

4725.3050 GROUTING.

Subpart 1. **Grouting materials.** The following grout materials as listed in part 4725.0100 are approved for filling an annular space between unconsolidated material or bedrock and a casing:

- A. neat-cement grout, except that rapid setting cement must not be used with plastic casing;
- B. cement-sand grout; and
- C. bentonite grout when used in unconsolidated materials.

Subp. 2. **Grouting requirements and methods.** The following general requirements apply to the grouting of wells and borings.

A. Grouting must start immediately on completion of drilling and be completed before placing a well or boring in service.

B. The annular space to be grouted must be protected from collapse and the introduction of materials other than grout.

C. A steel plate, or a nontoxic metal, rubber, or plastic grout basket may be attached to the casing within ten feet of the bottom. Wood, burlap, or other organic material must not be used.

D. Grout must be pumped under pressure into the annular space from the bottom up to the established ground surface or base of the pitless adapter or unit. Grout must be pumped through the casing or through a tremie pipe placed within ten feet of the bottom of the space to be grouted. The tremie pipe may be retracted as grouting proceeds; however, the bottom of the tremie pipe must remain submerged in grout while grouting.

E. Grout flowing out of the annular space at the surface must meet the minimum specifications and densities in this chapter before grouting may stop.

F. Dumping of grout is not allowed except when the depth of the space to be grouted is less than ten feet.

Subp. 2a. **Wait on cement.** Neat-cement grout or cement-sand grout must be allowed to set a minimum of 24 hours. Rapid setting cement must be allowed to set a minimum of 12 hours. Drilling, development, or pump operation is prohibited during the time the cement is setting.

Subp. 3. **Grouting depth requirement.** When constructing a well or boring with a method such as mud or air rotary, auger, or jetting that creates an open annular space or drills a bore hole larger than the casing or casing couplings outside diameter, a grouting

material specified in subpart 1 and the grouting methods specified in subpart 2 must be used to fill the annular space between the casing and the bore hole.

A. If the depth of the casing is 50 feet or less, the grout must extend from the bottom of the casing, top of the bentonite seal as specified in subpart 8, or top of the gravel pack, to the established ground surface, or the base of the pitless adapter or unit.

B. If the depth of the casing is more than 50 feet, the annular space below 50 feet must be filled with grout, except that the portion of the well or boring in an unconsolidated formation below 50 feet in depth may be filled with cuttings. The cuttings must be placed without bridging, and must be the unconsolidated materials taken from the bore hole. The annular space above 50 feet must be filled from:

(1) a depth of at least 50 feet to the established ground surface or the base of a pitless adapter or unit; or

(2) the top of the bentonite seal as specified in subpart 8 or the top of the gravel pack to the established ground surface or the base of a pitless adapter or unit.

Subp. 4. **Grouting between casings.** The annular space between an inner and outer casing must be filled with neat-cement grout or cement-sand grout according to subpart 2.

Subp. 5. **Driving casing.** When driving casing in an unconsolidated formation, a cone-shaped depression or temporary outer casing filled with bentonite grout, bentonite powder, or granular bentonite must be maintained around the outside of the casing. The bottom of driven casing, except for a drive-point, temporary casing, or outer casing that has a neat-cement or cement-sand grouted inner casing must be equipped with a drive shoe in accordance with part 4725.2250, subpart 15. Casing may only be driven through:

A. an unconsolidated formation;

B. sandstone bedrock including the St. Peter, Jordan, Franconia, Iron-ton-Galesville, Mt. Simon, Hinckley, or Fond du Lac formations;

C. ten feet or less of limestone or dolomite bedrock including the Cedar Valley through Galena groups, the Platteville formation, or the Prairie du Chien group;

D. ten feet or less of the St. Lawrence or Eau Claire confining layers; and

E. two feet or less of the Decorah or Glenwood confining layers.

Subp. 6. **Sealing bore hole below screen.** If a bore hole extends more than ten feet below the bottom of a screen, the bore hole must be filled with grout from the bottom of the bore hole to within ten feet or less of the screen.

Subp. 7. **Grouting in bedrock.** The additional requirements in items A to C apply to grouting a well or boring in bedrock.

A. When bedrock is encountered in the construction of a well or boring, the casing must be equipped with a drive shoe driven firmly into stable bedrock or the casing must be grouted with neat-cement grout, or cement-sand grout from the bottom of the casing to the top of the bedrock.

B. When the casing of a well or boring extends more than ten feet into bedrock, or extends through any portion of a bedrock confining layer, the casing must be installed in a bore hole 3.0 inches larger, or 3.5 inches larger for casings deeper than 100 feet and larger than 12 inches inside diameter, than the outside diameter of the casing or couplings, whichever is larger, and the annular space in bedrock must be grouted with neat-cement grout or cement-sand grout, except that steel casing may be driven more than ten feet in a sandstone formation.

C. If a cavern more than twice the diameter of the bore hole exists or the grout level fails to rise after insertion of either more than one cubic yard of grout or the quantity of grout necessary to fill ten vertical feet of hole, then the following grouting materials and methods may also be used in the portions where the conditions exist:

(1) pouring of a mixture of gravel or stone aggregate not larger than one-half inch in diameter while simultaneously pumping neat-cement grout or cement-sand grout through a tremie pipe in a ratio not to exceed five parts aggregate to one part grout;

(2) pumping a mixture of gravel or stone aggregate not larger than one-half inch in diameter and cement-sand grout or neat-cement grout in a ratio not to exceed five parts gravel or aggregate to one part Portland cement; or

(3) pumping of alternate, equal thickness layers of cement-sand grout or neat-cement grout and pouring gravel or stone aggregate not larger than one-half inch in diameter. Individual layers of aggregate must not exceed ten feet in thickness. Aggregate must not be emplaced in a confining layer.

Neat-cement grout or cement-sand grout must be pumped through the casing or through a tremie pipe. The aggregate must be poured into the bore hole at a rate that prevents bridging.

Subp. 8. **Bentonite seal between gravel pack and grout.** A layer of bentonite pellets, bentonite chips, or granular bentonite not to exceed five feet in thickness is allowed between a gravel pack and grout. The bentonite pellets, bentonite chips, or granular bentonite must not extend into a confining layer or extend more than ten feet above the static water level, and must be poured without voids or bridging. A tremie pipe must be inserted to within ten feet of the top of the pellets, chips, or granular bentonite, and the annular space grouted to the established ground surface or base of the pitless unit or adapter.

Statutory Authority: *MS s 103I.101; 103I.111; 103I.205; 103I.221; 103I.301; 103I.401; 103I.451; 103I.501; 103I.525; 103I.531; 103I.535; 103I.541; 103I.621; 144.05; 144.12; 144.383; 157.04; 157.08; 157.09; 157.13*

History: *17 SR 2773; 33 SR 211*

Published Electronically: *September 2, 2008*