4727.0950 CASING REQUIREMENTS FOR TEMPORARILY SEALED EXPLORATORY BORINGS.

Subpart 1. **Casing types.** If casing is used in a temporarily sealed exploratory boring, the casing must be:

A. steel casing as specified in subpart 15;

B. stainless steel casing as specified in subpart 16; or

C. plastic casing as specified in subparts 17 and 18.

Subp. 2. **Watertight casing required.** All casing must be watertight throughout its length, with threaded, solvent welded, or welded joints. Recessed couplings, reamed and drifted couplings, integral flush-threads, or other couplings that match the design, taper, and thread type of the casing must be used on threaded casing. Thread must not be exposed on the exterior of the pipe when the casing is joined to the coupling or when the pipe sections are joined together.

Subp. 3. **New casing required.** Casing installed in a temporarily sealed exploratory boring must be new casing produced to specifications. Casing removed from an exploratory boring is acceptable for reuse in an exploratory boring if the casing meets the specifications for new casing.

Subp. 4. **Casing markings required.** Casing must be marked by the manufacturer according to casing specifications in subparts 15 to 18. Markings must be rolled, stamped, or stenciled by the manufacturer.

Subp. 5. **Casing testing.** Casing rejected by the manufacturer must not be used. The commissioner may require that casing be submitted to an independent testing agency to evaluate whether it meets or exceeds specifications when the casing:

A. lacks markings or has illegible or altered markings;

B. contains pits, cracks, patches, partial welds, bends, or other manufacturing defects; or

C. lacks mill certification papers from the original manufacturer.

Subp. 6. **Casing rejection.** The commissioner shall reject casing if:

A. the casing is not submitted for evaluation and verification when required by the commissioner;

B. the casing fails to meet the specifications in subparts 15 to 18; or

C. the lot of casing contains defective lengths, including casing with girth-welded joints or casing with welded patches.

Subp. 7. **Removed casing.** Casing that is installed during drilling, sometimes referred to as surface casing, and that is removed upon completion of drilling is not required to meet the specifications for casing in subparts 15 to 18, but must be of sufficient strength to withstand the structural load imposed by conditions both inside and outside the exploratory boring.

Subp. 8. **Outer casing; unconsolidated materials.** An outer casing installed in unconsolidated materials is not required to meet the specifications for casing in subparts 15 to 18 if:

A. the casing is of sufficient strength to withstand the structural load imposed by conditions both inside and outside the boring;

B. an inner casing meeting the requirements of subpart 1 is installed; and

C. the annular space between the casings is filled with neat cement grout.

Subp. 9. **Inner and outer casing.** The annular space between an inner casing and an outer casing must be grouted for its entire length by pumping neat cement grout through a tremie pipe, a drill rod, or the casing as specified in part 4727.0980.

Subp. 10. **Casing height.** All casings of a temporarily sealed exploratory boring must extend vertically at least one foot above the established ground surface and at least five feet above the regional flood level. The established ground surface immediately adjacent to the casing must be graded to divert water away from the casing. Termination of the top of the casing below the established ground surface, such as in a vault or pit, is prohibited.

Subp. 11. **Casing offsets.** Casing offsets are prohibited.

Subp. 12. **Minimum casing depth.** An exploratory boring that is temporarily sealed must be cased according to items A to C. Borings that flow must meet the special requirements in part 4727.0985.

A. A boring that terminates in unconsolidated materials must be cased from a point one foot above the established ground surface and at least five feet above the regional flood level to the bottom of the boring.

B. A boring that terminates in igneous or metamorphic bedrock must be cased from a point one foot above the established ground surface and at least five feet above the regional flood level into igneous or metamorphic bedrock.

C. A boring that terminates in sedimentary bedrock must be cased from a point of one foot above the established ground surface and at least five feet above the regional flood level into sedimentary bedrock. When a confining layer is encountered, the boring must be cased according to part 4727.0975.

Subp. 13. **Casing cover.** The casing of a temporarily sealed exploratory boring must be covered with a water tight and insect-proof cap or cover equivalent to the casing in weight and strength consisting of:

A. an overlapping cap with compression gasket; or

B. a threaded or welded cover or cap.

Subp. 14. **Casing protection.** The casing of an exploratory boring that is temporarily sealed must be protected by at least one of the following methods:

A. surrounding the casing with a concrete pyramid or cone that has horizontal dimensions of at least 24 inches by 24 inches at the established ground surface, rises 12 inches above the established ground surface at the casing, and has a base with a volume of at least three cubic feet below the established ground surface;

B. installing a steel outer protective casing meeting the specifications of subpart 15 that is at least 3.25 inches in diameter larger than the inner casing, extends at least two feet above the established ground surface and four feet below the established ground surface, and has neat cement grout or concrete grout in the annular space between the casings from the bottom of the outer protective casing to the established ground surface;

C. placing three posts at least four inches square or four inches in diameter around the boring at equal distances from each other and two feet from the exploratory boring. The posts must extend two feet above the established ground surface and four feet below the established ground surface, or to a depth of two feet if each post is set in concrete to a depth of two feet. The posts must be made of reinforced concrete, decay-resistant wood, or steel pipe meeting the specifications of subpart 15. Steel pipe must be covered with an overlapping, threaded, or welded steel or iron cap or be filled with concrete or cement; or

D. extending the casing vertically at least four feet above the established ground surface and reporting the accurate location of the exploratory boring on the temporary sealing report. The location must be determined and reported by using either a differential global positioning system or a survey with bearings and distances taken from property corners or a permanent survey control point.

Subp. 15. **Steel casing requirements.**

A. Steel casing used in the construction of a temporarily sealed exploratory boring must be produced to the following specifications:

(1) ASTM Standard A53-90b;

(2) ASTM Standard A589-89a, Types I, II, and III;

(3) API Specification 5L;

(4) DCDMA Technical Manual, section B designations C80, R80, or RC100, and section D flush joint casing standards; or

(5) CSA Standard M253.1 - M1981 for flush joint casing.

B. Steel casing must have the minimum weights and thicknesses specified in this item, subject to the tolerance in the specifications in item A.

	Size in Inches	Wgt. Lbs. Per Ft. Plain End	Thrds. & Cplgs.*	Thrds. R&D Cplgs.	Thickness in Inches
S	1	1.68	1.68	1.70	.133
c	1-1/4	2.27	2.28	2.30	.140
h	1-1/2	2.72	2.73	2.75	.145
e	2	3.65	3.68	3.75	.154
d	2-1/2	5.79	5.82	5.90	.203
u	3	7.58	7.62	7.70	.216
l	3-1/2	9.11	9.20	9.25	.226
e	4	10.79	10.89	11.00	.237
	5	14.62	14.81	15.00	.258
4	6	18.97	19.18	19.45	.280
0	8	28.55	29.35		.322
	10	40.48	41.85		.365
S	12	49.56	51.15		.375
t	14	54.57	57.00		.375
a	16	62.58	65.30		.375
n	18	70.59	73.00		.375
d	20	78.60	81.00		.375
a	22	86.61			.375
r	24	94.62			.375
d	26	102.63			.375
	30	118.65			.375
W	32	126.66			.375

g	34	134.67	.375
t	36	142.68	.375

* Nominal weight based on length of 20 feet including coupling.

Steel casing up to ten inches in diameter must be Schedule 40. Larger diameter casing must be standard weight.

Diameter-Inches			Couplings	
External	Internal	Thrds. per Inch	Minimum External Diameter Inches	Minimum Length Inches
1.315	1.049	11-1/2	1.576	2-5/8
1.660	1.380	11-1/2	1.900	2-3/4
1.900	1.610	11-1/2	2.200	2-3/4
2.375	2.067	11-1/2	2.750	2-7/8
2.875	2.469	8	3.250	3-15/16
3.500	3.068	8	4.000	4-1/16
4.000	3.548	8	4.625	4-3/16
4.500	4.026	8	5.200	4-5/16
5.563	5.047	8	6.296	4-1/2
6.625	6.065	8	7.390	4-11/16
8.625	7.981	8	9.625	5-1/16
10.750	10.020	8	11.750	5-9/16
12.750	12.000	8	14.000	5-15/16
14.000	13.250	8	15.000	6-3/8
16.000	15.250	8	17.000	6-3/4
18.000	17.250	8	19.000	7-1/8
20.000	19.250	8	21.000	7-5/8
22.000	21.250			
24.000	23.250			
26.000	25.250			

30.000	29.250
32.000	31.250
34.000	33.250
36.000	35.250

Subp. 16. **Stainless steel casing requirements.** Stainless steel casing used in the construction of a temporarily sealed exploratory boring must meet ASTM Standard A312-86a and meet at least:

A. ANSI Schedule 5 for welded joints; and

B. ANSI Schedule 40 for threaded joints.

Subp. 17. **Plastic casing requirements.** Plastic casing and couplings used in the construction of a temporarily sealed exploratory boring must:

A. meet ASTM Standard F480-88;

B. withstand internal pressures of 200 pounds per square inch (psi); and

C. have a minimum standard dimension ratio (SDR) of 21.

Subp. 18. **Additional approved plastic couplings.** In addition to plastic couplings approved under subpart 17, couplings meeting the following requirements are also approved:

A. couplings with socket dimensions meeting the requirements of ASTM Standard F480-88, Table 3; and

B. ANSI Schedule 40, four-inch and five-inch diameter slip x female thread and five-inch diameter slip x male thread couplings meeting the requirements of ASTM Standard D2466-90a.

Subp. 19. **NSF standard for plastic material.** All plastic casings, couplings, components, and related joining materials, including solvents, cements, or primers, used in the construction of a temporarily sealed exploratory boring must conform with the requirements of NSF Standard 61-1991 or the health effects portion of NSF Standard 14-1990 and be tested as conforming by an agency certified by ANSI. Conformance to the NSF standard must be coded, stamped, or marked on the casings, couplings, and components, as well as on the containers of related joining materials, including solvents, cements, or primers.

Subp. 20. **Plastic casing installation.**

A. When preparing to install plastic casing, a person must:

(1) inspect casing and couplings carefully for cuts, gouges, deep scratches, damaged ends, and other major imperfections. Any plastic casing or coupling having such defects or imperfections shall not be used;

(2) use solvent cement meeting the requirements of the specifications for the plastic that will be used;

(3) use only casing and coupling combinations that give interference fits; and

(4) use plastic couplings with molded or formed threads and thread lubricants suitable for the plastic material that will be used.

B. When cutting plastic casing, casing ends must be cut square using fine-tooth blades with little or no set or a plastic pipe cutter equipped with extra wide rollers and thin cutting wheels. Standard steel pipe or tubing cutters must not be used for cutting plastic casing.

C. All dirt, dust, and moisture must be cleaned from casing ends and couplings using chemical or mechanical cleaners suitable for the particular plastic material. All burrs must be removed from casing ends and couplings.

D. A primer must be used when required or recommended by the solvent cement label instructions.

E. An even coat of solvent cement must be applied to the inside of the couplings to cover the distance of the joining surface only. An even coat of solvent cement must then be applied to the outside of the casing being joined to a distance equal to the depth of the casing coupling socket.

F. When assembling plastic casing, a person must:

(1) make the joint with solvent cement before the solvent cement dries;

(2) reapply cement before assembling if the solvent cement dries partially;

(3) turn the casing to evenly distribute the solvent cement while inserting the coupling into the coupling socket;

(4) insert the casing to the full depth of the coupling socket and assemble casing;

(5) remove excess solvent cement from the exterior of the joint with a clean, dry cloth;

(6) tighten a threaded joint by no more than one full turn using a strap wrench;

(7) not disturb the coupling joint until after the solvent cement has set; and

(8) allow sufficient time for the solvent cemented joint to set.

G. Screws must not be used to join plastic casing.

H. A person must not drill inside plastic casing. Drilling tools such as drill bits must not be inserted in plastic casing.

I. Plastic casing must not be used as an outside casing in exploratory borings cased more than five feet into limestone or dolomite bedrock. In limestone or dolomite bedrock, plastic casing may be used as an inner casing if surrounded by an outer steel casing.

J. Plastic casing must not be driven.

K. A person installing plastic casing must either seal the exploratory boring or remove and replace all casing when:

(1) the plastic casing cannot be installed without driving the casing; or

(2) the casing fails during construction.

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