the pipe and acceptable to the department, shall inspect the testing procedure of the entity and perform hydrostatic tests on at least 10 lengths of pipe in the entity's stock which has been tested and marked. In addition, the department may require that up to 10 lengths of pipe selected in any year by the department from stock of randomly selected well drillers shall be tested by an independent laboratory in Wisconsin acceptable to the department and contracted for by the entity supplying the pipe. No more than one length of pipe may be selected for testing during any visit. The transportation of the pipe to the laboratory and replacement of the driller's stock and the cost of the testing shall be the responsibility of the entity supplying the pipe. The results of the surveillance inspection and testing by the laboratories shall be reported to the department by the laboratories.

4. All pipe intended for water well construction or other potable water supply use within this state shall be subject to random examination by the department which may require any defective length of pipe or lots having more than 5% of pipe with lengths less than 5 feet to be rejected and returned to the manufacturer or supplier. Defective lengths shall include, but not be limited to:

a. Pipe with girth welded joints;

b. Pipe with welded patches;

c. Pipe not conforming to the marking requirements of subd. 2. or 3.;

d. Pipe with injurious defects, such as:

1) Cracks;

2) Open welds;

3) Partial or incomplete welds;

4) Open seams;

5) Laminations in pipe wall which exceed 12½% of wall thickness;

6) Slivers which exceed 12½% of wall thickness.

5. The listed ASTM, API and AWWA references are available for inspection at the offices of the department of natural resources, the secretary of state and the revisor of statutes and may be obtained for personal use from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103, the American Petroleum Institute, Division of Production, 300 Conigan Tower Building, Dallas, Texas 75201 and from the American Water Works Association, 6666 West Quincy, Denver, Colorado 80235.

(2) THERMOPLASTIC CASING PIPE. (a) *Pipe and material specifications.* 1. The thermoplastic well casing pipe and couplings shall be new polyvinyl chloride (PVC) material produced to and meeting the current ASTM F-480 standard except that the impact resistance requirements specified in the current ASTM D 2241 standard may be substituted for the impact resistance requirements specified in ASTM F 480. PVC material shall conform to cell classification 12454-B or 12454-C as designated by markings of PVC 1120 or 1220. The material shall be formulated to include a filler material to resist ultra-violet degradation. The

solvent cement shall conform to the ASTM D-2564 standard. No used or reclaimed materials may be used. Either integral bell pipe or one piece couplings shall be used.

2. The pipe shall have a standard dimension ratio (SDR) of 21, 17, or 13.5.

3. The nominal casing size shall be at least 5 inches.

4. The well casing pipe, couplings, cement, primer and other components shall be evaluated and approved for use as well casing in potable water supplies by the National Sanitation Foundation (NSF) Testing Laboratories, Inc., P.O. Box 1468, Ann Arbor, Michigan 48106 or an equivalent laboratory approved by the department. Such laboratory must approve the materials as being acceptable for use as well casing for potable water supplies. Approvals of alternate laboratories will be based on the demonstration of unbiased, reliable and appropriate testing methods at least as stringent as NSF methods.

5. The well casing pipe and couplings shall be marked in accordance with the current ASTM F-480 specification and this section. The pipe shall be marked at least every 5 feet showing the nominal size; standard dimension ratio; type of material; the designation 1120 or 1220; the wording — "well casing" — followed by impact classification; designation "ASTM F-480" including year of issue of the standard with which the well casing pipe complies; manufacturer's name or trademark; manufacturer's code for resin manufacture, lot number and date of manufacture; and the NSF-WC designation or other approved laboratory's seal or mark. Couplings shall be marked with all of the above information except the standard dimension ratio, the wording "well casing", and manufacturer's code for resin, lot and date.

(b) *Storage and inspection.* 1. The pipe and couplings may not be stored by the driller in direct sunlight for periods exceeding 3 months. It is recommended that pipe and coupling inventories be rotated or utilized to minimize exposure to ultraviolet radiation.

2. The pipe shall be stored in such a manner as to prevent deformation, sagging or bending.

3. Prior to use, the pipe and couplings shall be inspected for cuts, deformations, gouges, deep scratches, damaged ends and other imperfections. Any pipe or couplings having such defects shall be rejected.

4. Pipe bells and couplings shall be manufactured to close tolerances to ensure an interference fit at the joint. Should a joint not have an interference fit allowing the dry pipe to enter the socket between ½ and ⅔ of the socket depth when inserted by hand, the pipe or coupling shall be rejected.

(c) *Assembly.* Joining techniques including procedures for cutting, cleaning of joints, use of primers, application of cement, assembly and hardening of solvent cement joints shall be in accordance with this section and the manufacturer's recommendations.

1. 'Cutting'. The installer shall use a fine tooth handsaw with little or no set or a plastic pipe cutter equipped with extra-wide rollers and thin cutting wheels for cutting the pipe. Pipe ends shall be cut square using a

miter box when sawed. Standard steel pipe or tubing cutters may not be used for cutting plastic pipe.

2. 'Cleaning'. The installer shall clean all dirt, dust, and moisture from pipe ends and couplings. The installer may use only chemical or mechanical cleaners which are suitable for the particular plastic material being used. All burrs shall be removed.

3. 'Primer'. The installer shall use a primer to prepare the pipe and coupling surfaces in order to form a continuous bond when cemented.

4. 'Cement application'. The joint shall be completed immediately following application of the solvent cement. A solvent cement shall be used which provides sufficient open time for making good joints, but which also cures rapidly to initial set. At temperatures below 32°F a cement formulated for use below 32°F shall be used. The installer shall apply a moderate and even coat of cement to the inside of the pipe bell or coupling to cover the length of the joining surface only. The installer shall then quickly apply an even coat of cement to the outside of the pipe to a length equal to the depth of the pipe coupling socket.

5. The installer shall make the joint as quickly as possible after application of the cement, and before it dries; reapply cement before assembling if the cement dries partially; insert the pipe into the coupling socket, turning the pipe at least ¼ turn before it seats to insure even distribution of cement; make sure that the pipe is inserted to the full depth of the coupling socket, and remove excess solvent cement from the exterior of the joint with a clean, dry cloth.

6. A newly assembled joint may not be moved until after sufficient time has elapsed to adequately cure the joint to withstand the installation stresses without movement or damage. It is recommended that all joints be allowed to cure at least 15 minutes if the ambient temperature is 60°F or above, at least ½ hour if between 40 and 60°F, and at least one hour if the ambient temperature is below 40°F before the pipe is moved and installed. Cure times may be reduced when temperatures are above the bottom of the above ranges. In no case shall cure times be less than ⅓ of the times recommended above. Cure times shall be increased by 50% when the relative humidity is over 60%. No pins, screws or fasteners may be installed in the joint.

7. For threaded couplings used for screens and pitless adapters, only approved lubricant specifically intended for use with PVC pipe is acceptable. A threaded joint shall be tightened by no more than one full turn using a strap wrench.

8. When a well screen is used, it shall be a telescoping type screen. The casing must be pulled back to expose the screen. An approved packer shall be used to seal the space between the screen and the casing. A small diameter drill stem or rod bearing on the screen bottom plate may be used to place the screen.

(d) *Installation requirements.* 1. The well casing pipe may not be driven, pushed or forced into the formation. When pulling back a casing to expose a screen, the force applied may not exceed the casing weight.

2. The casing shall be set in an outer drillhole full of drilling mud or a temporary casing which shall in either case be at least 4 inches larger

than the nominal pipe size. A permanent tag bearing the message "plastic well casing" shall be attached to the top of the well casing.

3. Thermoplastic well casing pipe may be used only for wells developed in unconsolidated formations and constructed in accordance with lines a, b and c of table 1 and lines b and c of table 3.

4. No drilling tools such as drillbits or stabilizers shall be placed in the casing nor shall any drilling or reconstruction occur after placement of the casing in the well. This restriction does not preclude the installation or replacement of telescoping screens.

5. Thermoplastic well casing pipe shall be used only for wells where the annular space is sealed with drilling mud or clay slurry. Cement grout may not be used. The thermoplastic well casing shall be set in the drilling mud of a drillhole constructed with rotary-mud equipment or within a temporary casing driven the entire depth of the permanent casing if constructed with other equipment.

6. Any pitless subsurface connection to the thermoplastic well casing shall be made in accordance with s. NR 112.14 (1) (b) or (2) (b) and (8). The portion of the well casing above a pitless adapter may be either steel or PVC well casing pipe meeting the requirements of this section.

Note: See NR 112.14 (8).

7. Threaded pipe is not permitted. Threaded couplings may only be used for installation of pitless adapters after placement of the casing.

8. If the portion of the well casing pipe which extends above the frost line is thermoplastic material, the upper terminus of the well shall be contained in a well house or in a capped oversized steel casing which extends from above the top of the thermoplastic well casing to a depth of below the frost level.

(e) The listed ASTM standards are available for inspection at the offices of the department of natural resources, the secretary of state and the revisor of statutes and may be obtained for personal use from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvia 19103.

History: Cr. (intro.), (1) (a) to (d) renum. from NR 112.08 (2) (a) to (d) and am. (1) (d) 5., cr. (2), Register, October, 1982, No. 322, eff. 11-1-82.

NR 112.09 Bored type well design and construction. (1) GENERAL. The general construction requirements are the same as NR 112.08 (1).

(2) SPECIFIC. Through the vertical zone of contamination the construction of bored type wells shall conform to the specifications for drilled type wells prescribed by NR 112.08 (2) [112.085 (1)]. They shall also conform to the following additional requirements:

(a) The minimum diameter of the casing pipe shall be 6 inches.

(b) The top of the well casing pipe shall terminate at least 8 inches above the ground grade.

(c) The curbing below the vertical zone of contamination shall be properly cured concrete pipe or equal. In such case the joints shall be the

(c) An insulated housing shall be provided above the spring box for frost protection for the pump and for the pressure tank, when installed at the spring. **(Note:** See figure 7.)

History: Cr. Register, June, 1975, No. 234, eff. 10-1-75.

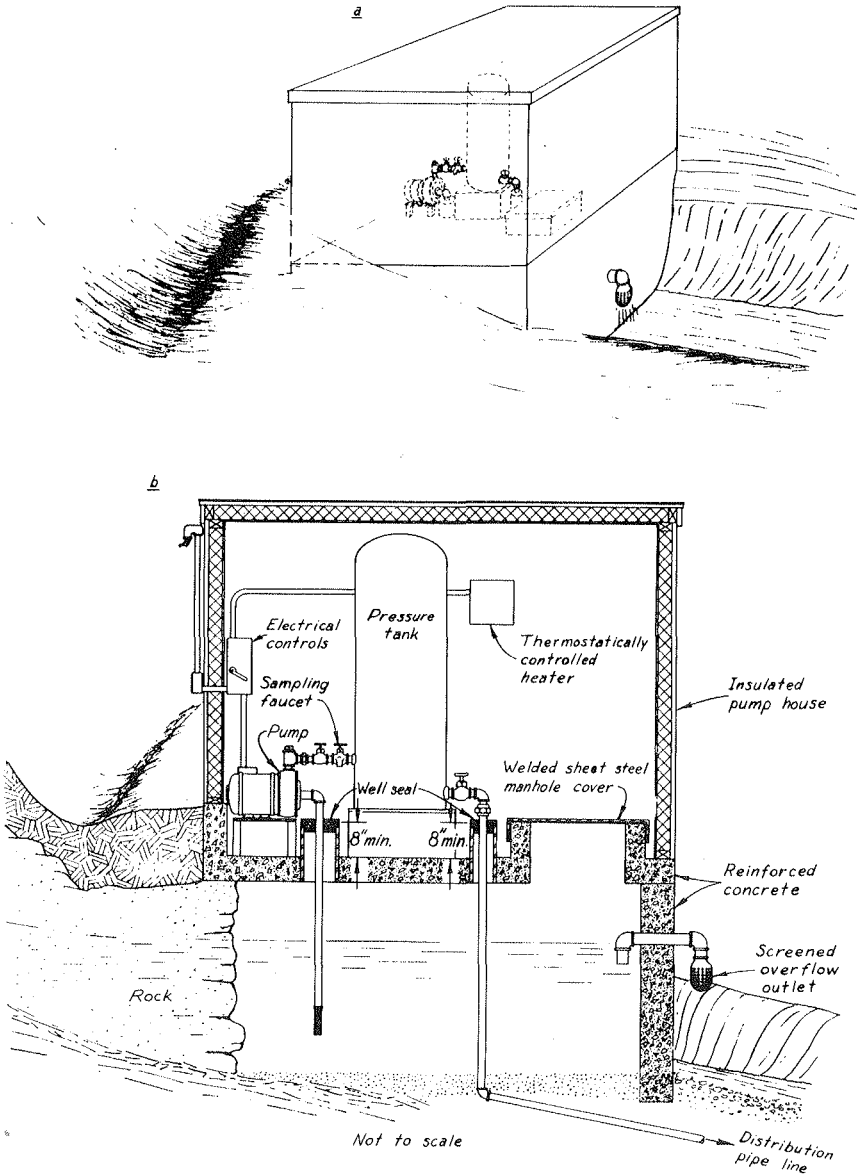

Figure 7. Spring House.

NR 112.14 Surface protection. (1) WATER SUPPLIES EXCEPT THOSE FOR LESS THAN 4 FAMILIES, SCHOOLS, SEWAGE TREATMENT PLANTS AND HIGH CAPACITY INSTALLATIONS. All wells governed by this chapter, except those serving residential units housing a total of not more than 3 families, and school water systems, high capacity water systems and sewage treatment plant water systems shall be provided surface protection in accordance with the provisions of this subsection.

(a) The watertight protective well casing pipe shall extend to a point at least 8 inches above the established ground surface unless a permit for construction of a separate well pit or a subsurface pumproom adjoining a basement has been obtained from the department; except that, within a flood plain, the top of a well shall terminate at least 2 feet above the regional flood elevation and no pit or subsurface pumproom shall be constructed. (**Note:** See section NR 112.07 (4).)

(b) Any pitless subsurface pipe connection to such a well shall be made with approved threaded fittings and shall be made above ground water level. The piping for such a connection shall be kept under gauge pressure. For the purpose of this chapter, approved threaded fittings include pitless adapters and pitless receiver tanks designed to be connected to the well casing pipe and approved by the department. The design criteria on which approvals are based involve materials of construction, wall thickness of pipe, wall thickness of other component parts, dimension of shortest cross-section of welds, method of fabrication and method of connection to the well casing.

(c) On off-set installations in basements, the pump impeller or cylinder shall be located preferably at an elevation above the ground surface or at least at an elevation not subject to flooding and in any case at least 2 feet above the basement floor. Any buried suction pipe shall be enclosed in a pressure conduit. Pressure conduits may terminate at the end of the horizontal line entering a basement if the elevation of the pipe entrance is 2 feet or more above the basement floor and the basement is in active use and not subject to flooding. Pressure conduit shall meet the minimum pipe specifications of the state plumbing code, ch. H 62, Wis. Adm. Code. A shallow well pump discharge line shall discharge through a seal-cross fitting before entering the pressure tank.

(2) WATER SUPPLIES FOR A MAXIMUM TOTAL OF 3 FAMILIES IN RESIDENTIAL UNITS. Water supplies for residential units housing a total of not more than 3 families, shall be provided surface protection in accordance with the provisions of this subsection.

(a) Watertight protective well casing pipe shall extend to a point at least 8 inches above the established ground surface unless a permit for construction of a separate well pit or sub-surface pumproom adjoining a basement is obtained from the department, except that, within a flood plain, the top of the well shall terminate at least 2 feet above the regional flood elevation and no pit or subsurface pumproom may be constructed. (**Note:** See s. NR 112.14 (1).)

(b) Any pitless subsurface connection to such a well shall be made with approved threaded fittings as defined in NR 112.14 (1) (b) or by means of joints welded in accordance with the standard welding procedure specifications of the department of industry, labor and human relations, Wis. Adm. Code s. Ind. 53.53 (3), and the connection shall be

made above ground water level. In addition, the pump location shall not be subject to flooding. Weld-on pitless adapter units shall be approved units.

(c) On off-set installations in basements, the pump impeller or cylinder shall be located preferably at an elevation above the ground surface or at least at an elevation not subject to flooding and in any case at least 2 feet above the basement floor. Any buried suction pipe shall be enclosed in a conduit. It is recommended that the conduit be pressurized. Conduits may terminate at the end of the horizontal line entering a basement if the elevation of the pipe entrance is 2 feet or more above the basement floor and the basement is in active use and not subject to flooding. Nonpressure conduit shall be at least 4 inches in diameter and conform to s. NR 112.085. Pressure conduit shall meet the minimum pipe specifications of the state plumbing code, s. H 62.19. A shallow well pump discharge line shall discharge through a seal-cross fitting before entering the pressure tank.

(d) Restriction on the pipe material when pressurized conduits are used with pitless adapters and the restrictions on the terminal of such pipe in a basement are the same as under sub. (1).

(3) ALL SCHOOL WATER SYSTEMS, HIGH CAPACITY WATER SYSTEMS AND SEWAGE TREATMENT PLANT WATER SYSTEMS. The watertight protective well casing pipe of wells for all school water systems, high capacity water systems and sewage treatment plant water systems shall terminate at least 12 inches above the established ground grade at the well except in flood plains where the top of the well shall terminate at least 2 feet above the regional flood elevation; no well pits may be constructed; and, except for sewage treatment plant systems, no subsurface pump piping connections shall be made to the well casing pipe.

(4) PITLESS ADAPTERS AND BURIED SUBMERSIBLE PUMP DISCHARGE LINES. Buried submersible pump discharge lines connected to pitless adapters must be maintained under gauge pressure at all times. Therefore, no check valves shall be placed in the pump discharge line between a pitless adapter and a hydropneumatic tank or approved comparable type pressure vessel. The check valve shall be located either at the top of the submersible pump, in that portion of the discharge pipe within the well or on the adapter spool of an approved unit.

(5) PIT PERMITS FOR OTHER THAN WELL PITS. Pit structures for the housing of offset pumps, for access to the head of a buried pressure tank or to completely house a pressure tank shall not be constructed without a permit from the department.

(6) APPLICATION FOR PIT AND SUBSURFACE PUMPROOM PERMITS. Permit applications to construct a well pit, pump pit, pressure-tank pit, pressure-tank access pit or subsurface pumproom adjoining a building basement, shall be made to the central office of the department on forms provided by the department. Such permits may be granted if the construction will be made in conformance with minimum specifications of the department. (**Note:** See subs. (1), (2) and (4).)

(a) Separate well pits, pump pits, pressure-tank pits and pressure-tank access pits shall conform to the following minimum specifications:

1. Dimensions:

a. Area. Five square feet of free floor area shall be provided for each square foot of area required for equipment and appurtenances. In no case shall the inside area of a pit be less than 24 square feet.

b. Width. The width of the pit shall be not less than ⅔ of the length.

c. Height. The height inside shall be at least 6 feet, but not less than 6 inches higher than any equipment installed therein.

d. Walls, floor and roof thicknesses. The wall thickness shall be at least 6 inches, the floor thickness shall be at least 4 inches and the roof thickness shall be at least 5 inches.

2. Construction:

a. Material. The pit shall be constructed of poured concrete thoroughly puddled in place. The concrete shall be prepared according to specifications of NR 112.19 or by use of clean water and washed sand and gravel or crushed rock in the following proportions: 1 part cement, 2 parts sand and 3 parts gravel. The water-cement ratio should not exceed 0.75 to 1.

b. Watertight juncture. The junction of walls, floor and roof shall be watertight. Every conduit or similar connection with the pit shall be watertight.

c. Reinforcement. The deck or pit roof and walls of the pit structure shall be adequately reinforced to insure strength and durability.

3. Elevation of pit roof. The pit roof or deck shall be above the ground surface.

4. Manhole opening:

a. Placement. The pit shall be fitted with a manhole opening. It shall be located directly over the well, unless the well casing itself extends through the cover, or a capped section of pipe at least equal in diameter and thickness to the well casing is cast into the pit roof directly over the well.

b. Size. The manhole opening shall be at least 20 inches square or 20 inches in diameter, inside measurement, and in any case shall be sufficiently large to permit entrance or removal of any unit or equipment that must be installed through the manhole.

c. Curbing. The manhole opening shall be provided with a raised curbing at least 4 inches thick, extending at least 4 inches higher than the pit roof.

d. Cover. A substantial watertight, overlapping, tight-fitting, shoebox type cover with skirted sides at least 3 inches wide shall be provided for the manhole. A welded sheet-steel cover is preferred, but a cover made out of lumber and covered in turn with sheet metal or tin will be acceptable if maintained in a waterproof condition.

e. Exception. A watertight, cast-iron manhole frame and cover with gasket may be substituted for the concrete curbing.

5. Drainage:

a. Gravity type. Where practical, the pit shall be drained by a separate watertight gravity-type drain discharging to the ground surface at a point free from flooding. The drain shall be constructed of cast iron, copper or galvanized steel having a minimum diameter of 2 inches.

b. Watertight sump type. When no gravity-type drain can be installed in conformance with sub. (5) (a) 5a, a watertight sump, having a minimum depth of 18 inches and a minimum cross-section of 18 inches square or minimum diameter of 18 inches, shall be installed.

6. Termination of well casing. In the case of well pits, the casing shall terminate at least 18 inches above the pit floor and be provided with an approved watertight, sanitary well seal with gasket, or an equivalent watertight connection with the pump.

7. Venting:

a. Pit. A well pit, pump pit, pressure-tank pit or pressure-tank access pit shall be vented by use of two 2-inch diameter galvanized steel pipes located in opposite corners, one pipe to extend to within 1 foot of the pit floor and the other to extend only through the pit roof. The upper end of the vent pipes shall terminate with return bends and be screened.

b. Well. Any well vent pipe shall extend to the top of the pit and terminate with a return bend with a screened outlet.

8. Pump installation. The free space around the well casing shall be such that the upper casing terminal is readily accessible for installation, adjustment or removal of an expanding type or equivalent well seal and for the removal of the pump or piping. The pump powerhead shall be mounted on an elevated subbase of concrete or metal. When pumps are installed with a flanged connection with the casing, all openings in the pump base shall be sealed.

(b) Subsurface pumprooms adjoining basements shall conform to the following minimum specifications:

1. General.

a. The dimensions, construction material, watertight juncture, reinforcement, roof elevation, manhole opening, well casing termination and pump installation shall conform to provisions of sub. (5) (a) 1. through (a) 4. inclusive, sub. (5) (a) 6. and 8.

b. The floor elevation shall be at least 1 foot higher than the basement floor if the basement is constructed with masonry other than reinforced poured concrete.

2. Drainage:

a. The pumproom floor may drain to the basement floor if the basement in turn is adequately drained.

b. If the basement is not adequately drained, a partition wall at least 1 foot high shall be constructed in the entranceway from the basement and separate drainage facilities shall be provided conforming to the pit drainage requirements of sub. (5) (a) 5.

(7) PITLESS ADAPTER CONNECTIONS TO STEEL WELL CASINGS. (a) *Threaded joints.* When the threaded end of a well casing is not conve-

niently terminated for installation of a pitless adapter, threads shall be provided at the top of a cut-off well casing for attachment of the pitless adapter, including pitless receiver tanks, by one of the following methods:

1. Cutting threads with a die.

2. Fitting and welding a full-length standard recessed coupling to the top of the casing, after reaming out threads to a point at least ⅓ the length of the coupling, including the recess, for adapters with male threads.

3. Fitting and welding a full-length standard recessed coupling to the top of the casing, after reaming out threads to a point at least ⅓ the length of the coupling, including the recess, and installing a steel pipe nipple made from pipe conforming to NR 112.085 (1), and threaded on both ends, for pitless adapters with female threads.

(b) *Weld-on units.* An approved type pitless adapter weld-on unit may only be installed on wells where nonpressure conduit installations with offset pumps are permissible. These are installations for private residences, serving not more than 3 families. (**Note:** See sub. (2).)

(c) *Well and pipe connection restrictions.* 1. The threaded lower end of a full-length adapter shall not be welded to the cut-off end of a well casing.

2. The threaded ends of a short model, complete adapter shall not be welded to the top of a cut-off well casing nor to the section of riser pipe extending from the unit to a point above the ground grade.

3. Pitless adapters, including pitless receiver tanks, shall not be connected to the well casing by means of a compressible joint.

4. Pitless adapter pipe connectors for attachment of pump piping shall be welded to the full adapters in the factory at the time the adapter is assembled by the manufacturer having approval to fabricate the same in cases of those designs not involving a casting where the connector will be part of the casting. Such pipe connector units may be welded to the well casing pipe in the field only for those installations where weld-on adapter units are permissible. Pipe connectors shall not be attached to well casings with compression joints. (**Note:** See sub. (2).)

(d) *Welding procedure.* The joining of a coupling to the cut-off well casing or of a weld-on pitless adapter unit or pipe connector to a well casing shall be done in accordance with the standard welding procedure specifications of the department of industry, labor and human relations, Ind 53.53 (3), Wis. Adm. Code. (**Note:** For adaption of pitless adapters, including pitless receiver tanks, see Figures 8 and 9.)

(8) PITLESS ADAPTER CONNECTIONS TO THERMOPLASTIC WELL CASINGS. No welding of steel well casing or a pitless adapter is permitted after steel well casing is attached to thermoplastic well casing. If a weld-on pitless adapter is to be utilized in cases allowed by sub. (2), the adapter shall be welded to the steel portion of the casing pipe before the steel casing is threaded into a thermoplastic coupling. The PVC coupling

shall be threaded onto the steel casing or adapter before it is solvent cemented to the top of the PVC casing.

History: Cr. Register, June, 1975, No. 234, eff. 10-1-75; am. (1) (intro.), renum. (3) thru (6) to be (4) thru (7), cr. (3), Register, April, 1978, No. 268, eff. 5-1-78; **am. (1) (c) and (7) (a) 3., r. and recr. (2) (c) and cr. (8),** Register, October, 1982, No. 322, eff. 11-1-82.

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