

**Practice Specification
Water Well (Code 642)**

I. SCOPE

The work consists of furnishing and installing a hole drilled, dug, driven, bored, jetted or otherwise constructed to an aquifer with fittings and appurtenances as specified for an agricultural production water well (not applicable for human consumption).

II. PUBLIC AND PRIVATE UTILITIES

1. Utilities are defined to be overhead and underground power or communication lines, and pipelines. The contractor should conduct their own search and discovery for utilities in order to lessen or avoid potential damages. Other buried infrastructure, such as landowner-installed drainage tile, private water lines, or electrical lines, are the responsibility of the landowner to locate. The owner/operator shall complete TX-ENG-80A, Utilities Inventory, during planning and return it to the NRCS representative.
2. The owner/operator shall also ensure that TX-ENG-80B, Cooperator Confirmation of the One-Call Utility Safety System is completed and returned to the NRCS representative prior to layout or any ground disturbance.
3. Cooperators, sponsoring organizations, and/or contractors shall be liable for damage to utilities and damage resulting from disruption of service caused by installation activities. The Natural Resources Conservation Service (NRCS) makes no representation on the existence or non-existence of any utilities. Absence of utilities on drawings is not assurance that no utilities are present at the site.

III. QUALITY CONTROL

1. Quality control of all materials and construction procedures is the responsibility of the landowner and contractor.
2. NRCS will make periodic review(s) of the work for the benefit of the agency, which will include the final construction check.

IV. LAWS AND REGULATIONS

1. Water wells constructed under this specification must meet all the stated requirements of NRCS as well as those required by TDLR. In cases where the NRCS and TDLR requirements differ, the more stringent criteria must be met.
2. Wells must be constructed by a well driller with a valid license from the TDLR.
3. Well drillers and landowners must comply with the applicable laws and regulations of all Federal, State, Tribal and local agencies including local groundwater conservation districts. It is the responsibility of the landowner to obtain all necessary permits from such entities. A map of the state's groundwater conservation districts can be found at:
<https://www.tceq.texas.gov/groundwater/districts.html>
4. The use of "TDLR rules" throughout this specification refers to the Water Well Drillers and Pump Installers Administrative Rules of the Texas Department of Licensing and Regulation (TDLR), 16 Texas Administrative Code, Chapter 76, [State of Texas Water Well Drillers and Pump Installers Administrative Rules](#).

V. LOCATION AND WELL HEAD PROTECTION

1. Locate the well at least 100 feet from potential sources of surface and subsurface pollution, for example a livestock watering trough. The separation distances contained in the TDLR rules must be met (*see Well Siting drawings in Section VIII of this specification*). TDLR [Alternative Well Siting Chapter 76.100 \(1\)\(b\)](#) and [Annular Sealing Example for Distance Reduction Chapter 76.100\(b\)](#) is allowed only in cases where both all TDLR requirements and requirements related to spacing can be met. If applicable, the well buffer zones found in the TAC 30, Chapter 321, Subchapter B, section 321.38 of the Texas Commission on Environmental Quality (TCEQ) Concentrated Animal Feeding Operations (CAFOs) rules must also be followed when planning the location of wells.

2. To protect the wellhead, livestock shall be excluded by durable fencing or a weatherproof and durable well house constructed on a concrete slab extending a minimum of 2 feet in all directions from the well casing.
3. Any abandoned or deteriorated well in the vicinity of the proposed well must be capped or plugged in accordance with the TDLR rules. When a drilled or constructed well produces unacceptable results (either by reason of water quality or yield quantity), or for other reasons the well must be abandoned, the well must be plugged or completed in accordance with the TDLR rules.
4. Wells must be located at a site not generally subject to flooding; provided however, that if a well must be placed in a flood-prone area, it must be completed with a watertight sanitary well seal, so as to maintain a junction between the casing and the pump column, and a steel sleeve extending a minimum of 36-inches above ground level and 24-inches below the ground surface.

VI. CASING MATERIALS

1. Casing material must be new plastic or steel. Plastic casing must conform to the material, dimensional and quality requirements as specified in ASTM F-480 and have a minimum thickness of SDR-26. Steel casing must meet or exceed the requirements as specified in ASTM A-53 grade or better and have a minimum weight and thickness of ANSI schedule 10. To prevent galvanic corrosion, dissimilar metals are not permitted. Steel casing must be used if the bore hole is driven.
2. Casing and joint strength must be sufficient to withstand all anticipated static and dynamic pressures imposed during installation, well development, and use. The casing and joints must withstand the maximum, anticipated differential head between the inside and outside of the casing. This is defined as the difference in elevation between the static water surface and the bottom of the well bore.
3. Joints must have adequate strength to carry the load due to the casing length and still be watertight, or must be mechanically supported during installation such that joint integrity is maintained.
4. Well casing must be marked in accordance with the specified ASTM designation, which must include, but not limited to nominal pipe diameter, type of material (i.e. PVC-1120), schedule or SDR as applicable, pressure rating in PSI, manufacturer's name or trademark, and ASTM designation.
5. The following tables may be used to select the appropriate casing diameter and strength:

DIFFERENTIAL HEADS for PVC-12454 PLASTIC, SCHEDULES 40 AND 80 CASINGS							
Based on NEH, Part 631-Chapter 32, Well Design and Spring Development, Table 32-7							
Nominal Diameter (inches)	Outside Diameter (inches)	Schedule 40			Schedule 80		
		Minimum Wall Thickness (inches)	SDR	Maximum Head (feet)	Minimum Wall Thickness (inches)	SDR	Maximum Head (feet)
3.5	4.000	0.226	17.7	435	0.318	12.6	1,270
4	4.500	0.237	19.0	350	0.337	13.4	1,045
5	5.563	0.258	21.6	235	0.375	14.8	765
6	6.625	0.280	23.7	175	0.432	15.3	690
8	8.625	-----	-----	-----	0.500	17.3	470
10	10.750	-----	-----	-----	0.593	18.1	405
12	12.750	-----	-----	-----	0.687	18.6	375

MAXIMUM ALLOWABLE DIFFERENTIAL HEAD FOR SDR-PR PLASTIC CASINGS					
Based on NEH, Part 631-Chapter 32, Well Design and Spring Development, Table 32.6					
Wall Thickness (uncoated)		PVC-12454	ABS-434	SR & PVC 14333	ABS-533
		PVC-1120, 1220	PVC-2110, 2112, 2116, 2120		
SDR	Inches	Maximum Allowable Differential Head (feet)			
13.5	*	1,020	920	815	665
17.0	*	495	445	395	320
21.0	*	255	230	205	165
26.0	*	130	120	105	85
* Wall Thickness Varies with Diameter.					

* Wall Thickness Varies with Diameter.

DIFFERENTIAL HEAD LIMITATIONS FOR NEW STEEL CASINGS											
Based on NEH, Part 631-Chapter 32, Well Design and Spring Development, Table 32-5											
Wall Thickness (uncoated)		Nominal Casing Size (inches)									
		4	5	6	8	10	12	14	16	18	24
Gage		Outside Diameter (inches)									
Inches		4.50	5.563	6.625	8.625	10.75	12.75	14.00	16.00	18.00	24.00
		Maximum Differential Head Limitations (feet)									
10 Ga	0.135	1,810	1,140	750							
8 Ga	0.164	2,660	1,740	1,190	640	360					
7 Ga	0.179	3,130	2,090	1,450	790	460	290				
3/16	0.188	3,415	2,300	1,610	890	520	330				
7/32	0.219	4,430	3,070	2,200	1,260	750	500				
Sch. 40	0.237	5,035	---	---	---	---	---	---			
1/4	0.250		3,880	2,840	1,680	1,030	690	550	390	290	130
Sch. 40	0.258		4,090	---	---	---	---	---	---	---	---
Sch. 40	0.280			3,490	---	---	---	---	---	---	---
9/32	0.280				2,140	1,350	910	730	520	390	180
5/16	0.312				2,625	1,690	1,160	930	680	510	240
Sch. 40	0.322				2,785	---	---	---	---	---	---
11/32	0.344					2,065	1,445	1,175	860	650	310
Sch. 40	0.365					2,325	---	---	---	---	---
3/8	0.375						1,970	1,420	1,055	800	390
Sch. 40	0.406						2,045	---	---	---	---
Sch. 40	0.438							1,975	---	---	---
7/16	0.438								1,490	1,145	580
Sch. 40	0.500								1,970	---	---
Sch. 40	0.562									1,965	---
Sch. 40	0.688										1,645

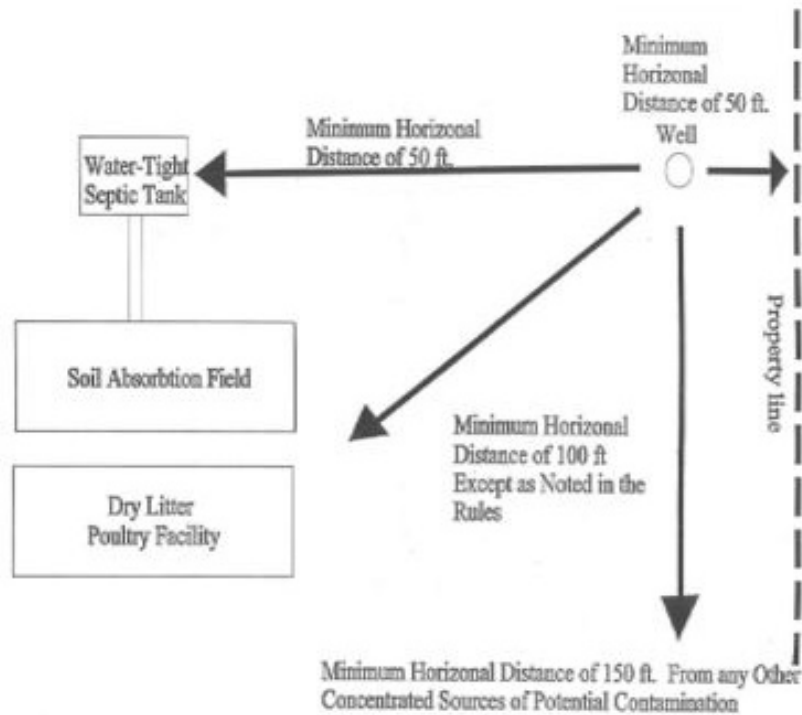
VII. INSTALLATION

1. The installation and completion of the well must comply with the TDLR rules.
2. Wells must be vented per TDLR rules and guidance.
3. The borehole must be sufficiently round, plumb, and of adequate diameter to permit satisfactory installation of the inlet, casing, filter pack, annular seal, and passage of the tremie pipe (including couplings), if used. The borehole must be 3-inches larger in diameter than the outside diameter of the casing to a depth of not less than 10-feet below the land surface and not less than the minimum specified in the TDLR rules or local requirements. The annular space between the casing and borehole must be filled with cement slurry, bentonite grout, or a solid column of granular sodium bentonite topped with a 2-foot cement atmospheric barrier to a depth not less than 10-feet below the ground surface or well head and not less than the minimum specified in the TDLR rules or local requirements (*see Section VIII of this specification*).
4. All Wells must be cased to a sufficient height (minimum of 12-inches) above the ground surface to prevent entry of surface and near-surface water, and to support the side of the hole through unstable earth materials. Casing must extend from above ground surface down through unstable earth materials to an elevation of at least 2-feet into stable material or the top of the screen.
5. The well screen and filter pack (also called gravel pack) must be determined by local geologic conditions. If a well screen is used, the well driller in consultation with the screen supplier or manufacturer, will select the applicable and proper screen and design the filter/gravel pack. The well screen must be installed in any earth material likely to produce silt or sand. Well screens may be constructed of commercially manufactured screen sections, well points, or field-perforated sections. Depth of the aquifer below ground surface and the thickness of the aquifer must govern the position and length of the screen. For a screened well cased to the bottom of the well, a minimum of five (5) feet of blank screen must be installed at the bottom of the well.
6. A concrete surface slab, sleeve placed around PVC casing, or pitless adapter must be installed according to the TDLR rules to protect the well from contamination (*see Section VIII of this specification*). If a concrete surface slab is installed, it must slope away from the casing and be separated from the casing by a plastic or mastic coating to prevent bonding.
7. A positive seal (grouted in place) or packer must be provided between the casing and the less pervious material overlying the aquifer of artesian wells, and in all aquifers where co-mingling of waters is undesirable. Grouting and sealing requirements are found in the TDLR rules.
8. An access port with a minimum diameter of 0.5-inches must be installed to allow for unobstructed measurement of the depth of the water surface, or for a pressure gage for measuring shut-in pressure of a flowing well. Access ports, pressure gages or other openings in the cover must be sealed or capped to prevent entrance of surface water or foreign material into the well. Removable caps are acceptable as access ports.
9. Wells must be disinfected immediately following construction or repair to neutralize any contamination from equipment, material, or surface drainage introduced during construction activities. Disinfect by adding chlorine bleach at a rate of 1-gallon of bleach for every 500-gallons of standing water (100-ppm chlorine concentration). When practical, the chemical solution must be agitated within the well column. The chemical solution must be left undisturbed for no less than 12-hours to assure complete disinfection.

VIII. TDLR DRAWINGS

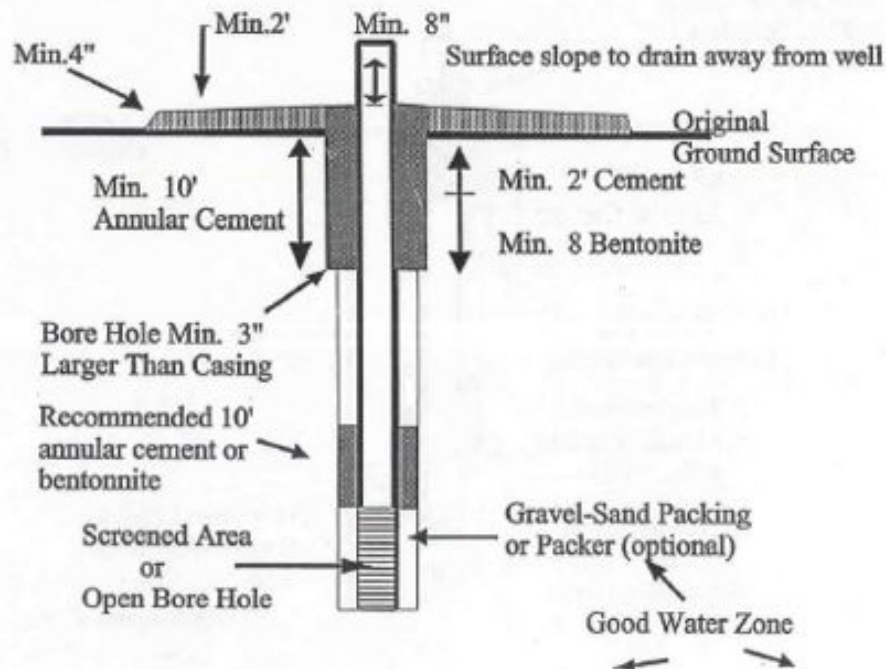
(Downloaded from [TDLR Well Construction and Plugging Specifications](#))

Well Siting Chapter 76.100 (a)(1)

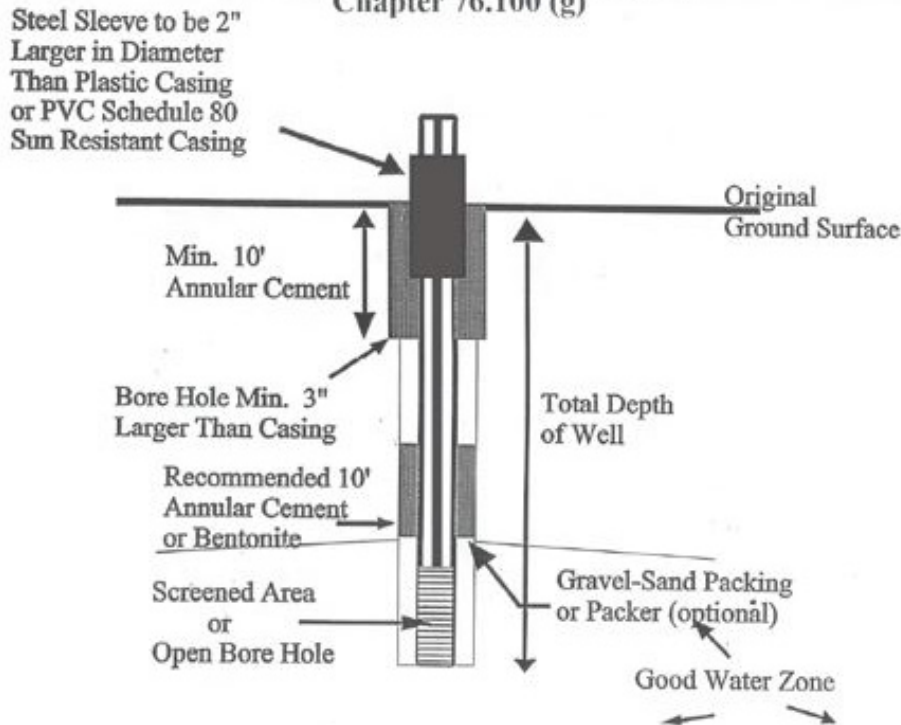


Proper Surface & Annular Sealing Examples

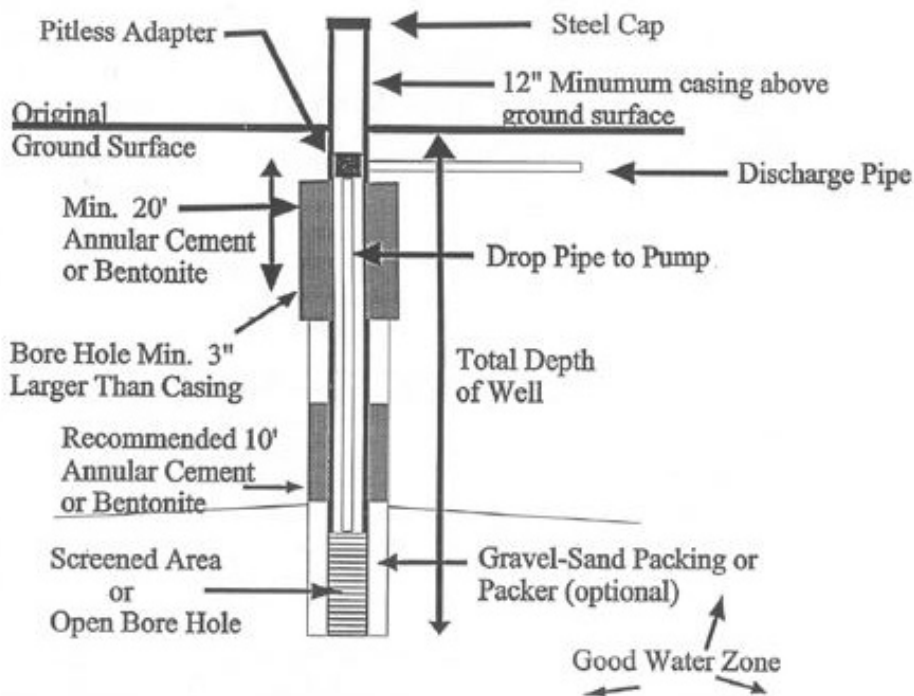
Chapter 76.100 (e)&(f)



Alternative Surface Completion Chapter 76.100 (g)



Pitless Adapter Surface Completion Chapter 76.100 (g)



IX. CERTIFICATION

1. The installer must furnish the owner/operator a written certification (with a copy provided to USDA-NRCS) that the installed well, appurtenances, and installation conform to the requirements of this specification and to the TDLR rules. The contractor must also certify that they are licensed by the State of Texas as a well installer.
2. The certification must also provide the following:
 - a. Copy of the [Texas Department of Licensing and Regulation Well Report and Driller's Log](#)
 - b. NRCS Contractor's Certification Sheet for Wells

X. MEASUREMENT

Measurement will be based on the amount of casing installed in the completed well; or in the cases where casing is not required, the entire depth of the well not to exceed 5-feet past the last water bearing strata, as reported in feet on the TDLR Well Report and Driller's Log. An onsite check of the completed installation will be performed by a USDA-NRCS representative.

XI. CONSTRUCTION DETAILS

1. Planned Capacity: _____ GPM
2. Planned Depth: _____ Feet
3. Casing Design: Nominal Diameter: _____ Inches
Outside Diameter: _____ Inches
Material: _____
Wall Thickness, Schedule, or SDR: _____
4. Minimum Borehole Diameter for Annular Seal: _____ Inches
5. Planned Surface Completion Type:
 - ☐ Concrete Slab
 - ☐ Surface Sleeve
 - ☐ Pitless Adapter
 - ☐ Steel Casing
6. Attachments:
 - a. TX- ENG-80B, Cooperator Confirmation of the One-Call Utility Safety System Form
 - b. NRCS Contractor's Certification Sheet for Wells

These construction specifications, attached construction details, and the requirement for completion of a TX-ENG-80A and a TX-ENG-80B have been reviewed with me, and a copy of each was provided. I agree to install this practice in accordance with the above referenced documents.

Owner/ Operator

Date

Specific Site Requirements