

567—49.11(455B) Material standards. All materials utilized in well water construction shall conform to the standards and guidance of the AWWA, API, ASTM, and NGWA, except as modified by this rule.

49.11(1) Well casing.

a. Steel well casing and couplings.

(1) Steel well casing pipe shall have the weights and dimensions specified in Table II. Well casing pipe shall be new steel pipe meeting one of the following standards:

1. ASTM A-53-96,
2. ASTM A-106-95,
3. ASTM A-589-95a - Type I, II or III,
4. API SPEC 5CT (5th Edition, 4/1/95),
5. API SPEC 5D (3rd Edition, 8/1/92), or
6. API SPEC 5L (41st Edition, 4/1/95).

(2) Each length of casing shall be legibly marked in accordance with API or ASTM marking specifications with the manufacturer's or processor's name or trademark, size in inches, weight in pounds per foot, whether seamless or welded (type of weld), and the API or ASTM specification or trade monogram.

(3) All casing pipe joints shall be watertight welded construction or threaded couplings.

(4) Minimum casing pipe and coupling weights and dimensions are shown in Table II below:

Table II - Minimum Casing Pipe and Coupling Weights and Dimensions

Size (inches)	Weight (lbs/ft)		Pipe				Couplings	
	Threads & coupling	Plain end	Thickness (inches)	External diameter (inches)	Internal diameter (inches)	Threads per inch	External diameter (inches)	Length (inches)
1	1.70	1.68	.133	1.315	1.049	11-1/2	1.576	2-5/8
1-1/4	2.30	2.27	.140	1.660	1.380	11-1/2	1.900	2-3/4
1-1/2	2.75	2.72	.145	1.900	1.610	11-1/2	2.200	2-3/4
2	3.75	3.65	.154	2.375	2.067	11-1/2	2.750	2-7/8
2-1/2	5.90	5.79	.203	2.875	2.469	8	3.250	3-15/16
3	7.70	7.58	.216	3.500	3.068	8	4.000	4-1/16
3-1/2	9.25	9.11	.226	4.000	3.548	8	4.625	4-3/16
4	11.00	10.79	.237	4.500	4.026	8	5.200	4-5/16
5	15.00	14.62	.258	5.563	5.047	8	6.296	4-1/2
6	19.46	18.97	.280	6.625	6.065	8	7.390	4-11/16
6-5/8 OD	20.00	19.49	.288	6.625	6.049	8	7.390	4-11/16
7 OD	20.00	19.54	.272	7.000	6.366	8 R	7.657	4-11/16
8	29.35	28.55	.322	8.625	8.071	8	9.625	5-1/16
10	41.85	40.48	.365	10.750	10.136	8	11.750	5-9/16
12	51.15	49.56	.375	12.750	12.090	8	14.000	5-15/16
14 OD	57.00	54.57	.375	14.000	13.250	8	15.000	6-3/8
16 OD	65.30	62.58	.375	16.000	15.250	8	17.000	6-3/4
18 OD	73.00	70.59	.375	18.000	17.250	8	19.000	7-1/8
20 OD	81.00	78.60	.375	20.000	19.250	8	21.000	7-5/8

R = Round Threads

b. Thermoplastic casing and couplings.

(1) Materials. Thermoplastic well casing pipe and couplings shall:

1. Be new PVC or ABS material having a minimum pressure rating of 200 psi and meeting one of the following standards: ASTM F 480-12, ASTM D2241-09, AWWA C-900-16, or ASTM 1785-21; and
2. Have an SDR of 21, 17, or 13.5, a DR of 18 or 14, or a SCH 40 or 80 rating, depending upon the specification.

(2) Potable water standards. The thermoplastic well casing pipe, pipe couplings, cement, primer, and other components shall be approved for well casing pipe in potable water supplies by the NSF 61-2016 or

the health effects portion of NSF 14-2012 as they relate to well casing pipe, or an approved equivalent organization.

(3) **Markings.** Each length of casing shall be legibly marked with the manufacturer's or processor's name or trademark, the size in inches, and the ASTM F 480 specification or trade monogram.

(4) **Casing joints.** Thermoplastic pipe shall be assembled with either flush-threaded joints, integral-bell, solvent-cemented joints, one-piece solvent-cemented couplings, or a nonmetallic restrained joint system in accordance with ASTM F 480-12.

(5) When cement grout is used with thermoplastic casing, the manufacturer's specifications for use shall be followed, except in the top 40 feet.

(6) Thermoplastic pipe extending above ground shall be protected from ultraviolet light exposure.

(7) Under no circumstances shall thermoplastic well casing be driven.

49.11(2) Grouting guides. Casing that is to be grouted shall have a minimum of two sets of centering guides attached to the casing to allow for unobstructed flow and deposition of grout.

49.11(3) Grouting materials and procedures.

a. **Concrete grout.** This mixture shall consist of cement, sand aggregate, and water, in the proportion of one bag cement (94 lbs.) and an equal volume of aggregate to not more than six gallons of clean water. Concrete grout shall not be used below the water table. Admixtures to reduce permeability or control setting time shall meet ASTM C 494-19. Concrete grout may be used with administrative authority permission where large void spaces need to be filled.

b. **Neat cement grout.** This mixture shall consist of one bag of cement (94 lbs.) to not more than six gallons of clean water. Admixtures to reduce permeability or control setting time shall meet ASTM C 494-19.

c. **Bentonite grout.** This is a mixture of water and commercial sodium-bentonite clay manufactured for the purpose of well grouting. Mixing shall be per manufacturer's specifications. Sodium-bentonite mixtures that have high viscosity but contain less than 10 percent solids are designed for drilling purposes and shall not be used as grout. Organic polymers used in grout mixtures shall meet NSF 60-2016.

d. **Bentonite pellets, chips, or granular bentonite.** A layer of bentonite pellets, chips, or granular bentonite not exceeding five feet may be used between the gravel pack and grout. Bentonite pellets are otherwise not permissible.

e. **Exclusion.** Drilling fluids and cuttings may not be used as grouting material.

f. **Application.** Grouting shall be performed by pumping the mixture into the annular space from the bottom upward through the casing or through a tremie pipe until the annular space is filled. Grouting shall be done in one continuous operation, if possible. The bottom of the tremie pipe shall remain submerged in grout while grouting.

g. **Exceptions.** If buried-slab, percussion, or casing-hammer/rotary methods are used to construct a well, grouting shall be performed in accordance with 49.10(1) and 49.10(2). If slurry circulation cannot be maintained, grouting shall be performed in accordance with 49.10(1) "c"(5).

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