.
- (ee) “Unconfined aquifer” means an aquifer containing groundwater at atmospheric pressure. The upper surface of the groundwater in an unconfined aquifer is the water table.
- (ff) “Water well” has the meaning specified in K.S.A. 82a-1203, and amendments thereto. (Authorized by K.S.A. 82a-1205 and 82a-1213; implementing K.S.A. 82a-1202, 82a-1205, and 82a-1213; effective, E-74-34, July 2, 1974; modified, L. 1975, ch. 481, May 1, 1975; amended May 1, 1980; amended May 1, 1987; amended Nov. 22, 1993; amended June 7, 2013.)

28-30-3. Licensing.

- (a) Eligibility. To be eligible for a water well contractor’s license, each applicant shall meet the following requirements:
 - (1) Submit a complete license application on a form provided by the department;
 - (2) submit a water well contractor application fee of \$10.00;
 - (3)
 - (A) Pass the water well contractor examination conducted by the department or employ a designated person who has passed the water well contractor examination; and
 - (B) submit a license fee of \$100.00 if the applicant or designated person passes the water well contractor examination; and
 - (4) submit a complete registration form on a form provided by the department for each drill rig operated by or for the applicant and a registration fee of \$25.00 for each drill rig operated by or for the applicant.

(b) License renewal.

- (1) Each licensee shall submit an application for renewal of license and drill rig registrations before July 1 of each year by filing the proper renewal forms provided by the department and by meeting the following requirements:
 - (A) Paying the annual license fee and a drill rig registration fee for each drill rig to be operated in the state;
 - (B) filing all records for each water well constructed, reconstructed, or plugged by the licensee in accordance with K.A.R. 28-30-4 during the previous licensure period;
 - (C) filing a report, on a form approved by the department, of all approved continuing education units earned by the licensee or designated person during the previous licensure period;
 - (D) meeting the continuing education requirements in subsection (c); and
 - (E) providing any remaining outstanding information or records requested that existed before the issuance or revocation of a license.
- (2) Failure to comply with the requirements of this subsection shall be grounds to revoke the existing license and terminate the license renewal process.

- (c) Continuing education requirements. Each water well contractor or the contractor's designated person shall earn at least eight units of continuing education approved by the secretary. This requirement shall apply each year beginning with the first full year of licensure or the renewal period. One unit of continuing education shall equal 50 minutes of approved instruction except for trade shows and exhibitions, which shall be counted as one unit for each approved trade show or exhibition attended. (d) Employment requirements. If the designated person who has passed the water well contractor examination under paragraph (a)(3)(A) leaves the contractor's employment, the contractor shall employ a designated person who shall take, within 90 days, and be required to pass the water well contractor examination. (Authorized by K.S.A. 82a-1205, K.S.A. 2012 Supp. 82a-1206, and K.S.A. 82a-1207; implementing K.S.A. 82a-1202, K.S.A. 82a-1205, K.S.A. 2012 Supp. 82a-1206, K.S.A. 82a-1207, K.S.A. 82a-1209, and K.S.A. 82a-1212; effective, E-74-34, July 2, 1974; effective May 1, 1975; amended May 1, 1980; amended May 1, 1983; amended May 1, 1987; amended Nov. 22, 1993; amended June 7, 2013.)

28-30-4. General operating requirements.

- (a) Water well record.
 - (1) Within 30 days after construction or reconstruction of a water well, each water well contractor shall submit a report to the department and to the landowner on the water well record form provided by the department.
 - (2) Each contractor shall report to the department and to the landowner on the water well record form provided by the department and attachments any polluted or other noncompliant conditions that the contractor was able to correct and any conditions that the contractor was unable to correct.
 - (3) Each contractor shall report to the department and to the landowner the plugging of any abandoned water well on the water well record form provided by the department.
 - (4) Each landowner who constructs, reconstructs, or plugs a water well that will be or was used by the landowner for farming, ranching, or agricultural purposes or is located at the landowner's residence shall submit a report to the department on the water well record form provided by the department within 30 days after the construction, reconstruction, or plugging of the water well. No fee shall be required from the landowner for the record.
- (b) Artificial recharge and return. Each contractor who constructs an artificial recharge well or a freshwater return well shall comply with all regulations applicable to these wells specified in article 46.
- (c) Water well tests. Results of a pumping test shall be reported on the water well record form provided by the department or a copy of the contractor's record of a pumping test shall be attached to the water well record form.
- (d) Water samples. Within 30 days after the department's receipt of the water well record form provided by the department, the contractor or landowner who constructs or reconstructs any water well may be requested by the department to submit a sample of water from the water well for chemical analysis. The sample shall be submitted within 30 days after the department's request.
- (e) Water well construction fee. Each contractor shall pay a \$5.00 fee to the department for each water well constructed. The construction fee shall be paid when the contractor requests a water well record form provided by

the department or shall accompany the water well record form submitted as specified in this regulation.

- (f) License number. Each drill rig operated by or for a contractor shall prominently display the drill rig license number assigned by the department in letters and numbers at least two inches tall. Decals, paint, or other permanent marking materials shall be used. (Authorized by K.S.A. 82a-1205; implementing K.S.A. 82a-1202, 82a-1205, 82a-1212, and 82a-1213; effective, E-74-34, July 2, 1974; modified, L. 1975, ch. 481, May 1, 1975; amended May 1, 1980; amended May 1, 1987; amended June 7, 2013.)

28-30-5. Construction regulations for public water-supply wells. All activities involving public watersupply wells shall meet the requirements of K.S.A. 65-163a, and amendments thereto, and regulations of the department, including K.A.R. 28-15-16. (Authorized by K.S.A. 82a-1205; implementing K.S.A. 82a-1202 and 82a-1205; effective, E-74-34, July 2, 1974; effective May 1, 1975; amended May 1, 1980; amended May 1, 1983; amended May 1, 1987; amended June 7, 2013.)

28-30-6. Construction regulations for all water wells not included under K.A.R. 28-30-5.

- (a) Each water well shall be constructed to minimize the potential for contamination of the delivered or obtained groundwater and to protect groundwater aquifers from pollution and contamination.
- (b) The following requirements for grouting shall be met:
 - (1) Each constructed water well and each reconstructed water well shall be sealed by grouting the annulus between the casing and the boring from ground level to at least 20 feet or to at least five feet into the first clay or shale layer if one is present, whichever is greater. If a pitless well adapter or unit is being installed, the grouting shall start below the point at which the pitless well adapter or unit attaches to the casing and shall continue at least 20 feet below this point or to at least five feet into the first clay or shale layer, whichever is greater.
 - (2) The diameter of the drilled boring shall be at least three inches greater than the maximum outside diameter of the casing.
 - (3) Water from two or more separate aquifers shall be separated from each other in the boring by sealing the annulus between the aquifers with grout.

- (c) If groundwater is encountered at a depth less than the minimum grouting requirement, the grouting requirement may be modified by the secretary to meet local conditions.
- (d) A well vent shall be used and shall terminate at least one foot above the ground surface. The well vent shall be screened with brass, bronze, copper screen, or other screen materials approved by the secretary that are 16-mesh or greater and turned down in a full 180-degree return bend to prevent the entrance of contaminating materials.
- (e) Before the completion of a constructed water well or a reconstructed water well, the water well shall be cleaned of mud, drill cuttings, and other foreign matter to make the water well suitable for pump installations.
- (f) Casing shall meet the following requirements:
 - (1) Each water well shall have durable watertight casing from at least one foot above the finished ground surface to the top of the producing zone of the aquifer. The watertight casing shall extend at least 20 feet below the ground level. Exceptions to either of these requirements may be granted by the secretary if warranted by local conditions.
 - (2) Each water well shall be an above-grade surface completion, except that an at-grade surface completion may be used if all requirements of subsection (s) are met. Casing may be cut off below the ground surface to install a pitless well adapter or unit.
 - (3) No opening shall be made through the casing, except for the installation of a pitless well adapter or unit designed and fabricated to prevent soil, subsurface, and surface water from entering the water well.
 - (4) The casing shall meet the requirements of the department's document titled "approved water well casing: water well casing for water wells other than public watersupply wells," dated November 7, 2012, which is hereby adopted by reference. Used, reclaimed, defective, or contaminated pipe shall not be used for casing any water well.
- (g) Each water well, when unattended during construction, reconstruction, treatment, or repair or during use as a cased test hole or as an observation or monitoring well, shall have the top of the casing securely capped in a watertight manner.
- (h) During construction, reconstruction, treatment, or repair and before its first

use, each water well producing water for human consumption or food processing shall be disinfected according to K.A.R. 28-30-10.

- (i) The top of the casing shall be sealed by installing a sanitary well seal when the water well is completed.
- (j) Each groundwater-producing zone that is known or suspected to contain natural or man-made pollutants shall be cased and grouted in accordance with subsection (b) during construction of any water well to prevent the movement of groundwater to either overlying or underlying fresh groundwater zones.
- (k) Toxic material shall not be used in the construction, reconstruction, treatment, or plugging of a water well, unless the material is flushed from the water well before use.
- (l) The pipe from the pump or pressure tank in the pump pit to the water well shall be sealed in a watertight manner where the pipe passes through the wall of the pump pit.
- (m) A water well shall not be constructed in a pit, basement, garage, or crawl space. Each existing water well that is reconstructed, abandoned, or plugged in a basement shall conform to the requirements specified in this article, except that the finished grade of the basement floor shall be considered ground level.
- (n) Drilling fluid used during the construction or reconstruction of each water well shall be initially disinfected by mixing sodium hypochlorite with water to produce at least 100 milligrams per liter (mg/l) of available chlorine.
- (o) Natural organic or nutrient-producing material shall not be used during the construction, reconstruction, or treatment of a water well, unless this material is flushed from the water well and the groundwater aquifer or aquifers before the water well is completed. Natural organic or nutrient-producing material shall not be added to a grout mix used in the annulus to grout the water well.
- (p) Each water well pump shall meet the following requirements:
 - (1) Each pump installed directly over the casing shall be installed to form an airtight and watertight seal between the top of the casing and the gear or pump head, pump foundation, or pump stand.
 - (2) A sanitary well seal shall be installed between the pump column pipe or pump suction pipe and the casing if the pump is not

mounted directly over the casing and the pump column pipe or pump suction pipe emerges from the top of the casing.

- (3) An airtight and watertight seal shall be provided for the cable conduit if submersible pumps are used.
- (q) Each sand point constructed, replaced, or reconstructed shall meet the following requirements:
 - (1) Each sand point shall be constructed by drilling or boring a pilot hole at least three feet below ground surface. The pilot hole shall be at least three inches greater in diameter than the maximum outside diameter of the drive pipe or blank casing if the casing method is used.
 - (2) Each sand point shall be completed using one of the following methods:
 - (A) Casing method.
 - (i) Water well casing that meets the requirements of the department's document titled "approved water well casing: water well casing for water wells other than public water-supply wells," as adopted by reference in paragraph (f)(4), shall be set from at least three feet below the ground surface to at least one foot above the ground surface. The casing shall be sealed between the casing and the pilot hole with grouting material approved by the secretary from the bottom of the casing to ground surface.
 - (ii) The drive pipe shall be considered the pump drop pipe and shall be capped with a solid cap.
 - (iii) For underground discharge completions, a "T" joint shall be used.
 - (iv) A sanitary well seal and a well vent shall be installed on the top of the casing in accordance with subsections (d) and (i).
 - (B) Drive pipe method.
 - (i) A sand point may be installed without a casing for aboveground discharge completions only. In these completions, the drive pipe shall terminate at least one foot above finished ground level.

- (ii) The annulus between the drive pipe and the pilot hole shall be sealed from the bottom of the pilot hole to ground surface with grout. The top of the drive pipe shall be sealed airtight and watertight with a solid cap of the same material as that of the drive pipe.
 - (iii) A well vent shall not be required.
- (C) Other methods. Other methods may be approved by the secretary on a case-by-case basis using the appeal procedure specified in K.A.R. 28-30-9.
- (r) Upon abandonment of a sand point, the contractor or landowner shall pull the drive pipe or leave it in place.
 - (1) If the drive pipe is left in place, the sand point shall be plugged from the bottom of the well to three feet below the ground surface with approved grouting material. The sand point constructed by the drive pipe method shall be cut off three feet below the ground surface, and the remaining three-foot-deep hole shall be backfilled with surface soil.
 - (2) If the drive pipe is completely pulled, the remaining hole shall be plugged with approved grouting material from the bottom of the remaining hole to three feet below the ground surface. The hole shall be backfilled with surface soil from three feet to ground surface.
- (s) Each monitoring well shall be an above-grade surface completion, unless the monitoring well is located on a roadway, sidewalk, driveway, parking lot, or other heavily trafficked area that requires an at-grade surface completion monitoring well. The following requirements shall be met for each at-grade surface completion:
 - (1) The location of each monitoring well shall be identified by a unique well number marked on a scaled map that shows latitude and longitude coordinates. The water well contractor shall submit the scaled map and coordinates to the department with the water well record form provided by the department.
 - (2) The construction method for each monitoring well shall meet the requirements of the department's procedure document titled "flush-mount well construction detail," dated May 23, 2012, which is hereby adopted by reference. (Authorized by K.S.A. 82a-1205; implementing K.S.A. 82a-1202 and 82a-1205; effective, E-

74-34, July 2, 1974; modified, L. 1975, ch. 481, May 1, 1975; amended May 1, 1980; amended May 1, 1983; amended May 1, 1987; amended June 21, 1993; amended June 7, 2013.)

28-30-7. Plugging of abandoned wells, cased and uncased test holes.

- (a) All water wells abandoned by the landowner on or after July 01, 1979, and all water wells that were abandoned prior to July 01, 1979 which pose a threat to groundwater supplies, shall be plugged or caused to be plugged by the landowner. In all cases, the landowner shall perform the following as minimum requirements for plugging abandoned wells.
 - (1) The casing shall be cut off three feet below ground surface and removed.
 - (2) All wells shall be plugged from bottom to top using volumes of material equaling at least the inside volume of the well.
 - (3) Plugging top of well:
 - (A) For cased wells a grout plug shall be placed from six to three feet below ground surface.
 - (B) For dug wells, the lining material shall be removed to at least five feet below ground surface, and then sealed at five feet with a minimum of six inches of concrete or other materials approved by the department. Compacted surface silts and clays shall be placed over the concrete seal to ground surface.
 - (4) Any groundwater displaced upward inside the well casing during the plugging operation shall be removed before additional plugging materials are added.
 - (5) From three feet below ground level to ground level, the plugged well shall be covered over with compacted surface silts or clays.
 - (6) Compacted clays or grout shall be used to plug all wells from the static water level to six feet below surface.
 - (7) All sand and gravel used in plugging abandoned domestic or public water supply wells shall be chlorinated prior to placement into a well.
- (b) Abandoned wells formerly producing groundwater from an unconfined aquifer shall be plugged in accordance with the foregoing and in addition

shall have washed sand, and gravel or other material approved by the department placed from the bottom of the well to the static water level.

- (c) Abandoned wells, formerly producing groundwater from confined and unconfined aquifers or in confined aquifers only, shall be plugged according to K.A.R. 28-30-7(a) and by using one of the following additional procedures:
 - (1) The entire well column shall be filled with grout, or other material approved by the department, by use of a grout tremie pipe.
 - (2) A 10 foot grout plug shall be placed opposite the impervious formation or confining layer above each confined aquifer or aquifers by use of a grout tremie pipe; and
 - (A) The space between plugs shall be filled with clays, silts, sand and gravel or grout and shall be placed inside the well so as to prevent bridging.
 - (B) A grout plug at least 20 feet in length shall be placed with a grout pipe so at least 10 feet of the plug extends below the base of the well casing and at least 10 feet of the plug extends upward inside the bottom of the well casing.
 - (C) A grout plug at least ten feet in length shall be placed from at least 13 feet below ground level to the top of the cut off casing.
 - (3) Wells that have an open bore hole below the well casing, and where the casing was not grouted into the well bore when the well was constructed, shall be plugged by (1) or (2) above, except that the top 20 feet of well casing shall be removed or perforated with the casing ripper or similar device prior to plugging. If the well is plugged according to part (2) of this subsection, the screened or perforated intervals below the well casing shall be grouted the entire length by use of a grout tremie pipe.
- (d) Plugging of abandoned holes. If the hole penetrates an aquifer containing water with more than 1,000 milligrams per liter, mg/l, total dissolved solids or is in an area determined by the department to be contaminated, the entire hole shall be plugged with an approved grouting material from the bottom of the hole, up to within three feet of the ground surface using a grout tremie pipe or similar method. From three feet below ground surface to ground surface the plugged hole shall be covered over with compacted surface silts or clays; otherwise, the hole shall be plugged in accordance with the following paragraphs.

- (1) Plugging of abandoned cased test holes. The casing shall be removed if possible and the abandoned test hole shall be plugged with an approved grouting material from the bottom of the hole, up to within three feet of the ground surface, using a grout tremie pipe or similar method. From three feet below ground surface to ground surface the plugged hole shall be covered over with compacted surface silts or clays.

If the casing cannot be removed, in addition to plugging the hole with an approved grouting material the annular space shall also be grouted as described in K.A.R. 28-30-6 or as approved by the department.

- (2) Abandoned uncased test holes, exploratory holes or any bore holes except seismic or oil field related exploratory and services holes regulated by the Kansas Corporation Commission under K.A.R. 82-3-115 through 82-3-117. A test hole or bore hole drilled, bored, cored or augered shall be considered an abandoned hole immediately after the completion of all testing, sampling or other operations for which the hole was originally intended. The agency or contractor in charge of the exploratory or other operations for which the hole was originally intended is responsible for plugging the abandoned hole using the following applicable method, within three calendar days after the termination of testing other operations.
 - (A) The entire hole shall be plugged with an approved grouting material from bottom of the hole, up to within three feet of the ground surface, using a grout tremie pipe or similar method.
 - (B) From three feet below ground surface to ground surface the plugged hole shall be covered over with compacted surface silts or clays.
 - (C) For bore holes of 25 feet or less, drill cuttings from the original hole may be used to plug the hole in lieu of grouting material, provided that an aquifer is not penetrated or the bore hole is not drilled in an area determined by the department to be a contaminated area.
- (3) Plugging of heat pump holes drilled for closed loop heat pump systems. The entire hole shall be plugged with an approved grouting material from bottom of the hole, to the bottom of the horizontal trench, using a grout tremie pipe or similar method approved by the department.

- (e) Abandoned oil field water supply wells. A water well drilled at an oil or gas drilling site to supply water for drilling activities shall be considered an abandoned well immediately after the termination of the oil or gas drilling operations. The company in charge of the drilling of the oil or gas well shall be responsible for plugging the abandoned water well, in accordance with K.A.R. 28-30-7(a), (b), and (c), within 30 calendar days after the termination of oil and gas drilling operations.

Responsibility for the water well may be conveyed back to the landowner in lieu of abandoning and plugging the well but the well must conform to the requirements for active or inactive status. The transfer must be made through a legal document, approved by the department, advising the landowner of the landowner's responsibilities and obligations to properly maintain the well, including the proper plugging of the well when it is abandoned and no longer needed for water production activities. If a transfer is to be made, the oil or gas drilling company shall provide the department with a copy of the transfer document within 30 calendar days after the termination of oil or gas drilling operations. Within 30 calendar days of the effective date of the transfer of the well the landowner shall notify the department of the intended use and whether the well is in active status or inactive status in accordance with K.A.R. 28-30-7(f).

- (f) Inactive status. Landowners may obtain the department's written approval to maintain wells in an inactive status rather than being plugged if the landowner can present evidence to the department as to the condition of the well and as to the landowner's intentions to use the well in the future. As evidence of intentions, the owner shall be responsible for properly maintaining the well in such a way that:
- (1) The well and the annular space between the hole and the casing shall have no defects that will permit the entrance of surface water or vertical movement of subsurface water into the well;
 - (2) the well is clearly marked and is not a safety hazard;
 - (3) the top of the well is securely capped in a watertight manner and is adequately maintained in such a manner as to prevent easy entry by other than the landowner;
 - (4) the area surrounding the well shall be protected from any potential sources of contamination within a 50 foot radius;
 - (5) if the pump, motor or both, have been removed for repair, replacement, etc., the well shall be maintained to prevent injury to people and to prevent the entrance of any contaminant or other foreign material;

- (6) the well shall not be used for disposal or injection of trash, garbage, sewage, wastewater or storm runoff; and
- (7) the well shall be easily accessible to routine maintenance and periodic inspection.

The landowner shall notify the department of any change in the status of the well. All inactive wells found not to be in accordance with the criteria listed in lines one through seven above shall be considered to be abandoned and shall be plugged by the landowner in accordance with K.A.R. 28-30-7(a) through (c). (Authorized by K.S.A. 82a-1205; implementing K.S.A. 82a-1202, 82a-1205, 82a-1212, 82a-1213; effective, E-74-34, July 02, 1974; modified, L. 1975, ch. 481, May 01, 1975; amended May 01, 1980; amended May 01, 1983; amended May 01, 1987.)

28-30-8. Pollution sources. Well locations shall be approved by municipal and county governments with respect to distances from pollution sources and compliance with local regulations. The following minimum standard shall be observed.

- (a) The horizontal distances between the well and the potential source of pollution or contamination such as sewer lines, pressure sewer lines, septic tanks, lateral fields, pit privy, seepage pits, fuel or fertilizer storage, pesticide storage, feed lots or barn yards shall be 50 feet or more as determined by the department.
- (b) Proper drainage in the vicinity of the well shall be provided so as to prevent the accumulation and ponding of surface water within 50 feet of the well. The well shall not be located in a ravine or any other drainage area where surface water may flow into the well.
- (c) When sewer lines are constructed of cast iron, plastic or other equally tight materials, the separation distance shall be 10 feet or more as determined by the department.
- (d) All wells shall be 25 feet or more from the nearest property line, allowing public right-of-ways to be counted; however, a well used only for irrigation or cooling purposes may be located closer than 25 feet to an adjoining property where:
 - (1) such adjoining property is serviced by a sanitary sewer and does not contain a septic tank system, disposal well or other source of contamination or pollution; and
 - (2) the property to be provided with the proposed well is served by both a sanitary sewer and a public water supply. (Authorized by

and implementing K.S.A. 82a-1202, 82a-1205; effective, E-74-34, July 02, 1974; modified, L. 1975, ch. 481, May 01, 1975; amended May 01, 1980; amended May 01, 1987.)

28-30-9. Appeals.

- (a) Requests for exception to any of the foregoing rules and regulations shall be submitted to the department in writing and shall contain all information relevant to the request.
 - (1) Those requests shall specifically set forth why such exception should be considered.
 - (2) The department may grant exceptions when geologic or hydrologic conditions warrant an exception and when such an exception is in keeping with the purposes of the Kansas groundwater exploration and protection act.
- (b) Appeals from the decision of the department shall be made to the secretary, who after due consideration may affirm, reverse or modify the decision of the department. (Authorized by K.S.A. 82a-1205; implementing K.S.A. 82a-1202, 82a-1205; effective, E-74-34, July 02, 1974; effective May 01, 1975; amended May 01, 1980; amended May 01, 1983; amended May 01, 1987.)

28-30-10 Water well disinfection for wells constructed or reconstructed for human consumption or food processing.

- (a) Gravel for gravel-packed wells shall be disinfected by immersing the gravel in a chlorine solution containing not less than 200 milligrams per liter, mg/l, of available chlorine before it is placed in the wells annular space.
- (b) Constructed or reconstructed wells shall be disinfected by adding sufficient hypochlorite solution to them to produce a concentration of not less than 100 mg/l of available chlorine when mixed with the water in the well.
- (c) The pump, casing, screen and pump column shall be washed down with a 200 mg/l available chlorine solution.
- (d) All persons constructing, reconstructing, or treating, a water well and removing the pump or pump column, replacing a pump, or otherwise performing an activity which has potential for contaminating or polluting the groundwater supply shall be responsible for adequate disinfection of the well, well system and appurtenances thereto. (Authorized by and implementing K.S.A. 82a-1202, 82a-1205; effective, E-74-34, July 02,

1974; modified, L. 1975, ch. 481, May 01, 1975; amended May 01, 1080; amended May 01, 1987.)

28-30-200. Definitions. In addition to the definitions in K.A.R. 28-30-2, the following definitions shall apply to the Equus Beds groundwater management district no. 2:

- (a) “Bedrock” means shale, limestone, sandstone, siltstone, anhydrite, gypsum, salt, or other consolidated rock that can occur at the surface or underlie unconsolidated material.
- (b) “Board” means the board of directors constituting the governing body of the Equus Beds groundwater management district no. 2.
- (c) “Borehole” means any hole that is drilled, cored, bored, washed, driven, dug, or otherwise excavated, in which the casing and screen have been removed or in which the casing has not been installed.
- (d) “Contaminate” means to engage in any act or omission causing the addition or introduction of substances to freshwater in concentrations that alter the physical, chemical, biological, or radiological properties of the freshwater, making the water unfit for beneficial use.
- (e) “District” means the Equus Beds groundwater management district no. 2, which is organized for groundwater management purposes pursuant to K.S.A. 82a-1020 et seq., and amendments thereto.
- (f) “Fluid” means any material or substance that flows or moves in a semisolid, liquid, sludge, gas, or any other form or state.
- (g) “Free-fall” means a method used to place grout in a water well or borehole that meets all of the following conditions:
 - (1) The total grouting depth below ground level does not exceed 75 feet.
 - (2) The grouting interval is free of fluids.
 - (3) The diameter of the water well casing or borehole is sufficient to allow the unobstructed flow of grout throughout the entire grouting interval.
 - (4) Grout is poured or discharged into the water well or borehole at a controlled rate.
- (h) “Fresh groundwater” means water containing not more than 1,000 milligrams of total dissolved solids per liter and 500 milligrams of chloride per liter.

- (i) “Grout” has the meaning specified in K.A.R. 28-30-2.
- (j) “Grout seal” means grout that is installed, placed, pumped, or injected to create a permanent, impervious watertight bond in a well casing, annular space, geologic unit, or any other apertures or apparatuses associated with a water well or borehole.
- (k) “Inactive well” means a water well that meets the following conditions:
 - (1) Is not operational;
 - (2) is properly constructed as specified in K.A.R. 28-30-5 or K.A.R. 28-30-6;
 - (3) is equipped with a watertight seal; and
 - (4) is maintained in good repair until the water well is returned to service as an active water well.
- (l) “Licensed geologist” means a geologist licensed to practice geology in Kansas by the Kansas board of technical professions.
- (m) “Licensed professional engineer” means a professional engineer licensed to practice engineering in Kansas by the Kansas board of technical professions.
- (n) “Monitoring well” means a water well used to monitor, obtain, or collect hydrologic, geologic, geophysical, chemical, or other technical data pertaining to groundwater, surface water, or other hydrologic conditions.
- (o) “Test borehole” means a borehole used to obtain or collect hydrologic, geologic, geophysical, chemical, or other technical data pertaining to groundwater, surface water, or other hydrologic conditions by means of placing sampling, logging, testing, casing, screen, or associated tools or equipment in the borehole for fewer than 30 days. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028 and K.S.A. 82a-1213; effective P-September 30, 2005)

28-30-201. Plugging operations; notification; report.

- (a) All plugging operations shall be supervised by one of the following:
 - (1) A water well contractor licensed by the department;
 - (2) a licensed professional engineer or licensed geologist; or

- (3) the water well or borehole owner, or the landowner of the property on which the water well or borehole is located.
- (b) Each water well or borehole owner, or the landowner of the property on which the water well or borehole is located, shall notify the district within 48 hours before any plugging operations occur.
- (c) Within 30 days after the plugging operation is completed, one of the following requirements shall be met:
 - (1) The water well contractor, licensed professional engineer, or licensed geologist that supervised the water well or borehole plugging operations shall submit a completed report of the work on the department's plugging record form WWC-5P or WWC-5 to the department, the district, and the landowner.
 - (2) The water well or borehole owner, or the landowner of the property on which the water well or borehole is located, shall submit a completed report of the work on the department's plugging record form WWC-5P or WWC-5 to the department and the district. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028 and K.S.A. 82a-1213; effective P-September 30, 2005)

28-30-202. Plugging operations for an abandoned water well or borehole; responsibility.

- (a) Each water well or borehole shall be considered abandoned if at least one of the following conditions exists:
 - (1) The water well or borehole was not completed.
 - (2) The water well or borehole threatens to contaminate fresh groundwater.
 - (3) The water well or borehole poses a safety or health hazard.
 - (4) Uncontrolled fluid flow is encountered or present in the water well or borehole.
 - (5) The use of the water well or borehole has ceased.
 - (6) The borehole testing, sampling, or other operations are completed within 30 days of completion of the borehole drilling.
 - (7) The water well or borehole owner has not demonstrated the intention to use the water well or borehole.

- (8) The water well can not be maintained in an active or inactive status.
- (9) The water well or borehole is not operational or functional for the intended use.
- (b) Each water well or borehole owner or the landowner of the property shall plug or cause an abandoned water well or borehole to be plugged as required in subsection (c) of this regulation.
- (c) Except as specified in subsection (e), the minimum plugging operations for an abandoned water well or borehole shall include the following:
 - (1) Before plugging operations begin, the following water well or borehole data shall be recorded as follows:
 - (A) The legal description of the water well or borehole location, to the nearest 10-acre tract and, if available, the geographic coordinates consisting of the latitude, longitude, and base datum;
 - (B) the diameter of the water well or borehole;
 - (C) the static water level; and
 - (D) the total depth of the water well or borehole.
 - (2) The materials used to plug a water well or borehole shall be clean, free of defects, properly prepared, and installed according to the manufacturers specifications.
 - (3) All plugging material that forms a bridge, entraps air or other fluids, or forms a blockage in the water well or borehole shall be freed or removed before continuing plugging operations.
 - (4) All pumping, sampling, logging, and related equipment and any other material or debris in the water well or borehole shall be removed from the water well or borehole.
 - (5) The annular space of the water well shall be grouted as specified in K.A.R. 28-30-203.
 - (6) Before plugging operations begin and when plugging operations are suspended or interrupted, the opening of the water well or borehole shall be secured to prevent fluids from entering the water well or borehole.

- (7) Before placement of any plugging material, the water well or borehole shall be disinfected as specified in K.A.R. 28-30-205.
 - (8) Except as specified in subsection (d) of this regulation, all of the following minimum grouting requirements shall be met:
 - (A) The water well or borehole shall be grouted from the bottom to three feet below ground level.
 - (B) Each water well meeting the requirements of subsection (d) shall be grouted from the top of the sand or gravel plugging material to three feet below ground level.
 - (C) Grout shall be placed in the water well or borehole using one of the following:
 - (i) A grout tremie pipe;
 - (ii) free-fall; or
 - (iii) a grouting procedure recommended by the grout manufacturer.
 - (D) Grout shall be allowed to cure as recommended by the grout manufacturer.
 - (9) Except as required by K.A.R. 28-30-203, the water well casing shall be cut off at a minimum of three feet below land surface and removed.
 - (10) From three feet below land surface to land surface, the water well or borehole shall be backfilled with clean, compacted topsoil and sloped so that drainage or runoff is directed away from the plugged water well or borehole.
- (d) Any water well or borehole owner, landowner of the property, water well contractor, licensed geologist, or licensed professional engineer may utilize coarse sand or fine gravel to plug a water well by filling the water well casing to the static water level or six feet below ground level, whichever is the greater distance below ground level, if both of the following water well conditions are present:
- (1) The water well is cased.
 - (2) The water well is completed in a single unconfined aquifer.

- (e) Drill cuttings from the original borehole may be used to plug a borehole that meets all of the following conditions:
 - (1) The depth of the borehole is less than the highest historical groundwater level.
 - (2) The depth of the borehole is 25 feet or less below ground level.
 - (3) The borehole is not located in a contaminated area. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028 and K.S.A. 82a-1213; effective P-September 30, 2005)

28-30-203. Annular space grouting procedures.

- (a) Each water well or borehole owner or landowner of the property with an abandoned water well that was constructed on or after May 1, 1983 shall have the water well's annular space grouted as follows:
 - (1) From three feet below ground level to a minimum of 20 feet below ground level; or
 - (2) below the point at which a pitless well adapter attaches to the well casing to a minimum of 20 feet below the pitless well adapter.
- (b) The annular space of each abandoned water well in which the water well was constructed before May 1, 1983 shall be grouted as follows:
 - (1) If the annular space does not contain grout or gravel pack and is free of debris, the grout shall be placed in the annular space in the following manner:
 - (A) From three feet below ground level to 20 feet below ground level; or
 - (B) below the point at which a pitless well adapter attaches to the well casing to a minimum of 20 feet below the pitless well adapter.
 - (2) If the annular space contains gravel pack or other material, all of the following requirements shall be met:
 - (A) The well casing shall be removed to a depth of four feet below ground level.
 - (B) The annular space shall be freed of gravel pack, any other material, and fluid from the top of the casing to six feet below the top of the well casing.

- (C) The grout shall be placed in the annular space from six feet below the top of the well casing to one foot above the top of the well casing.
- (c) From three feet below ground level to ground level, the water well or borehole shall be backfilled with clean, compacted topsoil and sloped so that the drainage or runoff is directed away from the plugged water well or borehole.
- (d) If groundwater is encountered at a depth less than the minimum grouting requirement, the annular space grouting requirement may be modified by requesting a variance from the district as specified in K.A.R. 28-30-208. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028 and K.S.A. 82a-1213; effective P-September 30, 2005)

28-30-204. Inactive well; application; construction and extension.

- (a) Each owner of an inactive water well shall meet the following requirements:
 - (1) Submit a completed, signed, and notarized inactive water well agreement, on a form provided by the district, to the district manager 30 days before placing the well on inactive status. The form shall include a statement that the water well does not pose a public health or safety hazard and does not threaten to contaminate the groundwater;
 - (2) remove all pumping equipment from the water well;
 - (3) construct the water well and the annular space as specified in K.A.R. 28-30-6;
 - (4) seal and maintain the water well and the annular space to prohibit the entrance of surface fluids and materials and the vertical movement of subsurface water into the well and to prevent damage;
 - (5) post a sign that meets the following conditions within three feet of the water well:
 - (A) Has a minimum height of three feet above land surface;
 - (B) is easily visible;
 - (C) is continually maintained; and

- (D) is constructed with the words “Inactive Water Well” and a legal description consisting of the 10-acre tract, section, township, and range description printed legibly; and
- (6) securely install a watertight seal or cap on the water well casing opening a minimum of one foot above land surface that consists of one of the following:
 - (A) Steel plating that is a minimum of 1/4 inch thick and is welded to the casing opening;
 - (B) a polyvinylchloride cap glued to the water well casing opening, with a minimum standard dimension ratio (SDR) of 21 or less on well casing less than four inches in diameter and a minimum SDR of 26 or less on well casing four or more inches in diameter. The SDR shall be calculated by dividing the casing's outside diameter (OD) by its minimum wall thickness (MWT); or
 - (C) any other seal or cap that is approved by the district manager.
- (b) Each water well owner shall repair all damage to the water well within 30 days, unless the district manager determines that the water well poses a public health or safety hazard, in which case the district manager shall set the time period for fewer than 30 days.
- (c) Each water well owner shall notify the district within 30 days after the water well is returned to service as an active water well.
- (d) The district manager or a staff member of the district may inspect any inactive water well.
- (e) Each water well owner shall be responsible for properly maintaining the water well in the inactive status.
- (f) A radius of 50 feet around the inactive well shall be free of contamination.
- (g) An inactive water well shall not be used for disposal or injection of any fluids or materials.
- (h) Each inactive water well shall be easily accessible for routine maintenance and inspection.
- (i) Each water well owner shall notify the district manager of any change in the condition of the water well.

- (j) Each inactive water well that does not meet the requirements of these regulations shall be deemed abandoned and shall be plugged in accordance with these regulations.
- (k) The expiration date of the inactive water well period may be extended beyond the date authorized in the approved inactive water well agreement or the date of any extension authorized by the district manager, if the water well is in good repair and meets the requirements of these regulations. The extension of time shall not exceed one year beyond the expiration date of the inactive well agreement or the date of any authorized extension.
- (l) Each approved inactive water well request and each approved extension of time shall be reported by the district to the department, in writing, within 30 days of approval on a form provided by the district. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028 and K.S.A. 82a-1213; effective P-September 30, 2005)

28-30-205. Disinfection of an abandoned water well or borehole.

- (a) Except as specified in subsection (b), the following minimum quantities of sodium hypochlorite with 5.25 percent to 6.0 percent strength, manufactured under trade names including Clorox, Purex, Sno-White, and Topco, and other bleach products with similar properties, shall be used to disinfect each abandoned water well or borehole:

Water well casing or hole diameter (inches)	Sodium hypochlorite (fluid ounces per foot of water column)
1.25	0.015
1.5	0.023
2	0.041
2.5	0.064
3	0.094
3.5	0.127
4	0.165
5	0.259
6	0.381
8	0.660
10	1.036
12	1.490
14	2.031
16	2.650
18	3.354
24	5.966
30	9.317

- (b) Any concentration of sodium hypochlorite not specified in subsection (a) or any combination of calcium hypochlorite may be used to disinfect an abandoned water well or borehole, if a minimum concentration of 100 milligrams of chlorine solution per liter per foot of water column in the water well or borehole is produced. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028 and K.S.A. 82a-1213; effective P-September 30, 2005.)

28-30-206. Administrative appeal to the board.

- (a) Any owner of a water well or borehole or any person whose legal rights, duties, privileges, immunities, or other legal interests are affected by an order issued by the district may request an appeal hearing with the board.
- (b) The request for hearing shall be filed with the board within 30 days after service of the order on the owner or owners of the water well or borehole or any person whose legal rights, duties, privileges, immunities, or other legal interests are affected by the order. The request for hearing shall state the basis for requesting a hearing and shall be accompanied by documentation supporting the request.
- (c) During the hearing, the board may take into consideration any relevant information or data, including information and data from any person whose legal rights, duties, privileges, immunities, or other legal interests may be affected by the order.
- (d) After consideration of all information and data presented, the board shall issue one of the following:
 - (1) An order remanding the case to the district manager with instructions for additional investigation; or
 - (2) a final order that contains findings of fact and conclusions of law.
- (e) Within 15 days of the service of a final order, the owner or owners of the water well or borehole or any person whose legal rights, duties, privileges, immunities, or other legal interests are affected may file a written petition for reconsideration to the board. The petition for reconsideration shall state the basis and contain any facts and conclusions of law that are in dispute.
- (f) The board shall render a written order denying the petition for reconsideration, granting the petition for reconsideration and modifying the final order, or granting the petition for reconsideration and setting the matter for further proceedings. After further proceedings, the petition for reconsideration may be denied or granted in whole or in part.

- (g) Unless clear and convincing evidence is presented to the board, the board shall not render a written order if the order would result in any of the following:
 - (1) The impairment of an existing groundwater use;
 - (1) an adverse effect on public health, safety, or the environment;
 - (3) the threat of groundwater contamination;
 - (4) an adverse effect on the public interest; or
 - (5) the impairment of the board's ability to apply and enforce these regulations or the management program specified in K.S.A. 82a-1029, and amendments thereto.
- (h) Any owner or owners or any person whose legal rights, duties, privileges, immunities, or other legal interests are affected by a final order or order rendered upon reconsideration may seek judicial review pursuant to the act for judicial review and civil enforcement of agency actions specified in K.S.A. 77-601 et seq., and amendment thereto.
- (i) Each order issued by the board shall be mailed to the owner or owners; any person whose legal rights, duties, privileges, immunities, or other legal interests are affected by the order; and the department. Service shall be deemed complete upon mailing. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028; effective P-September 30, 2005)

28-30-207. Variance; extension of time.

- (a) If an individual or party wants a variance from any of the regulations contained in K.A.R. 28-30-200 through K.A.R. 28-30-206 or an extension of time pursuant to K.A.R. 28-30-204, the individual or party shall submit a request, in writing, to the district.
 - (1) Each request shall include the following:
 - (A) The name, address, telephone number, and contact person of the individual or party requesting the variance or extension of time;
 - (B) the specific legal description of the site location to which the variance or extension of time would apply;
 - (C) the specific regulation from which the variance is sought or the amount of time requested; and

- (D) the reason for requesting the variance or extension of time and any supporting data.
- (2) A variance or extension of time may be granted by the district manager if the variance or extension is in keeping with the purposes of the Kansas groundwater exploration and protection act and the groundwater management district act.
- (c) Each variance or extension of time granted by the district manager shall be reported by the district to the department within 30 days of approval.
- (d) Each individual or party who wants an extension of time for the inactive water well period shall submit the request at least 30 days before the expiration date on a form provided by the district. (Authorized by and implementing K.S.A. 2004 Supp. 82a-1028; effective P-September 30, 2005.)

Effective May 01, 1980

Kansas Department of Health and Environment
Approved Water Well Casing
(Authorization K.A.R. 28-30-6(h))

Water Well Casing for Water Wells Other Than Public
Water Supply and Reservoir Sanitation Zone Water Wells

STEEL AND WROUGHT IRON

Dept of Casing in Feet	Nominal Diameter, (in inches)									
	04	06	08	10	12	14	16	18	24	30
	Minimum Wall Thickness*									
0-100	10	10	10	10	10	10	10	10	7	.219
100-200	10	10	10	10	10	7	7	7	.219	.219
200-400	10	10	10	10	7	7	7	.219	.250	.250
400-600	7	7	7	7	7	7	.219	.250	.312	.312
600 +	7	.219	.219	.219	.219	.219	.250	.375	.375	.375

*Decimal numbers indicate thickness in inches. Whole numbers indicate the United States standard gage (10 gage=.0141 inches and 7 gage=.0179 inches.)

Kansas Department of Health and Environment
Approved Water Well Casing
(Authorization K.A.R. 28-30-6(h))

Water Well Casing for Water Wells Other than Public
Water Supply and Reservoir Sanitation Zone Water Wells

THERMAL PLASTIC WATER WELL CASING

For Polyvinyl Chloride (PVC), Styrene Rubber (SR)
which is the same as Rubber Modified Polystyrene (RMP)
and Acrylonitrile - Butadiene Styrene (ABS)

Minimum Wall Thickness (inches) and Tolerances (inches) made in
Standard Dimension Ratios (SDR)

Normal Pipe Size	SDR 26		SDR 21		SDR 17		SDR 13.5	
	Min.	Tol.	Min.	Tol.	Min.	Tol.	Min.	Tol.
2	----	----	0.113	0.020	0.140	0.020	0.176	0.021
2.5	----	----	0.137	0.020	0.169	0.020	0.213	0.026
3	----	----	0.167	0.020	0.206	0.025	0.259	0.031
3.5	----	----	0.190	0.023	0.235	0.028	0.296	0.036
4	0.173	0.021	0.214	0.026	0.265	0.032	0.333	0.040
5	0.214	0.027	0.265	0.032	0.327	0.039	0.412	0.049
6	0.255	0.031	0.316	0.038	0.390	0.047	0.491	0.058
8	0.332	0.040	0.410	0.049	0.508	0.061	-----	-----
10	0.413	0.050	0.511	0.061	0.632	0.076	-----	-----
12	0.490	0.059	0.060	0.073	0.750	0.090	-----	-----
14	0.539	0.065						
16	0.616	0.074						

The minimum is the lowest wall thickness of the wall casing pipe at any cross section. All tolerances are on the plus side of the minimum requirement.